

NEO-QUESTIONS 1 TO 1
Board Review Companion
Fifth Edition

BY

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AUTHORS



Dr. Shabih Manzar is a board certified Neonatologist with a spectrum of neonatology experience. His professional experiences encompass three continents. He has held positions as Consultant Neonatologist, Attending Neonatologist, Acting Head Division of Neonatology and Assistant Professor in Department of Pediatrics. He has worked in level III and level II NICU. In addition to the bedside neonatal care, part of neonatology experience also involved development of regional neonatal transport; formation of national neonatal networks; education of specialist registrars, residents, fellows, medical students, neonatal nurses and advanced neonatal nurse practitioners; participation in multi-disciplinary clinics with perinatal/obstetric colleagues, organization and participation in national and international neonatal meetings, as well as oversight over all pertinent audits.

He has received the best resident and valedictorian award during Pediatric residency and scored among top 90% on Neonatal Boards. He had numerous publications in peer-reviewed journals. He is a NRP instructor since 1995 and is passionate about conducting neonatal resuscitation courses and workshops globally.



Dr. Naveed Ur Rehman Durrani has completed his fellowship in Neonatal-Perinatal Medicine from McMaster University and is the subspecialist affiliate of Royal College of Physician and Surgeons Canada (RCPSC) in Neonatal-Perinatal Medicine. He completed his training in Pediatrics from The Aga Khan University Hospital Pakistan, and is the Fellow of The College of Physician and Surgeons (FCPS) Pakistan and also the Member of The Royal College of Physicians Ireland (MRCPI).

Throughout his career in Neonatology, he worked in various level III NICU in different countries. His passion is to teach new learners during their rotations in NICU. He has various poster presentation locally and internationally related to Neonatology. He represents different working groups and committees during hospital clinical governance's meetings. He is also a NRP instructor from Canadian Pediatric Society (CPS).

He completed various quality improvement projects and published his research articles in peer review journals. His interest focuses mainly on Golden hour management of preterm babies, early onset sepsis and various audits to improve the quality of services.

Preface to the Fifth Edition

It gives us a great pleasure to launch the fifth edition of our book. As mentioned in previous editions, the aim of this book is to help not only the Neonatal Fellows to prepare and practice for Neonatal Board examination but also to help Neonatologists to maintain their recertification through MOC (Maintenance of Certificate).

In the current edition, the format of the questions is the same i.e. Question followed by answer but the questions have been grouped according to the system. Firstly, we think that in this way new learners will have a better understanding of the subject and more willingness to learn and secondly, they will feel mental satisfaction to have completed one system before moving on to another. This book contains 360 broad-based questions selected from several neonatal study topics in conformation with board content as outlined on www.abp.org. A set of 45 calculation questions are presented in specific chapters at the end.

We wish the fifth edition would be helpful to the neonatal fellows in training and neonatologist in practice for the board exams and it would be an aide to pass the board.

This book is supplementary to study and not a reference source for management. Reading from Textbook and Medical journals is highly recommended.

Feedback to improve this book would be highly appreciated.

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Declaration:

Resemblance of any question, picture or image to any other source, book or journal is merely coincidental. This book is free and not intended towards any commercial benefits or monetary compensation.

Acknowledgements:

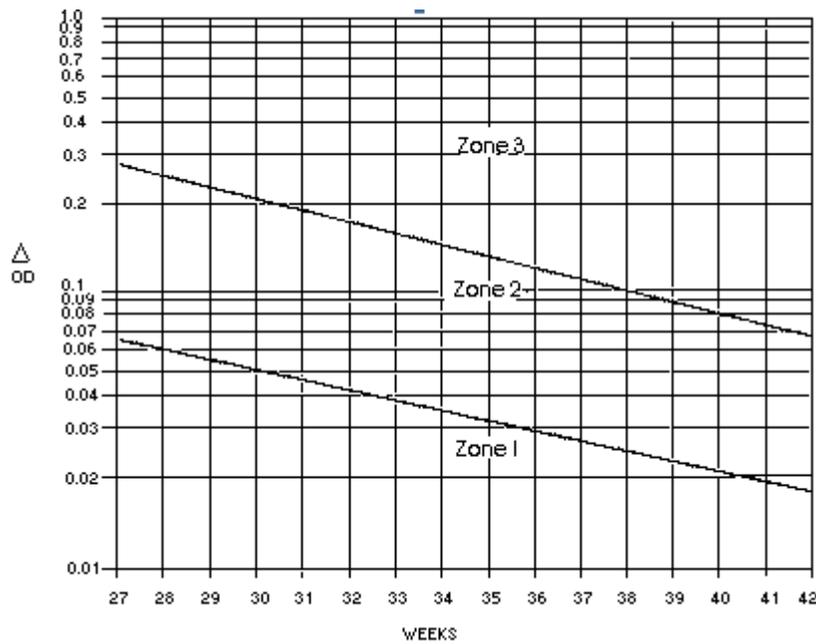
We would like to thank:

- Dr. Zia, Dr. Ram, Dr. Saeed and Dr. Haleem for their critical review, comments and discussion on these questions.
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- All our neonatology colleagues for their constructive feedback.

Dedication:

To our parents, teachers, families and children

Example of the question format and critique:



A 33 wks infant is being monitored for Rh Isoimmunization. The middle cerebral artery (MCA) Doppler study showed peak systolic velocity of 60 cm/sec, 1.3 multiple of mean (MoM) while delta optical density (ΔOD) of amniotic fluid is 0.13. Using the graph, the best intervention would be to

- A. Advise mother to repeat the amniocentesis & OD test in 1 week
- B. Repeat MCA Doppler in 2-3 days, if velocity increases perform exchange
- C. Infer from MCA that fetus is anemic and defer cordocentesis
- D. Perform intrauterine exchange transfusion
- E. Deliver the fetus

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the antenatal management of Rh Isoimmunization, role of Liley curve and interpretation of MCA measurements

Critique:

Observation with follow up in week is the preferred approach. For a 33 wks fetus the value of 0.13 is plotted on Zone 2 of Liley curve and should be repeated in a week. MCA Doppler for 33 wks fetus with PSV of 60cm/sec and MOM of 1.3 is normal. Exchange transfusion & delivery are not indicated for the reasons aforementioned.

Reference:

Gruslin AM, Moore TR. Erythroblastosis Fetalis, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (Eds). Mosby 2006: 389-407

Good luck!

CARDIOVASCULAR

Q 1:

An infant underwent TGA repair. After surgery, he continued to require high ventilatory support. CXR showed hazy hemithorax. A pleural tap was done that showed pH 7.52, WBC 900, Segs 10% Lymph 85%, protein 2 g%. After the tap baby improved and was extubated. Next morning you noted the surgical wound to have some erythema. You ordered a CBC that showed WBC 12,000, bands 2, segs 62 and no lymphocytes. The next step would be to

- A. Order CXR to look for thymus
- B. Order HIV on the baby
- C. Sent quantitative Immunoglobulin levels
- D. Send wound & blood culture
- E. No intervention & follow WBC

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complication of cardiac surgery and lab findings in chylothorax.

Critique:

Chylothorax fluid show high lymphocytes when resolved observation is suffice. Repeat CBC is normal less likely to be infection or immune deficiency state.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 78

Q 2:



This infant is receiving digoxin and lasix for CHF. His monitor showed the above strip with sats of 91%, pulse of 140, BP of 67/43. The next best action would be to

- A. Give adenosine
- B. Give lidocaine
- C. Give calcium
- D. Perform DC cardioversion
- E. Perform DC defibrillation

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of ECG.

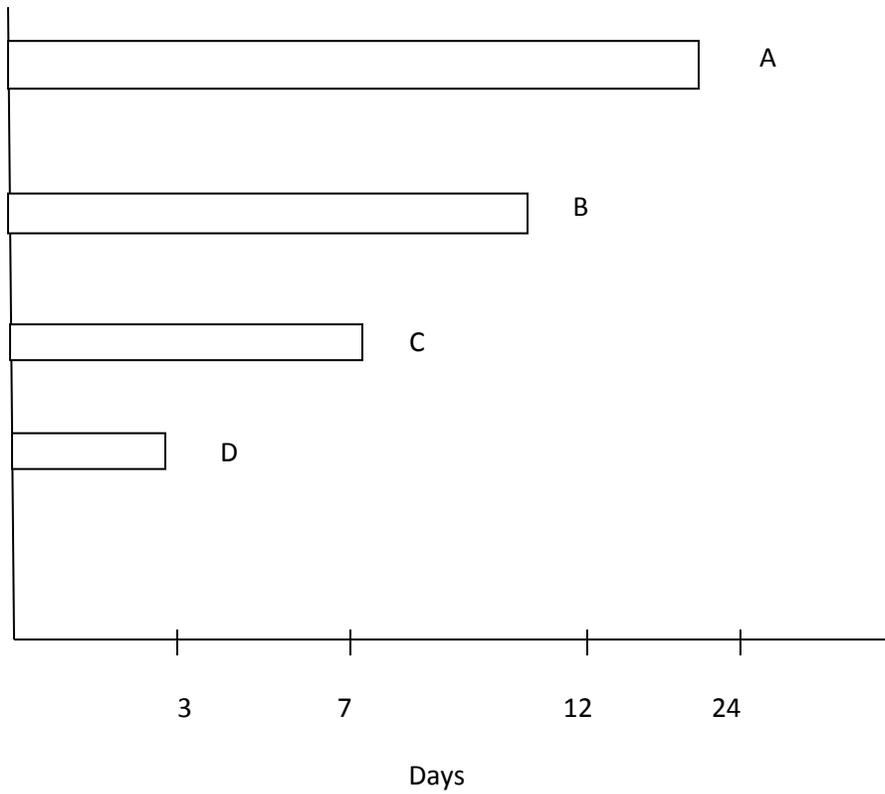
Critique:

The strip showed V-tach. V-tach with pulse is treated with lidocaine. Pulseless V-tach needs DC cardioversion.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 110-113

Q 3:



Match the time of presentation

- A. TGA
- B. HLHS
- C. Coarctation of Aorta
- D. VSD

Preferred response is D C B A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the timing of CHDs presentation.

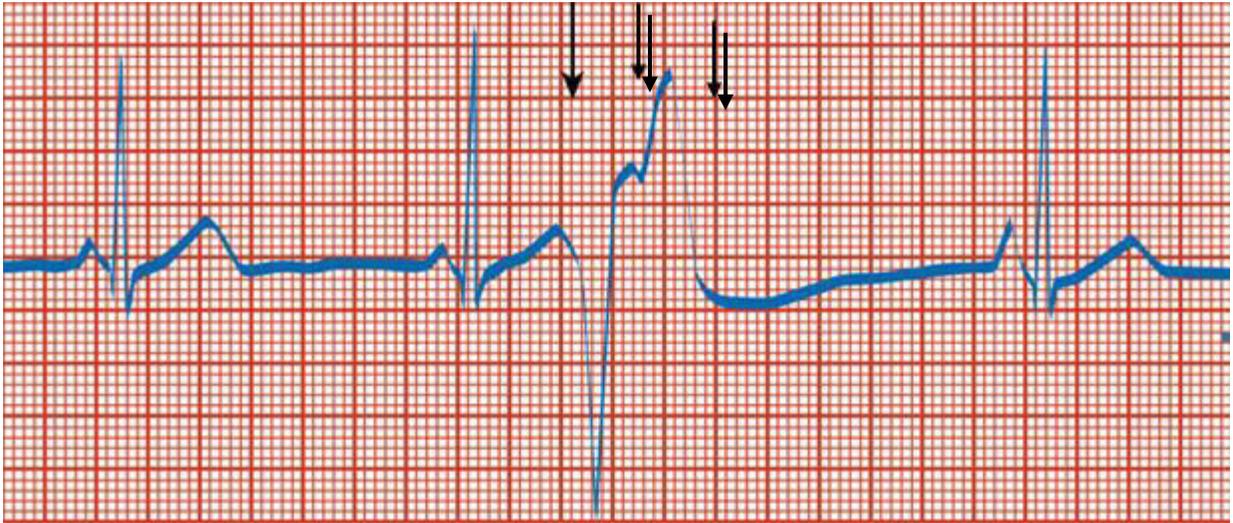
Critique:

Signs of TGA appear early (1-2days) followed by HLHS (3-7 days), then Coarctation of aorta (~ 14 days), then VSD (~ 4-6 weeks)

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 92-103

Q 4:



True statements about this rhythm are all EXCEPT

1. Acidosis or hypoxia could be the cause
2. Electrolytes should be checked
3. Echocardiograph should be done
4. Premature conduction is the cause
5. Lidocaine should be given IV

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the ECG representation of PVC and its management.

Critique:

Most PVCs are usually benign. Treatment is needed when they are multiform or exhibit 'R on T' phenomenon.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1265

Q 5:

A term 3.2 kg baby is noted to have tachypnea and poor perfusion. Septic workup was done and antibiotics were started. Baby's sats pre-and post were both 82%. O₂ was given via hood but condition worsen and baby was placed on ventilator (Vt 20 ml PEEP 6 IT 0.35 O₂ 70% rate 50). CXR showed ETT at T2 with slight increase PVMs. No infiltrate is seen. The blood gas showed pH 7.24/ pCO₂ 38/ pO₂ 46/ HCO₃ 18/-8. The sats are still running low, last reading is 78%. The most appropriate action at this time is to

- A. Give surfactant
- B. Give IVF bolus
- C. Increase Vt, decrease rate & increase FiO₂
- D. Decrease Vt, decrease rate & decrease FiO₂
- E. Decrease IT, decrease PEEP & increase FiO₂

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the effect of O₂ administration on HLHS.

Critique:

Hypoplastic left heart is unique in a sense that O₂ supplementation worsens the condition due to steal of blood from PDA to go the dilated pulmonary vasculature (in response to O₂ therapy). It is therefore important to decrease vent setting and O₂ in HLHS.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 103

Q 6:

The segment that may remain open beyond six months without clinical significance is

- A. PDA
- B. PFO
- C. Ductus venosus
- D. VSD
- E. Posterior fontanel

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the characteristics of PFO.

Critique:

PFO may remain open for months. Post Font should close by 3-4 months. VSD becomes symptomatic beyond 6 months. PDA and DV closed early in life.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1206

Q 7:

Which segment of the fetal circulation contains the highest O₂?

- A. Right atrium
- B. Right ventricle
- C. Left ventricle
- D. Descending Aorta
- E. Umbilical artery

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the characteristics of fetal circulation.

Critique:

Oxygenated blood > placenta > IVC > RA (SVC bring deoxygenated blood, so mixing) > RV > to PA > PDA > descending Aorta

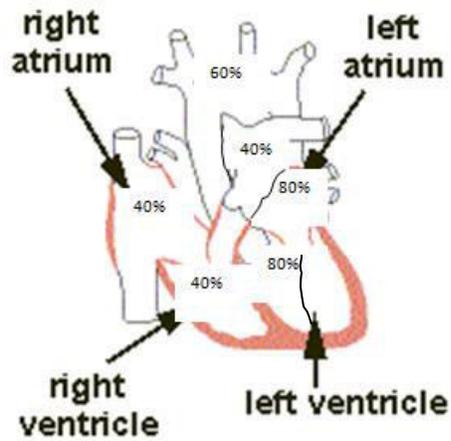
Oxygenated blood > placenta > IVC > via DV > LA (PFO) > LV > ascending Aorta

So, LV and ascending Aorta contains the highest PO₂.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1206

Q 8:



The diagram is labeled with oxygen saturations. Basing on the pulmonary blood flow to systemic blood flow ratio (Q_p/Q_s ratio), which of the following is true statement

- A. This happens in PPHN
- B. It is classic of PDA
- C. It is suggestive of ASD
- D. It is seen in VSD
- E. The cause is Coarctation of Aorta

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the calculation of Qp/Qs ratio and its interpretation

Critique:

$Qp/Qs \text{ ratio} = \frac{Ao \text{ sat} - SVC \text{ sat}}{RV \text{ sat} - PV \text{ sat}}$

From the data = $\frac{60-40}{80-40} = 0.5$ (< 1 R – L shunt, less pulm PF e.g PPHN, > 1 L – R shunt, more pulm flow, e.g. PDA). Sats differences are not that high in ASD, VSD and coarct.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 91

Q 9:

A 10-day old, 650 grams 25-week baby is treated with 3 courses of ibuprofen (10 mg/kg x 1 dose, then 5 mg/kg x 2 doses). Infant remains on ventilator. The vital signs are: Temp 97.8, HR 180/min, BP 42/12. The repeat Echo showed LA-Ao ratio of 1.6. The parents gave consent for PDA ligation. The true statement about this infant is

- A. Second course of ibuprofen with slightly higher dose should be tried before ligation
- B. The LA-Ao ratio is within normal limits for the gestational age
- C. Operation should be delayed till BP stabilizes
- D. Infant should be given hydrocortisone 0.6 mg/kg/dose x 3 doses peri-operatively
- E. Use of steroid is contraindicated in this patient

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know about management of PDA.

Critique:

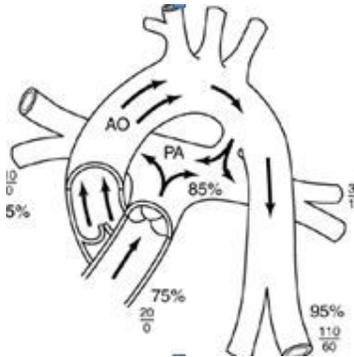
The LA-Ao ratio of > 1.5 is suggestive of open duct, so ligation should be done without much delay. HC 3 doses (stress dose) are needed as infant is premature on vent and have low BP.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 99-100

Iyer P, Evans N. Re-evaluation of the left atrial to aortic root ratio as a marker of patent ductus arteriosus. Archives of Disease in Childhood - Fetal and Neonatal Edition, Vol 70, F112-F117

Q 10:



The cardiac physiology shown in the picture will lead to which of the following

- A. Hypotension
- B. Cyanosis
- C. Right side cardiac failure
- D. Left side cardiac failure
- E. Arrhythmia

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know about PDA and its implication.

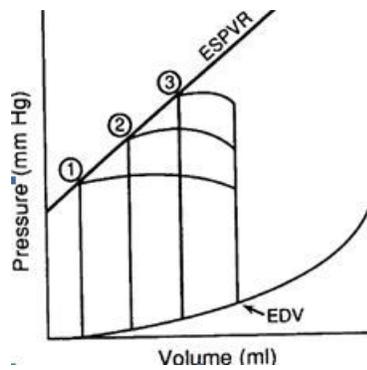
Critique:

The picture shows L-R shunt, cyanosis is less likely. PDA will give left sided heart failure.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 99-100

Q 11:



In the above pressure-volume loop, the patient might be moved from curve 3 to curve 1 by:

- A. Administering a diuretic
- B. Administering an inotropic agent
- C. Administering an anti-arrhythmic agent
- D. Administering a vasodilator
- E. Decreasing left ventricular contractility

Preferred response is D.

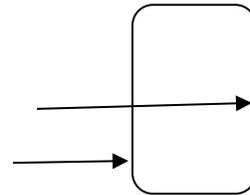
P C R (Pearl, Critique, Reference)

Pearl:

To know the pressure-volume curve (Frank- Starling principle)

Critique:

preload
after load



The loop- shift to right means increase after load and preload

Shift up means inotropy- increase contraction- down decrease contraction

Diuretic will decrease the preload- will move the loop to left

Vasodilator will decrease the after load- will move the curve to left

Curve 1- effect of vasodilator –decrease after load (move to left)

Reference:

<http://pharmacology2000.com/cardiac/cardiac1.htm>

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 89-90

Q 12:

A 45-day-old premature infant is noted to have BP of 112/78. She had history of UAC placement and PDA ligation. Currently she is on NC 30% O₂ with 2 lpm flow via blender. She receives albuterol and aerobid 2 puffs twice daily. She has received a 12-day course of dexamethasone after parental consent 2 weeks back. Her exam showed mild tachypnea, no other abnormalities were noted. The most likely cause for her hypertension is

- A. Reno-vascular disease
- B. Steroids use
- C. PDA ligation
- D. Chronic lung disease
- E. Incidental

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the differential diagnosis of hypertension

Critique:

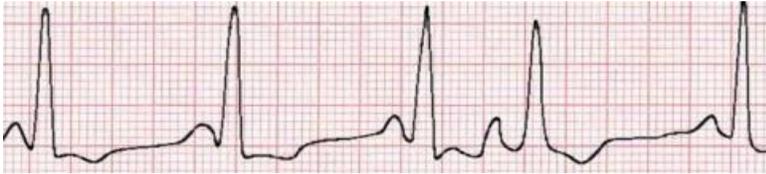
Single high BP reading should be confirmed by repeat measurements. As the infant is stable incidental elevation is most likely diagnosis.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1670-74

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 107

Q 13:



The true statement about the above ECG is

- A. The heart rate is 70/min
- B. The PR interval is > 200 ms
- C. P-wave is > 0.3 millivolt
- D. Beat no 3 is the early beat
- E. This is typical premature ventricular contraction (PVC)

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of ECG.

Critique:

HR – follow big boxes, 300-150-100-75 (see 4 such boxes b/w 2 QRS, correct answer). Big box is 0.2 sec or 200 ms (small box is 0.04 sec - 5 small box / 1 big box). One small box = 1 millivolt (so B & C are wrong). Beat 4 is early beat. This is typical premature atrial contraction (PAC) not PVC.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 109-114

Q 14:

A 3.5 kg newborn male is transferred from regional hospital with cyanosis. History reveals late deceleration which prompted Cesarean Section. Apgar was 3/5/7. On arrival to your hospital, you noted the baby to be dusky with sats of 85%. On examination, you noted poor air entry with grade 2/6 murmur at LLSB. You immediately intubated the baby and placed him on ventilator with 100% FiO₂ and MAP of 12. A UAC is place by the NNP and the gas showed pH 7.26/ PaO₂ 45/PCO₂ 51/ HCO₃ 19/ -6. An urgent echo was obtained which showed no structural heart defect. You expect the Qp/Qs ratio to be

- A. > 1
- B. < 1
- C. = 1
- D. same as OI
- E. same as AaOD₂

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the value of Qp/Qs ratio

Critique:

Qp/Qs ratio: Pulmonary blood flow/Systemic blood flow, as PBF is numerator, increase flow will give a ratio > 1 or vice versa. In PPHN PBF is lower than SysBF, so ratio would be < 1 .

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 91

Q 15

At discharge, the physical examination of a premature baby now 41 wks PMA revealed a soft grade 1/6 murmur. You ordered an Echocardiogram which showed no cardiac defects except for peripheral pulmonary stenosis. Mom is worried. What would be the most appropriate statement regarding this condition?

- A. With time the murmur will disappear
- B. SBE prophylaxis should be provided
- C. There is an increase risk of URI
- D. Some traveling restrictions will apply
- E. Bronchodilator provides symptomatic relief

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know about significance of PPS

Critique:

PPS is benign and usually resolve over time.

Reference:

<http://www.emedicine.com/MED/topic1965.htm>

Q 16:



Figure A



Figure B

A 32 wks preterm baby AGA (weight 2.1 kg, L 44 cm, HC 32 cm) is intubated and surfactant was given at 10 minutes of life. Umbilical lines were placed. UAC is sutured at 21 cm and UVC at 13 cm. X-ray showed both lines above the diaphragm. The nurse hooked up both catheters to transducer (Fig A & B). The best description of the findings would be

- A. The UAC is in Aorta, represented by Figure A
- B. The UVC is in IVC, represented by Figure B
- C. The UVC is in left atrium, represented by Figure B
- D. The UAC is in Pulmonary artery, represented by Figure A
- E. The UVC is in Aorta, represented by Figure A

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know about different pressures in heart chambers as reflected by UAC-UVC.

Critique:

Rule of thumb: ETT length ($1/5^{\text{th}}$ of infant length) UAC length ($1/3^{\text{rd}}$ of infant length), UVC ($1/2$ of UAC). Infant's length is 44 cm (ETT: $44/5 = 8.8$, UAC: $44/3 = 14$, UVC: $14/2 = 7$). So, lines look high (one can use nomogram using shoulder umbilical length).

Tracing with a notch represent arterial vessel. The systolic pressure is peak of the wave and diastolic the notch.

Statement A is wrong- pressure is low for aorta ($\sim 50/25$ mm Hg)

Statement B is wrong- pressure is high for IVC ($\sim 1- 3$ mm Hg)

Statement C is correct- UVC may go to left atrium via PFO (pressures mean 8 mmHg)

Statement D is wrong- (UAC cannot go into pulmonary A, too much negotiation)

Statement E is wrong- (Pressure of 25/5 does not suggest Aorta)

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 116

Gomella TL et al. Neonatology: management, procedures, on-call problems, diseases and drugs. Appleton & Lange 1999: pg 151-2

Q 17:



This 28 wks 1 kg preterm infant is 2 hr old and is breathing at rate of 65/min. He is placed on a nasal cannula @ 1 lpm, 23% O₂ with sats 91-94%. True statement about the findings displayed is

- A. The pO₂ in the blood gas obtained from the umbilical catheter would be higher than the blood gas PO₂ obtained from an arterial stick
- B. The pressure obtained by placing a transducer to the umbilical line would be greater than 6 cm of H₂O
- C. To prevent complications removing the line completely would be better than adjusting it
- D. Intubation and PPV is needed for better lung compliance
- E. Surfactant should be given as rescue therapy

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the course of umbilical catheter and PO₂ and pressures is different chambers of heart.

Critique:

B is the best choice as LA pressure is about 8 mm Hg. PO₂ would be same in both gases drawn from UVC or arterial stick because UVC is in left atrium. Adjustment of UVC is needed but not removal. Currently infant is stable of low support so D and E are not preferred choices.

Reference:

<http://www.ajronline.org/cgi/content/full/180/4/1147>

Important Calculations

Q 1:

The follow up clinic calls you for opinion for a 2-year-old female, a known case of Turner syndrome, who is noted to have hypertension. The systolic BP is 97 and diastolic is 65. You tell them to repeat three values with appropriate cuff size. The nurse calls with the readings

Reading 1: Sys 98, Dias 68

Reading 2: Sys 100, Dias 70

Reading 2: Sys 96, Dias 65

What would be the mean arterial pressure

- A. 54 mm Hg
- B. 66 mm Hg
- C. 78 mm Hg
- D. 81 mm Hg
- E. 85 mm Hg

The correct response is C.

Solution:

MAP = Systolic P + 2 diastolic P

3

Take mean of all 3 readings systolic = $98+100+96 = 294/3 = 98$

Take mean of all 3 readings diastolic = $68+70+65 = 203/3 = 67$

$98 \times 2 (67)/3 = 77.3$

RESPIRATION

Q 1:

Biphasic stridor occurs in all EXCEPT

- A. Vocal cord paralysis
- B. Subglottic stenosis
- C. Laryngomalacia
- D. Tracheomalacia
- E. Laryngeal web

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the mechanism and causes of stridor.

Critique:

Biphasic stridor occurs in A, B, C & E. In Tracheomalacia stridor is heard during expiration. Inspiratory stridor occurs in supraglottic obstruction (macroglossia, choanal atresia).

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 76

Q 2:

A 33 wks preterm infant, who is diagnosed to have TEF with esophageal atresia, is in respiratory distress. The blood gas obtained at 35% oxyhood is pH 7.26/ 55 CO₂/ 41 O₂/ 19 HCO₃⁻/-6 BD. The most appropriate action would be to:

- A. Place on 3lpm O₂ via NC, 40% O₂ via blender
- B. Start NCPAP with 5/5, 35% O₂
- C. Give surfactant
- D. Place on SIMV, PIP 24, PEEP 5
- E. Place on HFOV, MAP 10, delta P 20

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the respiratory needs of infants with TEF.

Critique:

HFOV is preferred in infant with TEF needing respiratory support

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1375

Q 3:

A 37 wks 4.5 Kg IDM, born after difficult labor, is noted to have respiratory distress. The CBC showed WBC of 24 with bands of 4%, Hb is 19 g/dl. Chest x-ray showed no fractures and clear lung fields. The most likely cause for the respiratory distress is

- A. Pneumonia
- B. Respiratory distress syndrome
- C. Hyper viscosity syndrome
- D. Klumpke's palsy
- E. Diaphragmatic paralysis

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the clinical presentation of phrenic nerve paralysis is associated with IDM.

Critique:

Diaphragmatic paralysis is more common with Erbs than Klumpke's. Given normal CBC and x-ray, pneumonia and RDS is less likely. Hb of 19 is high but not high enough to give respiratory symptoms.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 542-545

Q 4:

Premature infants are prone to apnea. The main reason is

- A. Preterm infants have more quiet sleep than REM sleep
- B. Hering-Breuer deflation reflex is more prominent during REM sleep
- C. Preterm infants have blunted response to CO₂
- D. Supplemental oxygen may be helpful in decreasing apneic episodes
- E. GER is the most common cause of apnea in preterm infants

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the mechanism and causes of apnea of prematurity.

Critique:

The CO₂ and MV curve is shifted to left and more steeper, which means blunting of CO₂ response resulting in apnea. REM is 80-90% in preterm infants. Head reflex occur in REM not HB reflex. Giving O₂ decreases the response to CO₂. GER is not the most common cause.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 1135-1140

Q 5:

CPAP decreases the respiratory rate by

- A. Increasing FRC
- B. Increasing V/Q ratio
- C. Stimulation of Hering-Breuer inflation reflex
- D. Inhibition of Hering-Breuer deflation reflex
- E. Stimulation of Head reflex

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the function of HB deflation and inflation reflex.

Critique:

By stretching the lungs, CPAP activates HB reflex thus lowering the RR.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 51

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1136-37

Q 6:

Fig A

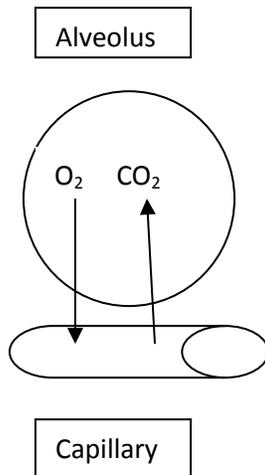
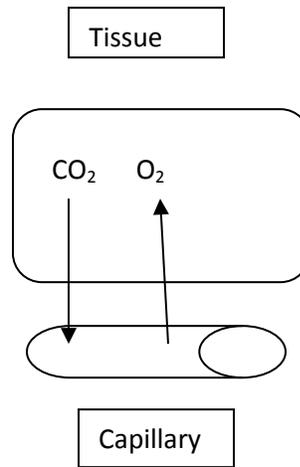


Fig B



True statement about the illustration is

- A. Fig A depicts Haldane effect of CO_2 transport
- B. Fig A depicts Bohr effect of CO_2 transport
- C. Fig A & B depict Haldane effect of CO_2 transport
- D. Fig A & B depict Bohr effect of CO_2 transport
- E. All are true statement

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the Bohr and Haldane effect of O₂ and CO₂ transport.

Critique:

Haldane effect: O₂ binding at cap results in CO₂ unloading, O₂ delivery at tissue increases CO₂ binding.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 64

Q 7:

A term infant presents with cyanosis, Hb = 15 g/dl

Saturations (obtained by Pulse oximetry transducer attached to right arm) = 94%

Saturations (obtained by arterial blood gas measurement) = 82%

PaO₂ = 65 mm Hg, room air

The most like reason for discrepancy between the saturations is

- A. Carbon monoxide poisoning
- B. Methemoglobinemia
- C. Use of adult nomogram in blood gas analyzer
- D. Insufficient reduced hemoglobin
- E. Increase Alveolar-arterial gradient

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the effect of CO poisoning on Hb saturation.

Critique:

COHb, clinical cyanosis, PaO₂ normal, normal sats on pulse ox HbCO absorbs light similar to HbO₂, sats normal on blood gas

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 65-66

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1308-1309

Q 8:

You note a difference is sats reported on blood gas and pulse oximeter, Hb =15 g/dl

Saturations (obtained by Pulse oximetry transducer attached to right arm) = 95%

Saturations (obtained by arterial blood gas measurement) = 86%

PaO₂ = 65 mm Hg, room air

The most like reason for discrepancy between the saturations is

- A. Carbon monoxide poisoning
- B. Methemoglobinemia
- C. Use of adult nomogram in blood gas
- D. Insufficient reduced hemoglobin
- E. Increase Alveolar-arterial gradient

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the effect of adult Hb on O₂ saturation.

Critique:

Blood gas analyzer use adult Hb as standard thus calculated sats are lower

Reference:

Goldsmith JP, Karotkin EH. Assisted ventilation of the neonate. 2003 Saunders, Pg 287

Q 9:

A term infant presents with cyanosis, Hb =15 g/dl

Saturations (obtained by Pulse oximetry transducer attached to right arm) = 85%

Saturations (obtained by arterial blood gas measurement) = 85%

PaO₂ = 40 mm Hg, 50% FiO₂

The most like reason for cyanosis is

- A. Carbon monoxide poisoning
- B. Methemoglobinemia
- C. Use of adult nomogram in co-oximetry
- D. Insufficient reduced hemoglobin
- E. Increase Alveolar-arterial gradient

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the effect of PPHN on O2 sats.

Critique:

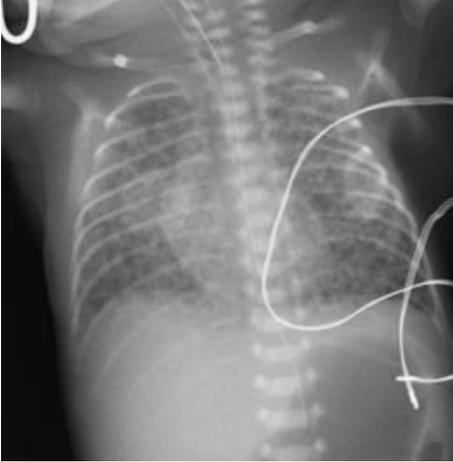
PPHN with ductal shunting gives differential cyanosis. Low PaO₂, low sats.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 75

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1245-48

Q 10:



This 14-day-old infant is on ventilator since birth. The last blood gas showed pH of 7.27, O_2 68 on 50% O_2 , PCO_2 of 68. True statement about the management plan of this infant is

- A. Using a high frequency ventilator
- B. Using ventilator with low rates
- C. Using ventilator with IT of 0.25
- D. Using ventilator with PEEP of 3
- E. Using iNO therapy with hypobaric oxygen

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the indication for using HFOV.

Critique:

With PIE and high CO₂, HFOV should be used. All other choices are not practical.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 68-69

Q11:

PO₂ would be highest in

- A. Fetal umbilical vein
- B. Fetal ductus venosus
- C. Maternal uterine vein
- D. Neonatal pulmonary artery
- E. Neonatal umbilical artery

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the pO₂ in different vessels

Critique:

Fetal UV 27, Fetal ductus 27, Maternal UV 40, Neo PA 50, Neo UA 70

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 88

Q 12:

True statement about RSV prophylaxis with Synagis include is

- A. Infant > 36 wks gestation and stable on RA should get 2 doses
- B. Infant between 32-35 wks > 6 month of age with no additional risk factor need 3 doses
- C. Infant between 29-32 wks does not need Synagis
- D. Infant < 28 wks > 6 month of age does not need Synagis
- E. Infant with CLD will need Synagis up to 1 years of age

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know about the indication of RSV prophylaxis.

Critique:

See AAP guidelines

Reference:

<http://pediatrics.aappublications.org/content/134/2/415>

Q 13:

A term African-American infant is treated for PPHN with iNO, 15 ppm. His sats are 88-92% on the right arm. His Hb is 14 and he is G6PD deficient. His MetHb level done to monitor iNO therapy is 9%. His ABG showed a PaO₂ of 190 on 50% O₂. The best way to manage his desaturation is to

- A. Give methylene blue
- B. Decrease iNO
- C. Decrease O₂
- D. Obtain Echo
- E. Transfuse PRBC

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complications of iNO, MetHb

Critique:

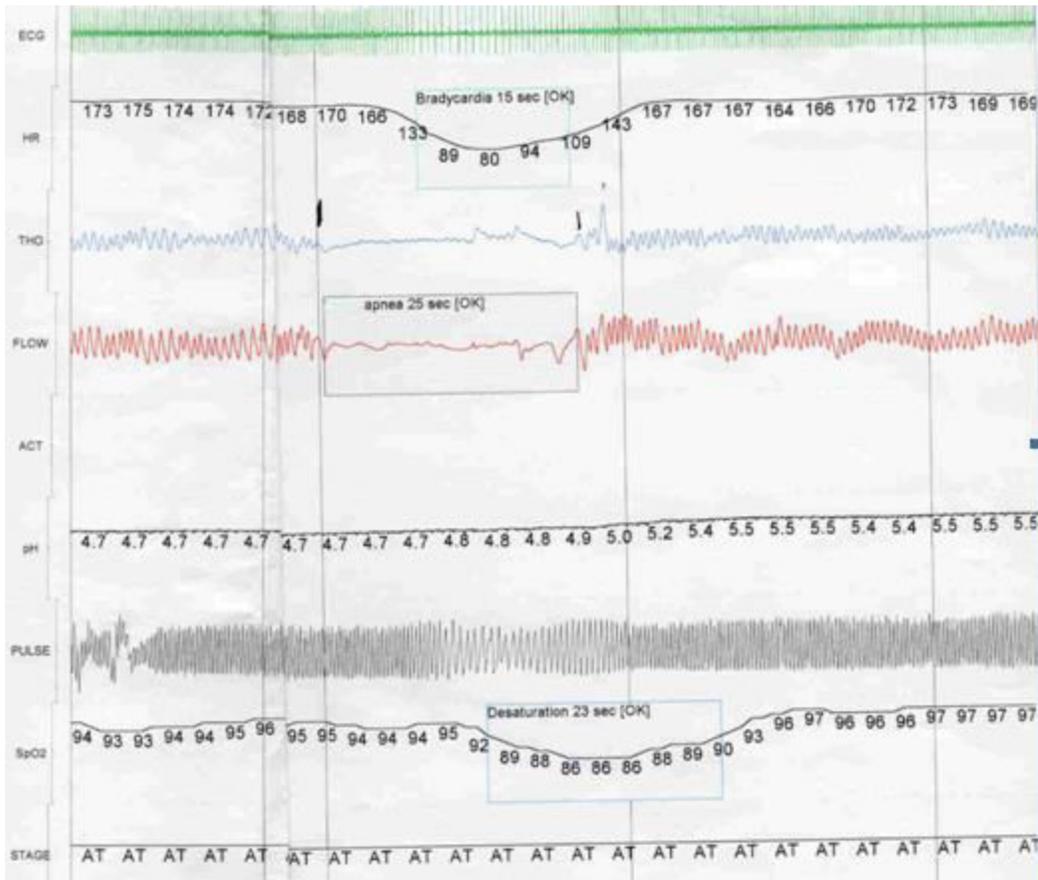
9% is high (~ 3% is normal). iNO should be reduced. Methylene blue would not work with G6PD deficiency state. D & E would not help here.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 65-66

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1308-1309

Q 14:



The true statement about the pneumogram shown above is

- A. Periodic breathing preceded the onset of apnea
- B. Desaturation and bradycardia has occurred simultaneously
- C. Nursing the infant at 45degree bed angle would eliminate the symptoms
- D. Using caffeine at 5-8 mg/kg will abate the symptoms
- E. Using nasal CPAP of 3-5 cm of H₂O will abolishes the symptoms

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of pneumogram and differentiate between central and obstructive apnea.

Critique:

Central apnea (both lines flat, THO & FLOW) associated with desats and bradycardia is noted with pH remained normal. CPAP is used when apnea is obstructive (flat FLOW, wavy THO)

Reference:

Polin RA, Spitzer AR. Fetal and neonatal secrets. Mosby 2007: pg 438-40

Q 15:



This premature baby is 4 hrs old. The true statement about his Pulmonary Function Test are all EXCEPT

- A. The compliance would be low
- B. The resistance would be high
- C. The time constant is decreased
- D. The FRC is low
- E. The WOB is high

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the pulmonary functions changes in RDS.

Critique:

This PT infant has RDS. RDS works opposite to CLD. All PFT are low (FRC, compl, TC). Resistance is not affected.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 61

Q 16:

Oxygen delivery is affected by many factors such as minute ventilation, size of tube, weight of the infant. Provided if these factors remain constant, the effective FiO_2 delivered to an infant who is on 1 L per min flow and 60% FiO_2 is close to

- A. 24%
- B. 28%
- C. 32%
- D. 38%
- E. 42%

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the effect flow on NC oxygen delivery.

Critique:

For 1 lpm 100% gives 66% FiO₂, 80% gives 49% and 60% delivers 38%. See Table 6-3 of reference.

Reference:

Gomella TL et al. Neonatology: management, procedures, on-call problems, diseases and drugs. Appleton & Lange 1999: pg 50

Q 17:

On day 3 of life a preterm 1.460 kg baby is extubated to BCPAP with 21% O₂. He is receiving TPN with D10% AA 2% @ 7ml/hr, IL 20% @ 0.3 ml/hr. His weight today is down by 10 gm. You increase caloric intake by increasing Dextrose to 12%, protein to 3% and IL to 0.6 ml/hr. The next day his O₂ requirement has gone up to 25%. Chest exam and CXR is normal. Morning labs: Na 134, K 4.2, HCO₃ 21. The most likely cause of his increase FiO₂ requirement is

- A. Increased O₂ consumption
- B. Increase fluid overload
- C. Increase renal solute load
- D. Clinically silent PDA
- E. Congestive cardiac failure

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the concept of respiratory quotient and O₂ consumption.

Critique:

There are no signs of fluid overload or PDA. CXR is normal. The increase O₂ requirement is due to increase O₂ consumption due to increase calories.

Reference

<http://members.aol.com/Bio50/LecNotes/lecnot18a.html>

Q 18:

A 32-year-old G 5 P4004 lady delivers a male infant at term. ROM was at delivery and GBS was negative. The newborn developed respiratory distress soon after birth. He was given surfactant and ventilated with high pressures without improvement in saturation. Echo showed no heart defects. iNO 20 ppm tried without success. The infant died at 6 hr of age. Parents denied any family history of such neonatal death and consented for autopsy to find the possible cause. The most likely finding on autopsy would be

- A. Lung histology showing alveolar proteinosis
- B. Lung histology showing maldeveloped lung tissue
- C. Lung histology showing heavy neutrophil infiltration
- D. Pulmonary artery showing increase muscular layer
- E. Pulmonary veins draining into the right atrium

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the clinical and pathological presentation of surfactant protein B deficiency.

Critique:

Early death suggests SP-B deficiency. Alveolar dysplasia is likely as well but infants do survive for little long time. PPHN & TAPVR are less likely as echo is normal. GBS was negative, neutrophilia is less likely.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 1133

Q 19:

A 12-day old, 815 g, 27 wks infant is stable on CPAP with flow of 6, PEEP of 6 and FiO₂ of 21%. His morning blood gas is 7.31/ 54 CO₂/ O₂ 45/ HCO₃ 21. He is on 8 ml q 3hr feeds with TPN @ 3 ml/hr. The nurse calls you to assess the abdomen which looks distended. On exam, the abdomen is soft and diaper is wet and yellowish smear of stool is noted. The best next intervention would be to

- A. Give glycerin suppository
- B. Check gastric residuals
- C. Decrease feeding volume
- D. Decrease CPAP parameter
- E. Gastric decompression

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complications associated with CPAP.

Critique:

CPAP belly is known complication of CPAP. Decreasing the flow & pressure will help in reducing the symptoms.

Reference:

Goldsmith JP, Karotkin EH. Assisted ventilation of the neonate. Saunders, 2003:pg142-143

Q 20:



This baby is on HFOV with saturation of 86% on 100% O₂. She has gained 200 gm in 2 days. Serum albumin is 1g/dl and Hb is 14 g/dl. She is acidotic (arterial gas: pH 7.15/ 68 CO₂/ 56 O₂/16 HCO₃⁻/ -9 BD/ 86% sat; venous gas: pH 7.11/ 71 CO₂/ 42 O₂/16 HCO₃⁻/ -9 BD/ 76% sat). The cardiac output is 170 ml/kg/min. The true statements about this infant are all EXCEPT

- A. Albumin infusion of 1g/kg might be helpful
- B. Use of inotropic agents should be considered
- C. A pleural tap should be attempted
- D. The oxygen delivery is about 27 ml/kg/min
- E. The oxygen consumption is about 3 ml/kg/min

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know to calculate Oxygen content, delivery and consumption.

Critique:

Albumin and inotrope should be given (low albumin and CO). There is no sign of pleural effusion. D & E are correct.

Oxygen content (CaO_2) = $1.34 \times Hb \times \text{sats in decimals} + \text{dissolved } O_2$

$$1.34 \times 14 \times 0.86 + 0.003 \times paO_2$$

$$16.1 + 0.003 \times 56 = 16.2 \text{ m per 100 ml}$$

Oxygen delivery (DO_2) = $CO \times CaO_2 = 170 \times 16.2$

$$= 1.7 \times 16.2 = 27 \text{ ml/min (100 ml = 1 dL)}$$

Oxygen consumption (VO_2) = $CO \times 1.34 \times Hb \times (\text{art sat} - \text{ven sat})$

$$= 170 \times 1.34 \times 14 \times (0.86 - 0.76)$$

$$= 1.7 \times 1.34 \times 14 \times (0.86 - 0.76) = 3.1 \text{ ml/min (100 ml = 1 dL)}$$

Reference:

Goldsmith JP, Karotkin EH. Assisted ventilation of the neonate. Saunders, 2003; Pg 288

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 62-63

Q 21:

A 6-day-old preterm female infant present with respiratory failure requiring 100% oxygen on assisted ventilation. Pink frothing secretions are noted in the ETT. The infant was delivered by the vaginal route in vertex presentation. Apgar scores were 7 at 1 minute and 8 at 5 minutes. He continued to demonstrate increased work of breathing and was intubated in the delivery room. Thirty minutes after birth, the patient had worsening tachypnea and subcostal retractions; chest radiograph at this time demonstrated diffuse bilateral reticular granular densities and micro-atelectasis. One dose of surfactant was given via ETT.

Arterial blood gas (ABG) revealed:

**pH: 7.33
PCO₂: 49 mm Hg
PaO₂: 31 mm Hg
HCO₃: 25 mmol/L
Base deficit: — 1 mEq/L**

Today notable findings on the physical examination included a loud systolic murmur at the second intercostal space and bounding palmar and popliteal pulses. Echocardiography revealed a large patent ductus arteriosus (PDA). Within 3 hours of obtaining the echocardiogram, he developed acute respiratory decompensation and bleeding from ETT. ABG on FiO₂ of 1.00 revealed:

**pH: 7.18
PCO₂: 72 mm Hg
PaO₂: 37 mm Hg
HCO₃: 22 mmol/L
Base excess: — 6.5 mEq/L**

You increase the PEEP and order blood. The other most appropriate action at this time would be to

- A. Start indomethacin IV**
- B. Send PT & PTT**
- C. Consider surfactant therapy**
- D. Change the ETT**
- E. Give Vitamin K IM**

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the management of pulmonary hemorrhage.

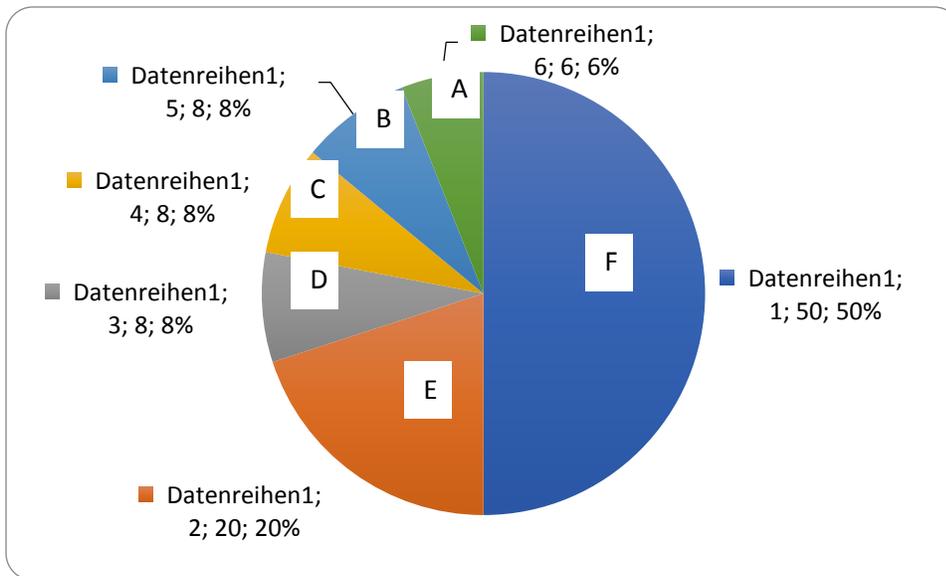
Critique:

Surfactant therapy is associated with pulmonary hemorrhage but interestingly it is also used after hemorrhage has occurred due inactivation of surfactant by blood. Medication will take time to act in PDA. PT & PTT is needed only if cause is not known (here we know its PDA with L-R shunt causing increase pulm BF). Vit K also for the same reason is not indicated. Changing ETT is an option only if it is obstructed with blood.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1127

Q 22:



Surfactant is composed of phospholipids, protein and cholesterol. In the above pie diagram letter F corresponds to

- A. Saturated phosphatidylcholine
- B. Unsaturated phosphatidylcholine
- C. Protein
- D. Neutral lipids
- E. Phosphatidylglycerol

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the composition of surfactant.

Critique:

Saturated PDC are in highest quantity and represented by letter F.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1076

Q 23:

A 16-day-old infant had PDA repair. Since she was brought back from OR her sats are 86-88%. CXR showed no new changes. Echo showed closed duct with calculated cardiac output of 200 ml/min. The post op Hb is 11 g/dl. Blood gas: pH 7.24/ pCO₂ 38/ pO₂ 46/ HCO₃ 18/-8 (40% O₂). The cap refill is 3 sec. The intervention by which O₂ delivery to this infant increases the most is

- A. Blood transfusion to raise Hb to 14
- B. Dopamine drip to raise CO to 300 ml/min
- C. Fluid bolus to change cap refill to < 2 sec
- D. Increase O₂ to raise sats to 100%
- E. Increase O₂ to raise paO₂ to 120

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know to calculate Oxygen content and delivery.

Critique:

$CaO_2 = 1.34 \times Hb \times sat + 0.003 \times PO_2$ (oxygen content)

$DO_2 = CO \times CaO_2$ (oxygen delivery)

$CaO_2 = 13$ (Hb 11, sat 0.88)

$CaO_2 = 16$ (Hb 14, sat 0.88)

Delivery of O_2 with Hb 11g/100ml & CO of 200 = 13×0.2 (dL) $\times 10 = 26$

Delivery of O_2 with Hb 14g/100ml & CO of 200 = 16×0.2 (dL) $\times 10 = 32$

Delivery of O_2 with Hb 11g/100ml & CO of 300 = 13×0.3 (dL) $\times 10 = 39$

Reference:

Goldsmith JP, Karotkin EH. Assisted ventilation of the neonate. Saunders, 2003; Pg 288

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 62-63

Q 24:



This infant is on HFOV: 100% O₂, MAP 28, amp 48, Hz 12. The infant is being treated with surfactant and antibiotics. iNO is increased to 20 pm. ABGs taken 20 minutes apart are

7.28/48/45/20/-6 (pH/CO₂/O₂/HCO₃/BD)

7.30/46/47/21/-5

7.32/44/ 51/22/-3

The next best intervention is to

- A. Increase iNO
- B. Give surfactant
- C. Increase HFOV support
- D. Start Milrinone drip
- E. Transfer for ECMO

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the criteria for ECMO, calculate OI and AaDO₂.

Critique:

Persistent hypoxia with high OI and AaDO₂ indicated ECMO referral.

Using third blood gas:

OI: $MAP \times FiO_2 \times 100 / PaO_2 = 28 \times 1 \times 100 / 40 = 70 (> 40 \text{ ECMO})$

AaDO₂ = $760 - 47 \times FiO_2 - PaCO_2 / 0.8 - PaO_2 = 713 \times 1 - 44 / 0.8 - 51 = 607 (> 600 \text{ ECMO})$

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1174-75

Q 25:

True statement about Hb-O₂ binding in neonates is

- A. It is energy independent
- B. Acidosis increases binding
- C. Chronic blood transfusions increase binding
- D. High altitude increases binding
- E. Hypothermia decreases binding

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the characteristics of Hb-O₂ binding.

Critique:

O₂ binding to Hb is energy independent- RBC does not have mitochondria. All other statements are wrong. Hb-O₂ dissociation curve; shift to left (increase binding)- Tip: Left L, low DPG (high altitude decreases DPG), Low Temp, Low H-low CO₂, Fetal Hb.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1089

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 62

Q 26:

A preterm infant treated with surfactant is now weaning on ventilator. His blood gas is 7.37/ 48 CO₂/ 51 O₂/ 21 HCO₃/ -1 BE. You decrease the PIP and PEEP. The tidal volume is displayed is 8 now.

Settings before the change: PIP 20 PEEP 5, Vt 6

Settings after the change: PIP 18 PEEP 4, Vt 8

True statement about these settings is

- A. The increase in tidal volume is fictitious
- B. The time constant remains constant with the change
- C. The work of breathing will increase
- D. The compliance is unchanged
- E. The compliance has increased

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the effect of ventilator changes on pulmonary dynamics- concept of dual wean.

Critique:

Compliance before change: $V/P = 6/15 = 0.40$ ml/cmH₂O (Vt= 6, PIP-PEEP = 20-5 = 15)

Compliance after change: $V/P = 8/14 = 0.57$ ml/cmH₂O (Vt= 8, PIP-PEEP = 18-4 = 14)

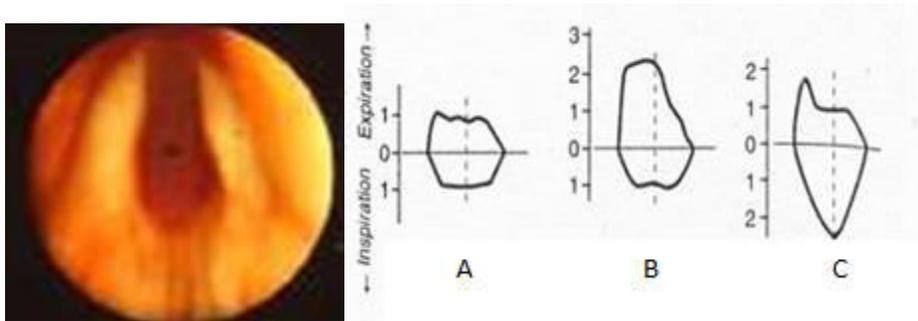
When compliance increases time constant increases- more time to empty. WOB will be reduced.

Reference:

Goldsmith JP, Karotkin EH. Assisted ventilation of the neonate. Saunders, 2003; Pg 301-308

Q 27:

A preterm infant is noted to have stridor soon after extubation. The direct laryngoscopic finding shown below will correspond to which of the following F-V loop?



Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the appearance of different flow-volume loops.

Critique:

A – subglottic stenosis (or narrow ETT)

B – Intra-thoracic (vascular ring)- inspiration loop is affected

C –Extra-thoracic (Laryngomalacia)- expiration loop is affected

Reference:

Goldsmith JP, Karotkin EH. Assisted ventilation of the neonate. Saunders, 2003; Pg 297

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1095

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 60

Q 28:

You are teaching residents about the pulmonary mechanics. You note the following ventilator parameters: Compliance 0.005 L/cmH₂O, Resistance 30 cmH₂O/L/sec. The 95% of the lung would be emptied by

- A. 0.15 sec
- B. 0.20 sec
- C. 0.25 sec
- D. 0.30 sec
- E. 0.45 sec

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the calculate time constant

Critique:

Time constant = compliance x resistance

From data = $0.005 \times 30 = 0.15$ s is one-time constant (63% of lung will be emptied)

It takes 3 time constant to empty 95% so $0.15 \times 3 = 0.45$

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 60

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1108

Q 29:

A preterm infant is being treated for his respiratory distress. He is on 30 % FiO₂, pressure cycle ventilator with PIP of 22, PEEP of 7, rate of 40 and IT of 0.35. His blood gas showed pH of 7.34, PaCO₂ of 53, PaO₂ of 88. The next best step is to

- A. Decrease rate to 35
- B. Decreased FiO₂ to 25%
- C. Decrease PEEP to 5
- D. Decrease PIP to 21
- E. Decrease both PIP and PEEP by 1

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the concept of dual wean

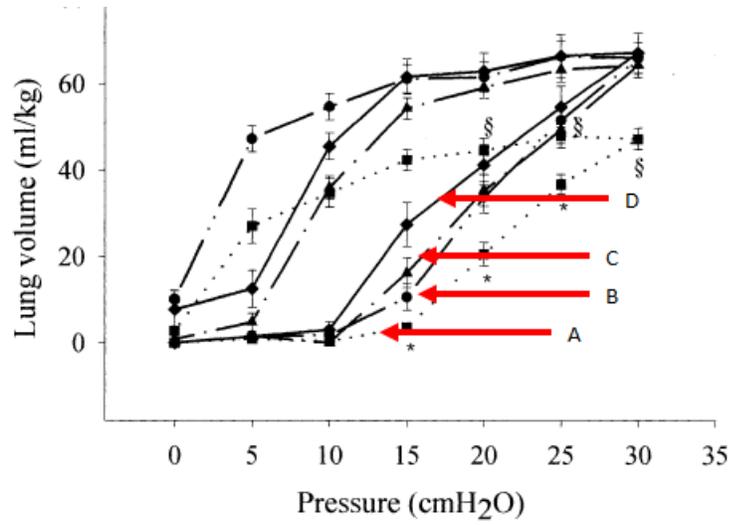
Critique:

When both PIP and PEEP is dropped simultaneously compliance increases.

Reference:

Goldsmith JP, Karotkin EH. Assisted ventilation of the neonate. Saunders, 2003; Pg 310-308

Q 30:



The total work of breathing would be highest for

- A. P-V loop A
- B. P-V loop B
- C. P-V loop C
- D. P-V loop D

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know about the PV loop and WOB.

Critique:

The flatter the PV loop (shift to right), the more work is done.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 58-59

Q 31:

A 630-gram baby is on HFOV with FiO_2 of 45%. The ventilatory settings are MAP 12, amplitude 24, Hz 10. The arterial blood gas is 7.29/ 32 (CO_2)/ 64 (O_2)/ 18/-7. The best weaning strategy is to

- A. Decrease amplitude to 18
- B. Increase frequency to 12
- C. Decrease frequency to 8
- D. Decrease MAP to 10
- E. Decrease FiO_2 to 30%

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know about HFOV weaning

Critique:

For high $p\text{CO}_2$ amplitude is increased and frequency is decreased. For low PCO_2 amplitude could be decreased usually in increment of 2 (24 to 18 is a big change). Here option B, increase frequency by 2 is the right choice. For low $p\text{O}_2$ MAP or FiO_2 is increased.

Reference:

Goldsmith JP, Karotkin EH. Assisted ventilation of the neonate. Saunders, 2003; Pg 190-198

Q 32:

A 5-month-old ex preemie 24 wks is presented to your clinic in December for vaccination. In addition to the routine vaccination you decided to give RSV vaccine. The baby is on caffeine once daily dose, lasix BID, albuterol BID, 0.4 lpm 100% O₂ to keep sats range from 88-92%. The most appropriate intervention at this visit is to

- A. Stop caffeine
- B. Wean Lasix to once daily dose
- C. Wean albuterol to once daily dose
- D. Wean O₂ to 0.2 lpm
- E. Give Flu vaccine

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know about follow up plan of a premature infant

Critique:

The infant is 44 wks PMA (24 + 20 wks) so caffeine could be stopped. All other options are wrong- Flu vaccine is indicated after 6 month of age. Sats ranges are still low to wean on O₂, lasix or albuterol.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 52 & 82

Q 33:

A 25-week premature infant is intubated with size 2.5 ETT and was placed on ventilator. The Respiratory Therapist has done some change on the ventilator which resulted in increased respiratory distress as evident by increased work and use of accessory muscles. The ventilator change that might have caused this was:

- A. Decreasing rate from 55-45
- B. Increasing PEEP from 5-7
- C. Decreasing PIP from 21 to 19
- D. Increasing IT from 0.30 to 0.35
- E. Increasing flow from 3 L to 6 L

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know about effect of flow on small ETT

Critique:

The change in flow from 3 to 6 would have an exponential change in turbulence of air going through a small 2.5 ETT.

Reference

Goldsmith JP, Karotkin EH. Assisted ventilation of the neonate. Saunders, 2003; Pg 22-23

Q 34:

A 600-gm baby is being treated with surfactant twice. His tidal volume, as indicated on the ventilator, has changed from 6 to 8. The pressure has changed from 20/5 now its 18/5. His airway resistance remains at 100. The true statement about his pulmonary mechanics would be

- A. His time constant will increase
- B. His compliance has decreased
- C. His alveolar pressure has increased
- D. His risk for pneumothorax has increased

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know about effect of compliance on time constant and calculations.

Critique:

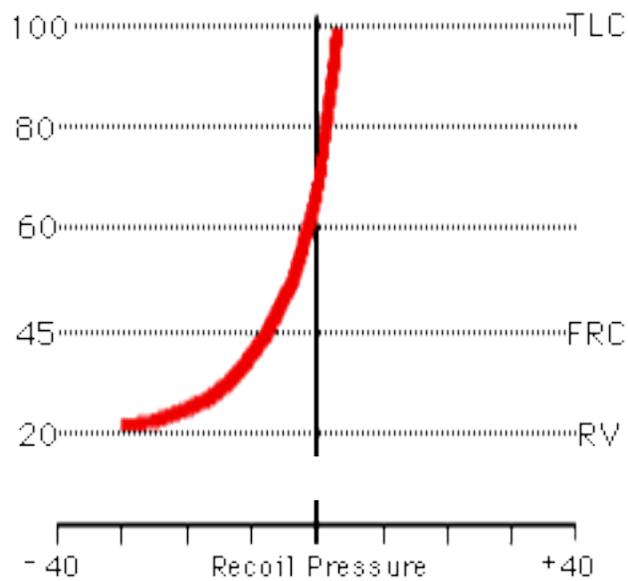
Compliance = change in volume / change in pressure and Time constant = compliance x resistance. The compliance has increased therefore time constant will increase i.e. more time would be needed to fill a more compliant lung. Use of surfactant with decrease surface tension thereby decreasing the alveolar pressure ($P = 2T/r$). Weaning on pressures decreases the risk of pneumothorax.

Reference

Goldsmith JP, Karotkin EH. Assisted ventilation of the neonate. Saunders, 2003; Pg 21-22

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 57-60

Q 35:



Compliance curve of relaxed chest wall

In preterm infant, the curved line represents

- A. Chest wall compliance
- B. Lung compliance
- C. Lung + Chest wall compliance
- D. Lung – Chest wall compliance

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know about compliance curves.

Critique:

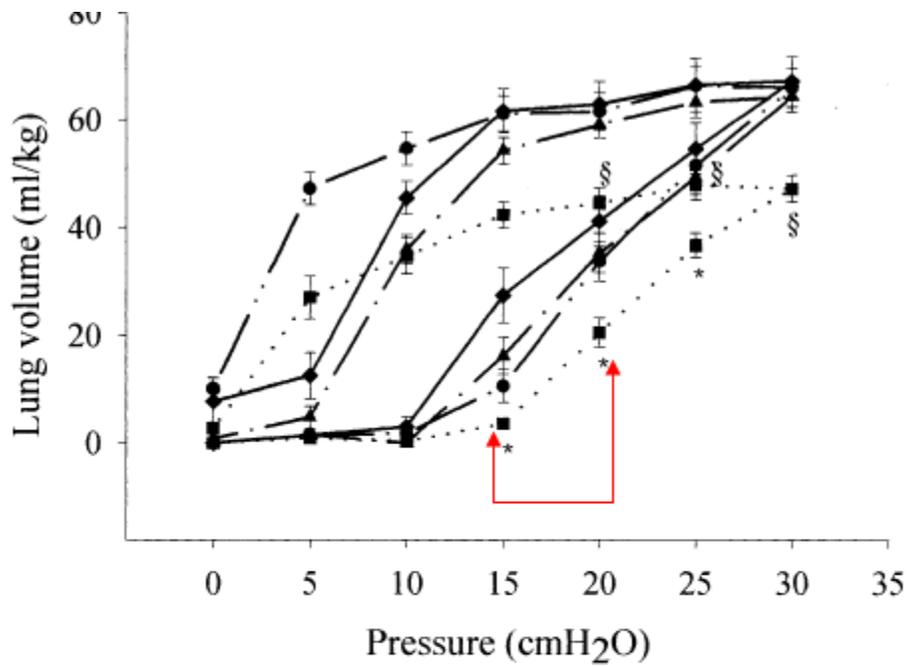
Neonatal chest wall is very compliant so the curve is very steep.

Reference

Goldsmith JP, Karotkin EH. Assisted ventilation of the neonate. Saunders, 2003; Pg 16-18

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 57

Q 36:



The compliance of the segment marked by arrows is close to

- A. 4 ml/ cmH₂O
- B. 8 ml /cmH₂O
- C. 15 ml/ cmH₂O
- D. 18 ml /cmH₂O
- E. 20 ml /cmH₂O

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know to calculate compliance.

Critique:

Compliance = change in volume / change in pressure (0-20/ 10-20)

Compliance before = 20/ 5 = 4.

Reference

Goldsmith JP, Karotkin EH. Assisted ventilation of the neonate. Saunders, 2003; Pg 16-18

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 57

Q 37:

The MFM team calls you to attend an urgent CS due to thick meconium and fetal bradycardia. The baby was born limp with HR of 50/min. You intubate the baby and sucked out 2 ml of meconium stained fluid from the trachea. You connect the ETT with self-inflating bag and start resuscitation with pressure of 25 cm of H₂O and rate of 40/min. You see a good chest rise. The HR is up to 60/min. You advise the nurse to start chest compression. HR remains 60. You give epinephrine 0.3 ml of 1:1000 via ETT while the other nurse gets the IV. You gave 0.3 ml 1: 10,000 via IV. The heart rate came up and you transferred the baby to NICU bagging all the way. You placed the baby on HFOV and placed a UAC/UVC. The first gas showed a pH of 7.17/PCO₂ of 56/ PaO₂ of 75 on 100% O₂. You start the baby on dopamine 20 mics/kg/min and dobutamine 20 mics/kg/min for low BPs. You obtain an echo which showed normal structural heart with supra systemic pulmonary pressure. You start the baby on 25 ppm of iNO. You call the ECMO center and the transport team is on its way. The serial gases all at 100% O₂ are as under:

Time: pH/ PCO₂/ PaO₂/HCO₃/ BA

10:00 am: 7.28/ 49/78/18/-8

10:30 am: 7.32/42/ 120/ 20/-5

11:00 am: 7.41/ 40/ 240/ 24/ -2

11:30 am: 7.42/ 38/ 256/ 24/-2

Despite of improved gases and high PaO₂ the sats remained 85-87%, in both pre and post ductal monitors. Which of the statement is true about this finding?

- A. Desaturation to low 80 is common in babies with PPHN
- B. High dose dopamine has caused vasoconstriction leading to low sats readings
- C. Babies born depressed at birth have low sats during first few hours of life
- D. Blood gas machine is reading high PaO₂ as it is calibrated for adult Hb
- E. High dose of inhaled nitric oxide is the cause for low sats

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complication of iNO- MetHb

Critique:

iNO therapy is associated with increased MetHb leading to low sats despite high pO₂.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1309-9

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 65-66

Q 38:

At 10 a.m. a neonate had a PaO₂ of 85 mm Hg, a SaO₂ of 98%, and hemoglobin of 14 gm/dl. At 11: 45 a.m. blood was noted on the bed and UAC was noted to be displaced. After stabilizing the baby a CBC was sent which revealed hemoglobin of 10 gm/dl. Assuming no lung disease occurs from this incident, what will be her new PaO₂, SaO₂, and CaO₂?

- A. PaO₂ unchanged, SaO₂ unchanged, CaO₂ unchanged
- B. PaO₂ unchanged, SaO₂ unchanged, CaO₂ reduced
- C. PaO₂ reduced, SaO₂ unchanged, CaO₂ reduced
- D. PaO₂ reduced, SaO₂ reduced, CaO₂ reduced
- E. Cannot assess from the data

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the difference between CaO_2 , SaO_2 and PaO_2

Critique:

Hb effect the CaO_2 (oxygen content), PaO_2 and SaO_2 are not affected.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 63

Q 39:

The physiology of RDS is best reflected by

- A. $V/Q > 1$ and increased FRC
- B. $V/Q >$ and increased tidal volume
- C. $V/Q > 1$ and low FRC
- D. $V/Q = 1$ and normal FRC
- E. $V/Q < 1$ and low FRC

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the respiratory mechanics of RDS

Critique:

All Pulmonary Function Tests are decreased in RDS except dead space

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 61

Q 40:

A preterm 18-day old weighing 1.6 kg is back from OR. She had repair done for her PDA. The surgical team informs you that the procedure took 4 hrs and baby has to be resuscitated with 50 ml of PRBC in the OR. You placed the baby on ventilator with rate of 60, tidal volume of 8, PEEP of 5, IT of 0.35. Fifteen minutes after admission to the NICU baby started to have some spontaneous movement and desaturations. The best course of action would be to

- A. Increase tidal volume
- B. Use fentanyl
- C. Use pavulon
- D. Transfuse PRBC
- E. Obtain a blood gas

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the role of tidal volume in adequate ventilation

Critique:

Vt of 8 for 1.6 kg baby is 5ml/kg, it should be increased.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 66-67

Q 41:

Due to gas entrapment FRC is increased in Meconium Aspiration Syndrome. In neonates, the normal FRC is about 20-30 ml/kg. The FRC is equal to

- A. Tidal volume + Inspiratory reserve volume
- B. Expiratory reserve volume + Residual volume
- C. Tidal volume + Expiratory reserve volume
- D. Tidal volume + Residual volume
- E. Expiratory reserve volume + Inspiratory reserve volume

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the volumes of lungs

Critique:

$FRC = RV + ERV$

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 56

Q 42:

The relationship between Hb and O₂ is important. Which of the following situations would be expected to lower PaO₂?

- A. Anemia
- B. Carbon monoxide toxicity
- C. Abnormal hemoglobin that holds oxygen with half the affinity of normal hemoglobin
- D. Abnormal hemoglobin that holds oxygen with twice the affinity of normal hemoglobin
- E. Lung disease with intra-pulmonary shunting

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the difference between CaO_2 , SaO_2 and PaO_2

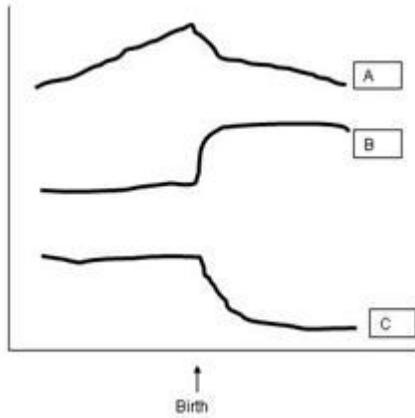
Critique:

Hb effect the CaO_2 (oxygen content), so A B C D will not affect PaO_2 . High altitude or lung disease will affect the PaO_2 .

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 65-66

Q 43:



This graph is obtained from a normal newborn and it represents normal pulmonary vascular physiology. The true statement about the displayed finding is

- A. Line A should be expressed as ml/kg/min
- B. Line B should be expressed as mm Hg/ml/min
- C. Line C should be expressed as ml/kg/min
- D. Line A should be expressed as mm Hg
- E. None of the above

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the changes in pulmonary vascular physiology after birth

Critique:

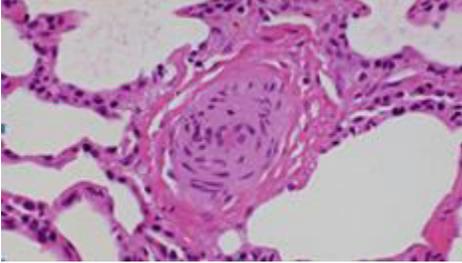
Pulmonary vascular Physiology: Pressure (mm Hg) decreases- Line A, resistance (mm Hg/ml/min/kg)-Line C decreases, and flow (ml/kg/min) increases-Line B.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 88

<http://www.uic.edu/classes/pmpr/pmpr652/Final/krauss/pedscardio.html>

Q 44:



The pulmonary slide is obtained from an infant died of severe hypoxemia. The most likely diagnosis is

- A. Hyaline membrane disease
- B. GBS pneumonia
- C. Meconium Aspiration syndrome
- D. Pulmonary hypertension
- E. Surfactant protein deficiency

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the changes in pulmonary vascular endothelium in PPHN

Critique:

Vascular smooth muscle hypertrophy is classic of PPHN.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 75

Q 45:

The most important and prominent action of inhaled Nitric oxide is (are)

- A. Conversion of L-Arginine to L-citrulline
- B. Conversion of GTP to cGMP
- C. Conversion of oxyhemoglobin to methemoglobin
- D. Reducing in the incidence of BPD
- E. All of the above

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the action and reaction of iNO

Critique:

Most prominent and important action is B.

Intrinsic NO comes from: L-arginine → Citrulline + NO

Inhaled NO → guanylate cyclase → GTP → GMP → Relaxation

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1176-1180

Q 46

Which of the following is higher in neonates as compared to adults

- A. Coagulation proteins
- B. Cardiac output
- C. Oxygen consumption
- D. Minute ventilation
- E. C & D both

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the physiological difference between neonates and adults

Critique:

O₂ consumption & Minute Ventilation are both high in neonates

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 61

Important Calculations

Q 1:

A term infant with severe PPHN secondary to MAS is started on ECMO. The cardiac output is by the ECMO pump at 1.4 liters/minute. The venous saturations are 78%, arterial saturations are 98%, and Hb = 14. What is this infants O₂ consumption?

- A. 52 ml of O₂ per minute
- B. 60 ml of O₂ per minute
- C. 75 ml of O₂ per minute
- D. 100 ml of O₂ per minute
- E. 360 ml of O₂ per minute

The correct response is A.

Solution:

Oxygen consumption = CO x Hb x 1.34 x (Art sat – Ven sat)

14 (dL/min) x 14 x 1.34 x (0.98-0.78) = 52 ml/min

Q 2:

Oxygen concentration of arterial & venous blood is 20 & 16 ml/100ml respectively. O₂ consumption is 200 ml/min. What would be the pulmonary blood flow?

- A. 2.5 L/min
- B. 2.8 L/min
- C. 5.0 L/min
- D. 7 L/min
- E. 7.5 L/min

The correct response is C.

Solution:

Oxygen consumption = CO x (CaO₂ – CvO₂)

200 = CO x 20-16 (here pulm flow is the CO)

200 = CO x 4 or CO = 200 /4 = 50 dL/min or 5 L/min (1L =10dL)

Q 3-5.

Q 3:

A 28-week premature infant is on breathing spontaneously in RA with blood gas of pH 7.38, PaCO₂ 40, PaO₂ 80. He became apneic and his alveolar ventilation is halved. The CO₂ output has not changed and respiratory quotient is 0.8

The PaCO₂ rise to

- A. 50 mm Hg
- B. 60 mm Hg
- C. 70 mm Hg
- D. 80 mm Hg
- E. 90 mm Hg

Q 4:

The drop in PaO₂ would be

- A. 40 mm Hg
- B. 50 mm Hg
- C. 60 mm Hg
- D. 70 mm Hg
- E. 80 mm Hg

Q 5.

The FiO₂ administered should be increased by

- A. 2%
- B. 4%
- C. 6%
- D. 8%
- E. 10%

Q 3:

The correct response is D.

Solution:

Alveolar ventilation is inversely proportional to CO₂, so if Alveolar vent is doubled the CO₂ would be halved or vice versa.

Q 4:

The correct response is B.

Solution: Respiratory quotient is 0.8 = CO₂ produced/ Oxygen consumed

$$RQ = \text{CO}_2 / \text{O}_2$$

$$0.8 = 40 / \text{O}_2$$

$$\text{Or } \text{O}_2 = 40/0.8 = 50$$

Q 5.

The correct response is A.

Solution:

Alveolar equation before = Alveolar equation after

$$713 \times 0.21 - 40/0.8 - 80 = 713 \times \text{FiO}_2 - 80/0.8 - 50$$

$$19 = 713 \times \text{FiO}_2 - 100 - 50$$

$$19 + 100 + 50 = 713 \times \text{FiO}_2 - 100 - 50 + 100 + 50$$

$$169 = 713 \times \text{FiO}_2$$

$$\text{FiO}_2 = 169/713 = 0.23 \text{ or } 23\% \text{ (2\% increase)}$$

Q 6:

A term infant is transported to Denver (BP 630) from Boston in an unpressurized airplane. The blood gas at Boston was pH 7.31, PaCO₂ 46, PaO₂ 66. With no change in minute ventilation, FiO₂ or PCO₂, the minimum PaO₂ the infant is likely to experience would be

- A. 40
- B. 50
- C. 55
- D. 60
- E. 65

The correct response is A.

Solution:

Alveolar equation at Denver = Alveolar equation at Boston

$$630 - 47 \times \text{FiO}_2 \text{ (pCO}_2 \text{ constant)} - \text{paO}_2 = 760 - 47 \times \text{FiO}_2 \text{ (pCO}_2 \text{ constant)} - 66$$

$$583 \times 0.21 - \text{PaO}_2 = 713 \times 0.21 - 66$$

$$122 - \text{PaO}_2 = 149 - 66$$

$$-\text{PaO}_2 = 149 - 66 - 122 = -39$$

$$\text{Or PaO}_2 = 39$$

Q 7:

A 1500 gm baby is transported to Denver (elevation 5000 ft, BP = 630) from Chicago receiving 40% FiO₂. What would be the FiO₂ requirement at Denver?

- A. 49%
- B. 45%
- C. 35%
- D. 30%
- E. No change as the aircraft is pressurized

The correct response is A.

Solution:

Alveolar equation at Denver = Alveolar equation at Chicago

$$630 - 47 \times \text{FiO}_2 = 760 - 47 \times \text{FiO}_2$$

$$583 \times \text{FiO}_2 = 713 \times 0.4$$

$$\text{FiO}_2 = 285 / 583 = 0.49 \text{ or } 49\%$$

Q 8.

What would be the A-a gradient of a baby who is breathing spontaneously on room air at sea level. The blood gas is pH 7.40/ $\text{CO}_2 = 40$ / $\text{PaO}_2 = 70$.

- A. 30 mm Hg
- B. 40 mm Hg
- C. 45 mm Hg
- D. 50 mm Hg
- E. 60 mm Hg

The correct response is A.

Solution:

$$\begin{aligned}\text{Alveolar- arterial gradient} &= 760-47 \times \text{FiO}_2 - \text{PaCO}_2 / 0.8 - \text{PaO}_2 \\ &= 713 \times 0.21 - 40 / 0.8 - 70 = 30\end{aligned}$$

Q 9.

A 2 hrs old neonate is placed on ventilator for his poor respiratory status. His cardiac monitor is showing HR of 152/min and saturation of 98%. His ventilatory settings are

MAP 12, Hz 12, Amplitude 26, 75% FiO₂

Blood gas from UAC: 7.41/ 42 (CO₂)/ 120 (PO₂)/ 22/ -2

CBC: WBC 14, bands 3%, Segs 43%, Hb 14 g/dl, Hct 45%, Platelets 234 K

His O₂ content would be close to

- A. 16.12 ml O₂/dl
- B. 18.74 ml O₂/dl
- C. 19.15 ml O₂/dl
- D. 20.42 ml O₂/dl
- E. 22.31 ml O₂/dl

The correct response is B.

Solution:

$$\text{Oxygen content} = 1.34 \times \text{Hb} \times \text{O}_2 \text{ sat} + 0.003 \times \text{PaO}_2$$

$$= 1.34 \times 14 \times 0.98 + 0.003 \times 120$$

$$= 18.38 + 0.36 = 18.74 \text{ ml/dl}$$

Q 10.

A 3.5 kg term neonate is breathing spontaneously in room air with respiratory rate of 45/min. His saturations are 98% as measure by Nelcore pulse oximeter. His tidal volume as measure pneumotachyograph is 8 ml with dead space of 2ml. His alveolar oxygen content would be close to

- A. 56.7 ml/kg/min
- B. 45.6 ml/kg/min
- C. 25.8 ml/kg/min
- D. 21.6 ml/kg/min
- E. 16.2 ml/kg/min

The correct response is A.

Solution:

Alveolar O₂ content = MV x FiO₂

MV = Vt-dead space x rate

So, Alveolar O₂ content = 8-2 x 45 x 0.21 = 56.7 ml/kg/min

Q 11.

Helium dilution method is used to calculate FRC. The volume of the circuit is 65 ml and pre- and post-Helium concentrations are 12% and 9% respectively. What is the FRC of the patient?

- A. 21.66 ml
- B. 26.44 ml
- C. 28.46 ml
- D. 29.86 ml
- E. 32.98 ml

The correct response is A.

Solution:

$$\text{FRC} = \frac{\text{Pre conc} - \text{Post conc}}{\text{Post conc}} \times \text{volume of the circuit}$$

$$\text{FRC} = \frac{12 - 9}{9} \times 65 = 21.66$$

Q 12.

In a newborn infant, the alveolar and mixed expired PCO_2 are 40 and 30 mm Hg respectively. What would be the anatomical dead space in this infant?

- A. 10% of tidal volume
- B. 25% of tidal volume
- C. 35% of tidal volume
- D. 45% of tidal volume
- E. 50% of tidal volume

The correct response is B.

Solution:

Anatomical dead space (Bohr equation) = $\frac{\text{Alv PCO}_2 - \text{expired PO}_2 \times \text{tidal volume}}{\text{Alv PCO}_2}$

40-30/40 (Vt is not given in the Q)

= 0.25 of total tidal volume i.e. 25%

Q 13.

In a newborn infant, the PaCO₂ is 55 mm Hg and mixed expired PCO₂ is 30 mm Hg. The tidal volume is 8 ml and rate is 45/min. What would be the physiological dead space in this infant?

- A. 2.5 ml
- B. 3.6 ml
- C. 4.8 ml
- D. 5.2 ml
- E. Cannot be computed

The correct response is B.

Solution:

Physiological dead space (Bohr eq) = $\frac{\text{PaCO}_2 - \text{expired PO}_2 \times \text{tidal volume}}{\text{PaCO}_2}$

$$55 - 30 / 55 \times 8 = 3.6 \text{ ml}$$

Q 14.

A term infant is born by CS. Thick meconium was noted requiring intubation and ventilation. The first arterial blood gas on 100% FiO₂ showed pH of 7.1, PCO₂ of 54 and PaO₂ of 54%. Echo showed pulmonary Arterial pressure of 60 mm Hg and Left atrial pressure of 6 mm Hg. The calculated resistance is 20 mmHg/L/min. What would be the pulmonary blood flow?

- A. 1.5 L/min
- B. 2.7 L/min
- C. 3.2 L/min
- D. 4.1 L/min
- E. 5.2 L/min

The correct response is B.

Solution:

$$\text{Resistance} = \frac{\text{Pressure}}{\text{Flow}}$$

$$\text{Flow} = \frac{\text{Pressure}}{\text{Resistance}}$$

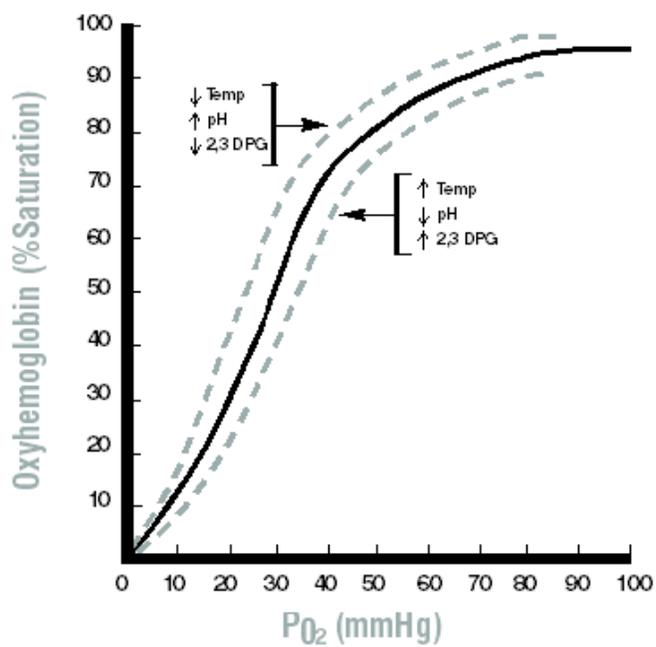
$$\text{Pul blood flow} = \frac{\text{Pul Arterial P} - \text{Left atrial P}}{\text{Resistance}}$$

$$60 - 6 / 10 = 2.7 \text{ L/min}$$

Q 15.

The blood flow to an organ is 200 ml/kg/min and O₂ consumption is 6 ml/kg/min. The PaO₂ is 80 mm Hg and Hb is 12 g/dl. The venous oxygen saturation is close

- A. 25%
- B. 35%
- C. 40%
- D. 45%
- E. 50%



The correct response is A.

Solution:

O₂ consumption = CO x Art O₂ content - venous O₂ content

6 = 2 x 1.34 x 12 x 0.90 - venous O₂ content (200 ml = 2 dL)

(O₂ content = 1.34 x Hb x sats in decimal - calculated from graph)

6 = 28 - CvO₂

Or CvO₂ = 28 - 6 = 22 mm Hg corresponds to 25% sat (using the graph)

HEMATOLOGY/ONCOLOGY

Q 1:

The best measure of bilirubin production is

- A. HbCO measurement
- B. ETCO measurement
- C. Serum bilirubin
- D. Reticulocyte count
- E. LFTs

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the metabolism of heme & bilirubin

Critique:

B is the best choice. Equimolar CO is produced with production of bilirubin from heme.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 301

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (Eds). Mosby 2006: pg 623

Q 2:

True statements about bilirubin metabolism are all EXCEPT

- A. Bilirubin is formed from biliverdin catalyzed by biliverdin reductase
- B. Equimolar CO is produced during conversion of bilirubin to biliverdin
- C. Bilirubin is converted back to biliverdin by reactive oxygen species
- D. Fe eliminated from heme oxidation catalyzed by heme oxygenase is recycled
- E. Exhaled CO could be used to assess bilirubin production

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the metabolism of heme & bilirubin

Critique:

B is the best choice. Equimolar CO is produced with production of biliverdin from heme.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 301

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (Eds). Mosby 2006: pg 623

Q 3:

A 34 wks fetus is confirmed to have signs of Rh Iso-immunization. The severity is best predicted by:

- A. Dilated umbilical vein
- B. Degree of fetal liver enlargement
- C. Amount of pericardial effusion
- D. Peak systolic velocity of 40 m/s in MCA
- E. Optical density (OD) in zone 3 of Liley curve

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the antenatal management of Rh Iso-immunization, role of Liley curve and interpretation of MCA measurements

Critique:

OD plotted on Zone 3 of Liley curve indicates severe disease. MCA Doppler with PSV of 40cm/sec is normal. A, B & C are relative indicators.

Reference:

Gruslin AM, Moore TR. Erythroblastosis Fetalis, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 389-407

Q 4:

A baby is born vaginally with history of thick meconium. She was intubated in the delivery room and despite providing PPV and following MRSOPA corrective steps as per NRP, saturations are noted to be 86-87% on 100% O₂. She was brought to NICU and Echo was ordered. She got extubated accidentally and started crying vigorously but still has the bluish hue. Chest was clear to auscultation and CXR was normal. You went back to update parents about the baby's condition. Parents told you that this is very common in their family and they showed their hands which were bluish as well. You came back to the unit and start thinking of the differential diagnosis. The best step in management is to

- A. Start iNO after echo
- B. Give methylene blue
- C. Re-intubated and place on ventilator
- D. Start IV Milrinone
- E. No intervention for now

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the difference between HbM disease and Methemoglobinemia.

Critique:

The infant most likely has HbM disease and it does not respond to methylene blue.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 65-66

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1308-1309

Q 5:

A term infant presents with cyanosis, Hb = 15 g/dl

Saturations (obtained by Pulse oximetry transducer attached to right arm) = 82%

Saturations (obtained by arterial blood gas measurement) = 90%

PaO₂ = 65 mm Hg, room air

The most like reason for discrepancy between the saturations is

- A. Carbon monoxide poisoning
- B. Methemoglobinemia
- C. Use of adult nomogram in blood gas analyzer
- D. Insufficient reduced hemoglobin
- E. Increase Alveolar-arterial gradient

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the effect of Methemoglobinemia on Hb saturation.

Critique:

MetHb, clinical cyanosis, PaO₂ normal, low sats on pulse ox, sats normal on blood gas

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 65-66

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1308-1309

Q 6:

A 6-day-old female infant present to the NICU with jaundice. She was delivered at term after an uncomplicated pregnancy, with a birth weight of 2.8 kg. The parents are first-degree cousins, and the family history is unremarkable. The baby is being breastfed. The prenatal history is not well-known. Physical examination reveals a hypoactive, jaundiced male infant whose axillary temperature is 97.2°F (36.2°C), heart rate is 156 beats/min, respiratory rate is 35 breaths/min, and blood pressure 60/35 mm Hg. His weight is 2.9 kg (10th percentile), length is 50 cm (50th percentile), and head circumference 35 cm (50th percentile). Examination of his eyes reveals yellow sclera, and the entire body is icteric. Cardiovascular examination reveals a regular heart rate and rhythm, with no murmurs. The lungs are clear to auscultation bilaterally. His liver is palpable 4 cm below the costal margin. Findings on the remainder of the physical examination are normal.

Laboratory results are as follows: serum total bilirubin, 24 mg/dL with a direct bilirubin of 3 mg/dL; serum aspartate aminotransferase, 38 U/L; alanine aminotransferase, 19 U/L; gamma glutamyl transferase, 144 U/L; alkaline phosphatase (AF), 520 U/L, creatinine, 0.4 mg/dL ; urea, sodium, 149 mEq/L, potassium, 4.6 mEq/L, and negative C-reactive protein. A complete blood count demonstrates hemoglobin, 18 g/dL; hematocrit, 48; white blood cell count, $10 \times 10^3/\text{mCL}$ ($10 \times 10^9/\text{L}$) with a normal differential count; and platelet count, $224 \times 10^3/\text{mCL}$ ($224 \times 10^9/\text{L}$). The most important investigation at this point is

- A. Serum alpha 1 antitrypsin level
- B. Urine reducing substance
- C. X-ray of knee joint
- D. Abdominal US
- E. HIDA scan

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the differential diagnosis of jaundice.

Critique:

H/o cousin marriage with jaundice and hypoactive infant, Galactosemia should be considered and urine reducing subs should be checked. A, D, E are indicated if direct bilirubin is high.

Reference:

Wong RJ, DeSandre GH, Sibley E, Stevenson DK. Neonatal Jaundice and liver disease, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 1419-65

Q 7:

A 24-day-old infant is being worked up for high conjugated bilirubin. He remained NPO x 2 weeks after many trials of feeds. His GI workup showed reflux which was treated with metoclopramide and feeds were established with TPN D 18, P3 L 3. His LFT showed GTT 135, AST 234, ALT 234, Alb 2.2, Glucose 42, PT 17 and bilirubin 11.7/7.8. Liver biopsy showed intrahepatic cholestasis. PAS stain showed intracytoplasmic inclusions. Alpha antitrypsin level was 135 mg/dl (nl 10-190) with absence of S and Z allele. Which of the following step would help further in management of this infant?

- A. Obtaining HIDA scan
- B. Performing glucagon challenge test
- C. Sending urine for organic acid
- D. Sending plasma for amino acid
- E. Starting phenobarbitone

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the differential diagnosis of cholestasis.

Critique:

Positive PAS with normal alpha trypsin level and absent genotype suggests glycogen storage disease. Glucagon stimulation test should get the priority here.

Reference:

Wong RJ, DeSandre GH, Sibley E, Stevenson DK. Neonatal Jaundice and liver disease, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 1419-65

Q 8:

A term baby is born by vaginal delivery. Mom is O-ve and baby is A+ve. True statement regarding the incompatibility is

- A. Direct Coombs on baby blood would be strongly positive
- B. More severe Rh disease is expected if baby was O+ve
- C. In maternal blood, IgG is formed primarily followed by IgM
- D. In neonatal blood, bilirubin of 10 at 24hr necessitates exchange transfusion
- E. In baby blood, hypochromasia of RBC and reticulocytosis would be noted

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the lab and management plan of ABO/ Rh incompatibility.

Critique:

Concomitant presence of ABO masks Rh disease due to hemolysis and less RBC available for sensitization. Coombs test is weakly positive in ABO. IgM is first response. Bili of 10 plots at low risk zone. Micro spherocytosis is characteristic of ABO not hypochromasia.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 1298

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 289

Q 9:

P 50 is defined as the level of partial pressure of O₂ where Hb is 50% saturated. P 50 would be lowest with

- A. Hb A
- B. Hb Bart
- C. Hb C
- D. Hb S
- E. Hb E

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the effect of different Hb on P50

Critique:

Bart Hb has 4 gamma chains and binds avidly to O₂, shifting Hb –dissociation curve to left and P50 to lowest. Other Hb will not affect P50 that much.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 284

Q 10:

A 3-day old female infant is transferred to your service with bilirubin of 23 (0.6 direct). She is born at term with Apgar score of 8/8. Physical exam is normal except for icterus. Infant's blood group is O+ve and mom is B+ve, Coombs negative. CBC showed 12 WBC with Hb of 15 and platelet of 235 K. Metabolic profile showed Na 135 K 4.2 BUN 10 Creatinine 0.2, Albumin 3.5, ALT 26, AST 84. Infant's feed was change from breast milk to formula and triple phototherapy was started. The best management strategy would be to

- A. Calculate bilirubin albumin ratio, if > 4 then perform exchange
- B. Hold exchange and follow q 3-4 hr bilirubin levels
- C. Make the infant NPO and increase IV fluids to 160 ml/kg/day
- D. Obtain retic count and send G6PD screen
- E. Obtain hepatic US

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the management plan of hyperbilirubinemia.

Critique:

Bili: Alb ratio of 8 should be used, BM should be changed to FF but not NPO. D & E not indicated-female infant normal LFTs.

Reference:

Wong RJ, DeSandre GH, Sibley E, Stevenson DK. Neonatal Jaundice and liver disease, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 1419-65

Q 11:

A term 3.5 Kg infant born vaginally with Apgar score of 9/9 is noted to have Hb of 8 g/dl. Kleihauer Betke test was negative and Cranial US was normal. Blood smear showed microcytic and hypochromic red cells. PO iron was started with dose of 10 mg once daily. The infant after 2 wks weighs 4 kg and tolerating formula feeds. The repeat Hb is 7.8 g/dl. The next best intervention is to

- A. Repeat Kleihauer Betke test
- B. Transfuse PRBC
- C. Start Vitamin E
- D. Start pyridoxine
- E. Increase iron dose

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the DIFFERENTIAL DIAGNOSIS of anemia.

Critique:

Iron dose is Ok (2.8 mg/kg for term infant) and no response after 2 weeks.
Pyridoxine is the right choice. This is a case of congenital sideroblastic anemia....
problem with heme synthetic pathway- Fe supplements not helpful-pyridoxine works as
cofactor for some of enzymes used in the heme synthetic pathway.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ,
Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1308

Q 12:

True statements about anemia of prematurity (AnOP) are all EXCEPT

- A. It is normocytic, normochromic anemia
- B. Occurrence coincides with physiological anemia
- C. Reticulocyte count is a good indicator of recovery
- D. EPO is low so therapy with EPO would help
- E. Fe and Vitamin E supplement has very little beneficial effect on AnOP

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the facts about anemia of prematurity.

Critique:

AnOP is normocytic, normochromic, in premature infants presents ~ 6-8 weeks
We use Fe, but AnOP is nutritionally insensitive (Brodsky, pg 288). We use EPO, but response is equivocal (Fanaroff, pg 1306). The correct response is C (retic is low in AnOP). A rising reticulocyte count may not predict recovery from anemia of prematurity (AnOP). The finding of an elevated reticulocyte count is not consistent with the diagnosis of AnOP
(<http://www.emedicine.com/PED/topic2629.htm>)

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1306

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 288

<http://www.emedicine.com/PED/topic2629.htm>

Q 13:

A term newborn is noted to have mucosal bleeding. CBC showed large platelets with counts of 170K. The next most important test to differentiate the cause is

- A. Ristocetin induced platelet aggregation (RIPA) test
- B. Bone marrow aspiration
- C. X-ray of limbs
- D. Blood cell morphology
- E. TORCH titers

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the DIFFERENTIAL DIAGNOSIS of large platelets

Critique:

Bernard-Soulier syndrome is characterized by unusually large platelets normal in number. RIPA is diagnostic.

Reference

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1341

Q 14:

A 14-day-old infant present with omphalitis. He is being breast fed and having seedy stools with each feeding. Physical exam is normal. The CBC showed WBC of 2.5 with neutrophils of 2%. After consulting with hematologist, you start G-CSF. Within 2 days the WBC rose to 6 and neutrophils to 36%. The most likely cause is

- A. Severe congenital neutropenia
- B. Idiopathic neutropenia of infancy
- C. Leukocyte adhesion deficiency
- D. Chronic granulomatous disease
- E. Schwachman-Diamond syndrome

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the DIFFERENTIAL DIAGNOSIS of neutropenia.

Critique:

Response to G-CSF favors congenital neutropenia. Idiopathic NP is rare and is diagnosis of exclusion. In LAD neutrophils are high. In SDS there is steatorrhea. CGD presents with recurrent infection.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 1312-18

Q 15:

A 33 wks female infant with BW of 1420 gm is noted to have prolonged bleeding after heel stick. Platelet count is 180 K and PT is 40. Vitamin K 1 mg IM was given with no response. The next important investigation is to check

- A. Factor V
- B. Factor VIII
- C. vWF
- D. aPTT
- E. Bone marrow

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the DIFFERENTIAL DIAGNOSIS of bleeding.

Critique:

Vitamin K will work for factor 2,7,9,10 not for factor V (IUGR infant with liver dysfunction). The infant is female, so B and D are less likely. In vWF deficiency PT is normal. Bone marrow aspiration is not indicated.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 1329

Q 16:

A 30-year-old lady, recently migrated from Caribbean, brings her 6-day old infant to ER with fever and jaundice. The delivery was uncomplicated and Apgar score was 9 and 9. The initial CBC showed WBC of 12, bands of 2, Hb 8 platelet of 168K. When you went, and examined the infant in the ER in addition to apparent icterus, spleen tip was noted to be palpable. To reach the diagnosis the most important test would be

- A. Abdominal US
- B. Red cell osmotic fragility test
- C. Red cell enzyme analysis
- D. Red cell morphology
- E. Urine for reducing substance

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the signs of congenital malaria.

Critique:

Classical presentation of malaria.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 836

Q 17:

A male infant has prolonged bleeding from circumcision. PTT is 98, platelet count is 264 K and PT is 12. His father, mother and two sisters had no history of bleeding problems. True statements about this infant are all EXCEPT

- A. He will benefit from epsilon aminocaproic acid (Amicar)
- B. Desmopressin acetate (DDAVP) intranasally would be beneficial
- C. His sisters might be carrier of this disease as well as his mother
- D. His condition is lifelong and spontaneous resolution is very less likely
- E. All male siblings would have an increased risk of having the same problem

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the clinical signs, laboratory values and genetics of hemophilia.

Critique:

Hemophilia is X-linked recessive disease, so statement E is wrong. 50 % son would be normal, getting the normal X from mom.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 1325-1326

Q 18:

A 21-day-old preterm infant who is getting TPN via PICC line is noted to have a 1x2 cm thrombus in right atrium. You decided to start heparin. The nurse taking care of the infant asks you about the difference between the low molecular weight heparin (LMWH) and unfractionated heparin (UFH). True statements about these heparins are all EXCEPT

- A. LMWH has short half life
- B. LMWH could be given SQ
- C. There is less risk of hemorrhage with the use of LMWH
- D. Monitoring the LMWH therapy requires measurement of anti-Xa assay
- E. UFH & LMWH mediates its anticoagulant action by binding to antithrombin III

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the difference between Unfractionated and low molecular weight heparin.

Critique:

LMW heparin as long half-life, so can be given as daily or twice doses.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1332-36

Q 19:

A preterm 24-day-old infant has recurrent umbilical granuloma that was cauterized 3 times. His CBC showed WBC of 18 K with Band 5%, segs 54%. He is on 2 lpm 25% O₂ with sats 85-87%. Increasing O₂ has not resulted in increased sats, which remains at 85-87%. The most likely cause of his condition is

- A. Leucocytes adhesion defect
- B. Unidentified allantois
- C. Persistent vitellointestinal duct
- D. Abnormal Hb oxidation
- E. Abnormal pulmonary oxygenation

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complications of nitrates containing substances causing MethHb

Critique:

AgNO₃ application may lead to MethHb causing low sats. In LAD WBC counts are high. Absence of h/o of discharge or bleed from umbilicus r/o B & C. Methylene blue would be helpful.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 65-66

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1308-1309

Q 20:



This infant is born to healthy parents and has an uneventful neonatal course. Mom noted poor feeding for last 2 days. He is afebrile with mild tachypnea. The best intervention is to

- A. Start acyclovir treatment
- B. Send CSF for microscopic exam
- C. Obtain Doppler study of aorta
- D. Transfuse platelets
- E. Transfuse FFP

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the clinical presentation of Protein C-S deficiency.

Critique:

A case of purpura fulminans. FFP should be given. Normal newborn course excludes HSV, DIC or aortic thrombosis.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1322

Q 21:

A thin woman with epilepsy controlled on anticonvulsants has break through seizure and delivers a baby vaginally by the assistance of ER staff. The baby looks term and weighs 3.7 kg. During blood draw the infant was noted to have prolonged bleeding. PT is 40 and PTT is 80, platelets are 217 K. The most likely cause is

- A. Folic acid deficiency
- B. Vitamin K deficiency
- C. Vitamin C deficiency
- D. Pyridoxine deficiency
- E. Sepsis with DIC

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the side effects of maternal anticonvulsants- Vitamin K deficiency

Critique:

Maternal anticonvulsants decrease Vitamin K and thus lower the transfer to fetus. The labs are classic of Vitamin K deficiency.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 39-40

Q 22:

You admitted a 3-day-old term infant with bilirubin of 17 mg/dl. You plan to start phototherapy. The best combination for effective phototherapy is

- A. Three Blue lights on top, 50 cm from the baby, 40 micW/cm²/nm irradiance
- B. Three Blue light on top, fiberoptic bili blanket on the back, 70 micW/cm²/nm irradiance
- C. Six Blue lights on top, 20 cm from the baby, 20 micW/cm²/nm irradiance
- D. Six Blue lights on top, 20 cm from the baby, fiberoptic bili blanket on the back
- E. Three green lights on top, 30 cm from the baby, 20 micW/cm²/nm irradiance

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the logistics of phototherapy

Critique:

Light color: blue, distance: 20 cm, Irradiance: 40, large surface area; with fibroptic blanket on the back.

A is too far distance wise, B: 70 is too high irradiance, C: 20 is low, D is ideal, E: blue light is preferable.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1442-45

Q 23:

A newborn is noted to have abdominal mass in right upper quadrant. Head is normal in size and shape with AFOF. No dysmorphic features are noted. Red reflex is present bilaterally & pupillary light reaction is equal in both eyes. Chest is clear and no murmur is heard. No hip click is noted. The vital signs reveal Temp 98.7, HR 140/min, BP 64/36. The admission blood work up showed: WBC 24 K, Hb 12 g/dl, Platelets of 670K. Urine analysis is normal. You have ordered abdominal US. The most likely diagnosis is

- A. Neuroblastoma
- B. Pheochromocytoma
- C. Wilms tumor
- D. Hepatoblastoma
- E. Renal mesothelioma

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know about DIFFERENTIAL DIAGNOSIS of abdominal mass

Critique:

Normal BP rules out A & B. Wilms is rare in neonatal period. No hematuria and position of the mass rules out renal mesothelioma.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 300

Q 24:

Lipophilic subtype of bilirubin crosses the placenta while hydrophilic is excreted in bile. Which of the following is lipophilic and crosses the placenta?

- A. Conjugated bilirubin
- B. Unconjugated bilirubin
- C. Photo-bilirubin
- D. Lumirubin
- E. Biliverdin

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the features of bilirubin and its subtypes

Critique:

Unconjugated bili crosses the placenta and BBB readily as its lipophilic. The clinical significance is kernicterus and placental clearance- fetus cannot eliminate it fast.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1419-1425

Q 25:

A 12 days old male term infant is being treated with antibiotics for presumed sepsis and persistent elevated WBC counts. Prenatal history was significant for PROM 19 hrs with GBS negative and failure to progress. During the C-Section a small 1x 2 cm incision was made accidentally on the thigh of the baby which required 2 stitches. The examination showed up slant eyes and single crease in right hand. Rest of the physical exam was within normal limits. The parents, a healthy oriental couple, are worried about the length of antibiotics, persistent elevated WBC counts and the non-healed incision. The detail laboratory report is as under

CBC: WBC 40, 000, 75% Segs with no toxic granulation, Hb 14 g/dl, Platelets 165 K

Blood Cx: negative

CXR: normal, no infiltrates

CSF: no cells, no organism, Cx neg

The most likely diagnosis is

- A. Chediak Higashi syndrome
- B. Myeloperoxidase deficiency
- C. Leukocyte adhesion defect
- D. Chronic granulomatous disease
- E. Down syndrome

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the factors important in wound healing and its relationship with different disorders

Critique:

Poor wound healing, high WBC favors LAD. WBC morphology is normal- CHS is less likely. No increase abscesses or infections- CGD is not likely. DS is less likely-no other findings. MPD is very rare.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1314-8

Q 26:

A 4-week-old former premature infant is noted to have Hemoglobin of 7 g/dl. Physical exam showed pallor, soft murmur and pedal edema. Blood smear showed micro spherocytosis with MCV of 102 fL and retic count of 6.6%. The best treatment plan would be

- A. Blood transfusion
- B. Vitamin E supplementation
- C. Iron supplementation
- D. Erythropoietin
- E. Observe for resolution

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the DIFFERENTIAL DIAGNOSIS of anemia in a 4 wks infant

Critique:

The description is classic of Vitamin E deficiency

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1302

Q 27:



The x-ray is obtained from a male infant who presented with abdominal distension. He underwent surgical resection of about 15 cm of small intestine with end-end anastomosis. Feeding was started with expressed breast milk but later changed to elemental formula due to steatorrhea. Stool exam showed > 25 fat globules/ HPF. Pancreatic enzyme, 1 capsule a day, was started and sweat chloride test was ordered which was reported as normal. The genetic study for mutation in delta 508 position is reported as normal. The next important step in management of this baby is to

- A. Obtain CBC
- B. Obtain serum electrolytes
- C. Repeat CF studies in 1 week
- D. Change feeds to formula containing MCT oil
- E. Increase pancreatic enzyme supplement to 2 caps/ day

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know about Shwachman-Diamond syndrome

Critique:

Steatorrhea and pancreatic insufficiency favor the diagnosis of Shwachman-Diamond syndrome which is associated with neutropenia and thrombocytopenia.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 272

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1311

Q 28:

A male baby is delivered by precipitous delivery at 33 wks of gestation. His birth weight was 1815 g. On day 3 of life his bilirubin was noted to be 12 mg/dl. He is a difficult IV stick and UVC went into liver x 2. NG feeds were started with 5 ml q 3 hr and advanced to 30 q 3 hr. His hemoglobin is 11.2 g/dl. Admission CBC showed a Hb of 16 g/dl. He is stable on room air with no respiratory distress. His blood group is B positive and mom's blood group is O +ve. By the evening his bilirubin has gone up to 17 and you started phototherapy. The most important investigation to evaluate the cause of jaundice is to obtain:

- A. Coombs test
- B. Fractioned bilirubin
- C. Cranial US
- D. Urine osmolality
- E. Reticulocyte count

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the DIFFERENTIAL DIAGNOSIS of jaundice

Critique:

Risk of IVH is low at 33 wks, baby is getting 130 ml/kg so Uosm would be normal. Retic will tell about hemolysis but not about the cause. Drop in Hb is more in favor of indirect hyperbilirubinemia- so direct bilirubin would be low.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 289

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1298

Q 29:

Parents of a 1900 g preterm baby, who is diagnosis to have Scimitar syndrome, are requesting early discharge. Baby is on full feedings with some emesis. He is breathing spontaneously of room air. Caffeine was discontinued 2 days back. On the day of discharge, after getting the car seat test, hearing screen, hepatitis B, Synagis and circumcision, the nurse noted bluish discoloration of the lips and nail bed. You placed the baby on sat monitor and readings are 87-89%. The most likely cause is

- A. Worsening cardiac status
- B. Decompensation off caffeine
- C. Reaction to Synagis and Hep B vaccine
- D. Reaction to anesthetic used for circumcision
- E. Severe GER

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know about clinical presentation of Methemoglobinemia

Critique:

Scimitar syndrome is characterized by partial anomalous pulmonary venous return-less likely reason as the baby is stable on room air and cyanosis would be severe. EMLA cream is frequently used for circumcision, it contains nitrites that may lead to Met Hb.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 65-66

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1308-09

Q 30:

Cyanosis would be most prominent in

- A. A preterm baby with Hb of 10 g/dl and O₂ saturation of 70%
- B. A term baby with Hb of 20 g/dl and O₂ saturation of 70 %
- C. A preterm baby with Hb of 7 g/dl and O₂ saturation of 70 %
- D. A term baby with Hb of 15 g/dl and O₂ saturation of 87%
- E. A term baby with Hb of 20 g/dl and O₂ saturation of 88 %

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know effect of Hb level on cyanosis. Anemia can mask cyanosis.

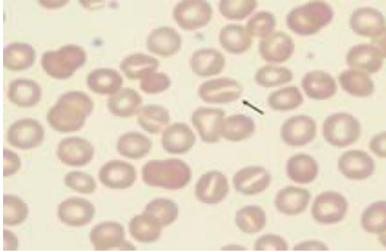
Critique:

At least 5 g/dl reduced Hb needed to be present to manifest cyanosis. So, for an infant with Hb of 10 g/dl and 70% sat – 30% Hb is available i.e. 3 g (< 5, no cyanosis). For infant with 20 g/dl and 70% sat – 30% Hb is available i.e. 6 g (> 5, cyanosis). All other have reduced Hb < 5 g. Anemia can mask cyanosis while polycythemia show it early.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1215

Q 31:



This blood film is obtained on a 44-day old preterm infant, who is treated for RDS and NEC. Baby is currently on feeds. His Hb is 7.6 g/dl, RBC 3, MCV 88, MCH 28, MCHC 32, RDW 20. The blood film showed anisocytosis, poikilocytosis and stomatocyte (arrow). The most likely diagnosis is

- A. Iron deficiency
- B. Liver disease
- C. Vitamin E deficiency
- D. Anemia of prematurity
- E. Splenic dysfunction

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the characteristics of RBC in different diseases.

Critique:

Stomatocytes are seen in liver disease. Fe def- microcytosis, hypochromia; Vitamin E def- microcytosis; AnOP- normocytic, normochromic; splenic dysfunction-Howell-Jolly bodies.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 287-88

Q 32:

A 6 weeks old preterm infant is pale. The hemoglobin is 6 g/dl. He is receiving fortified breast milk and is on room air. His weight one week back was 1800 gm and today its 1860 g. His vital signs are: HR 180/ min, RR 45/min, BP 67/45. He has soft systolic murmur. His other labs are

Na 132, K 4.1, ALT 45, AST 48, GGT 34, Alk Phos 780, Ferritin 450 ng/dl

CXR normal, Cranial US normal

The best management plan would be to

- A. Start Fe supplementation
- B. Check breast milk for lead content
- C. Start erythropoietin
- D. Give blood transfusion
- E. Check blood smear

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the differential diagnosis of anemia and its management.

Critique:

Poor weight gain, tachycardia and flow murmur suggest the need for blood transfusion. Although restrictive policies are followed lately but in the case described above PRBC are indicated. Erythropoietin and Fe will take some time to act.

Reference:

Ohls RK. Transfusions in preterm infant. NeoReviews Vol 8 No.9 Sept 2007, e 377

Q 33:

The level 2 regional hospital has referred a 7 days old preterm infant with bilirubin of 12, direct 7 mg/dl. Baby weighs 1.8 kg and is receiving 20 ml q 8 hr of breast milk and 2.5 m/hr of TPN. On examination, you noticed a deep tinge of orange discoloration on skin and sclera. No dysmorphic features were noted however a pungent smell is noted during exam. Mother is 28 y/o and father is 34 y/o and both are healthy. They have two other children, 6 and 3 y/o, and both are normal. Father's brother and one sister had history of gall bladder stones. Mother works at daycare center and father works in fishery department.

The initial lab studies are as follows

CBC: WBC 21, Hb 12, Plt 102 K, glucose 41 mg/dl, PT 32, aPTT 48

Na 132, K 3.9, HCO₃ 12, ALT 98, AST 69, Alk Phos 230, Bili 12.8 / direct 9 mg/dl.

CXR: hyperinflation, no infiltrates, PICC in SVC

The next important investigation should include

- A. Urine organic acid
- B. Urine ketones
- C. HIDA scan
- D. Serum alpha 1 antitrypsin
- E. TORCH screen

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the differential of cholestatic jaundice

Critique:

This is a case of tyrosinemia- pungent smell is the clue. Succinylacetone would be present in urine.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1459-60

Q 34:

A 35 wks infant is born to a GBS positive mother. Mom received 2 doses of steroids. The infant developed tachypnea soon after birth. His CXR looked hazy bilaterally. The CBC showed WBC 3.8, bands 28, segs 23, lymph 23. The spinal tap showed 2 WBC. Blood and CSF cultures are pending. Which of the following statement is true?

- A. This is a case of GBS pneumonia with meningitis
- B. This is a case of RDS needing surfactant therapy
- C. The low ANC suggests risk of infection
- D. The high IT ratio suggests stress
- E. Abnormal CBC is reflection of maternal steroids

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the differential diagnosis of neutropenia

Critique:

The ANC is 874, IT ratio is 0.54, CSF is normal. 35 wks, risk of RDS is less, esp. mom with 2 doses of steroids. D & E are less likely.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 214

Q 35:

At day 2 of life a newborn baby was noted to have pale and cold lower extremities with capillary refill of 5 sec. History was positive for attempt of UAC. A Doppler study of kidneys showed no flow to the right renal artery with thrombosis extending into the aorta. The most appropriate management plan is to treat this baby with

- A. Low molecular weight heparin
- B. Urokinase
- C. Streptokinase
- D. Tissue plasminogen activator
- E. Thrombectomy

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the management of renal arterial thrombosis

Critique:

As thrombosis has extended to aorta thrombectomy should be done.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1675

Q 36:

The elevation of which of the following indicates ischemic liver damage

- A. Prothrombin time
- B. ALT
- C. AST
- D. Alkaline phosphatase
- E. LDH

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know about LFTs

Critique:

PT signifies liver function, ALT & AST acute injury-could be viral, elevated alk phos suggest obstructive pathology. LDH is specific for ischemic injury.

Reference:

<http://www.gastromd.com/lft.html>

Important Calculations

Q 1:

You were called to see a newborn infant in the nursery. The baby is tachypneic and looks pale. The glucose is 35 and sats are 92%. You tell the nurse to give the baby feeds and obtain the CBC. Two hr later the nurse calls you with the results; the glucose is 64 while CBC showed hemoglobin of 4 g/dl. You called your charge nurse for admission to the NICU. While running through the differential diagnosis, you called you OB colleague and requested her to send the Kleihauer-Betke test on the mother blood. The results are as follows:

No. of fetal cells/hpf = 3

No. of maternal cell/hpf = 600

The estimated fetal blood loss is about

- A. 25 ml
- B. 35 ml
- C. 50 ml
- D. 65 ml
- E. 70 ml

The correct response is A.

Solution:

$$\frac{\text{No of fetal cells}}{\text{No of maternal cells}} \times 100$$

$$= 3/600 \times 100 = 0.5 \% \text{ (1\% = 50 ml)}$$

$$0.5\% = 25 \text{ ml}$$

Q 2:

A 32-year-old woman had a late US which showed twin pregnancy. There is discordant growth between the fetuses. You suspect TTTS. At delivery, you note that one baby is plethoric weighing 3.6 kg. His cord hematocrit is 86%. You immediately obtain a central hematocrit which is reported as 78%. You decide to do a partial exchange transfusion. Which one of the following is the most appropriate choice?

- A. 65 ml albumin
- B. 75 ml D10W
- C. 85 ml NS
- D. 90 ml D5 W
- E. 95 ml plasma

The correct response is C.

Solution:

Partial exchange volume = $\frac{\text{Observed hematocrit} - \text{desired hematocrit} \times \text{blood volume}}{\text{Observed hematocrit}}$

$$78 - 55 / 78 \times BV = 0.29 \times 80 \times 3.6 \text{ (BV = 80 ml x weight)} = 85 \text{ ml}$$

Q 3:

While removing an umbilical arterial line a term 3.5 kg infant with an initial hematocrit of 45, there is excessive blood loss from the umbilical artery. The following morning the infant is pale and tachycardiac. His hematocrit is 25. The infants estimated blood loss is close to

- A. 30 ml
- B. 40 ml
- C. 100 ml
- D. 160 ml
- E. 240 ml

The correct response is B.

Solution:

Estimated blood loss = $\frac{\text{Initial hematocrit} - \text{final hematocrit} \times \text{blood volume}}{\text{Mean hematocrit}}$

Mean HCT = $45 + 25 / 2 = 35$

Blood volume in term = 80 ml/kg (for preterm infant use 100 ml/kg)

Estimated blood loss = $45 - 25 / 35 \times 80 \times 3.5 = 160 \text{ ml}$

Q 4:

A 1.5 kg preterm infant is noted to have a Hct of 20%. He is tachycardiac and having frequent desaturations. You want to raise the Hct to 35%. The PRBC sent by the blood bank has Hct of 70%. How much PRBC (approx.) you will give to the infant

- A. 15 ml
- B. 20 ml
- C. 25 ml
- D. 30 ml
- E. 35 ml

The correct response is D.

Solution:

PRBC needed = $\frac{\text{Desired Hct} - \text{observed Hct}}{\text{Hct of blood}} \times \text{BV (100 ml x wt)}$, use 80 ml for term infants

$$35 - 20 / 70 \times 100 \times 1.5 = 32 \text{ ml}$$

Q 5:

A preterm infant who weighs 1 kg has received 5 PRBC transfusions of 10ml/kg in 2 weeks. The extra iron he received from these PRBC is close to

- A. 10 mg
- B. 25 mg
- C. 50 mg
- D. 75 mg
- E. 100 mg

The correct response is C.

Solution: 1 ml of PRBC = 1 mg of iron

5 PRBC 10 ml/kg = 50 ml = 50 mg

Q 6:

A 2-kg preterm infant receives 10ml/kg PRBC for Hb of 7 g/dl. The expected Hb post-transfusion will be close to

- A. 8 g/dl
- B. 10 g/dl
- C. 13 g/dl
- D. 16 g/dl
- E. 18 g/dl

The correct response is C.

Solution:

1 ml of PRBC raises Hct by 1%

10 ml by 10% (Hb is $1/3^{\text{rd}}$ of Hct; 1g Hb = 3 % Hct, so 10 % Hct = 3 g Hb)

PRBC volume received = 10 ml/kg = 10 x 2 = 20 ml

20 ml will raise the Hct by 20% or Hb by 6 g (10% = 3 g Hb)

So, 7 + 6 = 13 g

Q 7:

A 3-kg term infant receives 10ml/kg PRBC (Hct =70%) for hematocrit of 20%. The expected post-transfusion hematocrit will be close to

- A. 25 %
- B. 28%
- C. 32%
- D. 35%
- E. 38%

The correct response is B.

Solution:

Formula:

$$\text{PRBC (vol in ml)} = \frac{\text{final Hct} - \text{observed Hct}}{\text{Hct of blood}} \times \text{BV}$$

$$30 (10/\text{kg}) = \frac{\text{final Hct} - 20}{70} \times 80 \times 3 (80 \text{ ml/kg blood volume})$$

$$30 \times 70 = \text{final Hct} - 20 \times 240$$

$$\frac{2100}{240} = \text{final Hct} - 20$$

$$8.75 = \text{final Hct} - 20 \text{ or final Hct} = 8.75 + 20 = 28.75$$

Q 8:

A 3-kg term infant was noted to have a hematocrit of 20%. How much blood is needed to raise the hematocrit to 30% (PRBC Hct =70%)?

- A. 20 ml
- B. 25 ml
- C. 30 ml
- D. 35 ml
- E. 40 ml

The correct response is D.

Solution:

Formula:

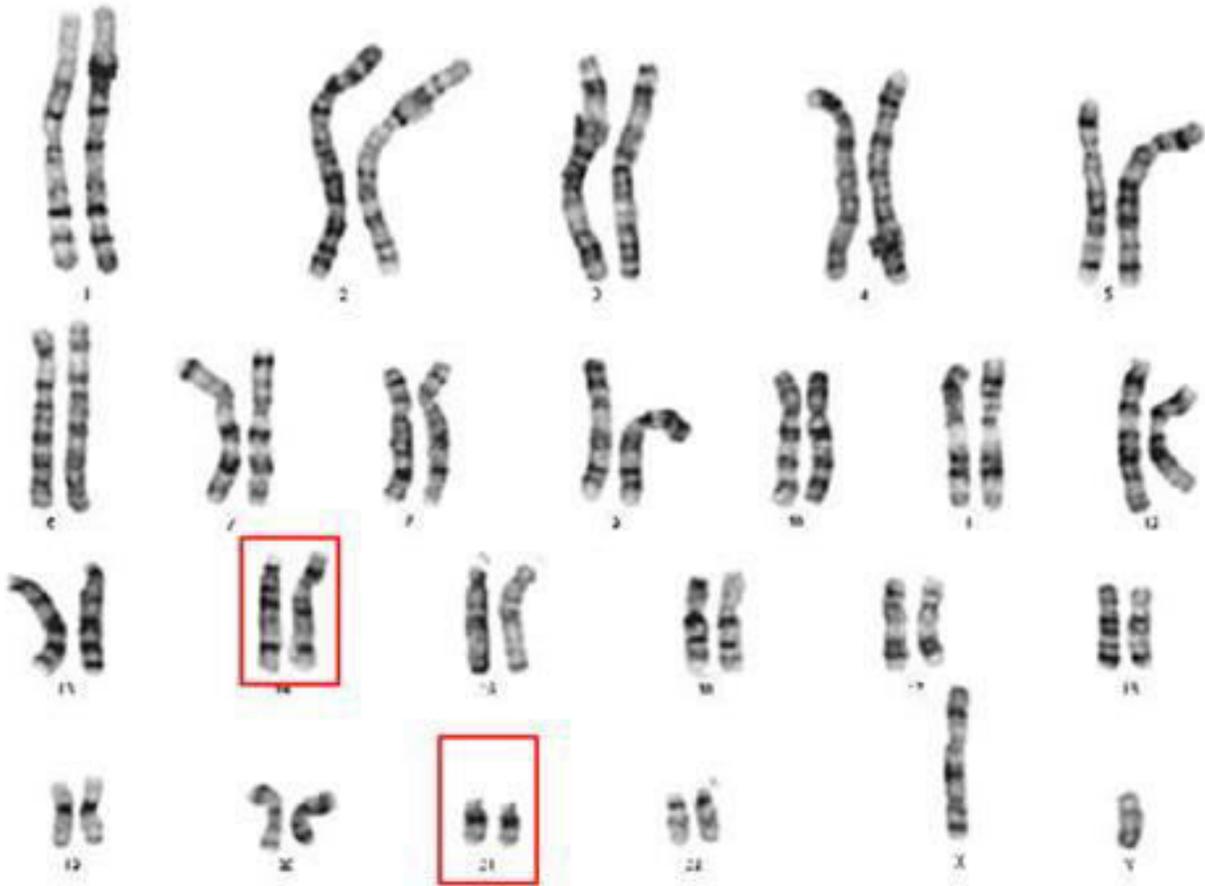
$$\text{PRBC (vol in ml)} = \frac{\text{final Hct} - \text{observed Hct}}{\text{Hct of blood}} \times \text{BV}$$

$$\text{PRBC} = \frac{30 - 20}{70} \times 80 \times 3 \text{ (80 ml/kg blood volume)}$$

$$\text{PRBC} = 10/70 \times 240 = 34 \text{ ml}$$

GENETICS

Q 1:



The male infant had dysmorphic features. The best advice to mom who is 18-year-old is

- A. The risk of having the same problem in next pregnancy is ~1%
- B. Because of her age, she is very less likely to have abnormal fetal chromosomes
- C. Father should be tested for karyotype
- D. This infant will need correction glasses early in life
- E. The infant will need some sort of assistance in walking

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the recurrence risk of Down syndrome.

Critique:

C is the best choice as this is 14:21 Robertsonian translocation. The risk would 1% for trisomy 21 (47 XY + 21). For Robertsonian translocation between 14:21 the risk is 10-15% if mom is affected and 5% for father. DS infants are not at high risk for myopia or gait problems.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 165

Q 2:



This condition occurs at what gestational age

- A. 6 wks
- B. 12 wks
- C. 18 wks
- D. 24 wks
- E. 34 wks

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the time frame of common congenital malformation.

Critique:

A is the best choice. This is syndactyly. It occurs at 6 wk.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (Eds). Mosby 2006: pg 134

Q 3:

You are called to see a term neonate at 3 minutes of life. The baby is breathing spontaneously and noted to have a soft baggy mass on the posterior aspect at the junction of neck & head. Abdomen looks distended and firm mass palpated bilaterally in the flank region. Limbs are well formed however extra digits are noted bilaterally. The most like mode of transmission of this condition is

- A. Spontaneous mutation
- B. Aneuploidy syndrome
- C. Autosomal dominant
- D. Autosomal recessive
- E. Infectious process

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the mode of inheritance of common syndrome.

Critique:

D is the best choice. The case is a classical description of Meckel Gruber syndrome.

Reference:

Schwartz S. Genetic aspect of perinatal disease and prenatal diagnosis, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (Eds). Mosby 2006: 113-140

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003;Pg 163

Q 4:



On examination, this infant is noted to have hypoplastic nails. The other important finding is a murmur. Echo showed large ASD giving appearance of single atrium. The most likely diagnosis is

- A. Edward syndrome
- B. Fetal alcohol syndrome
- C. Fetal hydantoin syndrome
- D. Ellis-van Creveld syndrome
- E. Smith-Lemli Optiz syndrome

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the D/D of hypoplastic nails-association with syndrome

Critique:

The combination of nail and specific echo findings favors the diagnosis of Ellis-van Creveld syndrome.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 174

Q 5:



This condition is highly associated with

- A. VSD
- B. Microdeletion
- C. Mental retardation
- D. Bleeding diathesis
- E. Pancytopenia

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the characteristics of TAR syndrome and differentiate it from Fanconi anemia.

Critique:

In TAR TOF is common not VSD, its AR, no MR, low platelets (bleeding) –as the name said TAR, pancytopenia would be characteristic of Fanconi.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1340

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 294

Q 6:

The risk of similar birth defect in the second infant is highest with

- A. VSD
- B. Hypospadias
- C. Club feet
- D. Cleft lip
- E. Cleft palate

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the risk of similar defect (for multi-factorial disorder).

Critique:

Cleft palate relative risk is 44 (9-134)

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 264

Q 7:

Which of the following malformation occurs earliest in development?

- A. Cleft lip
- B. Omphalocele
- C. Anencephaly
- D. Hypospadias
- E. Syndactyly

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the time frame of common malformation.

Critique:

Anencephaly 3-4 wks, syndactyly 6 wks, Cleft lip 5-7 wks, Omphalocele 10 wks, Hypospadias 12 wks

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 134

Q 8:

The nurse calls you to see a baby as she cannot pass the NG tube through the nose. On exam, you noticed down slanting palpebral fissure and syndactyly. The most likely diagnosis is

- A. CHARGE association
- B. Apert syndrome
- C. Crouzon syndrome
- D. Zellweger syndrome
- E. Treacher-Collins syndrome

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the clinical signs of Apert syndrome and its DIFFERENTIAL DIAGNOSIS with others.

Critique:

Apert syndrome: choanal atresia, syndactyly, down slanting eyes.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 170

Q 9:

Down syndrome is characterized by

- A. Neutrophilia < thrombocytopenia
- B. Polycythemia > thrombocytopenia
- C. Hypoglycemia > hypothyroidism
- D. VSD > AV canal defect
- E. Disjunction > translocation

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the clinical, lab and genetical aspects of Down syndrome.

Critique:

DS is characterized by neutrophilia > thrombocytopenia > polycythemia, hypothyroidism, AV canal defect, disjunction 94%, translocation 4%

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 167

Hematology lecture, NeoPREP, Atlanta 2007

Q 10:

Advanced paternal age is associated with all EXCEPT

- A. Apert syndrome
- B. Treacher Collins syndrome
- C. Marfan syndrome
- D. Waardenburg syndrome
- E. Angelman syndrome

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the association of advanced paternal age to some common syndromes

Critique:

Angelman syndrome is caused by microdeletion. The deleted piece is always maternal. All other syndromes are associated with advanced paternal age.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; 133-136

Q 11:

A tall man suffering from Marfan syndrome marries a tall lady later diagnosed to have Marfan syndrome as well. Their first child was normal. What is the risk of second child of having Marfan syndrome?

- A. 25%
- B. 50%
- C. 75%
- D. 100%
- E. Cannot be estimated

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the recurrence risk in dominant diseases

Critique:

Aa -----Aa (A- dominant gene)

Possibilities: AA, aa, Aa, Aa ($3/4 = 75\%$)

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 162-63

Q 12:



The finding shown above is associated with

- A. Fanconi syndrome
- B. Carpenter syndrome
- C. Ellis-van Creveld syndrome
- D. TAR syndrome
- E. Holt-Oram syndrome

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know about association of absent thumb with certain syndromes.

Critique:

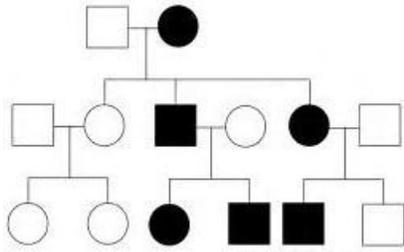
Fanconi anemia not syndrome may be associated with absent thumb.

Carpenter- syndactyly & polydactyly; Ellis-van- polydactyly, TAR- absent radius.

Reference

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 171-75

Q 13:



True statement about this pattern of pedigree is

- A. Males are more affected than female
- B. Females transfer the disease more than the males
- C. The affected individual would have same defective genetic code
- D. The affected individual would have different phenotypes
- E. The recurrence risk is 25 % with each pregnancy

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know about pedigree of autosomal dominant diseases.

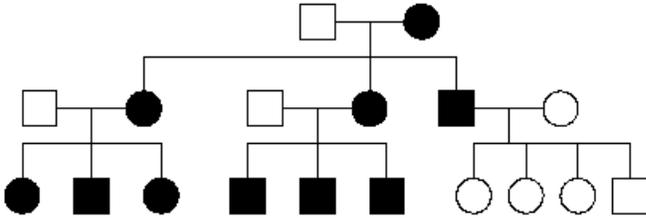
Critique:

AD – male female equal, both can transfer, affected individual same phenotype, recurrence risk is 50%.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 162

Q 14:



This pedigree is characteristic of

- A. Autosomal dominant inheritance
- B. X-linked dominant inheritance
- C. Mitochondrial inheritance
- D. X-linked recessive inheritance
- E. Erroneously drawn pedigree

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the pedigree of mitochondrial inheritance

Critique:

Male female equally affected but only females transferred the disease (note that in generation 2)

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 164

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 124-25

Q 15:

You are provided with the genetic report which states 46 XY del (15) (q12) (mat). This baby would have

- A. Ambiguous genitalia
- B. Small hands
- C. Cardiac murmur
- D. Severe hypotonia
- E. Mental deficiency

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the nomenclature of genetic expression

Critique:

This is Angelman syndrome. Severe mental deficiency is associated with this syndrome.

Prader Willi syndrome would be del 15 q 12 (pat) is associated with small hands

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 168-69

Important Calculations

Q 1:

The incidence of an autosomal recessive disorder in a population is 1 in 3600. The carrier frequency of that disease for the given population would be

- A. 1 in 1800
- B. 1 in 160
- C. 1 in 90
- D. 1 in 60
- E. 1 in 30

The correct response is E.

Solution:

Hardy-Weinberg Principle: $p^2+2pq+q^2=1$

q is the affected allele frequency (p for unaffected)

The incidence is $1/3600$ so $q^2 = 1/3600$ or $\sqrt{q^2} = \sqrt{1/3600}$ (squaring both sides)

Or $q = 1/60$

Carrier frequency is $2pq$ (p is usually 1) = $2 \times 1/60 \times 1 = 1/30$

Q 2:

The incidence of an autosomal recessive disorder in a population is 1 in 2500. The carrier frequency of that disease for the given population would be

- A. 0.0004
- B. 0.004
- C. 0.04
- D. 0.02
- E. 0.01

The correct response is C.

Solution:

Hardy-Weinberg Principle: $p^2+2pq+q^2=1$

q is the affected allele frequency (p for unaffected)

The incidence is 1/2500 so $q^2 = 1/2500$ or $\sqrt{q^2} = \sqrt{1/2500}$ (squaring both sides)

Or $q = 1/50$

Carrier frequency is $2pq$ (p is usually 1) = $2 \times 1/50 \times 1 = 1/25$ or 0.04

Q 3:

The incidence of an autosomal recessive disorder in a population is 1 in 2500. The allele frequency of that disease for the given population would be

- A. 0.0004
- B. 0.004
- C. 0.04
- D. 0.02
- E. 0.01

The correct response is D.

Solution:

Hardy-Weinberg Principle: $p^2+2pq+q^2=1$

q is the affected allele frequency (p for unaffected)

The incidence is 1/2500 so $q^2 = 1/2500$ or $\sqrt{q^2} = \sqrt{1/2500}$ (squaring both sides)

Or $q = 1/50$ or 0.02

Q 4:

A pregnant lady is worried about the risk of her child being affected with an autosomal recessive disorder. Her sister and one brother have the disease. The disease has a heterozygote carrier rate of 1 in 25. Her husband's family has no history of this disease. The risk of this baby having the disease is close to

- A. 1 in 2500
- B. 1 in 1500
- C. 1 in 150
- D. 1 in 100
- E. 1 in 25

The correct response is C.

Solution:

Chance of recessive disease x carrier rate for heterozygote x carrier rate for homozygote

$$\frac{1}{4} \times \frac{1}{25} \times \frac{2}{3} = \frac{1}{150}$$

IMMUNOLOGY

Q 1:

A 21-day-old male infant presents with history of recurrent oral thrush and eczematous skin rash. The WBC counts are persistently low with normal morphology. Nitro blue tetrazolium test is negative. The most likely diagnosis is:

- A. Severe combined immunodeficiency
- B. Chronic Granulomatous Disease
- C. Leukocyte Adhesion Defect
- D. Bruton's disease
- E. Chediak Higashi syndrome

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the differential diagnosis of recurrent infection.

Critique:

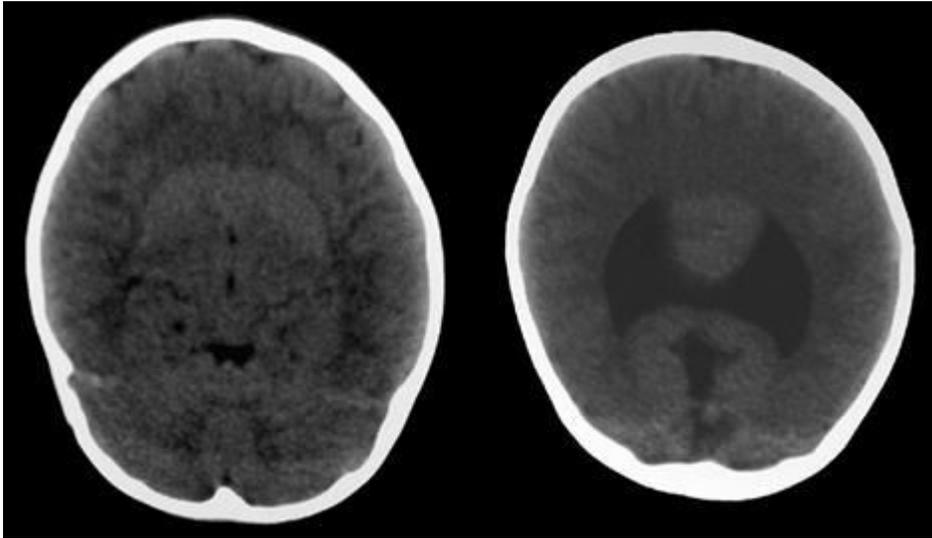
A is the best choice. Negative NBT test rules out CGD. Normal WBC morphology rules out CHS and low WBCs rules out LAD. Brutons disease although likely in male infant (X-linked) but usually manifest later (mom IgG are protective for first few months)

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 212-213

CENTRAL NERVOUS SYSTEM

Q 1:



This CT is obtained from a neonate with who presents with severe hypotelorism. The true statement about this condition are all EXCEPT

- A. Mental retardation is common
- B. Endocrine disorder should be expected
- C. Transillumination could be positive
- D. Associated with chromosomal abnormalities
- E. It occurs in neurulation phase of CNS development

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the clinical and radiological findings of holoprosencephaly sequence.

Critique:

E is the best choice. Holoprosencephaly occurs in ventral induction phase.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 127

Q 2:

Cerebral blood flow decreases with all EXCEPT

- A. Decrease $p\text{CO}_2$
- B. Increase $p\text{O}_2$
- C. Increase serum glucose
- D. Increase fetal Hb
- E. Polycythemia

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the factors affecting cerebral blood flow.

Critique:

D is the best choice. Increase fetal Hb increases CBF.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 128

Q 3:

A 10-day old infant is ventilator dependent. He has no pulmonary disease however required ventilatory support to keep PCO₂ within normal limits. His generalized tone is low with weak reflexes. Muscle biopsy showed no inflammatory cells and normal blood vessels. Other test on muscle biopsy specimen: NADH-dehydrogenase normal oxidative enzyme activity, acid phosphatase normal, PAS & Oil O Red stains normal Cytochrome c-oxidase no activity. Muscle fibers showed random atrophy with no degeneration with normal internal nuclei. The most likely diagnosis is

- A. Myotonic dystrophy
- B. Muscular dystrophy
- C. Myotubular myopathy
- D. Primary carnitine deficiency
- E. Mitochondrial myopathy

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the muscle biopsy findings in different myopathies

Critique:

This is a case of Leigh syndrome. Clue is no activity to cytochrome oxidase.

Biopsy is essentially normal.

Myotubular myopathy would have large fibers, centrally placed nuclei

Myotonic dystrophy: small fibers, centrally placed nuclei

SMA: hypotrophy fascicles with hypertrophy fascicles

Muscular dystrophy: replacement by fat, conn tissue, peri placed nuclei

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 980-88

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 145-48

Q 4:

The antenatal US demonstrate 'banana sign'. The true statements about this finding are all EXCEPT

- A. It is seen in spina bifida
- B. It is associated with Arnold-Chiari malformation
- C. 'Banana' is the dilated cisterna magna
- D. 'Banana' is the compressed cerebellum
- E. It is often seen with the 'lemon sign'

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the antenatal US (banana and lemon signs)

Critique:

Lemon sign suggests head compression due to CSF leak and banana sign is seen due to compressed cerebellum.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 16

Q 5:

A 32 wks preterm infant had head circumference of 30 cm at birth and today at day 7 head measures 29 cm measured by 3 nurses. The best intervention is

- A. Obtain CUS
- B. Obtain CT brain
- C. Order skull x-rays
- D. Repeat HC yourself
- E. Reassure the parents

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the criteria for diagnosis of microcephaly.

Critique:

This is normal due to resolution of edema and soft tissue swelling.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 989

Q 6:



This 12-day-old infant had tracheostomy due to severe hypotonia and high PCO_2 . Mom gave history of having difficulty in doing daily chores. The antenatal history is positive for polyhydramnios and decreased fetal movement. Antenatal US showed nuchal lucency of 3.2 mm. Serum lactate is 1.8, ammonia is 54, CPK is 12. Muscle biopsy is pending. The most likely cause for this condition in the infant is

- A. Degeneration of anterior horn cells
- B. Altered muscle protein with dysfunctional Na-K channel
- C. Immune process involving neuromuscular junction
- D. Genetic defect of neuromuscular junction
- E. Chromosomal aberration

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the DIFFERENTIAL DIAGNOSIS of hypotonia.

Critique:

As mother is affected, DIFFERENTIAL DIAGNOSIS is myotonic dystrophy or myasthenia. As infant is 12 day old, myasthenia is less likely. In myotonic dystrophy, the defect is dysfunctional Na-K channel. SMA 1 is less likely as it is AR and parents are normal.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 976-988

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 145-48

Q 7:

A 37 wks IUGR infant failed hearing screening x 2. The BAER study showed stimulus threshold of 80 decibels bilaterally consistent with severe sensorineural hearing loss. This baby was delivered in the ER. The Apgar score was 1/3/5/7. The infant required PPV for 3 minutes. The cord blood gas showed a pH of 7, BE of -16. The mother urine was positive for cocaine and opiates. Her serology was positive for rubella. The postnatal course of the baby was complicated by hyperbilirubinemia and streptococcus pneumonia meningitis, treated for 21 days with ampicillin. MRI scan of brain, EEG and neurological exam is unremarkable. The most likely cause for abnormal BAER test is

- A. Streptococcal meningitis
- B. Hyperbilirubinemia
- C. Congenital infection
- D. Perinatal asphyxia
- E. Exposure to drugs

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know about BAER and factors affecting it.

Critique:

With normal neuro exam, EEG and MRI- ABCD are less likely. Cocaine is known to affect BAER & so is the choice here.

Reference

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 743-47

Q 8:

CSF report: Colorless, RBC 540, WBC 12 (51% lymph), glucose 9, protein 427. This CSF specimen is most likely obtained from

- A. A preterm infant with post-hemorrhagic hydrocephalus
- B. A premature infant with grade I hemorrhage
- C. A term infant with viral meningitis
- D. A term infant with bacterial meningitis
- E. A term infant with perinatal asphyxia

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of CSF.

Critique:

IVH gr 1 would not have high protein, meningitis would have high WBCs (12 is normal). Asphyxia is less likely to give his CSF picture.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 133-34

Q 9:

Change in the head shape mostly seen now in premature babies following AAP recommendation of sleep is

- A. Scaphocephaly
- B. Dolichocephaly
- C. Plagiocephaly
- D. Brachiocephaly
- E. Trigonocephaly

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the shapes of head.

Critique:

Deformational plagiocephaly due to 'back to sleep' program from AAP.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1013

Q 10:



This newborn baby is delivered vaginally with breech presentation at term. He was noted to have difficulty in breathing soon after birth. Antenatal history was positive for polyhydramnios. The next important step in confirming the diagnosis is

- A. Passage of NGT to stomach
- B. Esophagram
- C. Echocardiogram
- D. Chromosomal analysis
- E. Electromyography

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the antenatal and postnatal signs of SMA.

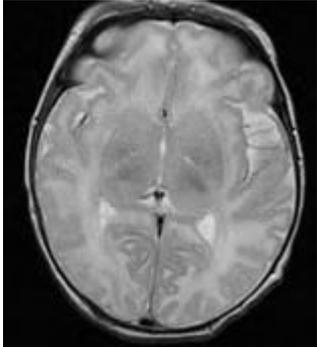
Critique:

Spinal muscular atrophies present with hypotonia and classic bell-shaped chest. EMG shows abnormal activity with fibrillation. Fetal akinesia is a key feature with polyhydramnios.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 978

Q 11:



This MRI is taken from a neonate who presented with rhythmic movement of right arm and legs. Baby was born by CS with Apgar of 8/9. The serum glucose was 49 mg/dl, Ca 7.9 mg/dl, iCa 1.2 mmol/L, Mg 2.1 mg/dl. The most important information that would help in diagnosis is history of

- A. Hearing loss in the family
- B. Early neonatal death
- C. Mom with seizure disorder
- D. Mom with vesicular lesions on the breast
- E. Mom with pulmonary embolism

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the signs of stroke and DIFFERENTIAL DIAGNOSIS of neonatal seizure.

Critique:

Seizure is due to ischemic stroke (note increase white signal on L side) secondary to factor V Leiden mutation. Maternal history of pulmonary embolism is the clue here (Autosomal dominant). HSV could be considered in DIFFERENTIAL DIAGNOSIS but its genital lesions rather than lesions on breast.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 934-37

Q 12:

A female newborn is delivered at the regional hospital to healthy non-consanguineous parents. The antenatal history was uneventful except for polyhydramnios. She was born at 38 weeks of gestation, with a birth weight of 2650 grams. The birth was a normal spontaneous delivery, with Apgar scores of 9 at 1 and 5 minutes. No dysmorphic features were noted. After initiation of feeding, increasing lethargy with poor feeding was observed at 24 hours. She became floppy with diminished response to painful stimuli. She was also noted to have a weak cry, repeated hiccups and paucity of movement. Electroencephalography on day 5 of life showed burst-suppression pattern compatible with encephalopathy. No hypoglycemia or metabolic acidosis was noted. The serum levels of ammonia, lactate and pyruvate were normal. Urine for ketones, reducing substances were negative and urinary organic acids were of normal pattern. The next best action is to obtain

- A. Eye exam
- B. Chromosomal analysis
- C. Skin biopsy with fibroblast culture
- D. Quantitative amino acid
- E. Urine for pipercolic acid

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the spectrum of presentation of metabolic disorder.

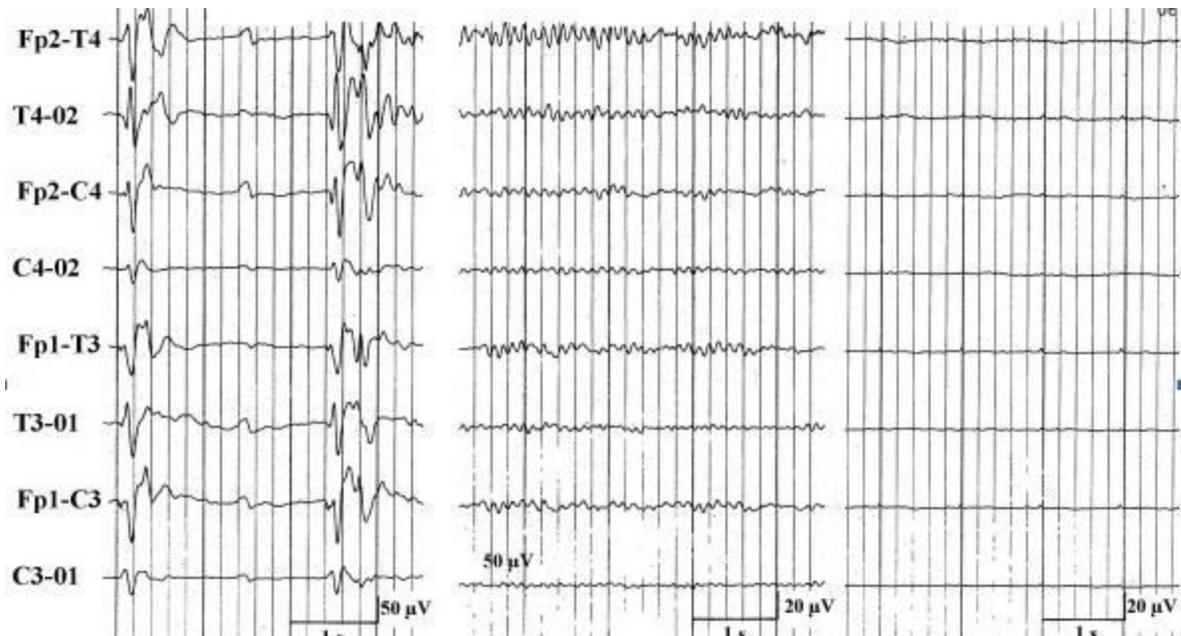
Critique:

Hiccups and EEG changes are classic of non-ketotic hyperglycinemia.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003;Pg 335-36

Q 13:



These sequential EEGs are taken from days 1-5 on a 42 wks infant with acute onset seizure. The true statement about the EEG pattern is

- A. Alpha waves predominate the EEG
- B. Background pattern is reassuring
- C. The EEG is suggestive of status epilepticus
- D. The EEG is isoelectric all along
- E. The outcome is poor basing on this EEG

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of EEG in neonatal seizure.

Critique:

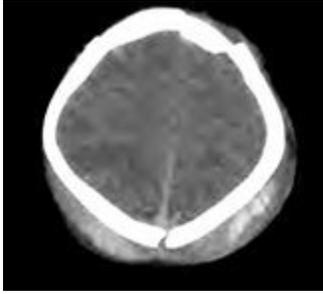
Alpha waves are high frequency waves seen in adults. Burst suppression is noted first followed by isoelectric EEG, an ominous sign. In status, continuous spikes are seen.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 956-76

<http://www.emedicine.com/neuro/TOPIC699.HTM>

Q 14:



This CT scan is taken at 6hr of age. The finding displayed is most likely associated with all EXCEPT

- A. Hb of 7 g/dl
- B. Bili of 7 mg/dl
- C. Skull fracture
- D. Prolong labor
- E. Labor instrumentation

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the different types of external hemorrhages.

Critique:

The scan shows sub-galeal bleed seen bilaterally. Fracture is rare in sub-galeal bleed. The soft tissue swelling is crossing the suture line, less likely to be a cephalohematoma (fracture occurs ~ 30%).

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003;Pg 143

Q 15:

All are features of bilateral right-sidedness EXCEPT

- A. Asplenia
- B. Interrupted IVC
- C. 3-lobed left lung
- D. Dextrocardia
- E. Need for prophylactic antibiotics

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the characteristics of asplenia and polysplenia.

Critique:

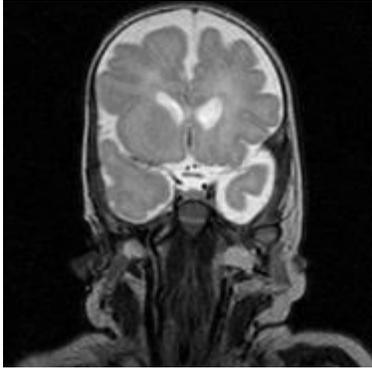
Right-sidedness means spleen absent so need for ABx, 3-lobed left lungs, Dextrocardia. Interrupted IVC is characteristics of left-sidedness or polysplenia.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1243

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 105

Q 16:



The MRI picture is suggestive of

- A. Lissencephaly
- B. Hydranencephaly
- C. Brachiocephaly
- D. Schizencephaly
- E. Micrencephaly

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the MRI findings in different neuronal diseases.

Critique:

Lissencephaly is smooth brain, schizencephaly partial absence of the cortex, hydranencephaly is CSF filled brain cavity with no brain tissue, brachiocephaly is due to premature closure of coronal sutures - all not seen in the MRI. The brain volume is reduced favoring E as the diagnosis.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 990-95

Q 17:

A 10-day-old infant is presented with poor feeding and progressive weakness. Examination showed a well-built infant with poor tone and bilateral ptosis. Chest is clear and no murmur heard. The pregnancy and delivery was uncomplicated. Family history is negative for any neurological disorder. Mother is 20-year-old and is in good health. She has a 3-year-old son who is also healthy. The next action to reach to the diagnosis would be to

- A. Obtain stool for toxin analysis
- B. Obtain barium enema using gastrograffin
- C. Obtain serum anti AChR antibody titer
- D. Schedule for muscle biopsy
- E. Perform MRI of brain and spine

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the clinical presentation & diagnosis of botulism.

Critique:

Classic presentation of botulism.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 819-20

Q 18:

Which of the following Cerebral palsy type is most likely associated with intrapartum asphyxia

- A. Dyskinetic CP
- B. Ataxic CP
- C. Hemiplegic CP
- D. Diplegic CP
- E. Quadriplegic CP

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the types of CP and association with HIE.

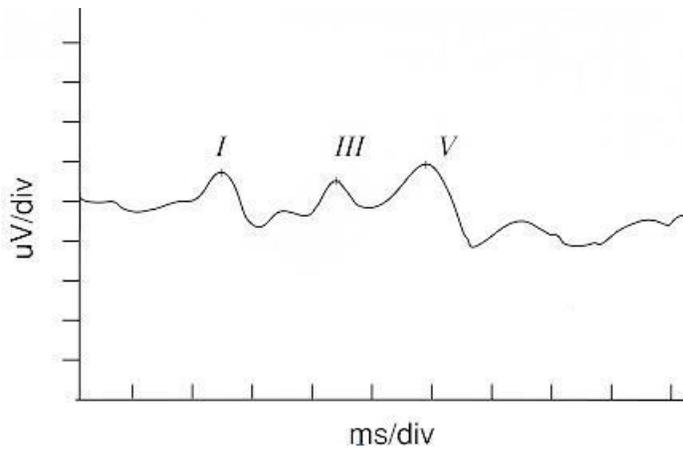
Critique:

Quadriplegic and less commonly dyskinetic CP are the only types associated with HIE.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 179

Q 19:



The above brainstem auditory evoked response (BAER) is obtained from a neonate who failed hearing screening at discharge. The action potential (AP) generated at different level of auditory pathway is represented by roman numbers. The true statement about the BAER is all EXCEPT

- A. Wave pattern is normal
- B. Wave I represent AP in VIII nerve
- C. Wave III represents AP at the level of superior olive
- D. Wave V represents AP at the level of auditory cortex
- E. Wave latencies appear normal

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the appearance and significance of wave form in BAER.

Critique:

Wave V at the level of brain stem not cortex. All other statements are true

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 947

Q 20:

A preterm 26 wks infant has abnormal CBC with bands of 35 %. Because of the high bands, blood culture (Cx) and CSF Cx were done. Both CSF and blood Cx grew *Flavobacterium meningosepticum*. The vital signs are: Temp 100.4, BP 92/64, HR 210/ min, RR 40-55/min, Sats 92-95 %. On examination baby look irritable with flushed face. The muscle tone is increased and a soft murmur is heard. The next step in the management is to

- A. Obtain Echo to rule out vegetations
- B. Apply ice pack on baby's face
- C. Give tylenol 10 mg/kg
- D. Give phenobarb 20 mg/kg
- E. Given fentanyl 2 mic/kg

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the subtle nature of seizures in neonates.

Critique:

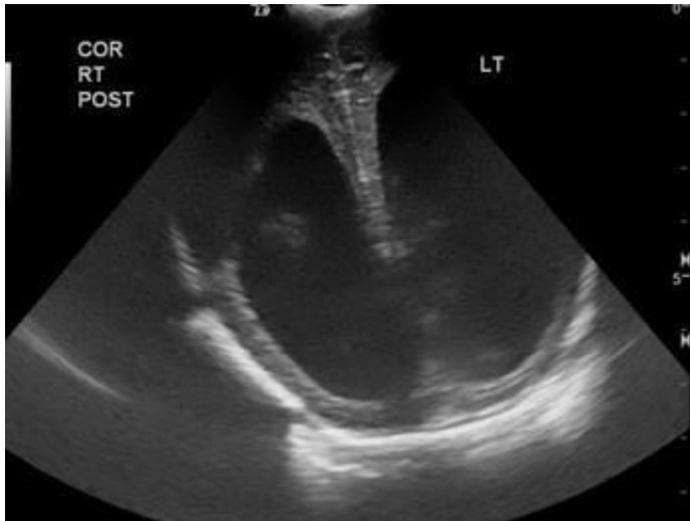
The infant is irritable with increase tone and tachycardia- these are signs of subtle seizure. Vegetations are too early to develop, HR is 210 no signs of SVT. Tylenol and fentanyl may help reducing the irritability but Phenobarb is best choice.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 956

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 148-50

Q 21:



This preterm infant underwent ventricular tap. The neurosurgeon removed 32 ml of CSF and sent it for analysis that showed protein of 427 mg/dl, glucose of 13 mg/dl and gram stain negative. The true statements about this infant are all EXCEPT

- A. The amount removed is equal to the total CSF volume of normal preterm infant
- B. Ventricular access device (VAD) is preferable to intermittent needle tap
- C. The observed hypoglycorrhacia may be due to history of IVH
- D. This infant might also benefit from acetazolamide therapy
- E. The high protein suggests the need for VP shunt earlier than later

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the CSF features of post hemorrhagic hydrocephalus

Critique:

High CSF protein would clog the shunt, so shunt should be delayed till CSF protein comes down.
All other statements are true.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; 133-136

Q 22:



The true statement about the condition displayed in the picture is

- A. It is right anterior plagiocephaly caused by fusion of right coronal suture
- B. It is right lambdoid synostosis caused by fusion of right lambdoid suture
- C. It is right anterior plagiocephaly caused by fusion of right lambdoid suture
- D. It is right posterior plagiocephaly caused by sleeping on the back
- E. None of the above is true description of the picture shown

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know about head shapes and craniosynostosis

Critique:

The picture displays deformation plagiocephaly.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1013

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 129-30

Q 23:

A 7-old infant with positive opiates test in meconium and urine is stable on formula feeds. His mean neonatal abstinence score (Finnegan score) is 11, 10, 9, 8 and 7 for last 5 days respectively. The best course of action is to

- A. Stop Finnegan scoring
- B. Continue Finnegan scoring but decrease frequency
- C. Start methadone 0.1 mg/kg q 12 hr
- D. Start paregoric 0.1 ml/kg q 4 hr
- E. Start phenobarbitone 3 mg/ kg q 12 hr

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the NAS

Critique:

As scores are trending down medications are not needed. A score of 7 warrants further observation so stopping NAS completely is not the right choice.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 750-51

Q 24:

Hearing screen is being mandated in almost all States. Auditory brain response (ABR) and Otoacoustic emission (OAE) are used as hearing screen tests. The true statement about these hearing screening tests is

- A. Both tests have relatively low sensitivities
- B. ABR is affected by middle ear fluid more than OAE
- C. ABR is sensitive to acoustic background noise
- D. OAE takes more time than ABR
- E. OAE detects hearing loss ranging from 500-2000 Hz

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the difference between ABR and OAE

Critique:

Both tests have high sensitivities. OAE is affected by fluid in ear. ABR take longer. OAE is not good for low frequency (500-2000Hz) range.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1046

Q 25:

The developmental FU clinic calls you to evaluate a 9-month-old baby noted to have increased muscle tone. On examination, you noticed the hypertonia with brisk reflexes. The infant cannot sit without support and have scissoring of legs when pull to stand. However, the infant interacts well with you and say mama/dada. You thought of CP and started going through the file. There was positive history of CMV in mom but no history of microcephaly, low platelets or IUGR in the baby. The Apgar was 3/5/9 and baby did receive phototherapy for 12 days. You are contemplating on the types of CP. The characteristics of extra-pyramidal CP are

- A. Delayed gross and fine motor, normal cognitive function
- B. Delayed gross motor, normal fine motor, normal cognitive function
- C. Delayed gross motor, delayed fine motor and abnormal cognitive function
- D. Normal gross motor, delayed fine motor, normal cognitive function
- E. Normal gross motor, normal fine motor, abnormal cognitive function

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the clinical spectrum of cerebral palsy

Critique:

Gross motor is affected in all types of CP. Fine motor in extrapyramidal. Cognition is generally normal in most CP except quadriplegic CP.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 152

Q 26:

Which of the following speech & language skill corresponds to a six-month-old infant?

- A. Startled by loud sounds
- B. Responds to name
- C. Says two words
- D. Follows commands
- E. Localizes sounds

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the developmental milestones

Critique:

Startled by loud sounds- 2 Months, Responds to name- 4 Months, Localizes sounds- 6 months, Says two words -10 Months, Follows commands- 12 Months,

Reference:

http://www.medem.com/MedLB/article_detailb.cfm?article_ID=ZZZILN5IQDC&sub_cat=105

<http://www.nidcd.nih.gov/health/voice/speechandlanguage.asp>

Q 26:

A term baby was transferred to your service for poor oral feeding. History was unremarkable. On examination, no dysmorphic features were noted. You tried changing formulas but nothing seems to work and baby remains on gavage feeds, which are tolerated well. You consulted speech therapist and she suggested swallow studies which showed mild GER. You order brain MRI which revealed absent septum pellucidum, no other defects are noted. However, radiologist advised 'to correlate with clinical findings'. You go ahead to counsel the mom about the findings. You will tell her that her baby is at risk of developing

- A. Hearing problems
- B. Speech delays
- C. Vision problems
- D. Motor delays
- E. Learning problems

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the association of absent septum pellucidum

Critique:

Optic N hypoplasia is associated with absent septum pellucidum (DeMorsier syndrome)

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 992

Q 37:

A term male baby was born to consanguineous parents. The baby on day 2 of life had tonic seizure. You placed the baby on amplitude integrated EEG which was inconclusive. The head CT showed absent corpus callosum. You repeated the EEG which showed burst suppression pattern. The labs are as follows

CBC: WBC 9, Bands 4, segs 56

Na 138, K 3.9, Cl 99, HCO₃ 20, anion gap 19

Ammonia 54, Lactate 1.6

pH 7.34, PCO₂ 46

The next most important step in management is to obtain

- A. Urine organic acid
- B. Serum amino acid
- C. CSF PCR for HSV
- D. Neurology consult
- E. Genetic consult

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the differential diagnosis of Seizure and agenesis of corpus callosum

Critique:

This is a case of non-ketotic hyperglycinemia. Elevated serum glycine will clinch the Dx.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 336

ENDOCRINOLOGY

Q 1:

A 26-day old preterm infant is receiving expressed breast milk. Mom is a strict vegetarian and she refused adding any Vitamin supplement to the milk. The bone profile test obtained on the infant showed Ca 8.5, Phos 3.4 Alk Phos 1200. The most likely cause for this finding is

- A. Vitamin D deficiency (Rickets)
- B. Osteopenia of prematurity (Metabolic bone disease)
- C. Transient hypoparathyroidism
- D. Iatrogenic hypophosphatemia
- E. Normal labs for the age

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the lab picture of Osteopenia of prematurity.

Critique:

The lab value is classic of OOP/ metabolic bone disease.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1521-1523

Q 2:

The nurse from the newborn nursery calls you about a 16 hrs old baby whose glucose is 30 mg/dl. He is being fed by breast and mom who is gravida 5 para 4 is happy with the amount. The delivery was uncomplicated with Apgar of 9/9. The birth weight was 2.8 kg. On exam you note slight jitteriness, fair muscle tone, soft non-distended abdomen, mild tachypnea, no murmur and normal male genitalia with penis of 3 cm and bilateral descended testes. His lab shows normal CBC. Na =135, Cl= 95, K =4.5, HCO₃ =9, BUN= 12, creatinine 0.8. The most appropriate initial test that would help in diagnosis is:

- A. Serum C-peptide level
- B. Urine osmolality
- C. Urine ketones
- D. Brain MRI
- E. Glucagon stimulation test

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the differential diagnosis of hypoglycemia.

Critique:

The infant is AGA with very low HCO₃ suggesting metabolic condition. C-peptide is indicated in LGA suspected to have hyperinsulinism. Penile size is normal ruling out hypopituitarism. B and E are not indicated.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 317-18

Q 3:

A 5-day-old term newborn is NPO and receiving TPN via central line (D 10%, P 2g/kg/d, Lipids 2 g/kg/d, Ca 300 mg/kg/d, Phos 3 mEq/kg/d). He is noted to have persistent increase serum Ca. His morning labs are: Na 138, K 4.9, Cl 103, HCO₃ 23, gluc 90, BUN 20, Creatinine 0.2, Calcium 10.8 mg/dl, Phos 6.4 mg/dl, ionized Ca 1.3 mmol/L. Urine Ca 8.7 mg/dl, Urine creatinine 9.4 mg/dl. True statements about his condition are all EXCEPT

- A. The FeCa is > 1%
- B. Urine Ca: Creatinine ratio is abnormal
- C. Ionized Ca is normal
- D. Thiazide diuretic could be helpful
- E. High Ca is due to low phosphate

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the causes and treatment of hypercalcemia.

Critique:

FeCa is $UCa \times PCr / PCa \times UCr \times 100 = 1.7\%$, Ca: Cr ratio = 0.9 (> 0.2 abnormal). iCa 1.3 is normal. Thiazide increase Ca absorption is not calciuric. Phos is 6.4 which is normal.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 323

Q 4:

The nurse calls you with glucose of 230 mg/dl on a 2-day old preterm 675 gm infant. The infant is receiving TPN D10W Proteins 1.5g @ 5 ml/hr. The best strategy to control glucose intolerance is to

- A. Give insulin 0.1 U/kg IV x 1 dose and decrease the TPN rate to 3.5 ml/hr
- B. Give insulin 0.1 U/kg IV x 1 dose and decrease the dextrose concentration to 7.5 g%
- C. Give insulin 0.1 U/kg x 1 dose only if blood glucose is > 250 mg/dl
- D. Give insulin 0.1 U/kg x 1 dose only if urine glucose is positive
- E. Give no insulin but decrease rate to 4ml/hr and dextrose concentration to 7.5 gm%

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the treatment of hyperglycemia & calculate glucose infusion rate.

Critique:

$GIR = \text{conc} \times \text{rate} \times 0.167 / \text{wt} = 12 \text{ mg/kg/min}$, with 3.5 ml/hr GIR will be 8.7 and with 7.5% DW GIR will be 9.3. Infant is receiving ~ 180 ml/kg /day, so A is best choice.

Reference:

Gomella TL et al. Neonatology: management, procedures, on-call problems, diseases and drugs. Appleton & Lange 1999: pg 73

Young TE, Magnum B. Neofax, Thomson 2007; pg 314-15

Q 5:

A 3-day-old male infant is noted to have poor feeding & hypotonia. The birth history was significant for difficult labor with Apgar of 3/7. He is mildly tachypneic and CXR showed slightly enlarge cardiac silhouette. The serum glucose is 12 mg/dl and urine is positive for ketones. The most likely diagnosis is

- A. Glycogen storage disease type II
- B. Zellweger syndrome
- C. Leigh syndrome
- D. Primary carnitine deficiency
- E. Galactosemia

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the clinical presentation of GSD.

Critique:

Hypotonia with cardiomyopathy and low glucose is classic of GSD.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 988

Q 6:

You resuscitated a preterm newborn. His Apgar score was 3/4/7. He weighs 1.5 kg. He is NPO receiving D10W @ 5 ml/hr. His blood gas is 7.26/52/45/16/-9. His serum calcium is 6.0 mg/dl, ionized 2.5 mg/dl. The reasons for low Ca are all EXCEPT

- A. Increase calcitonin secretion
- B. Low Ca intake
- C. Prematurity
- D. Relative low PTH
- E. Acidosis

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the causes of hypocalcemia.

Critique:

Asphyxia stimulates calcitonin secretion leading to Ca deposition in bone causing low serum Ca. IVF is without Ca so intake is low. Prematurity is known to cause low Ca due to decrease transplacental transfer. PTH is suppressed in fetus due to high Ca and there is transient hypoPTH which increases rapidly after birth. Alkalosis not acidosis causes low Ca due to HCO₃ increases Ca binding to albumin.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1508-12

Q 7:

A newborn male is noted to have stretched penis size of 1 cm. The brain CT scan showed absent pituitary gland. The other associated findings in this baby would be all EXCEPT

- A. Jitteriness
- B. Hyperbilirubinemia
- C. Low birth weight
- D. Low blood volume
- E. Low blood pressure

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the manifestations of panhypopituitarism.

Critique:

Birth weight of a panhypopituitary newborn is not different from normal infants. Fetal growth hormone does not influence fetal growth.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 276

Q 8:

A 4-week-old ex 26 weeks' preterm male baby is receiving 24% O₂ via blender @ 2 lpm. He is receiving feeds fortified to 30 cal. His medications include albuterol, furosemide, fluticasone, spironolactone, caffeine, neotraphos, hydrochlorothiazide. His bone profile showed a Ca of 13.2, Phos of 4, Alk Phos 650. The most likely reason for this lab finding is

- A. Excessive intake
- B. Vitamin D deficiency (Rickets of Newborn)
- C. Drug induced
- D. Hyperparathyroidism
- E. Osteopenia of prematurity (Metabolic diseases of prematurity)

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know about DIFFERENTIAL DIAGNOSIS of hypercalcemia

Critique:

The lab picture is suggestive of drug induced cause. Intake looks adequate. Vit D deficiency and osteopenia of prematurity will give low Ca. High PTH can give this lab picture but no source or cause is given.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 323

Q 9:



This is a 1 hr old baby. Which of the following investigation should be done next?

- A. Pelvic ultrasound
- B. Genitourethrogram
- C. Chromosomal analysis
- D. 17 Hydroxyprogesterone
- E. Serum electrolytes

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know DIFFERENTIAL DIAGNOSIS of ambiguous genitalia

Critique:

Starting point would be pelvic US.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1560-62

Q 10:

A 950 gm 33 wks female infant was born via Cesarean section (CS). The pregnancy was complicated by IUGR and PIH. She received propranolol to control her BP. Her GTT was normal. CS was done due to worsening UA Doppler flow. The baby was normal except for submucosal cleft palate. IVF was started via UVC and GIR of 12 mg/kg/min was provided to keep baby's glucose > 45 mg/dl. Endocrinologist recommended some blood tests. The results are:

Growth hormone 13 ng/ml, TSH 5.2 uIU/ml, cortisol 12 UG/ dl, Insulin 3 uU/ ml

LFT: ALT 34, AST 56, Bili 4

The most likely cause of infant's hypoglycemia

- A. Maternal propranolol
- B. Hypopituitarism
- C. Liver failure
- D. Low maternal glucose transport
- E. Low neonatal glycogen store

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the differential diagnosis of neonatal hypoglycemia.

Critique:

Prolonged hypoglycemia in severely IUGR infant is most likely due to low glycogen stores. Propranolol induced hypoglycemia is likely but with GIR of 12 glucose should come up. GH is normal. LFTs are normal. Mom GTT was normal- fetus get glucose via transplacentally through gradient transport.

Reference

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 317-18

Q 11:

A 6-day old 1.6 kg 32 wks preterm IUGR infant is on BCPAP 5/5 with O₂ of 28%. He was on TPN then gradually advanced to full feeds. His blood sugars were ranging from 48-68 while on TPN and partial feeds, now the lower level of glucose range from 35-45. To counteract the prolonged hypoglycemia while on full feedings, the best strategy is to

- A. Add 1/4 tsf of Polycose to each oz. of feedings
- B. Add 1g/kg of Corn starch to each oz. of feedings
- C. Start IV Somatostatin
- D. Increase to 30 calories formula feeds
- E. Change to continuous 24 hrs feedings

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the oral management of hypoglycemia in neonates

Critique:

Adding a glucose polymer is the best option.

Polyose 1 tsp = 2 g = 8 cal

Corn starch 1 g = 3.8 cal

Reference:

<http://www.pinnaclepetsupply.com/polyose.html>

<http://www.calorie-charts.net/cereal-grains-pasta/2159>

Q 12:



A term macrosomic baby is having problems with persistent hypoglycemia. Maternal history is negative for diabetes. In addition to hypoglycemia, he is in congestive cardiac failure. The Echo showed normal anatomy and connections with marked left ventricular hypertrophy with no obstruction to the flow. The CXR (fig) showed cardiomegaly. On examination, the baby is noted to be hypotonic and hyporeflexic. The laboratory reports are

Na 135, K 3.8, ALT 320, AST 240, Normal C peptide

Blood gas: pH 7.34/ 48/ 52/ 20/-4

Urine neg for glucose, ketone, protein

The most important diagnostic test to consider is

- A. CT chest
- B. Serum ammonia and lactate
- C. Nerve conduction studies
- D. Muscle biopsy
- E. MRI of brain

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know DIFFERENTIAL DIAGNOSIS of hypotonia, hypoglycemia and cardiomegaly

Critique:

This is the classic description of GSD, type 2-Pompe disease. Blood gas is normal so lactate-ammonia are not indicated- less likely to be urea cycle or fatty acid oxidation defect. CT chest, MRI brain and Nerve conduction would not help.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 988

Q 13:

A 4-day old baby is consulted for ambiguous genitalia. The postnatal genitogram showed presence of vagina and uterus. Abdominal & pelvic US showed ovaries bilaterally. Blood test showed elevated 17 OH progesterone with normal electrolytes. The vital signs are normal including the BP. The best management plan is to

- A. Start flornidol with hydrocortisone
- B. Start flornidol only if deoxy corticosterone (DOC) is low
- C. Start flornidol only if electrolytes are abnormal
- D. Assign sex as female
- E. Check testosterone level

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know DIFFERENTIAL DIAGNOSIS of ambiguous genitalia

Critique:

The case is classic of 21-OH deficiency, both hormone replacements should be started. DOC would be low and electrolytes would be abnormal by 5-6 days. Send chromosome to confirm genotype. No need for checking testosterone.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 314

Q 14:

A 3.9 Kg baby is born by NSVD with Apgar of 8/9 and was transferred to the nursery. The nurse calls the Pediatrician on call about the glucose of 18 mg/dl. The Peds ordered urgent feedings and advise repeating glucose. The repeat glucose after 1 hr was 26. Peds on call increased the feeds to 2 oz and advise to check the glucose post feeding. Baby vomited half of the formula and glucose after 1 hr is 28. Peds tells the nurse to start IV and give 2 ml/kg (8 ml) of Dextrose 10 % solution. The nurse calls the NICU team to site an IV due to difficult IV access. After the bolus, the glucose came up to 40. Peds decides to transfer the baby to NICU. In the NICU the baby was started on IVF D10W 90 ml/kg/d. However, glucose remains less than 50. Endocrinology consult was obtained and baby was started on glucagon, which was changed to diazoxide. Two doses of hydrocortisone were given and then somatostatin was started. The lab showed high insulin with high C-peptide. Abdominal US confirmed the presence of pancreatic adenoma and baby underwent partial pancreatectomy. The most important test to follow is

- A. Bayley scale II
- B. Periodic eye exam
- C. Abdominal US
- D. Serial C-peptide
- E. Glucose tolerance test

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the long-term complications of hypoglycemia.

Critique:

This infant is at risk of developmental delay, the most threatened complication of prolonged hypoglycemia.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1477

ETHICS

Q 1:

You received a call from the regional level 2 hospital about a preterm 31 wks infant just delivered. The Pediatrician wanted your advice about surfactant and ventilator management. You gave the instruction and advised for immediate transfer. The Pediatrician intubated the infant and gave one dose of surfactant and placed the infant on ventilator. Your transport team went to pick the infant by air transport. During the transport, the baby coded and died. Active resuscitation was done, including reintubation, needling the chest and CPR. The cause of death was later found to be severe bilateral pneumothoraces. The true statement about the legal implication in this case is

- A. You are safe as you were not involved in the care
- B. Your transport team is solely responsible
- C. Standard of care was not met
- D. Pediatrician is not liable
- E. The cause of death is a known complication in these cases

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the legal and ethical aspects of medical practice.

Critique:

The occurrence of pneumothorax is known complication of PPV. All other statements are incorrect

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 51

Q 2:

You received a phone call from your MFM colleague about a 22 wks pregnant lady who has just walked into the L&D. She had no antenatal care and lives in shelter. The MFM is starting IVF, antibiotics and tocolytics. You agreed to the plan. The lady delivered a viable male infant and you were called to resuscitate. The baby did respond to resuscitation. The infant remained in the NICU for 90 days and developed cerebral palsy later. Mom sues you for not giving the MFM appropriate advice resulting in infant CP. The true statements about this case are all EXCEPT

- A. You are not liable as you were not consulted formally before birth
- B. You are not liable as you had no antenatal contact with the mother
- C. MFM could be liable for the case as she took care of the labor
- D. You could be liable as you took care of the baby in NICU
- E. CP in the infant is not related to mother negligence

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the legal and ethical aspects of medical practice.

Critique:

Cerebral palsy could be related to mother negligence. The cause is prematurity. All other statements are true.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 51

Q 3:

A 19 wks fetus is noted to have hydrops fetalis during surveillance US. The mom denies amniocentesis. The appropriate action would be to

- A. Take court order and perform the amniocentesis
- B. Respect mom's decision and defer amniocentesis
- C. Try to convince the mom on the benefits of diagnostic amniocentesis
- D. Transfer her to other physician's care who might be able to perform the amniocentesis
- E. Document in the chart about the discussion and defer amniocentesis

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the ethics involving fetal therapy

Critique:

Fetal therapy involves maternal consent and understanding.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 38-39

FLUIDS AND ELECTROLYTES

Q 1:

Syndrome of inappropriate antidiuretic hormone (SIADH) is characterized by all EXCEPT

- A. Low urine output
- B. Low Na excretion
- C. High Urine Osmolality
- D. Low plasma Osmolality
- E. Weight gain

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the lab values in SIADH.

Critique:

B is the best choice. Na is excreted despite low serum Na in SAIDH. This is due to stimulation of ANP secondary to increased blood volume.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 321

Q 2:

At what age ECF equal ICF

- A. 14 days
- B. 4 weeks
- C. 2 months
- D. 3 months
- E. 6 months

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the body water compartment in fetal and neonatal life.

Critique:

ECF reduces while ICF increases after birth.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 218

Q 3:

You are taking care of a neonate who is recovering from RDS. His Na is 131, Urine Osm is 540 and serum Osmolality is 265. The best action would be to

- A. Obtain creatinine and BUN
- B. Calculate FeNa
- C. Restrict fluids
- D. Supplement Na deficit
- E. Obtain urine Cx

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know about the cause of hyponatremia.

Critique:

Low Na with high urine Osm and low serum Osm favors SIADH. Fluid restriction should be done.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 219

Q 4:

A term newborn male presents with polyuria and hypernatremia. You suspect diabetes insipidus (DI). Nephrogenic DI differs from neurogenic DI in all EXCEPT

- A. Urine osmolality
- B. Mode of inheritance
- C. Response to water deprivation
- D. Response to DDAVP administration
- E. Serum ADH level

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know about the difference between type of DI.

Critique:

Nephrogenic DI is end organ disease (ADH amount is normal). It differs from neurogenic DI in all of above. Urine osmolality is low in both.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 320

Q 5:

A preterm baby is NPO and receiving IVF via PIV. The labs are: Na 135, Cl 99, HCO₃ 21, glucose 90, BUN 14, creatinine 0.3 and serum osmolality is 280. The IV came out and it took 2 hrs to get the IV and restart the fluids. The Na now is 140, glucose is 50 and BUN is 24. His new serum osmolality would be

- A. Increased
- B. Decreased
- C. Remain unchanged
- D. Cannot asses with the data

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the calculation/formula of serum osmolality from the data.

Critique:

Serum Osm = $2 \text{ Na} + \text{glucose} / 18 + \text{BUN} / 2.8$

Before: $2 \times 135 + 90 / 18 + 14 / 2.8 = 280$

After: $2 \times 140 + 50 / 18 + 24 / 2.8 = 291$

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 219

Q 6:

A 1.2 kg, 26-day old ex 27 wks preterm infant is receiving 20 cal preterm formula. He has history of feeding intolerance but for last 2 days he is tolerating 26 ml q 3 hrs feeds via NGT. Routine morning lab showed serum Na of 127 with creatinine of 0.7, glucose 89, Cl 89, K 2.7. You send urine for lytes which revealed: Na 27, K 28, creatinine 15.2. Urine specific gravity is 1010, pH is 7, negative for protein and glucose. The most likely cause for the hyponatremia in this infant is:

- A. Inadequate Na intake
- B. Excessive Na excretion
- C. Dilutional hyponatremia
- D. Spurious hyponatremia
- E. SIADH

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the DIFFERENTIAL DIAGNOSIS of hyponatremia

Critique:

The cause of low Na is low content of non-fortified milk. Infant is getting ~ 110 ml dilutional hyponatremia is less likely. Specific gravity is normal SIADH is less likely.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 220-21

Q 7:

Routine morning lab on an infant with CHF treated with lasix and digoxin reveals serum Na of 127 with creatinine of 0.7, glucose 89, Cl 89, K 2.7, HCO₃ 12. The best action is to

- A. Start milk fortification
- B. Start po bicitra
- C. Start po polycitra
- D. Stop lasix
- E. Stop digoxin

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the oral treatment of electrolyte imbalance.

Critique:

Na, K and HCO₃⁻ all are low. Polycitra contains all (K, HCO₃ and Na).

Reference:

Harriet & Lane, under Citrate Mixtures

Q 8:

A 3-day-old infant is extubated to nasal CPAP after being treated with surfactant. His blood gas showed: pH 7.26/CO₂ 48/ O₂ 56/ HCO₃ 16/ -9. A fluid bolus of 10/kg was given followed by HCO₃ of 1 mEq/kg. The repeat gas: pH 7.29/CO₂ 58/ O₂ 52/ HCO₃ 19/ -4. However, the bedside nurse reports increase O₂ requirement. You increase the PEEP and flow by 1 and repeated the gas that showed pH 7.24/CO₂ 62/ O₂ 56/ HCO₃ 22/ -3. Within next 20 minutes' baby got intubated. The most likely reason for worsening respiratory gas is

- A. Subclinical PDA with L-R shunt
- B. Worsening RDS
- C. Too fast weaning from ventilator
- D. Excess fluid intake
- E. HCO₃ use

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complications associated with HCO_3 use.

Critique:

$\text{HCO}_3 + \text{H} = \text{H}_2\text{O} + \text{CO}_2$. Use of HCO_3 without adequate ventilation lead to increase CO_2

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 1109-10

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 223

Q 9:

Best choice of post resuscitation fluids for an asphyxiated term 3.5 kg infant with glucose of 47 mg/dl is:

- A. D 10 W @ 14 ml/hr
- B. D 12 W @ 13 ml/hr
- C. D 12 W @ 12 ml/hr
- D. D 20 W @ 11 ml/hr
- E. D 20 W @ 9 ml/hr

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the fluid management HIE.

Critique:

Glucose is OK so a GIR ~ 8 mg /kg/min should be maintained. Fluid restriction is needed. TF ~ 50 -60 ml/kg/d is the target. Formula for GIR is: $D\% \times \text{rate} \times 0.167 / \text{wt}$

E is best choice as it provides TF 61 ml/k/d and GIR 8.5. Choice A, B and C gives high fluids while choice D provide high GIR.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 506 and 951

Gomella TL et al. Neonatology: management, procedures, on-call problems, diseases and drugs. Appleton & Lange 1999: pg 73

Q 10:

A term infant is born to a 16-year-old anorexic girl. The baby has Apgar score of 8 and 9. She is being observed in the nursery under radiant warmer. She is given bottle feeds. She tolerated 3 out of 4 feeds and passed meconium x 2. The infant is tachypneic with sats of 94-96%. Her vital signs are: Temp 99, HR 167, RR 82, BP 56/32. Which of the following is the main determinant of fluid balance in this infant?

- A. Urine output
- B. Respiratory losses
- C. Insensible loss from skin
- D. Fluid intake
- E. Stool output

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the effect of respiration on insensible fluids losses

Critique:

Term infants have mature stratum corneum so they have less TEWL than preterm infants. The other main source is respiratory losses, especially when nursed under radiant warmer.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 592-93

Q 11:

A 26 week 12 days old 1.2 kg preterm baby is reported to have Na of 126 mEq/L. He is on ventilator and is receiving antibiotics for positive blood and CSF cultures. He is receiving TPN with 4 mEq/kg/d of Na. His urine output for 24 hr is 48 ml. You order urine electrolytes (UNa) and urine osmolality (Uosm). Which of the following results fit best to the cause of hyponatremia in the infant?

- A. UNa 12, Uosm 100
- B. UNa 60, Uosm 200
- C. UNa 40, Uosm 700
- D. UNa 40, Uosm 400
- E. UNa 10, Uosm 500

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know about lab values in SIADH

Critique:

This preterm has SIADH- High urinary Na and high osmolality (preterm infant may not be able to concentrate > 500 osm)

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 219-221

Q 12:

Fluid balance is very important in management of neonates. Excess fluid may lead to certain complications. Fluid restriction is helpful in all of the following cases EXCEPT

- A. A neonate with FeNa of $> 3\%$
- B. A preterm infant with echo showing LA: Ao ratio of 1.6
- C. A preterm infant with serum Na of 127 mEq/L, urine Osm of 500
- D. A preterm infant with plasma osmolality of 270 mOsm/kg
- E. A term infant with ascites and albumin of 20 g/L

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know importance of fluid management

Critique:

FeNa of > 3% mean renal disease, < 3% mean prerenal, so fluid restriction (FR) will help. LA: Ao ratio of > 1.5 is suggestive of PDA, so FR will help. Low serum Na and high urine osm suggests SIADH, FR will help. In low serum osm FR will help. In ascites, due to low albumin FR would not help as there will be third spacing.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 702-3

Iyer P, Evans N. Re-evaluation of the left atrial to aortic root ratio as a marker of patent ductus arteriosus. Archives of Disease in Childhood - Fetal and Neonatal Edition, Vol 70, F112-F117

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 219

Q 13:

A pediatrician calls you for opinion on a 4-day old male infant with persistent vomiting. Prenatal and natal history was unremarkable. Family history is negative for any febrile illness or similar condition. You advised to obtain the basic lab work up. The pediatrician calls you with the results

Serum Na 152, K 4.8, Cl 99, HCO₃ 21

CBC: WBC 8.7, Hb 13, Hct 41, Plt 156 K, bands 4%, segs 53%

Urine: No WBC, glu, protein, ketone 1 +, sp gravity 1006, pH 5.5

You advise admission to the pediatric ward for fluid therapy. The best explanation of this case is

- A. Poor feeding is central in nature, CT scan of brain is warranted
- B. Poor feeding is gastrointestinal, UGI should be done
- C. The condition could be genetic, X-linked inheritance
- D. The condition is due to hypertrophy of pylorus
- E. The condition is acute in nature, no further studies are needed

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the Differential Diagnosis of hypernatremia

Critique:

High serum Na with low urine sp gravity suggests diabetes insipidus, Nephrogenic DI is X-linked. In pyloric hypertrophy Cl will be low and there will be alkalosis.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 214

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1662

Q 14:

A preterm baby underwent bowel resection and ileostomy secondary to NEC. The infant is currently on TPN which is being cycled for cholestasis. His ileostomy output is 68 ml/ 24 hrs. You order replacement fluids NS cc/cc and send the output for electrolytes analysis. Which of the following electrolytes values are expected?

- A. Na 120, Cl 80, K 10
- B. Na 20, Cl 100, K 8
- C. Na 120, Cl 15, K 70
- D. Na 20, Cl 120, K 4
- E. Na 130, Cl 80, K 35

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the composition of different body fluids

Critique:

Bile, small intestine and ileostomy fluids are essentially very similar (like Na 120, Cl 80, K 10, stomach has high Cl and diarrheal stool has high K)

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 700

Important Calculations

Q 1:

A 32-year-old women had a late US which showed twin pregnancy. There is discordant growth between the fetuses. You suspect TTTS. At delivery, you note that one baby is plethoric weighing 3.6 kg. His cord hematocrit is 86%. You immediately obtain a central hematocrit which is reported as 78%. You perform partial exchange transfusion using the NS. The lab values for the twins are as below

Twin 1: Na 142, K 4.5, Cl 102, BUN 49, Creatinine 0.9, glucose 146

Twin 2: Na 132, K 4.5, Cl 92, BUN 24, Creatinine 0.3, glucose 61

The estimated plasma osmolality in twin 1 is about

- A. 275 mOsm
- B. 295 mOsm
- C. 310 mOsm
- D. 320 mOsm
- E. 325 mOsm

The correct response is C.

Solution:

$$\text{Osm} = 2 \text{ Na} + \frac{\text{glucose}}{18} + \frac{\text{BUN}}{2.8}$$

$$= 2 \times 142 + 146/18 + 49/2.8 = 309.6 \text{ mOsm/l}$$

GASTROINTESTINAL

Q 1:

A 26-day-old 3.5 kg infant is stooling in large quantity after reanastomosed following ileostomy. You started the baby on loperamide 0.1 mg po TID. The nurse is asking to add thickening agent to the formula to decrease the transit time. The best action would be to

- A. Add Polycose to the feeds
- B. Add cornstarch to the feeds
- C. Add pectin to the feeds
- D. Start cholestyramine
- E. Increase loperamide dose

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complications and management of short bowel syndrome.

Critique:

Pectin would be best in delaying the transit time.

Reference:

<http://www.healthsystem.virginia.edu/internet/digestive-health/nutritionarticles/practicalgastrodec03.pdf>

Q 2:

Complications of short bowel syndrome would be least with

- A. 30 cm bowel left, colon intact, no ileocecal valve
- B. 40 cm bowel left, colon resected, no ileocecal valve
- C. 40 cm bowel left, colon resected, intact ileocecal valve
- D. 10 cm bowel left, colon intact, intact ileocecal valve
- E. Difficult to assess basing on these information

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complications of SBS

Critique:

In SBS at least 30-40 cm of gut is needed with intact ileocecal valve. If valve is resected > 40 cm is needed. Colon resection leads to poor prognosis especially if IC valve is resected.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 277

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1370-71

Q 3:



This newborn baby is operated for Gastroschisis with primary closure. Within next few hrs, this infant is most likely to develop

- A. Abdominal distension
- B. Metabolic acidosis
- C. Respiratory acidosis
- D. Wound dehiscence
- E. Cardiac decompensation

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complications associated with Gastroschisis.

Critique:

Respiratory acidosis due to diaphragmatic compression by intestinal content in limited abdominal cavity.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1381-85

Q 4:

A term infant is having increase stool output. The lab indices are

Serum: Na 129, Cl 93, HCO₃ 16, K 3.5, Urea 38, glucose 78

Urine: pH 5.5, Sp gr 1025, Osm 560, ketones 2+

Stool: Osm 300, Na 70 K 30

True statements about this infant are all EXCEPT

- A. The infant is acidotic with increased anion gap
- B. The serum is hypo-osmolar
- C. The labs values match SIADH
- D. The infant is suffering from osmotic diarrhea
- E. The infant is at risk of dehydration

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the difference between osmotic and secretory diarrhea, calculate anion gap and osmolality.

Critique:

Anion gap = $\text{Na} - (\text{Cl} + \text{HCO}_3) = 20$ (nl is 12-15) – A is correct

Serum osmolality = $2 \text{ Na} + \text{glucose}/18 + \text{BUN}/2.8 = 276$ (nl 285-290)- B is correct

SIADH: Low serum and hyperosmolar urine-C is correct

Fecal osmolar gap = $290 - (2 \times \text{Na} + \text{K})$, > 50 mean osmotic diarrhea

$$290 - (2 \times 132) = 290 - 264 = 26 \text{ - it's NOT osmotic diarrhea}$$

Dehydration is likely- E is correct

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1368

Q 5:

A 23-day old ex 36 wks infant, who had been operated for jejunal atresia with ileostomy followed by reanastomosis, is having loose stools. The true statements about this infant are all EXCEPT

- A. Adding pectin to feeds helps in increasing the transit time
- B. Using po metronidazole would help against bacterial overgrowth
- C. Using po cholestyramine might be helpful in chelating bile salts
- D. Adding MCT oil orally would help reducing fat malabsorption
- E. Using po proton pump inhibitors would be helpful

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the management of SBS.

Critique:

Pectin decreases the transit time. All other statements are correct.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1370-71

<http://www.healthsystem.virginia.edu/internet/digestive-health/nutritionarticles/practicalgastrodec03.pdf>

Q 6:

A term newborn male was noted to have imperforate anus. However, smear of meconium is noted in the diaper. A colostomy with distal stoma was performed and infant was started on feeds. The nurse taking care of the infant reports wet diaper between the diaper changes suggesting dribbling of urine. The most appropriate action would be to

- A. Order VCUG
- B. Order contrast study from distal stoma
- C. Order pelvic US
- D. Order MRI of spine
- E. Order surgical consult

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the association in cases of imperforate anus

Critique:

Tethered cord is seen in 25% of infant with imperforate anus. High index of suspicion should be paid to any unusual symptom and MRI spine should be done as indicated

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1400

Q 7:

A term baby was noted to have bilious aspirate on day 3 of life. KUB showed dilated loops. Barium study showed corkscrew appearance of the jejunum. Exploratory laparotomy was done with resection of jejunum and end-end anastomosis. About 30 cm of small intestine was removed with preserved ileocecal valve. The baby was started on feeds. The nurse is concerned about the increased stool output and skin redness around the anus. Stool pH is 5 and reducing subs is positive. The best intervention at this point is to start po

- A. Metronidazole
- B. Cholestyramine
- C. Zinc supplementation
- D. Loperamide
- E. Omeprazole

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complications and treatment of short bowel syndrome

Critique:

SBS causes bacterial proliferation leading to CHO intolerance and osmotic diarrhea. Zn deficiency will follow later.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1370-71

Q 8:



This baby was born by vaginal delivery. Umbilical cord was clamped at 30 seconds. He is at increased risk for

- A. Chromosomal anomalies
- B. Polycythemia
- C. Hypoglycemia
- D. Cholestasis
- E. Bronchopulmonary dysplasia

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complications associated with Gastroschisis.

Critique:

Intestines being placed on the right side and clamping of cord favor the diagnosis of gastroschisis (in Omphalocele cord is attached to the mass). 30 sec for cord clamping will increase the red cell mass but does not lead to polycythemia. There are no risk factors for low glucose or BPD.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1381-1385

Q 9:

A 14-day-old preterm infant is noted to have abdominal distention and frank UGI bleeding. On abdominal exam bowel sounds are present with no visible loops, spleen is palpable 3 cm. The infant has a stormy course in the unit with surfactant, ventilation, CPAP, umbilical lines, TPN and antibiotics. Currently he is on NC 2 lpm with partial feeds. The abdominal Doppler US is abnormal. The most likely reason for the infant's condition is

- A. History of RDS
- B. History of infection
- C. History of line placement
- D. Treatment with CPAP
- E. Treatment with TPN

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complications associated with UVCs.

Critique:

This is a case of esophageal varices secondary to portal vein thrombus (sec to UVC)

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1331

INFECTIOUS DISEASES

Q 1:

Placental pathology would be most important in diagnosis and management in which of the following

- A. GBS infection
- B. Listeria infection
- C. Syphilis
- D. Preeclampsia
- E. APLA syndrome

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the involvement of placenta in different infection.

Critique:

B is the best choice. Placental micro abscesses are seen with Listeria.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 18

Q 2:

A preterm 650 gm 24 wks infant is reported to have the blood culture positive for *Listeria monocytogenes*. The CBC showed 3.1 WBC, segs 15%, Hb 12, Hct 35%, and NRBC 28. Electrolytes: Na 128, K 3.9, Gluc 178, bili 4.7. The CSF analysis showed: xanthochromia, RBC 13, NRBC 2, glucose 166. The approach to mother's concern is:

- A. Spinal tap is normal, meningitis is less likely
- B. High glucose in CSF suggests immature blood brain barrier
- C. NRBCs are smaller than RBCs and presence in CSF suggests *Listeria* meningitis
- D. Yellow CSF indicates that baby is at high risk of kernicterus
- E. Baby should be treated for 21 days with ampicillin

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of CSF.

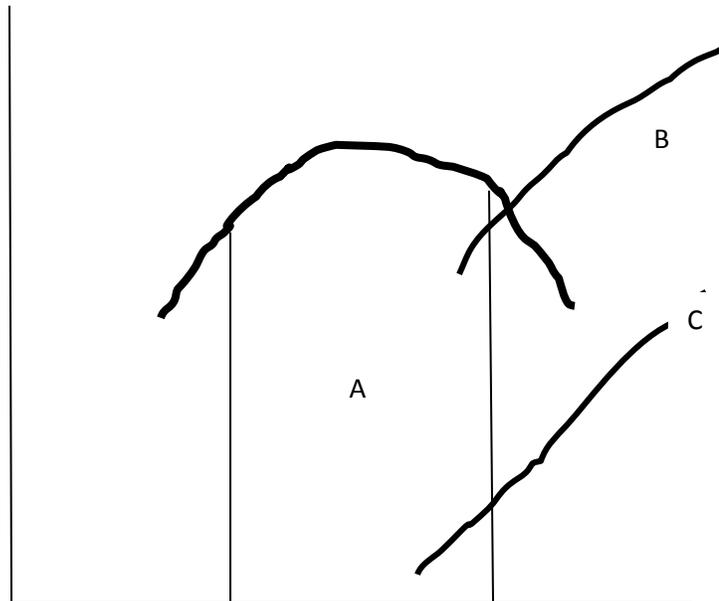
Critique:

CSF is normal. High glucose in CSF reflects passive transfer. NRBC are larger than RBC. Xanthochromia is due to hyperbilirubinemia. Treatment for 21 days only if CSF is positive.

Reference:

Brody D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 184

Q 3:



This graph represents Hepatitis B infection response. Vertical lines are onset of recovery and complete recovery, right to left. Hepatitis B core IgG Ab is represented by the curve

- A. A
- B. B
- C. C
- D. Not represented here

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the Hepatitis B serology.

Critique:

Antigens: HBc & HBe with HBs –indicates acute infection (no shown here)

Antibodies: HBc Ab & HBe Ab (curve A –IgM response) present during window period. HepBs Ab is represented by curve C.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 195

Q 4:

A 6-day-old preterm infant is noted to have bilateral eye discharge. The conjunctiva looks hyperemic with some yellow discharge. The gram stain of the discharge is negative. The most appropriate management is

- A. Oral erythromycin
- B. Saline wash q 4-6 hrs
- C. IV ceftriaxone
- D. Massage on inner canthus
- E. No treatment

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the differential diagnosis of conjunctivitis.

Critique:

< 24 hr- chemical, 24-48 hr, staph, 2-5 days, Gonococcal, 6-14 days Chlamydia/ HSV.
Giemsa stain for Chlamydia- treat with oral erythromycin.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 376

Q 5:

A lady who is incarcerated for sex crime delivers a 2.6 Kg baby in ER. On exam baby is hypotonic with asymmetrical Moro reflex. The arm is adducted with forearm pronated and fingers pointing posteriorly. The most important step is to obtain

- A. Urine toxicology
- B. CSF for VDRL
- C. X-ray chest including neck
- D. Brain CT scan with contrast
- E. Nerve conduction study

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the manifestation of syphilis

Critique:

The case describes early presentation of syphilis as Erbs palsy.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 186-88

Q 6:

The routine practice of obtaining both aerobic and anaerobic blood culture (Cx) is being questioned by the nurses in your unit. The true statement about anaerobic infection is

- A. Routine anaerobic blood Cx should be abandoned in the NICU
- B. Early onset sepsis with anaerobes is a rare entity in neonates
- C. Anaerobic blood Cx should be done only when GI perforation is suspected
- D. Vertical transmission may lead to serious anaerobic septicemia
- E. Penicillin G is the drug of choice for all anaerobic infections

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the specifics of anaerobic infection.

Critique:

Risk of serious early anaerobic infection is high. All other statements are wrong.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 819

Q 7:

A preterm 26 wks infant has abnormal CBC with bands of 35 %. He is 6 day old now and is currently on ventilator (PIP 20, PEEP 4, rate 45, O2 35%). He was delivered via cesarean section secondary to blood tinged amniotic fluid. Mom GBS status was unknown and she received 1 g ampicillin 1 hr prior to delivery. Mom had flu like symptoms and low grade fever. Initial CBC on the infant was normal and antibiotics (ampicillin and gentamicin) were discontinued after 5 days as blood culture remained negative. Two days later the CBC revealed high bands so blood culture was redrawn with CSF analysis. Both CSF and blood culture grew *Flavobacterium meningosepticum*. The best statement regarding the infant's current diagnosis is

- A. The dose and time of intrapartum ampicillin was inadequate
- B. The postnatal length of antibiotics therapy was inadequate
- C. The source of infection is the mom
- D. The source of infection is the NICU
- E. Vancomycin should be started immediately

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the pathology and management of *Flavobacterium meningosepticum*

Critique:

Flavobacterium meningosepticum is gram negative rods found in water sources in NICU and usually sensitive to piperacillin (Zosyn).

Reference:

<http://www.cdc.gov/ncidod/eid/vol6no5/chiu.htm>

Q 8:

A 7-day old preterm infant who is on 2 lpm 25% O₂ and gavage feeding is noted to be hypoactive. A full septic work up was done and antibiotics were started. The labs results are:

WBC 7.9, Band 8, segs 21, lymph 45

CXR: no infiltrates

Urine Cx: negative

CSF: no organism, WBC 8, 1 poly 7 lymphocytes, glu 51, protein 87

RSV rapid test: negative

Baby was made NPO and nutrition was provided via TPN. 24 hr later, the baby was noted to have labored breathing and tachycardia, HR 210/min. SVT was ruled out as EKG showed sinus tachycardia. By the evening the baby got intubated and placed on ventilator. The next best action at this point is to

- A. Repeat CSF for fungal culture
- B. Send rectal swab for viral PCR
- C. Start acyclovir
- D. Send CSF for VDRL
- E. Obtain echocardiogram

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the manifestation of enteroviruses

Critique:

Myocarditis due to coxsackie B is presented here.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 203-4

Q 9:

A 78-day-old preterm ex 26 wks baby with severe BPD is doing fine on humidified NC and feedings. The nurse calls you as the infant is having desaturation spells during the morning rounds. On examination, the infant is barely moving air so you advised albuterol nebs. The O₂ is increased to 100%. The O₂ sats improved but baby remained lethargic. You perform a septic work up and started the baby on Vancomycin 15 mg/kg/dose q 12 hrs & gentamicin 4 mg/kg/dose q 24 hr. The peak & trough of Vanco is 32 P & 7 T and Genta is 10 P & 0.6 T. The lab calls with a positive blood culture for pseudomonas aeruginosa sensitive to gentamicin with MIC of 3 mcg/ml. The organism is also sensitive to piperacillin, ceftazidime and cefotaxime. The most appropriate action is to

- A. Stop gentamicin and start ceftazidime
- B. Increase gentamicin dose and add cefotaxime
- C. Leave gentamicin at same dose and add ceftazidime
- D. Continue gentamicin with no changes
- E. Increase gentamicin and start ceftazidime

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the concept of MIC and peak and trough levels.

Critique:

Although the organism is sensitive to genta but MIC is high (> 4 times trough level) suggesting the need for adjuvant therapy. The peak is Ok thus increasing genta dose is not the right choice.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 209-211

Young TE, Magnum B. Neofax, Thomson 2007; pg 40 and 74

Q 10:



This infant is born to a 16-year-old lady. Rest of the physical examination is normal. The most appropriate investigation for the lesion shown is

- A. Viral Cx and PCR
- B. Wet prep
- C. VDRL
- D. Biopsy
- E. None

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the signs of syphilis

Critique:

Desquamating rash with peeling suggest syphilis. 2/3rd infants have no other symptoms. Candida or HSV are less likely.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 186-189

Q 11:

A 5-day-old newborn male infant is transferred to your service for increased oxygen requirement and respiratory distress. He was born at 35 weeks of gestation to a 24-year-old lady, who is G7P6. She had seizure disorder for which she takes valproic acid and lamitrigine. She had regular prenatal care and normal screening US. Delivery was complicated by PROM > 20 hr. Apgar was 9/9. Baby was nursed by mom in her room. On day 3 of life, mild tachypnea was noted and the physician on call performs the septic work up and started the baby on broad spectrum antibiotics. The following day, the baby was noted to be lethargic so LP was done and IV cefotaxime was added. By early morning of day 5, the respiratory distress increased and baby needed intubation and then was transferred. On examination, you note the baby to be hypoactive with diminished reflexes. You order admission labs and repeat CXR. The nurse calls you as baby started to bleed from the nose. You noted oozing from the IV site. In the meantime, the lab calls you with panic report. CBC showed: WBC of 28 K, Plt 45K, PT 70, PTT 95, ALT 3567, AST 2458. The most likely diagnosis is

- A. Fulminant GBS sepsis
- B. Congenital Listerosis
- C. Systemic HSV infection
- D. Severe drug reaction
- E. Parvo virus infection

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complications of HSV infections.

Critique:

Signs of liver failure in a neonate with sepsis (Cx neg) should raise the flag for HSV infection.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 840-43

Q 12:

A 16-year-old primigravida presents to ER with PROM and delivered a baby boy with shoulder dystocia. The Apgar score was 5/9. On reviewing maternal history, you note that she is VDRL positive. On further inquiring she told you that she did not take the medication prescribed by her physician. You requested the ER staff to draw VDRL titer and treponemal test. Similarly, you sent body swab culture, blood and CSF for VDRL on the baby. Which of the following is the main indication to treat this baby?

- A. Untreated mom
- B. Positive VDRL in baby, 2- fold increase titers from mom
- C. Copious nasal secretions
- D. CSF glucose of 50 & protein of 90
- E. Displaced fracture of clavicle

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know about indication of treatment of syphilis

Critique:

Untreated mom is the main indication for treating the infant. Refer to AAP Redbook or CDC for recent indications.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 186-189

Q 13:

A 21-day old 31 wks had a positive bronch trap (tracheal aspirates) for *Klebsiella* and *Candida*. The baby is extubated to NC successfully. The CBC showed WBC of 7.9, band 8%, Segs 45%, Lymph 12%, Platelet 147K. You ordered urine KOH prep, which was reported to have pseudohyphae suggestive of *Candida*. The most appropriate action would be to

- A. Start antifungal treatment
- B. Send urine catheter specimen for KOH & culture
- C. Send immunological work up
- D. Repeat nasopharyngeal culture
- E. Start gentamicin & amphotericin B

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know implications of candida infection

Critique:

The infant's WBC is normal. Urine bag specimen is less reliable due to contamination, repeating a catheter specimen is a better option before embarking on treatment.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 830-32

Q 14:

The blood culture on a 3-week-old infant was reported positive for *Staphylococcus aureus*. Mom has been pumping and freezing the milk. She has diagnosed mastitis recently which was treated with Dicloxacillin. Baby had frequent stools, however stool microscopy showed no WBC. Baby was made NPO due to abdominal symptoms and PICC was attempted with failure. The most likely cause of bacteremia is

- A. Multiple IV attempts
- B. Maternal mastitis
- C. Use of freezed milk
- D. Poor hygiene practice
- E. Maternal Dicloxacillin

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the causes of staph infection in NICU

Critique:

Poor hand washing practices is the main factor associated with staph infection in NICU.

Reference:

<http://infectious-diseases.jwatch.org/cgi/content/citation/2005/1118/7>

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 816-17

METABOLIC

Q 1:

A 20-hr old 1.2 kg preterm baby nursed in incubator is stable on 24% O₂ NCPAP and TPN @ 4.5 ml/hrs (D 8%, P 2 g, no Fat, no lytes) is noted to have a blood gas of 7.26/51 CO₂/ 45 O₂/19 HCO₃⁻/-4. Serum Na is 130, Cl 90, HCO₃ 19. The acidosis is most likely due to

- A. Use of amino acid
- B. Resolving RDS
- C. Decrease fluid intake
- D. Low renal HCO₃ threshold
- E. Lactic acidosis

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the differential diagnosis of metabolic acidosis & calculation of anion gap.

Critique:

E is the best choice. Anion gap ($\text{Na} - \text{HCO}_3 + \text{Cl}$) = 21 (normal is 12-14) suggest extra acid, which premature babies are prone to develop. Protein of 2 g is not high enough to give acidosis. RDS would show improvement in respiratory acidosis. Fluids of 4.5ml/hr (90 ml/kg/day) is fine for a 1.2 kg baby nursed in incubator. HCO_3 of 19 is not suggestive of low threshold.

Reference:

Dell KM, Davis ID. Acid-base management, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (Eds). Mosby 2006: 703-712

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 223-227

Q 2:

A preterm infant received TPN for 8 days. The maximum nutrient content per day for dextrose was 12%, fat 2.5 g/kg and protein of 3.5 g/kg. The TPN was heparinized with 0.7 U/ml and other additive used were carnitine & albumin. His metabolic profile showed: Na 142, K 6.4, BUN 64, Creatinine 0.7, triglyceride 265, albumin 3.2 and bili 6.7/ direct 0.9, glucose 76. The newborn screen results revealed elevated acyl carnitine level. The best explanation for the finding is:

- A. Use of high protein intake
- B. Use of high lipid intake
- C. Possible use of carnitine
- D. Possibility of liver damage
- E. Possibility of metabolic disease

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the factors affecting NBS.

Critique:

As carnitine was used in TPN and infant is otherwise stable, NBS should be repeated. LFT is normal and protein and lipid intake is normal. TG is high and for reason carnitine is added in TPN

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 679-91

Q 3:

You examine a term male infant in the nursery. You note bilateral cataract, hypotonia and cryptorchidism. The CBC is normal. Electrolytes are: Na 130, K 3.3, Cl 99, HCO₃ 18 and the capillary blood gas is 7.24/37/42/18/-8 (pH/PCO₂/PO₂/HCO₃/BE). Urine pH is 5.5. The most like diagnosis is

- A. Bartter syndrome
- B. Lowe syndrome
- C. Zellweger syndrome
- D. Distal RTA
- E. Isovaleric acidemia

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the DIFFERENTIAL DIAGNOSIS of acidosis and hypokalemia.

Critique:

The case is a description of Lowe syndrome (oculocerebrorenal) syndrome. Renal dysfunction simulates proximal RTA. Bartter syndrome would manifest as metabolic alkalosis and low Cl; Zellweger would have prominent forehead, epicanthal fold; In Distal RTA urine pH would be > 6.5- as no acidification happens at distal tubule; In Isovaleric academia there will be an increase in anion gap (13 here, normal).

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 236

Q 4:

You receive a call from a pediatrician about a 3-day old baby who is vomiting and looks dehydrated. The baby was given IVF. The labs are

Na: 126, K 4.2, HCO₃ 18, Cl 98, Glucose 39

Hgb 14, Hct 45

Bili 12 / 0.4 direct

Urine dipstick showed Ketone 1+, negative for bili, protein and glucose

The next most appropriate step is to

- A. Give Na rider over 48 hrs
- B. Start phototherapy
- C. Start ORS with slow increments
- D. Repeat urine analysis with clinitest
- E. Repeat electrolyte after IV bolus

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the value of reducing subs in urine (Galactosemia).

Critique:

Clinistix checks for glucose, clinitest checks for galactose. Hypoglycemia+ Jaundice+ poor feeding in newborn- think Galactosemia

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 328-29

MATERNAL FETAL MEDICINE

Q 1:

Which of the following timing is (are) abnormal for a primigravida?

- A. Start of contractions to complete cervical dilatation ~ 15 hrs
- B. Cervical dilatation to delivery of fetus ~ 2 hrs
- C. Delivery of head to shoulder ~ 2 min
- D. Delivery of baby to placenta ~ 5 min
- E. All above timings are within normal limits

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the timings of normal labor.

Critique:

C is the best choice. Time from delivery of head to shoulder should not exceed 60 secs.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 31

Q 2:

A 32-year-old primigravida presents with severe abdominal pain and vaginal bleeding after being falling down five steps. She has chronic hypertension and smokes 1 pack a day. She denied any use of illicit drugs other than cocaine. You suspect abruption placenta. The most common cause for abruption placenta is:

- A. Hypertension
- B. Cocaine use
- C. Factor V Leiden mutation
- D. Smoking
- E. Trauma

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the causes of abruptio placenta.

Critique:

A is the best choice. HTN is the most commonly associated with abruption.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 7

Q 3:

Maternal serum alpha-fetoprotein (MSAFP)

- A. get access to mother via feto-maternal hemorrhage
- B. is most sensitive when measured during 16-18 wks of gestation
- C. correlates directly with fetal AFP at any gestational age
- D. correlates inversely with amniotic AFP at any gestation gestational age
- E. is more sensitive than amniotic AFP

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know about the MSAFP.

Critique:

MSAFP is most sensitive at 16-18 wk. All other statements are wrong

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 12

Q 4:

A 24-year-old lady presents with onset of labor. She is 26 weeks by her LMP. She was started on IVF, MgSO₄ and betamethasone. Her contractions stopped and she was discharged home on oral nifedipine (Procardia) with advice of bed rest. Within 24 hr she came back with ruptured membranes and bleeding PV. She delivered a viable male baby. The infant required intubation and transferred to NICU. Surfactant was given and antibiotics were started. The UAC was inserted while UVC was unsuccessful. CXR showed bilateral haziness and UAC at T 7. IVF @ 90ml/kg/d was started via UAC. The vital signs reveal: Temp 97, HR 170, BP 30/12, sats 91%. A fluid bolus was given followed by dopamine drip. BP still remained low and hydrocortisone was started. The most likely cause for refractory hypotension in this baby is:

- A. Hypovolemia
- B. Umbilical catheter
- C. Pulmonary hemorrhage
- D. Maternal blood loss
- E. Maternal medication

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complication of nifedipine

Critique:

Procardia is associated with neonatal hypotension. Infant is receiving adequate volume and there is no clinical sign of pulmonary hemorrhage.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 35-36

Q 5:



The slope line represents amniotic fluid

- A. Volume
- B. Chloride content
- C. Protein content
- D. Osmolality
- E. Index

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the characteristics of amniotic fluid.

Critique:

Osmolality fall with increase in GA. AF volume and index has a bell shape curve. Protein is low and Cl is high in AF.

Reference:

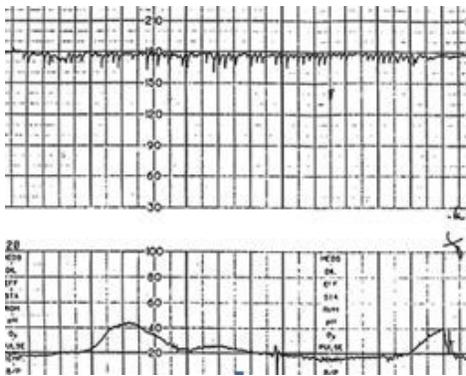
Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 409-11

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 21-22

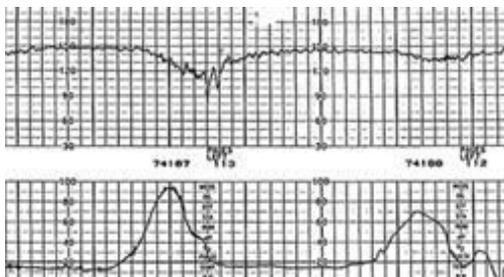
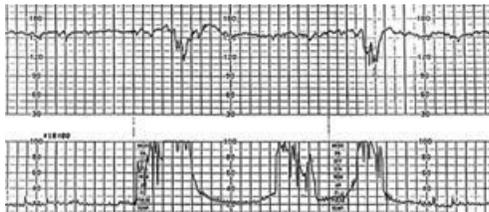
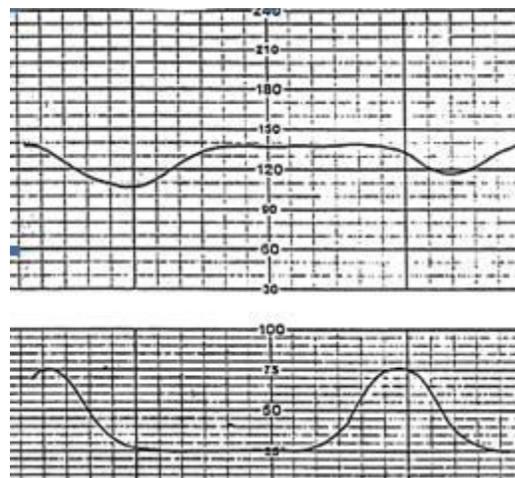
Q 6:

Which of the following is a non-reassuring fetal heart strip?

- A. Strip A
- B. Strip B
- C. Strip C
- D. Strip D



B



Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of FHR pattern.

Critique:

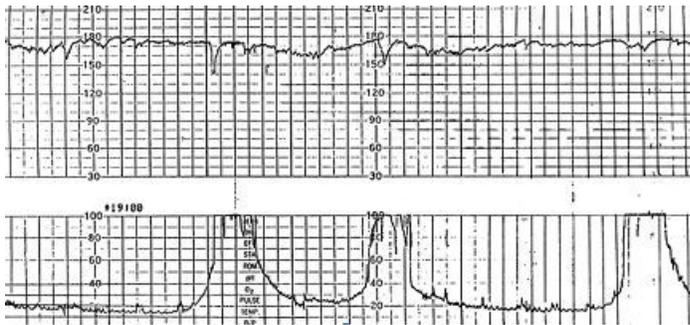
Strip B is bad-it shows loss of beat to beat variability and with decal. Strip A shows good beat to beat variability. Strip C showed variable decal with shoulder. Strip D shows late decal with good beat to beat variability

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Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 173-79

Q7:



The strip shown above could be caused by all EXCEPT

- A. Fetal anemia
- B. Maternal anemia
- C. Maternal fever
- D. MgSO_4 treatment
- E. Terbutaline treatment

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of FHR pattern and cause of fetal tachycardia

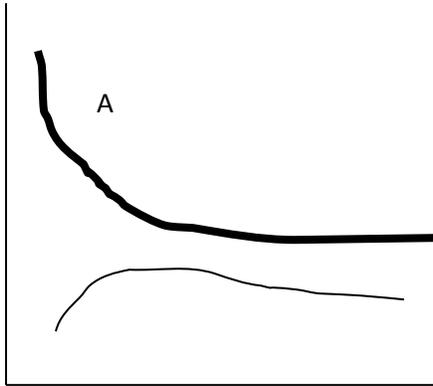
Critique:

MgSO₄ is not associated with fetal tachycardia. All other are associated with FT.

Reference:

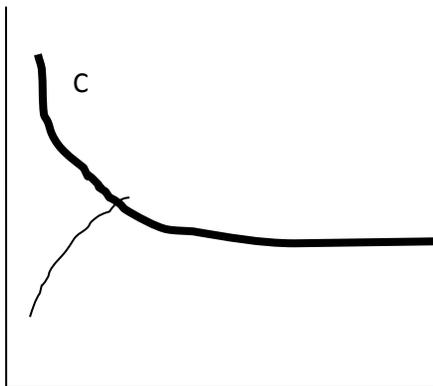
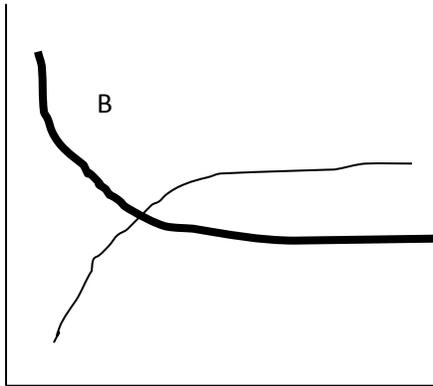
Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 173-79

Q 8:



Which of the following figure (thick line maternal level, thin line fetal level) represents dexamethasone transfer across placenta

- A. Figure A
- B. Figure B
- C. Figure C



Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the placenta drug transfer principle.

Critique:

Fig A depicts the drugs with slow placental transfer e.g. Dexamethasone

Fig B depicts the drugs with intermediate placental transfer e.g. Ampicillin

Fig C depicts the drugs with fast placental transfer, quick equilibrium e.g. Mg SO₄

Reference:

Blackburn ST. Maternal, fetal and neonatal Physiology. A clinical perspective. Saunders 2003: pg 186-87

Q 9:

A pregnant woman presents with acute onset of abdominal pain and vaginal bleeding. A male infant is delivered via emergency CS. The Apgar score is 3/8. The arterial cord gas (pH/CO₂/O₂/HCO₃/BD) would be

- A. 6.80/130/13/21/16
- B. 6.80/40/40/10/-12
- C. 6.90/32/12/10/-14
- D. 6.90/50/35/21/-2
- E. 7.12/45/34/22/2

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of cord blood gas.

Critique:

Acidosis, negative base deficit, low O₂ (C matches that)

Reference:

<https://secure1.csmc.edu/nicu/cbg/>

Q 10:

A lady presents with vaginal bleeding. She is 25 wks pregnant. All are appropriate intervention EXCEPT

- A. Magnesium sulfate 2 grams per hour
- B. Vaginal cultures, urinalysis, culture and sensitivity
- C. Betamethasone for fetal lung maturity
- D. PT, PTT and INR labs
- E. GBS prophylaxis

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the management of premature labor with PV bleeding.

Critique:

All are needed. GBS prophylaxis is not indicated at this gestational age.

Reference

<http://www.cdc.gov/MMWR/preview/mmwrhtml/rr5111a1.htm>

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 331-357

Q 11:

The strongest predictor of preterm labor in a primiparous woman is

- A. Presence of uterine contraction occurring 2 per hr
- B. Cervical dilation of up to 4-5 cm of physical exam
- C. Presence of 10-15 ng/ml of fetal fibronectin in cervicovaginal fluid
- D. Cervical length of 10 mm on ultrasound
- E. Presence of 20-30 pg/ml of IL-6 in cervical fluid

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the markers & predictors of premature labor.

Critique:

Fibronectin > 50, IL-6 > 400, Cervical length < 30 mm are predictive of PTL. A & B are not specific to PTL.

Reference

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 331-357

Q 12:

An IUGR 34 wks fetus had a biophysical profile (BPP) that showed reactive NST, AFV > 2 cm, two fetal breathing movement, 3 episodes of opening and closing of hand and 4 limb movements. An oxytocin challenge test (OCT) was done, that showed no late deceleration with 3 contractions. An amniocentesis done that showed LS ratio of 1.5. The true statement about this condition is

- A. The BPP is 8/10
- B. The OCT is negative
- C. Fetus is at low risk for RDS
- D. Fetus is at high risk for growth retardation
- E. Fetus delivery should be considered

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know about NST, BPP and OCT

Critique:

Reactive NST, negative OCT and BPP of 8/10 are reassuring. The BPP is 10/10, L:S ratio is low so RDS risk is high. Fetus is at low risk for IUGR. Delivery is not indicated.

Reference

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 168-69

Q 13:

True statements about RhoGam are all EXCEPT

- A. It's a monoclonal antibody
- B. Given at 28 wks before delivery
- C. Given within 72 hrs after delivery
- D. Kliehauer-Betke test could be used to calculate the dose
- E. Single dose is usually enough for the same pregnancy

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the indication of Rh immune prophylaxis.

Critique:

RhoGam is obtained by pool human sera. KB test could be used (1 vial, 300 ug for 30 ml fetal blood)

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 393-94

Q 14:

A 23-year-old lady with history of multiple drug abuse presents in labor. She is term and OB decided to try VBAC. The presentation was breech and delivery was prolonged. You were called to attend the delivery. The baby was delivered vaginally and required PPV for 30 sec. The Apgar was 3/5. The cord gas was 7.21/ 51/ 19/18/-3. You brought the baby to the NICU where on examination she was noticed to be floppy. Her pupils are reactive but she does not have any deep tendon reflexes. The most likely cause for the finding is

- A. Acute spinal cord injury
- B. Prolong umbilical cord compression
- C. Abruption placenta
- D. Perinatal asphyxia
- E. Maternal polydrug use

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complications of breech delivery and signs of spinal cord injury.

Critique:

Spinal cord injury is associated with breech presentation. Normal cord gas reactive makes other options less likely. Polydrug use is not associated with these signs.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 144

Q 15:

IUGR could be caused by maternal, placental or fetal factors. Among maternal factors, fetal growth is least affected by

- A. High altitude of 3000 m above sea level
- B. Pregnancy induced hypertension
- C. Gestational hypertension
- D. Maternal body mass index
- E. Maternal tetralogy of Fallot

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the causes of IUGR.

Critique:

Gestational HTN if controlled would have least effect of fetal growth. All other affect the growth.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 280-83

Q 16:

A 32 wks 6 day old 1.3 kg infant has persistent HR of 200/min. He is receiving 6 mg of po caffeine q 24 hr. His exam is otherwise normal with normal vital signs. He is tolerating 23 ml q 3 hrs of expressed breast milk. The EKG showed sinus tachycardia. Mom gives history of being very upset these days and started smoking again and increase coffee intake. Due to lack of sleep, she started taking temazepam (Restoril). The next best action is to

- A. Decrease caffeine dose to 4 mg po every 24 hrs
- B. Decrease feeding volume, as baby is fluid overloaded
- C. Use only previous stored milk or switch to formula feeds
- D. Tell her to stop Temazepam, as this may be a potential source of infant's symptoms
- E. Obtain 5-channel pneumogram with pH probe

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the effect of medications, present in breast milk.

Critique:

Most medications taken by mom readily cross placenta. Mom's high caffeine intake is the potential source of symptoms, so C is the best approach. Mom is insomniac, she needs the medication. Caffeine dose and fluid intake are adequate.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 198

Q 17:

Twin A male, was delivered via vertex presentation at 0816. Weight was 1640 grams. Apgar score was 8 and 9 at one and five minutes respectively. Cord gas showed a pH of 7.31, pCO₂ 38, PO₂ 27 bicarb 20, base excess -1. Twin B female was delivered at 0817 had Apgar of 5 and 8 at one and five minutes respectively. Weight was 1515 grams. Cord gas showed a pH of 7.14, pCO₂ 85, PO₂ 24 bicarb 20, base excess -3.2. Two separate placentas were sent for pathology. True statement about this case is

- A. Smaller size is the cause for observed poor cord gas in twin B
- B. Gases are wrongly labeled as Twin A and B
- C. Gases are wrongly labeled as venous
- D. The acidosis observed in twin B is predominantly respiratory
- E. Twin-Twin transfusion is the cause for hypoxemia seen in cord gases

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of cord blood gas.

Critique:

Size is less likely to be the cause of depression noted in twin B. Twin B is depressed and have low pH- rightly labeled. Arterial cord gas has lower O₂ (mean 18), both are venous specimen, rightly labeled. Separate placenta and different sex rules out TTTS.

Reference:

<https://secure1.csmc.edu/nicu/cbg/>

Q 18:

A 36 wks baby boy is delivered by CS secondary to maternal eclampsia. EMS brought the mother to ER after having a seizure episode. She was loaded with 4 g of MgSO₄. The CS was done under GA. Baby was noted to be depressed at birth. Apgar score was 4/8. In the nursery, he is noted to have mild respiratory distress. CXR was normal. The lab values are

Maternal: Uric acid 7.3, Mg 1.8, Hb 12, Platelets 213K

Baby: Mg 2.3, Hb 14, WBC 9.1, bands 4, Platelets 254K

Cord blood gas: 7.32/51/32/25/1.3 (pH/CO₂/O₂/HCO₃/BD)

Blood gas @ ~ 4 hrs of life 7.28/61/46/27/0.3

Blood gas @ ~ 8 hrs of life 7.34/38/41/20/5.3

True statement about this case is

- A. Cord blood gas is not affected by maternal seizure
- B. Baby's respiratory distress is due to infection
- C. Baby's high Mg level is due to gradient transfer of Mg from mom
- D. Maternal high uric acid suggests decreased renal clearance
- E. Maternal seizure could be related to elevated uric acid

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of cord blood gas, effect of Mg and eclampsia.

Critique:

Cord gas is normal. CBC is normal. Mg is actively transported through placenta. Uric acid is high in eclampsia and is due to decreased renal clearance and is not associated with Seizure.

Reference:

<https://secure1.csmc.edu/nicu/cbg/>

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 324

<http://www.emedicine.com/med/topic1905.htm>

Q 19:

Fetal blood concentration would be LOWEST when the anesthetic medication is given to the mother by which route?

- A. Intravenously
- B. In epidural space
- C. In subarachnoid space
- D. Via inhalation
- E. Intramuscularly

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the effect of maternal anesthetic medication on fetus

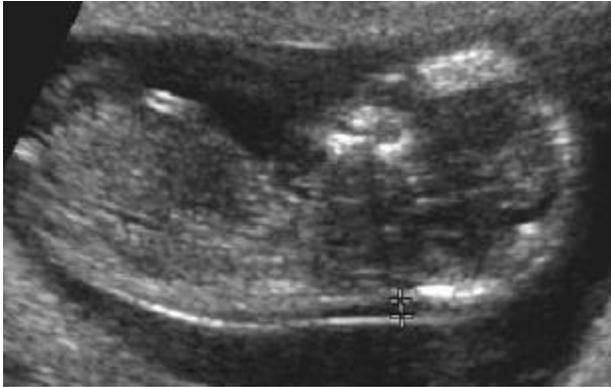
Critique:

Highest to lowest: IV > inhalation > epi > IM > spinal

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 470-71

Q 20:



This antenatal US is performed at 12 wks gestation. The measurement of nuchal translucency is 1.8 mm. The finding suggests

- A. Need for chronic villus sampling for DNA analysis
- B. Need for obtaining alpha fetoprotein in maternal blood
- C. Looking at the maternal chromosomal count
- D. Looking for blood incompatibility between fetus and mother
- E. Observation with follow up US

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the importance of nuchal translucency in antenatal US.

Critique:

First trimester US with nuchal translucency of > 3 mm is suspicious. Here it 1.8 mm. The best choice is observation with follow up.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 155

Q 21:

A 34 wks pregnant woman diagnosed with nephrotic syndrome is being treated with prednisone, levamisole, cyclophosphamide, cyclosporine, furosemide and spironolactone. Her diet is restricted with no salt and high protein. For last two weeks, her generalized swelling is decreased but her neck swelling persisted. Her fetus is at high risk for

- A. IUGR
- B. Congenital nephrotic syndrome
- C. Hypothyroidism
- D. Heart block
- E. Premature birth

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the factors causing hypothyroidism.

Critique:

Mom on no salt is at risk of iodine deficiency and goiter (Iodine fortified salt is an important source of iodine). Maternal neck swelling suggests persistent goiter. Iodine deficiency may lead to neonatal hypothyroidism.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1531-38

Q 22:

Infants born to diabetic mothers are at highest risk of developing which of the following congenital anomaly?

- A. Neural tube defect
- B. Transposition of great arteries
- C. Microcolon
- D. Absent sacrum
- E. Rectal agenesis

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the fetal anomalies associated with maternal diabetes.

Critique:

NTD 10-fold, TGA 5-fold, C, D & E are not that frequent.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 326

Q 23:

Among the medications given to the mother before delivery which one would cause LEAST problem to the fetus

- A. Thiopental
- B. Ketamine
- C. Vecuronium
- D. Fentanyl
- E. Meperidine

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the anesthetic drug placental transfer and UV:MV ratio.

Critique:

The umbilical vein: maternal vein ratio (UV:MV ratio) of vecuronium is lowest (~ 0.11, very little effect on the fetus). A ratio of 1 means UV: MV=1, high placental transfer.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 470

Q 24:

Between 24-40 wks which of the following increases at the highest percentage?

- A. Weight
- B. Intracellular water content
- C. Fat
- D. Protein
- E. Glycogen

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the fetal body composition.

Critique:

Fat increases the most (%) followed by protein, glycogen and ICW. Weight flattens after 36 weeks.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 271-74

Q 25:

A 16-year-old primiparous young lady is in second stage of labor. During the contraction, she cries with pain and then hyperventilates for 60 minutes before delivery the baby. The potential effect of this on fetus could be all EXCEPT

- A. Low uterine PCO_2
- B. Low uterine PaO_2
- C. Low umbilical PCO_2
- D. Low umbilical PaO_2
- E. Shifting of fetal Hb dissociation curve to Left

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the effect of maternal hyperventilation/ Lamaze exercise on blood gases.

Critique:

Maternal hyperventilation lower the PCO_2 in uterine A creating a gradient for fetal CO_2 , so umbilical CO_2 falls. If this continues for long hypocarbia shift the HB- O_2 curve to left causing hypoxia and acidosis, lowering the fetal PO_2 . Maternal PO_2 is not affected.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 468

Q 26:

Symmetrical IUGR differs from asymmetrical IUGR. Which of the following is NOT a characteristic of the former?

- A. Normal ponderal index
- B. Lower head circumference
- C. High risk of hypoglycemia
- D. Low risk for asphyxia
- E. Delayed catch up growth

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the difference between symmetric and asymmetric IUGR.

Critique:

Symmetric IUGR infants are at low risk of hypoglycemia as compared to asymmetric IUGR. All other options are correct.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 296-303

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 24

Q 27:



The histology slide depicts the cross section of umbilical cord. The true statements about the observation noted are all EXCEPT

- A. This condition is more common in twins
- B. This can easily be diagnosed by antenatal US
- C. Prompt antibiotic use can prevent complications
- D. Urination would be normal in this infant
- E. Renal ultrasound is advisable

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the histology and association of single umbilical artery.

Critique:

This histology shows single UA, 2 vessel cord. Single UA is more common in twins and could be easily diagnosed by antenatal US. There are no inflammatory cells, so ABx are not indicated. There is no other tissue seen (allantois/ persistent vitelline duct). Renal US should be done- some centers do it.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 8-9

Q 28:

A pregnant lady was rescued from a building fire. True statement about the risk of carbon monoxide poisoning is

- A. O₂ sat monitor will read a low reading
- B. Blood may appear more pink than usual
- C. Fetus is relatively safe because of fetal Hb
- D. Cord pH and PO₂ would be low
- E. Flying to higher altitude would help

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complication of maternal carbon monoxide poisoning.

Critique:

COHb will give falsely high readings as COHb absorbs light similar to O₂Hb. Blood is less oxygenated so does not appear pink. Fetus is not safe as CO is low MW and fat soluble, placenta transfer and binding to FeHb resulting in impaired O₂ delivery causing low pH and low PO₂. Hyperbaric oxygen would help not hypobaric- high altitude.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 259

Q 29:

A term newborn baby weighs 1675 gm. On exam is noted to have puffy face. Maternal history is positive for PROM. Maternal serology is negative for syphilis, hepatitis and HIV. The triple screening showed elevated alpha- fetoprotein. The placenta is noted to be boggy and weighs 1900 gm. To reach the diagnosis, the most important additional investigation required is

- A. RPR on baby's serum
- B. Kleihauer-Betke test on mom's blood
- C. Abdominal US
- D. Urine analysis
- E. Chromosomal analysis

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the DIFFERENTIAL DIAGNOSIS of heavy placenta & elevated alpha-fetoprotein.

Critique:

The infant has Nephrotic syndrome, UA will show proteinuria. RPR is not indicated- mom serology is negative. KB test is for hydrops related to anemia. Abdominal US and chromosome are not indicated.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1678-1679

Q 30:



This infant is born at term. Mom has facial rash for which she takes topical medication. The most important next intervention would be

- A. Audiology assessment of both
- B. Renal US on baby
- C. Echocardiography on baby
- D. Electrocardiogram on baby
- E. Anti-Ro and anti-La antibodies on mom

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the association of retinoic acid and fetal microtia (isotretinoin embryopathy)

Critique:

The mom is taking retinoic acid for her acne. The most other important potential teratogenic effects are cardiac (TGA, TOF, VSD), so echo should be done. SLE is less likely to give microtia, so ECG and anti-rho are not indicated.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 39

Q 31:

Fetal fibronectin has been used to assess the risk of preterm delivery. All are true statements about fetal fibronectin EXCEPT

- A. Positive result is suggestive of possible preterm delivery
- B. Negative result is reassuring with regards to preterm delivery
- C. It is recommended in all preterm labor from 24-34 weeks
- D. Its presence in the first trimester is normal
- E. Fast kit has been recently approved for domestic use

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the importance of fetal fibronectin

Critique:

There is no fast kit available yet. All other choices are correct.

Reference:

http://www.marchofdimes.com/professionals/14332_1149.asp

Q 32:

Placental pathology reports are often informative. The placental pathology report on a 25 wks gestation shows focal intervillous fibrin deposition with secondary villous atrophy. Cord and membranes appear normal. The details are:

Gestational Age: 25 5/7 weeks.

OB Index: G6, P4, A2, L 4

Maternal History: Tobacco use. Premature rupture of membranes at 21+ weeks, prolonged rupture for four weeks. Cesarean section done with breech presentation.

Amniotic fluid: Clear and blood tinged.

Baby Weight: 760 grams.

Apgars: 5 and 8 at 1 and 5 minutes

The most likely etiology for the observed placental findings is

- A. Maternal infection
- B. Maternal diabetes
- C. Maternal hypertension
- D. Maternal drug abuse
- E. Maternal antiphospholipid syndrome

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the features of placental pathology

Critique:

Hypertension- infarcts, infection- inflammatory cells, Fibrin deposits- APLA syndrome

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 455-462

Q 33:

A 23-year-old lady is currently 38-4/7-week gestation. Weight now is 229 pounds, which is up 2-1/2 pounds in 1 week. Blood pressure is 162/100, and repeat blood pressures 130/90 and 140/94. Urine dip stick showed 4+ protein, no glucose, no ketones. Fundal height measured 38 cm. Her abdomen is obese, soft and non-tender. She does have 1+ pretibial edema; however, face and hands are not swollen. Deep tendon reflexes are +2 without clonus. On exam, her cervix is 1 cm, 50% effaced, minus 3 station, with vertex ballotable, and an intact bag of water. Non-stress test was performed today and showed a fetal heart rate baseline of 130, moderate variability, and two 15 x 15 accelerations. No decelerations. No uterine contractions or irritability traced. A growth ultrasound was done today. Estimated fetal weight is 3 pounds 9 ounces, which is less than 10th percentile. BPD measurement was 7.49, which is equal to 30-0/7 weeks. HC is equal to 28.3 cm, which is 31-0/7 weeks. The AC measurement is 26.1 cm, which equals 30-1/7-week gestation; and femur length is 6.06 cm, which equals 31-3/7-week gestation. AFI is 2.7cm. Biophysical profile is 8/10. All of the following statements are true about the situation EXCEPT

- A. Delivery should be planned within 24 hrs
- B. Mg SO₄ should be started
- C. The fetus is at risk of hematological problems
- D. Head measurement indicates symmetrical IUGR
- E. The risk of perinatal asphyxia is high

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complications and management of preterm labor

Critique:

Fetus is sym IUGR sec to preeclampsia and is at high risk for asphyxia, neutropenia and thrombocytopenia. MgSO₄ is indicated to prevent seizure. BPP is 8/10 and GA is 25 wks, delivery is not indicated now.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 331-56

Q 34:

A mother is worried about her third pregnancy. Out of her two previous male children, one is autistic and other one is normal. She is a chemist and her husband is CEO in a private firm. Her current antenatal US showed female fetus. The true statement about her situation is

- A. Fragile X syndrome is x-linked recessive disease
- B. Third child being a female fetus is very less likely to have Fragile X syndrome
- C. Normal parents rule out the genetic cause for autism
- D. Fetal karyotype analysis would help in diagnosis of Fragile X syndrome
- E. Up to 60% of Fragile X kids are autistic

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know about Fragile X syndrome

Critique:

Fragile X is x-linked dominant. Normal karyotype cannot exclude FXS. Autism is high in FXS.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 175

Jones KL. Smith's Recognizable Patterns of Human Malformation. Elsevier Saunders 2006; pg 160-161

Q 35:

Placental examination is very helpful in diagnosing certain diseases. The description of normal placenta at term gestation is (weight, diameter, thickness)

- A. 325 gm, measures 15 x 1.5 cm
- B. 400 gm, measures 17 x 1.5 cm
- C. 500 gm, measures 22 x 2 cm
- D. 650 gm, measures 28 x 3 cm
- E. 700 gm, measures 30 x 3 cm

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the size of normal placenta

Critique:

500, 22 and 2 is the best choice.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 455-62

<http://www.aafp.org/afp/980301ap/yetter.html>

Q 36:



The picture corresponds to

- A. 6 wks of gestation
- B. 9 wks of gestation
- C. 12 wks of gestation
- D. 14 wks of gestation
- E. 16 wks of gestation

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the developmental stages of external genitalia

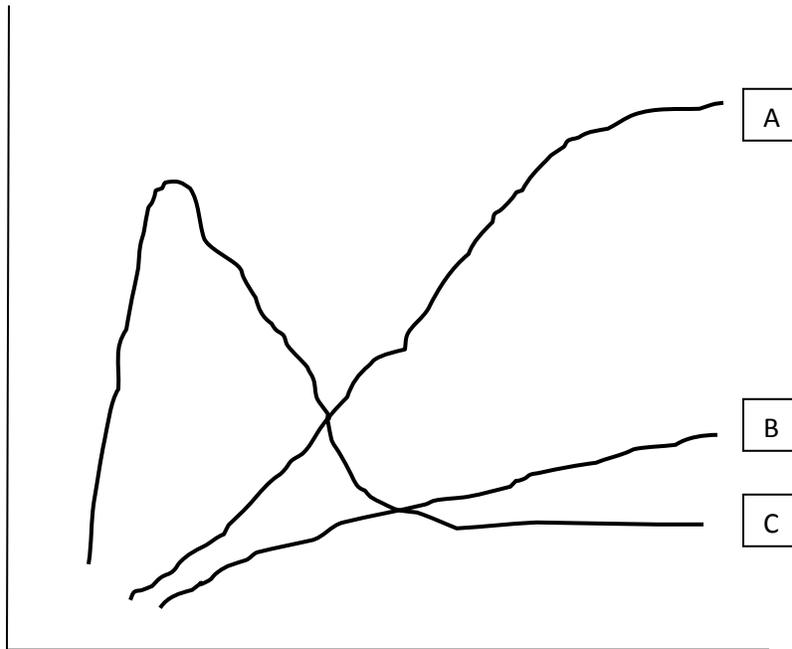
Critique:

By 9 wks the external genitalia is undifferentiated and by 14wks completely differentiated

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1554

Q 37:



Placental hormones play an important role in maintaining the pregnancy. Which of the following hormones is represented by letter A in the diagram?

- A. Estradiol
- B. Progesterone
- C. Beta HCG
- D. Prolactin
- E. Human placental Lactogen

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know about placental hormones

Critique:

HPL appears around 12 wks and peak at 30 wks.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 4-5

Q 38:

Regional anesthesia has gained popularity in OB practice. The main difference between the epidural and spinal anesthesia used during labor is

- A. Site of insertion of the needle
- B. Onset of action
- C. Associated complications
- D. Strength of anesthesia
- E. Type of medication used

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know difference between epidural and spinal anesthesia

Critique:

Spinal anesthesia is quick in action and fades faster than epidural. All other options are same for both.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 473-77

Q 39:

Which of the following condition/procedure is associated with highest fetal mortality?

- A. Abruptio Placenta
- B. Placenta Previa
- C. Vasa Previa
- D. EXIT (ex utero intrapartum treatment) procedure
- E. PUBS (percutaneous umbilical blood sampling)

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complication of abnormal placentation.

Critique:

Vasa Previa is associated with very high mortality (50-90%).

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 9

Q 40:

Which of the following fetal milestone could be observed the earliest

- A. Limb movement
- B. Hand fisting
- C. Babinski reflex
- D. Sucking
- E. Swallowing

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the fetal milestones.

Critique:

Hand fisting 6-8 wks, Limb movement, Babinski 9-12 wks, Suck swallow 12-14 wks

Reference:

<http://gynob.com/concepti.htm>

<http://www.prolife.com/FETALDEV.html>

Q 41:

Amniotic fluid pool is maintained continuously by fetal urine and fetal swallowing. The true statement about the amniotic fluid is

- A. Its osmolality is lowest at 18 weeks of gestation
- B. Fetal urine contributes same amount of what the fetus swallow
- C. Intramembranous transfer of fluid is more than transmembranous transfer
- D. The pH is less than maternal vaginal fluid
- E. Lung fluid flow is equally bidirectional from lung to amniotic cavity

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the physiology of amniotic fluid

Critique:

Fetus contributes more from urine than swallow (1220 vs 800 ml). Osmolality decrease with advancing GA. AF pH is high than vaginal pH. AF flow to the lung is not bidirectional.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 409-411

Q 42:



This fetal echo is the four-chamber apical view taken in a third trimester fetus. After birth, the baby developed SVT and EKG showed WPW syndrome. The most true statement regarding this condition is

- A. Digoxin is the drug of choice
- B. Propranolol should be avoided
- C. Surgery is preferred over radiofrequency ablation
- D. Brain imaging studies should be done
- E. Biopsy is needed to confirm the diagnosis

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the presentation and complications of rhabdomyoma

Critique:

Rhabdomyoma is associated with tuberous sclerosis, so brain imaging is advisable. Digitalis is contraindicated in WPW. Surgery is rarely needed.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 104

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1250

Q 43:

A 26-year-old primigravida 40 wks pregnant woman presented to ER with abdominal pain. She was hooked up to the cardiotachograph (CTG) which showed FHR of 70 and no uterine contractions. Cervix is closed on PV exam. The most immediate intervention would be to

- A. Obtain maternal heart rate on CTG
- B. Proceed with emergency CS
- C. Perform urgent abdominal US
- D. Stimulate the fetus
- E. Reposition the mom

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the values and trend of FHR on CTG

Critique:

When fetus is stable and CTG showed low HR, it is advisable to check if that is maternal HR.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 173-9

Q 44:

You were called to attend a crash CS for fetal bradycardia. Baby was lifeless at birth. After aggressive resuscitation, you noted heart rate at 9 minutes of life. The 15 min Apgar was 5. You admitted the baby to NICU and started the baby on hypothermia treatment as per the unit protocol. The first gas obtained from UAC was 6.88/ 66/ 87 (O₂)/ 8/ -22. While reviewing the records, you note that the cord gas was 7.13/ 56/ 37 (O₂)/ 14/ -12. The reason for this discrepancy is

- A. Inappropriate cord blood sample
- B. Wrong cord gas report
- C. Cord blood obtained from the placenta side
- D. Late onset metabolic acidosis
- E. Tight cord around the neck

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of cord blood gas.

Critique:

Cord compression may result in preservation of acid-base status.

Reference:

<https://secure1.csmc.edu/nicu/cbg/>

Q 45:

A 32-year-old primigravida is admitted to L&D in active labor. You are consulted by MFM to discuss the neonatal aspect of twin gestation. True statement about twin is

- A. Sex can differentiate between identical and fraternal twins
- B. Dichorionic Diamniotic membranes confirms dizygosity
- C. Monoamniotic monochorionic is the least common form of twinning
- D. Twin-twin transfusion syndrome is rare in monochorionic diamniotic twins
- E. Most of conjoined twins have chromosomal aberration

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know about types of twins

Critique:

Di/Di is most common and Mono/Mono is most rare. TTTS occurs in Mono/Di.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 375-381

Gomella TL et al. Neonatology: management, procedures, on-call problems, diseases and drugs. Appleton & Lange 1999: pg 447-51

Q 46:

A diagnostic percutaneous umbilical blood sampling (PUBS) was carried out for fetal anemia. The blood gas on the sample showed a PO_2 of 45. This PO_2 indicates

- A. Contaminated blood sample
- B. Blood sample from uterine vein
- C. Blood sample from uterine artery
- D. Blood sample from umbilical vein
- E. Blood sample from umbilical artery

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the PO₂ content of Uterine A & V and Umbilical A & V

Critique:

PO₂ in Uterine A ~ 90, Uterine V~45, Umbilical A ~ 20, Umbilical V ~30

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 88

Q47:

A young lady with blood group A –ve had abnormal US suggestive of immune hydrops. PUBS was done and fetal Hb was noted to be 5 g/dl. Mom Hb is 12 g/dl. A Kleihauer-Bette test is done that showed fetal RBC of 5 and maternal RBC of 400. You plan to give Rhogam. How many vials (300 microgram) is needed?

- A. One vial
- B. Two vials
- C. Three vials
- D. Four vials
- E. Five vials

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the value of KB test.

Critique:

KB test: no of fetal cell/ maternal cell x 100 = 1.25%, 1% = 50 ml ~ 62 ml

1 vial of RhoGam for 30 ml blood loss, so 2 vials are needed

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 286

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 393-94

NUTRITION

Q 1:

Human mature human milk as compared to mature cow milk is deficient in

- A. Vitamin B
- B. Vitamin A
- C. Vitamin E
- D. Vitamin C
- E. Folic acid

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the difference between BM and cow's milk.

Critique:

BM is low in Vit D K & B. The other constituents' lows in BM are: protein, phos, Ca, Na, and K

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 671-672

Q 2:

Human mature human milk as compared to mature cow milk is relatively low in

- A. Protein
- B. Fat
- C. Lactose
- D. Copper
- E. Vitamin C

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the difference between BM and cow's milk.

Critique:

BM is low in Vit D K & B. The other constituents' low in BM are: protein, phos, Ca, Na, and K

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 671-672

Q 3:

True statement about intralipid infusion in neonates is

- A. High incidence of IV burns due to high osmolality of the solution
- B. 20% solution have more phospholipids than 10% solution
- C. Is compatible with IV Na but not with IV Ca
- D. Clearance is fast in neonates b/c of increase Vd
- E. Main source of IL is soybean oil

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know about IL solution.

Critique:

IL is a low osmolality soln, compatible with IV Ca and Na. 20% IL is low in Phos: TG ratio. Clearance is due to lipoprotein lipase.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 685-87

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 254

Young TE, Magnum B. Neofax, Thomson 2007; pg 314-15

Q 4:

True statements about the amino acid Cysteine are all EXCEPT

- A. It is considered as essential AA
- B. It is insoluble in most of the AA solutions
- C. When added to TPN, it leads to acidosis
- D. When added to TPN, it decreases Ca/P solubility
- E. When added to TPN, it increases nitrogen balance

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the characteristics of AA cysteine.

Critique:

Essential AA in neonates (CATT-G) Cysteine, arginine taurine, tyrosine, glycine. Cysteine increases Ca/P solubility. All other statements are true.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 685

Q 5:

Breast feeding has certain advantages over formula feeds. A 3-month-old term infant who is exclusively breast fed needs supplementation with

- A. Iron
- B. Vitamin D
- C. Vitamin C
- D. Fluoride
- E. Folic acid

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the composition of BM

Critique:

BM fed infants need Vit D after 3 months and Iron after 6 months.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 674-5

Q 6:



This growth chart is obtained from an infant who has CLD/BPD and received two courses of dexamethasone. He is requiring 30% FiO₂ to keep sat > 92%. He runs low axillary temperature however rectal temperatures are normal. He is on fortified milk with additional vitamins. The most important intervention at this point is to obtain

- A. Echocardiogram
- B. Thyroid profile
- C. Nutritional evaluation
- D. Bone age assessment
- E. Brain MRI

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the assessment of growth

Critique:

Head circumference is the most concerning observation. In larger babies, axillary temp may run low. A, B & C –all are after the brain MRI. Bone age assessment is not needed now-linear growth is ok.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 989-995

Q 7:

A 26 week, 900 gm, 6 day old premature infants is stable on 24% O2 and nasal CPAP. She is receiving TPN (D 12%, P 3.5g/kg/day, fat 2 g/kg /day) via PICC line. The morning labs showed triglyceride of 250 mg/dl, glucose of 140 mg/dl and albumin of 3.2 mg/dl and BUN of 24 mg/dl. The true statement about this infant is

- A. Hyperglycemia is the reason for falsely elevated triglyceride level
- B. High triglyceride level decreases the risk for hyperbilirubinemia
- C. High triglyceride level indicates that the infant is in catabolic state
- D. Fat dose is high for the gestational age in days and weight of the baby
- E. IV heparin 1U/ml and carnitine 20 mg/kg/day may be beneficial

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the causes and management of triglyceridemia

Critique:

TG increases not decreases hyperbilirubinemia risk. 2 g/kg of lipids on D6 is not high for preterm infant. Carnitine supplementation may help here.

Reference:

http://www.medscape.com/viewarticle/489706_4

Q 8:

The parents are worried about their baby who for last 4 days has lost weight (down from 4235 gm to 3895 gm). This is a 23 days old term baby operated for gastroschisis. The baby is receiving TPN with partial feeds. His LFT showed elevated ALT, AST, and PT. He has received 4 transfusions in last 2 weeks. His Hb is 7.6 g/dl with ferritin of 770 ng/dl. The best intervention to help control baby's problems is to

- A. Start cycling the TPN
- B. Add po fat-soluble vitamin (ADEK)
- C. Add po actigall (ursodeoxycholic acid)
- D. Start po iron supplementation
- E. Add po pancreatic enzymes

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know about the complications of cholestasis

Critique:

Fat soluble vitamins (ADEK) are needed in cholestasis. The infant is manifesting signs of deficiencies (anemia, poor wt gain). Ferritin is high so Fe is not indicated. Actigall would help in bilirubin excretion but anemia should be treated with Vit E. There are no signs of malabsorption- no need for pancreatic enzymes.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 255-56

Q 9:

A term 4.3 kg infant who was born vaginally with history of shoulder dystocia is noted to have decreased right arm movement. X-ray showed fractured of right clavicle. On 3rd day of life, his metabolic profile showed Na 142, K 6.1, HCO₃ 18, Ca 6.8, Phos of 9, ALT 24, AST 38, Alk Phos 345, Bili 11.8, Creatinine of 1.2. His glucose ranges from 58-92 mg/dl. He is given breast milk, which is running short of supply now. The best alternative to breast milk in the case described is

- A. Soy-based 20 cal formula
- B. Lactose free 20 cal formula
- C. Regular term formula
- D. 24 cal Fortified formula
- E. 20 cal 60/40 formula

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know about different formulas, esp 60/40.

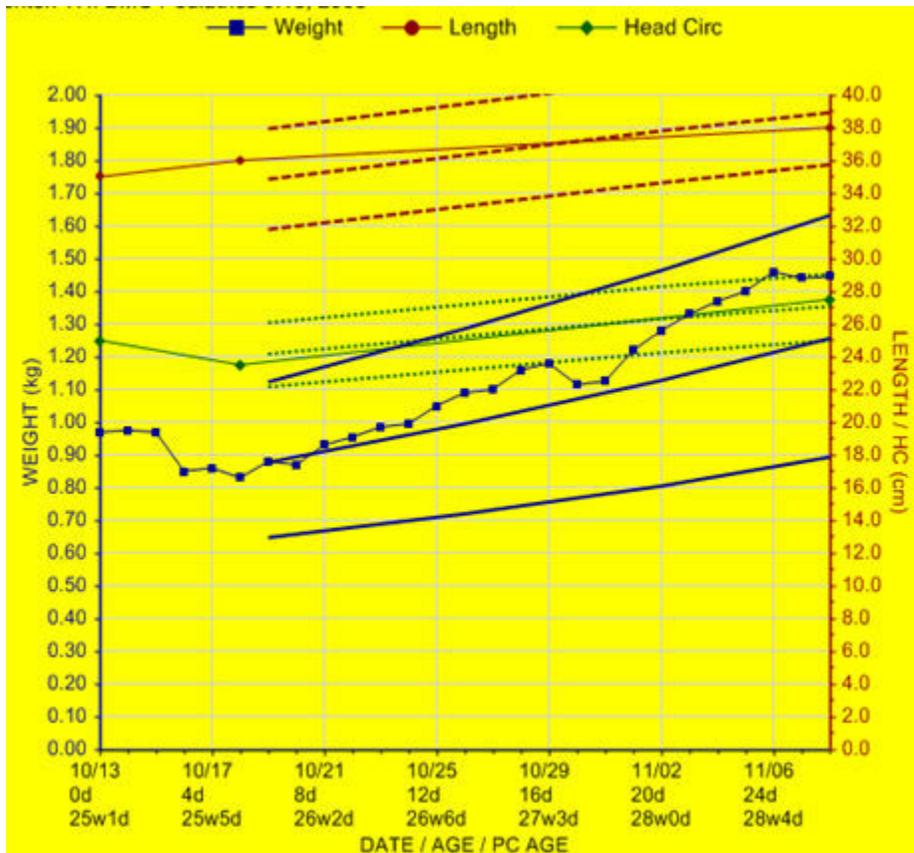
Critique:

60/40 is the low phosphate formula (28 mEq/ 100 cal) needed in condition where infant has low serum Ca and high phos.

Reference

Young TE, Magnum B. Neofax, Thomson 2007; pg 281

Q 10:



This growth curve is of a baby who was born at 25 weeks of gestation with birth weight of 970 gm. The baby is 26 days old today and weighs 1445 gm. The baby is on 24 Cal fortified BM 30 ml every 3 hr. The parents are worried about the growth of the baby. You ordered some basic labs, results are as follow

Na 132, Cl 98, Bili 3.2, direct 2.6, ALT 23, AST 32, T Protein 4.6,

Alb 3.1, BUN 25, creatinine 0.5, Hb 10.6 g/dl, glucose 97

The best intervention would be to

- A. Add Beneprotein 1 g/kg/day
- B. Add Cornstarch 1 g/kg/day
- C. Add MCT oil 1 ml/kg/day
- D. Add NaCl supplement 1 mEq /kg/day
- E. Fortify BM to 30 calories

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the role of dietary supplements

Critique:

Total protein & albumin and glucose are normal, so A&B are not the correct choices. Na of 132 is low but the dose given is low. Fortification will help but result in increased osmolality of milk.

Reference:

Young TE, Magnum B. Neofax, Thomson 2007; pg 312

Important Calculations

Q 1:

A 1600 gm infant is receiving TPN with partial feeds. TPN is D 10% and Protein 2% running at 4.2 ml/hr with IL 20% at 1 ml/hr. The feeds are 11 ml q 3hr of 20 cal formula. The total caloric intake of this baby is close to

- A. 90 cal /kg/d
- B. 95 cal/kg/d
- C. 100 cal/kg/d
- D. 110 cal/kg/day
- E. 120 cal/kg/day

The correct response is A.

Solution:

Calories from TPN

Dextrose = 10% (10g / 100ml)

Total fluids 4.2 ml/hr = 100 ml/day

100 ml of D10 will give 10 g of glucose (1 g = 3.4 Cal), so $10 \times 3.4 = 34$ Cals

Protein = 2% (2g / 100ml)

Total fluids 4.2 ml/hr = 100 ml/day

100 ml of 2% Protein will give 2 g of Protein (1 g = 4 Cal), so $2 \times 4 = 8$ Cals

Lipids = 20% (20g / 100ml)

Total fluids 1 ml/hr = 24 ml/day

100 ml of 20% Fat will give 20 g (0.2 g/ml)

24 ml will give $24 \times 0.2 = 4.8$ g, Fat (1 g = 9 Cal), so $4.8 \times 9 = 43.3$ Cals

Feeds (20 cal mean 20 cal per oz, that is 0.67 cal/ml)

11 ml q 3 = $11 \times 8 = 88$ ml $\times 0.67 = 58.96$ Cal

Total Cals = $34 + 8 + 43 + 58 = 139$ cal or 90 cal/kg/day

Q 2:

A 1600 gm infant is receiving TPN with partial feeds. TPN is D 10% and Protein 2% running at 4.2 ml/hr with IL 20% at 1 ml/hr. The feeds are 12 ml q 3hr of 20 cal formula. The total protein intake of this baby is close to

- A. 2g /kg/day
- B. 2.5g /kg/day
- C. 3 g/kg/day
- D. 3.5g /kg/day
- E. 4g /kg/day

The correct response is B.

Solution:

Protein via TPN = 2 %, 2 g/100 ml

4.2 ml/hr = 100 ml/day (4.2 x 24) = 2 g

Protein via feeds = ~2 g/100 ml

12 ml q 3 = 96 ml/day (11 x 8) = ~ 2 g (2 g per 100 ml)

Total protein TPN + feeds = 4 g or 2.5 g/kg/day

Q 3:

A term male infant weighs 1875 g, his head circumference is 32 cm and length is 44 cm. He fits into the definition of symmetrical IUGR. What would be his ponderal index?

- A. <1
- B. >2
- C. <2
- D. >3
- E. Cannot be computed

The correct response is B.

Solution

$$\text{PI} = \frac{\text{Weight (gm)}}{\text{Length (cm)}^3} \times 100$$

$$\frac{1875 \times 100}{44^3}$$

$$= 2.2$$

OPHTHALMOLOGY

Q 1:

Ptosis is caused by damage to which cranial N

- A. II
- B. III
- C. IV
- D. V
- E. VII

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the function of cranial Ns.

Critique:

CN III supplies levator palpebral muscle.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 131

Q 2:

It is easier to perform complete eye exam in a 27 wks at birth due to the fact that

- A. The corneal reflex is not developed
- B. The pupillary reflex is not present
- C. The palpebral fissure is relative large for the face
- D. The eye lid tone is low, easy to retract the lids
- E. Dolls eye (oculocephalic) reflex is absent

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know about eye reflexes in preterm infants

Critique:

Corneal and doll eye reflexes are present @ 24-25 wk. Pupillary reflex exists after 28 wks. Palpebral fissure are tight in preterm infants as compared to term infants.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 370

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 526

Q 3:

You are called to evaluate a term newborn male who is noted to have dysmorphic feature. On examination, you note normal looking head with open fontanel, hypotonia, normally placed eyes but deeply seated with white eye reflex bilaterally on ophthalmoscopy. No murmur is heard and testes are undescended. The most important investigation at this time that will help in further diagnosis and management is to order

- A. Urine analysis
- B. CT scan of brain
- C. Pelvic US
- D. Ophthalmology consult
- E. Genetic consult

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the differential diagnosis of bilateral cataract, hypotonia

Critique:

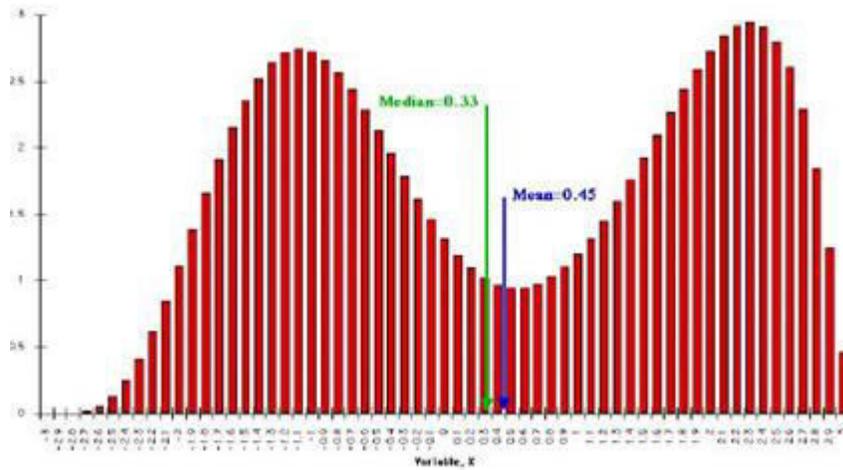
Classic description of Lowe (oculocerebrorenal) syndrome. Tubular dysfunction is present so UA is the right choice.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 236

STATISTICS

Q 1:



The best measure of central tendency for the above displayed data is

- A. Mean
- B. Median
- C. Mode
- D. Mean & Median
- E. Standard error of mean

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the use of mean, median and mode.

Critique:

C is the best choice. For bimodal distribution use mode (bimodal-mode).

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 389

Q 2:

		ROP	
		Positive	Negative
Oxygen	Positive	15	25
	Negative	25	35

100 preterm infants (wt < 1000g) were screened for ROP. The results are depicted above. True statement about the finding is

- A. Odd ratio is greater than 1
- B. Oxygen exposure results in ROP
- C. There is a negative association between O₂ and ROP
- D. There is 30% chance of ROP in O₂ exposed group

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the concept of odd ratio and relative risk.

Critique:

OR = cross product = $a \times d / b \times c$

RR= exposed / non-exposed = $[a/a+b] / [c/c+d]$

So, OR = 15×35 divided by $25 \times 25 = 525 / 625 = 0.84$ (less than 1 means no association)

RR = $15/15+25$ divided by $25/25+ 35 = 0.78$ (less than 1 negative association)

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 392-393

Q 3:

You are asked to attend M&M monthly meeting for the month of March. The data presented to you is as under

No. of live birth during March = 416

No. of still birth, after 28 wks = 2

No. of still birth, before 28 wks =0

Neonatal death before 7 days = 1

Neonatal death within 28 days = 4

Term infant = 342

34-36 wks = 42

28-34 wks = 24

24-27 wks= 8

The neonatal mortality rate would be

- A. 4 per 1,000 live birth
- B. 6 per 1,000 live birth
- C. 8 per 1,000 live birth
- D. 12 per 1,000 live birth
- E. Insufficient data

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know how to calculate NMR by given data.

Critique:

NMR = number of death in < 28 days/ Live birth x 1000
= 1+4/ 412 x 1000= 12

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 398

Q 4:

Cesarean section rate in your hospital has climbed up to 48%. You note that rates of transient tachypnea had risen to 24% from 11% last year. To compare CS with or without TTN which of the following test would be appropriate?

- A. ANOVA
- B. Student t- test
- C. Mann-Whitney
- D. Pearson
- E. Chi-square

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the application of different statistical tests.

Critique:

For categorical variable, as asked in the Q, chi square should be used.

Student t-test and ANOVA are for continuous variables while Pearson is for correlation. Mann-Whitney is use for non-parametric data.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 396

Q 5:

A study on 200 preterm infants is carried out with the power of 80%. The odd ratio of caffeine in decreasing symptomatic apnea is reported a 0.76 (0.65-0.87, 95% CI). True statement about this finding is

- A. The odds of developing apnea on caffeine is 24%
- B. The odds of remaining apnea free is 76%
- C. The change to alpha error is high
- D. Sample size should be increase to 400 infant
- E. Caffeine is effective in reducing apnea

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of OR.

Critique:

OR of 0.76 with CI not crossing 1 suggest E as correct choice. Power is high so alpha error is less likely and sample size is adequate. A & B are wrong representation of OR

(< 1, no association, > 1 positive association)

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 393

Q 6-7:

You obtain serum creatinine values in 100 consecutive neonates. The mean is 0.8 and variance is 0.2. The standard deviation would be:

- A. 0.1
- B. 0.2
- C. 0.4
- D. 0.02
- E. 0.04

To validate further, you obtain serum creatinine values in 400 consecutive neonates. The mean is 0.8 and standard deviation is 0.2. The standard error of mean would be:

- A. 0.01
- B. 0.02
- C. 0.04
- D. 0.1
- E. Same as SD

Preferred response is C & A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the relationship between SD, variance and SEM.

Critique:

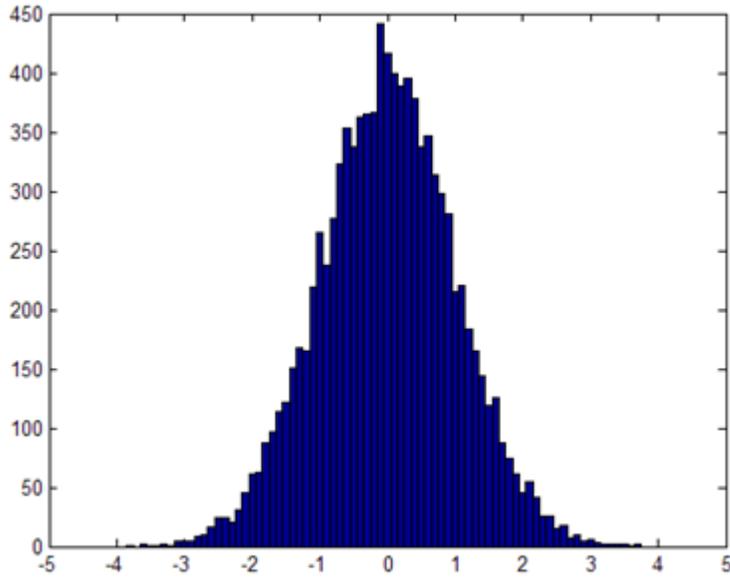
SD = sq. root variance i.e. sq. root of 0.2 = 0.4

SEM= SD / sq. root number = 0.4 / 20 = 0.02

Reference:

Brody D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 391-2

Q 8:



The above graph represents serum glucose values in neonates at 4-6 hrs of birth. The mean is 60 and SD is 10. True statement about this distribution is

- A. 34% of neonates have glucose > 70
- B. 68% of neonates have glucose between 60-70
- C. 5% of neonates have glucose > 90
- D. 99% of neonates have glucose between 30-90
- E. None of the above

Preferred response is D.

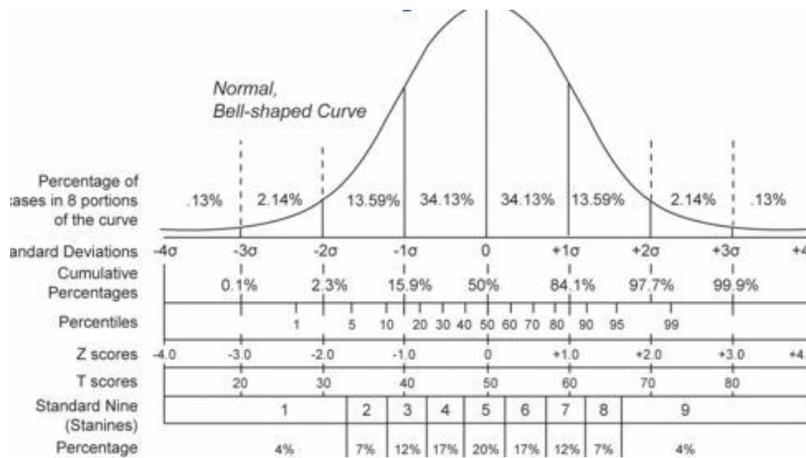
P C R (Pearl, Critique, Reference)

Pearl:

To know the concept of mean and SD.

Critique:

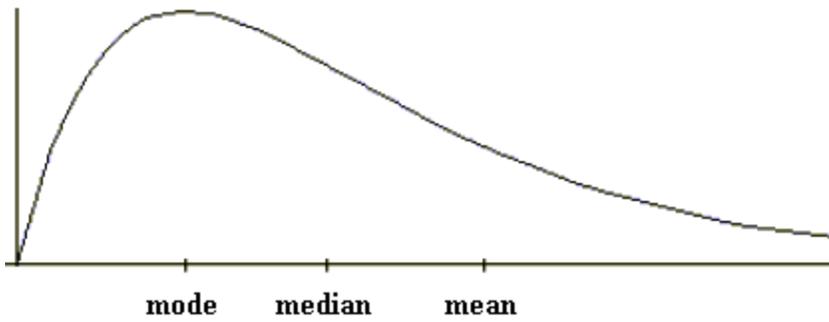
Mean 60 SD 10, 1 SD 68% = 50-70, 2 SD, 95% = 40-80, 3 SD, 99% = 30-90.



Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 390

Q 9:



True statement about the graph is

- A. The data is skewed to the left
- B. Mean should not be used as measure of central tendency
- C. Mode should be used as measure of central tendency
- D. Median should be used as measure of central tendency
- E. None of the above

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the concept of skew data.

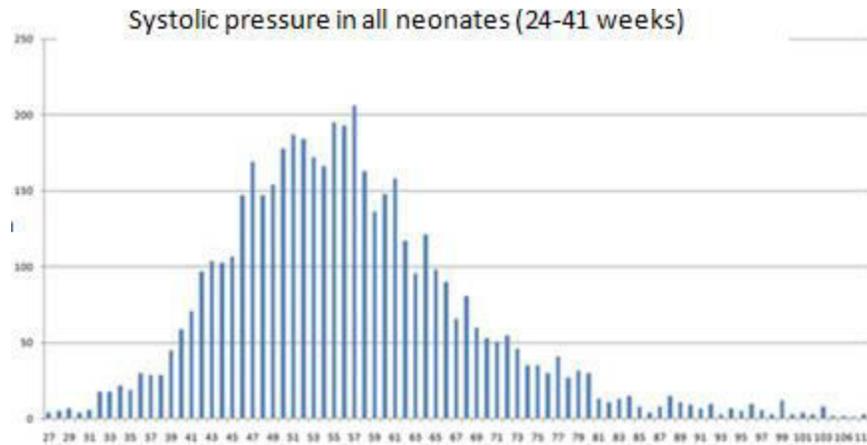
Critique:

For skew data, follow the tail, tail on right means data skewed to right. For skew data use median, for bimodal use mode, for normal distribution use mean.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 389

Q 10:



True statements about the graph are all EXCEPT

- A. 50% of the neonates would have systolic pressure above 55
- B. 99% of the neonates would have systolic pressure above 40
- C. Systolic pressure would be best represented as 55 ± 25
- D. A systolic pressure of 27 represents lowest systolic pressure
- E. A systolic pressure of 81 is within the 2SD of the mean

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the concept of mean and SD.

Critique:

99% of neonate will have BP above 81, see critique to Q 8 for explanation.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 390

Q 11:

		Disease	
		Positive	Negative
Test	Positive	9	1
	Negative	2	88

100 preterm infants were screened for hypothyroidism. The results are depicted above. True statement about the finding is

- A. A positive test means that the baby has hypothyroidism
- B. 9 % of infants have hypothyroidism
- C. The test has higher PPV than NPV
- D. The test has higher sensitivity than specificity
- E. Screening test is useless

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the screening test (sensitivity, specificity, PPV, NPV).

Critique:

Sensitivity: $a/a+c = 81\%$

Specificity: $d/b+d = 98\%$

PPV: $a/a+b = 90\%$

NPV: $d/c+d = 97\%$

11% infants have hypothyroidism (disease positive/ total number)

Snout: a very sensitive test and test is positive means disease is out

Spin: a very specific test and test is positive means disease is in

So, if spec > sens means disease is IN

If sens > spec disease is OUT

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 394-95

Q 12:

You note higher incidence of stage 3 NEC in male infant. True statement about statistical representation is

- A. Stage 3 NEC is ordinal variable
- B. Gender is nominal variable
- C. Gender is categorical variable
- D. A & B are correct
- E. A, B & C are correct

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know about types of variables.

Critique:

Categorical or nominal variables are: gender, yes, no type data. Ordinal variables are NEC, Apgar score, ROP staging.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 388

Q 13:

All are example of parametric test EXCEPT

- A. Student t test
- B. ANOVA
- C. Mann-Whitney
- D. Pearson
- E. Chi-square

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know about types of statistical tests.

Critique:

Mann-Whitney test is used for non-Gaussian curves. All other tests are used for Gaussian curves.

Tips:

For continuous variables (e.g. BP, weight, etc.), use Student t test...if more than 2 groups use ANOVA

For categorical variables (e.g., gender, mode of delivery, race, etc.) use chi-square, if sample size is small < 20 use Fisher exact test

for same individuals (pre-post) ...use McNemar (categorical variable) or paired student t-test (continuous variable)

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 396

Q 14:

You plan a study to look at the infants with hearing loss and find how many received Gentamicin. This study would be

- A. Cohort
- B. Case-control
- C. Cross-sectional
- D. Survey
- E. Audit

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know about types of types of study.

Critique:

Disease (D), Exposure (E).....D for disease = case

D > E, disease present > track back to expo, case-control study (case first, e.g. hearing loss > genta use)

E > D (cohort study, opposite of above, expo > onset on dis, e.g., genta use > hearing loss)

At a given time (looking at both D & E), cross-section.... just like histo slide, e.g. serology after exp

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 386-88

Q 15:

Your unit has started using transcutaneous bilirubin monitor. You screen 200 consecutive babies and compared these values with simultaneously obtained serum bilirubin. Which of the following statistical test would be most appropriate to apply in this situation?

- A. Pearson's correlation
- B. Chi-square
- C. Fischer Exact
- D. Student t-test
- E. Wilcoxon

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the application of statistical test.

Critique:

Pearson correlation- to see correlation b/w Transcutaneous Bilirubin and Total serum bilirubin.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 396

Q 16:

Researchers registered 1,000 pregnant smokers and 750 pregnant non-smokers women into a study in 2002. They were followed up over a five-year period. Results in 2007 showed that the incidence of IUGR was 60% higher in the smoking group as compared with the non-smoking group. Researchers concluded that there was a link between smoking and IUGR. Which ONE of the following best describes the design of the above study?

- A. Case-control study
- B. Cross-sectional survey
- C. Randomized control trial (RCT)
- D. Systematic review
- E. Cohort study

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the types of research studies

Critique:

Exposure -> disease- Cohort study; Disease -> exposure-case-control study.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 386-88

Q 17:

Researchers registered 450 babies with hearing loss and 2750 babies without hearing loss. Then they looked at who received IV gentamicin. Results showed that the incidence of hearing loss was 30% higher in the gentamicin group as compared with the non-gentamicin group. Researchers concluded that there was a link between gentamicin and hearing loss. Which ONE of the following best describes the design of the above study?

- A. Case-control study
- B. Cross-sectional survey
- C. Randomized control trial
- D. Systematic review
- E. Cohort study

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the types of research studies

Critique:

Exposure > disease - Cohort study; Disease > exposure-case-control study.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 386-88

Important Calculations

Q 1:

You are working in a level 2 nursery. The pre-discharge hearing screening using ABR is a routine in your nursery. You change your antibiotics usage practice from cefotaxime to gentamicin because of increased mortality reported with use of cefotaxime. To evaluate the effect, you screen 200 babies with ABR who received gentamicin and developed hearing deficit confirm later by audiological assessment. Your findings are

True positive cases = 4

True negative cases = 190

False positive cases = 4

False negative cases = 2

Which one of the following is true statement about the ABR test?

- A. Sensitivity is 90%
- B. Specificity is 97%
- C. PPV of about 30%
- D. NPV of about 68%
- E. Data insufficient

The correct response is B.

Solution:

$$\text{Sensitivity} = \text{TP} / \text{TP} + \text{FN}$$

$$\text{Specificity} = \text{TN} / \text{TN} + \text{FP}$$

$$\text{PPV} = \text{TP} / \text{TP} + \text{FP}$$

$$\text{NPV} = \text{TN} / \text{TN} + \text{FN}$$

$$\text{Sens} = 4/6 = 66\%$$

$$\text{Spec} = 190/194 = 97\%$$

$$\text{PPV} = 4/8 = 50\%$$

$$\text{NPV} = 190/192 = 98\%$$

4	4
2	190

Q 2.

In your town there were 25, 400 live birth in the year 2007. There were 1200 abortions, 7,890 premature birth greater than 28 weeks and 17, 510 term birth. Forty-six preterm babies > 28 wks died within 7 days and 12 term babies died before 7 days of life. What is the perinatal mortality rate in your town?

- A. 1.8 per 1000
- B. 2.2 per 1000
- C. 2.6 per 1000
- D. 3.2 per 1000
- E. 3.8 per 1000

The correct response is B.

Solution:

$$\text{PNMR} = \frac{\text{Fetal death after 28 wks} + \text{neonatal death before 7 days}}{\text{Number of live birth} + \text{fetal death after 28 wks}} \times 1000$$

$$46+12 = 58 / 25400+46 = 2.2 \text{ per 1000 live birth}$$

Q 3.

In your town there were 25,400 live birth in the year 2007. There were 1200 abortions, 7,890 premature birth greater than 28 weeks and 17,510 term birth. Forty-six preterm babies > 28 wks died within 7 days and 12 term babies died before 7 days of life. What is the neonatal mortality rate in your town?

- A. 1.8 per 1000
- B. 2.2 per 1000
- C. 2.6 per 1000
- D. 3.2 per 1000
- E. 3.8 per 1000

The correct response is B.

Solution:

$$\text{NMR} = \frac{\text{All neonatal death less than 28 days}}{\text{Number of live births}} \times 1000$$

$$\text{Total deaths before 28 days} = 46 + 12 = 58 / 25400 \times 1000 = 2.2 \text{ per 1000 live birth}$$

PHARMACOLOGY

Q 1:

The best fit for three compartment pharmacokinetic model is:

- A. Vancomycin given IV
- B. Surfactant given via ETT
- C. Caffeine given PO
- D. Drug transport across placenta
- E. Drug transport across breast tissue

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the pharmacokinetic principle of drugs.

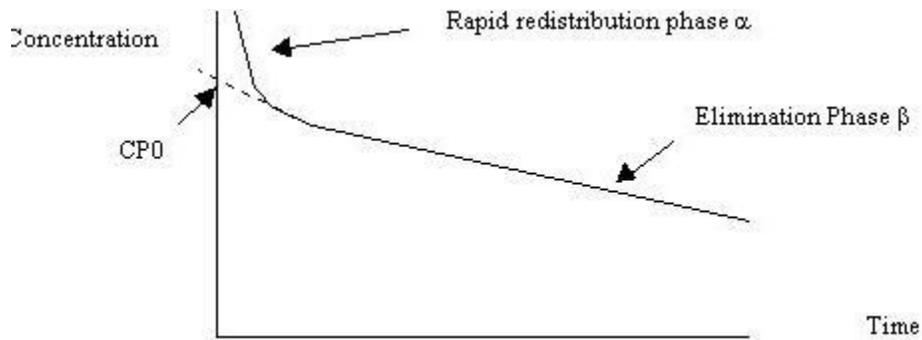
Critique:

E is the best choice as passage of drug through breast follow 3 comp model. Placenta and vanco both follows 2 comp model. Caffeine follows zero-order kinetics and surfactant none of the above.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (Eds). Mosby 2006: pg 198

Q 2:



The graph represents

- A. Gentamicin pharmacokinetics
- B. Vancomycin pharmacokinetics
- C. Placental pharmacokinetics
- D. A & C
- E. B & C

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the pharmacokinetic principle of drugs.

Critique:

E is the best choice. The graph depicts two compartment model. Gentamicin follows one-compartment model.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 204-210

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 381

Q 3:

True statements about use of phenobarbitone in neonates are all EXCEPT

- A. A dose of 40-50 mg/kg could be used in refractory seizure
- B. A level of 35 ug/ml is desirable level
- C. Dose should be reduced to half when use concomitantly with phenytoin
- D. Should not be continued beyond 3 months of life
- E. Lidocaine is used as an alternative in many European centers

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the pharmacology of phenobarbitone.

Critique:

Dose as high as 40-60 mg /kg could be used with target level of 15-40 ug/ml. Dose should be adjusted but not reduced to half when used concomitantly with phenytoin. D & E are true statements.

Reference:

Young T, Magnum B. Neofax. Thomson 2007: pg 184-185

Q 4:

Most drugs are lipophilic and they are changed to water soluble compounds in liver. The steps are:

- A. Conjugation > oxidation > cyto P 450
- B. Cyto P 450 > oxidation > conjugation
- C. Conjugation > demethylation > cyto P 450
- D. Oxidation > conjugation > cyto P 450
- E. Demethylation > cyto P450 > conjugation

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the metabolism of drug.

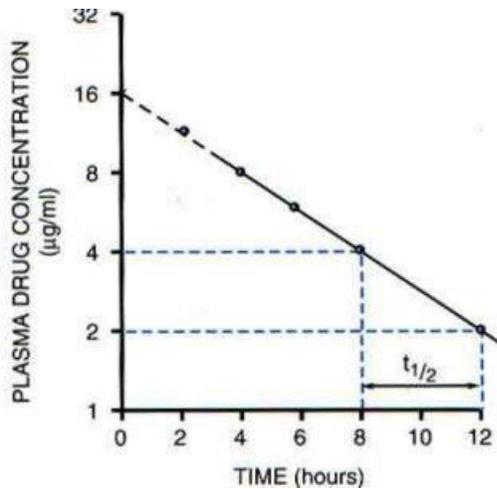
Critique:

Drugs first go through phase I reaction (oxidation, methylation, reduction)
then Cytochrome P 450 metabolism and finally Phase II reaction (conjugation)

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 379

Q 5:



The graph (drawn on semi-log paper) represent log of drug concentration (y-axis) plotted versus time (x-axis). True statement about this graph is

- A. As the slope is linear, it represents zero-order kinetics
- B. As the slope is linear, it represents one-compartment model
- C. Phenytoin is a typical example that follows this kinetic
- D. Alcohol is a typical example that follows this kinetic
- E. The half-life of drug is 2 hrs

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the graphic representation of drug kinetics.

Critique:

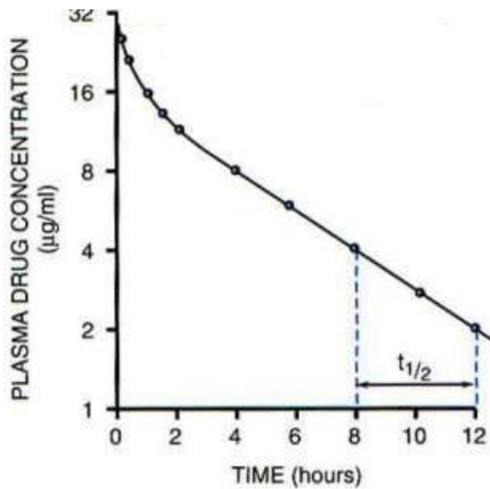
The graph represents one-comp model. This is not zero-order. Alcohol and phenytoin follow zero-order kinetics. Half-life is 4 hr. Tip: Zero-order displayed on plain paper is straight line). On semi log zero order is parabolic line-bent outwards.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 379-81

http://www.rxkinetics.com/pktutorial/1_1.html

Q 6:



The graph (drawn on semi-log paper) represent log of drug concentration (y-axis) plotted versus time (x-axis). True statement about this graph is

- A. The graph represent drug following two compartment model
- B. As the slope is biphasic, it represents first order kinetics
- C. Gentamicin is a typical example that follows this kinetic
- D. Caffeine is a typical example that follows this kinetic
- E. The half-life is 2 hr

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the graphic representation of drug kinetics.

Critique:

The graph represents two-comp model. This is not first-order. Genta follows first-order while caffeine follows zero order in high doses. Half-life is 4 hr. Tip: Zero-plain-straight (zero-order displayed on plain paper is straight line). On semi log zero order is parabolic line-bent outwards not inwards.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 379-81
http://www.rxkinetics.com/pktutorial/1_1.html

Q7:

Dose: 250 mg I.V. Bolus

Time hr	Concentration mg/L
0.25	10.8
0.5	8.5
1	6.2
2	4.9
3	4.4
4	4.0
6	3.4
12	2.0

The pattern of elimination of drug indicates the drug following

- A. Zero-order kinetics
- B. First-order kinetics
- C. Fixed percentage of drug excretion per unit time
- D. A & C
- E. B & C

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the order kinetics of drugs.

Critique:

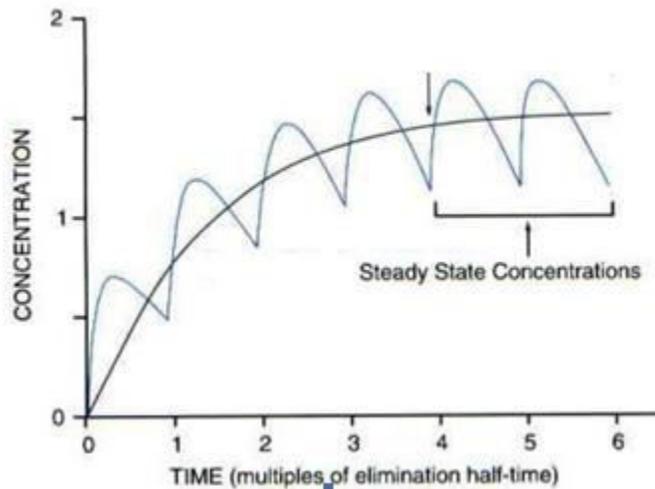
A fixed percentage of the drug is excreted (~20%). This is a feature of first order kinetics.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 379-81

http://www.rxkinetics.com/pktutorial/1_1.html

Q 8:



True statements about the graph are all EXCEPT

- A. Steady state concentration (SSC) would be about 75 % at 2nd half life
- B. If infusion rate and clearance is given, SSC could be calculated
- C. If dose before and after is known with SSC before, SSC after could be calculated
- D. SSC is directly proportional to volume of distribution
- E. Longer the half-life longer the it takes for the SSC

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the concept of SSC.

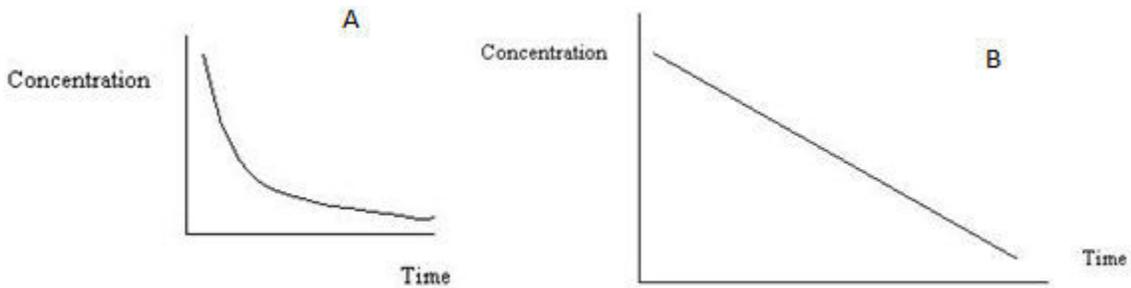
Critique:

With high Vd half large dose is needed and serum conc. is lower. Thus, SSC is not directly proportional to Vd. It depends upon half-life. All other statements are correct.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 382
http://www.rxkinetics.com/pktutorial/1_1.html

Q 9:



True statement about the illustration is

- A. Graph A could be zero-order kinetics if plotted on semi-log paper
- B. Graph A could be first-order kinetics if plotted on semi-log paper
- C. Graph B could be zero-order kinetics if plotted on plain paper
- D. Graph B could be first-order kinetics if plotted on plain paper
- E. Graph B could be one-compartment model if plotted on plain paper

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the graphic representation of drug kinetics.

Critique:

Zero-plain-straight (zero-order displayed on plain paper is straight line). On semi log zero order is parabolic line-bent outwards. First order on plain paper is parabolic bent inwards while on semi-log its straight line.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 379-81

http://www.rxkinetics.com/pktutorial/1_1.html

Q 10:

Terbutaline is used for tocolytics. Basing on FDA safety scale, this drug is category

- A. Category A
- B. Category B
- C. Category C
- D. Category D
- E. Category X

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the FDA classification of drug category

Critique:

A- safe (vitamins), B- animal OK, human not proven (PCN), C- animal risk, no studies on human (b blockers, MgSO₄), D- document fetal risk BUT benefits > risk (anticonvulsant), X-unsafe (acne cream products, retinoid)

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 38

Q 11:

You are preparing a presentation on the treatment candidiasis in neonates. With regards to antifungal properties, the true statement regarding antimycotics used in neonates is all EXCEPT

- A. Nystatin is fungicidal
- B. Fluconazole is fungistatic
- C. Flucytosine has good CSF penetration
- D. Liposomal Amphotericin B is less nephrotoxic
- E. Hearing deficit is a known complication

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the facts about antifungal drugs

Critique:

Hearing deficits are not associated with antifungal agents. All other statements are true.

Reference:

Young TE, Magnum B. Neofax, Thomson 2007; pg 8, 34, 36

Q 12:

During the lecture on congenital heart disease the presenter emphasizes on the use of prostaglandin in all cyanotic infants while waiting for echocardiogram. All of the following are true about prostaglandin (PGE1) EXCEPT

- A. It is given as continuous drip
- B. It causes apnea, which is dose dependent
- C. Long term use cause osteopenia
- D. It causes blood flow from Pul A to Ao through PDA in HLHS
- E. It causes blood flow from Ao to Pul A through PDA in TOF

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the uses and complications of PGE1

Critique:

Long term use causes periosteal thickening not osteopenia. All other statements are true.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1226

Q 13:

A 32-year-old lady with no prenatal care presents to L&D fully dilated. She delivered a 3.2 kg baby, who remained cyanotic despite oxygen therapy. You took the baby to the NICU and placed him on sat monitor. Breathing on RA, the preductal sats are 62% while post ductal sats are 72%. On examination, you noticed bounding pulses and tachypnea. No murmur is heard. CXR showed increase heart size with increased PVMs. EKG showed right axis. You order an urgent echo and started the PGE₁ drip. The parents are at the bedside and you are explaining about the possibility congenital heart disease. The mom tells you that she had mitral valve prolapse and father had operation for ASD last year. During the conversation mom touched the baby and baby stops breathing. You called the code and started CPR. The most likely cause for infant's deterioration is

- A. PGE₁ drip
- B. Ductus closure
- C. Laryngeal spasm
- D. Subtle seizure
- E. Blocked airway

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the side effects of PGE₁

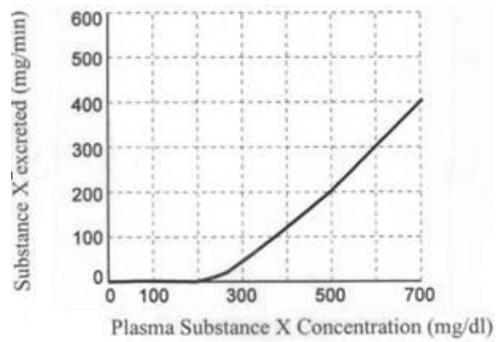
Critique:

Apnea is one of the commonest side effects of PGE, others are flushing, fever & bradycardia

Reference

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 118

Q 14:



In this graph, the X axis represent the serum concentration and Y -axis the urine concentration of substance X. The renal threshold of substance X is

- A. 100 mg/dl
- B. 200 mg/dl
- C. 250 mg/dl
- D. 300 mg/dl
- E. 400 mg/dl

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the concept of renal threshold

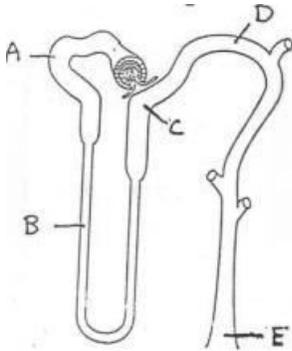
Critique:

Renal threshold is the level of a substance in serum after which it starts appearing in the urine. The graph displays the example of glycosuria. Once a level of 200 mg/dl is reached the glucose will start spilling in the urine.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1667-8

Q 15:



Furosemide (Lasix) blocks the active chloride transport resulting is chloride excretion. Which letter represents its site of action?

- A. Letter A
- B. Letter B
- C. Letter C
- D. Letter D
- E. Letter E

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the site of action of diuretics

Critique:

Furosemide acts on thick ascending loop of Henle.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 82

<http://www.cmellc.com/geriatrictimes/images/g010327.gif>

Q 16:

Which statement about gentamicin is true?

- A. It is the most common antibiotic used in the NICU
- B. The dose of 4 mg/kg q 24 hr works for both preterm and term infants
- C. It is distributed poorly in preterm infants
- D. It acts by blocking 50S subunit of bacterial ribosomes
- E. The dose should be decreased for higher trough levels

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the pharmacology of gentamicin

Critique:

Gentamicin acts on 30S subunit, preterm infants have high volume of distribution due to increase ECF so longer half-life. Frequency should be adjusted for high trough.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 211

Young TE, Magnum B. Neofax, Thomson 2007; pg 4041

Q 17:

A pregnant lady has consented for using digoxin to treat her fetus suffering from SVT and hydrops. A loading dose of 1 mg is given followed by 0.25 mg maintenance TID. The serum digoxin level drawn at steady state is 1.2 ng/dl (1-2.5 ng/dl) in mom and 0.6 ng/dl in fetus. The reason for low level is

- A. High fetal clearance
- B. Low loading dose in mom
- C. Low maintenance dose in mom
- D. High volume of distribution in fetus
- E. Placenta metabolizing the drug

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the principle of fetal drug transfer.

Critique:

Fetus has high ECF and thus high Vd. Fetal clearance is limited, adequate dose is given to mom, placenta does not metabolize digoxin.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 204-212

Important Calculations

Q 1:

A preterm infant who is receiving gentamicin at 4 mg /kg every 36 hr. The peak is 6.4 while the trough is 0.8 drawn 10 hr apart. The half-life of gentamicin is close to

- A. 3.3 hr
- B. 3.9 hr
- C. 4.2 hr
- D. 5.4 hr
- E. 6.2 hr

The correct response is A.

Solution:

Genta P = 6.4, Trough = 0.8, Time = 10 hr

It will take one half life for the level to drop down to half, therefore

6.4
↓ 1 half life
3.2
↓ 2 half life
1.6
↓ 3 half life
0.8

Now total time is 10 hr between the samples, so

Total time between peak and trough

No of half life
 $= 10/3 = 3.3 \text{ hr}$

Q 2:

The resident on call started Octreotide on a baby with congenital chylothorax who weighs 3.2 kg on admission. The trough of the drug is 14 while the peak is 24. Assuming the volume of distribution as 1, what is the dose he used?

- A. 16 μg
- B. 24 μg
- C. 32 μg
- D. 36 μg
- E. 40 μg

The correct response is C.

Solution:

$$\text{Dose} = \frac{\text{Concentration (peak - trough)} \times \text{volume of distribution}}{S \times F} \text{ (S= active fraction, F=bioavailable)}$$

$$= 10 \times 1 \text{ (S \& F for most IV meds is 1)}$$

$$= 10 \times \text{weight} = 32 \text{ ug}$$

Q 3:

A 1.5 kg newborn is being operated for NEC. He was given Vanco & Genta preoperatively, 15mg/kg and 4 mg/kg respectively. The gent peak is 6.8 and trough is 1.8, drawn 10 hr apart. The infant was placed on fentanyl drip and requiring prn vecuronium. He looks edematous. ID recommends adjusting the gent dose because of high volume of distribution and high through. The target given is 6 peak and 0.5 trough. The new dose would be:

- A. 4.2 mg/kg
- B. 4.4 mg/kg
- C. 4.6 mg/kg
- D. 4.8 mg/kg
- E. cannot be computed

The correct response is B.

Solution:

Calculate Vd from dose

$$Vd \text{ (L/kg)} = \frac{\text{Dose (mg/kg)}}{\text{Concentration (Peak-trough)}}$$

$$= 4 / 6.8 - 1.8 = 0.8 \text{ L/kg}$$

With the target, Peak and trough

$$Vd \text{ (L/kg)} = \frac{\text{Dose (mg/kg)}}{\text{Concentration (Peak-trough)}}$$

$$0.8 = \text{Dose} / 6 - 0.5$$

$$0.8 \times 5.5 = \text{Dose}$$

$$\text{Dose} = 4.4 \text{ mg/kg}$$

Q 4:

An 800-gm preterm infant is hypotensive. You gave 2 boluses of NS with slight improvement, however BP still remains low and you opted to start 5 micgr/kg/min of dopamine drip. How much dopamine you will add to 50 ml of D5W to run the drip at 0.1 ml/hr.

- A. 240 mg
- B. 180 mg
- C. 160 mg
- D. 120 mg
- E. 60 mg

The correct response is D.

Solution:

For 50 ml use 3 (for 100 ml use 6)

$3 \times \frac{\text{Dose} \times \text{weight}}{\text{Rate}} = \text{mg needed}$

$3 \times 5 \times 0.8 / 0.1 = 120 \text{ mg}$

Q 5:

After obtaining a CBC and blood Cx, an infant weighing 3.3 kg is started on Vancomycin 50 mg q 8 hr and gentamicin 13 mg q 24 hr. The vanco levels are: peak 12 ug/dl & trough 5 ug/dl. Basing on the pharmacokinetics the best strategy to get vanco peak to 20 ug/dl with trough of 5 ug/dl is to

- A. Double the dose with same frequency
- B. Leave same dose and decrease the frequency
- C. Increase dose by 5% with same frequency
- D. Increase the dose and decrease the frequency
- E. Increase frequency to q 6 hr with same dose

The correct response is A.

Solution:

Calculate Vd from dose

$$Vd \text{ (L/kg)} = \frac{\text{Dose (mg/kg)}}{\text{Concentration (Peak-trough)}}$$

$$= 15 \text{ (50 mg/weight)} / 12-5 = 2.1 \text{ L/kg}$$

With the target, Peak and trough

$$2.1 = \text{Dose} / 20-5$$

$$2.1 \times 15 = \text{Dose}$$

$$\text{Dose} = 32 \text{ mg/kg (}\sim\text{ double of 15 mg/kg)}$$

Q 6:

Your hospital has adopted JCAHO policy of standardized the medication drip. Which of the follow prostaglandin drip you will choose for baby weighing 3.5 kg with dose of 0.05 micgm/kg/min.

- A. D5 W, 525 micgm in 50 ml @ 1 ml/hr
- B. D5 W, 325 micgm in 50 ml @ 1 ml/hr
- C. D10 W, 575 micgm in 50 ml @ 1 ml/hr
- D. D5 W 500 micgm in 50 ml @ 1 ml/hr
- E. 0.45 NS, 425 micgm in 50 ml @ 1 ml/hr

The correct response is A.

Solution:

For drips in mg/kg/min use formula $3 \times \text{dose/rate} \times \text{weight}$ (mg in bag of 50 ml)

$3 \times \text{dose/ rate} \times \text{wt.} = 3 \times 0.05/1 \times 3.5 = 0.525 \text{ mg or } 525 \text{ micrograms}$

Q 7:

You want to start fentanyl drip on a 1.5 kg infant. The dose is 2 mic/kg/hr. Which of the following solution you will choose.

- A. D5 with 500 micgm fentanyl in 50 ml @ 0.3 ml/hr
- B. D5 with 333 micgm fentanyl in 50 ml @ 0.2 ml/hr
- C. D5 with 1500 micgm fentanyl in 50 ml @ 0.1 ml/hr
- D. D5 with 2500 micgm fentanyl in 50 ml @ 0.5 ml/hr
- E. D5 with 5000 micgm fentanyl in 50 ml @ 0.4 ml/hr

The correct response is A.

Solution:

{For drips in microgram/kg/hr use formula $50 \times \text{dose}/\text{rate} \times \text{weight}$ (microgram in bag in 50 ml)}

$50 \times \text{dose}/\text{rate} \times \text{wt.} = 50 \times 2/0.1 \times 1.5 = 1500 \text{ microgram or } 15 \text{ mg}$

Q 8:

During morning rounds on a 34 wks 2.8 kg infant you note that in addition to TPN, a drip of fentanyl is running at 0.4 ml/hr. You look at the IV bag that showed 1400 mcg of fentanyl in 50 ml of D5W. How much fentanyl (microgram per kg dose) the infant is receiving.

- A. 2 mcg/kg/hr
- B. 3 mcg/kg/hr
- C. 4 mcg/kg/hr
- D. 5 mcg/kg/hr
- E. 6 mcg/kg/hr

The correct response is A.

Solution:

{For drips in microgram/kg/hr use formula $50 \times \text{dose}/\text{rate} \times \text{weight}$ (microgram in bag in 50 ml)}

$50 \times \text{dose}/\text{rate} \times \text{wt.} = 50 \times \text{Dose} / 0.4 \times 2.8 = 1400 \text{ microgram}$

Or $\text{Dose} = 1400 \times .4/50 \times 2.8 = 4 \text{ mcg/kg/hr}$

RADIOLOGY

Q 1:



This premature infant is intubated with difficulty. True statement about the findings displayed is

- A. ETT placement is adequate
- B. There is tracheal shift to right
- C. Baby is extubated
- D. UVC tip is adequately placed
- E. Both A& B are correct

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of ETT and UVC placement.

Critique:

ETT is slightly high and shifted to right. UVC needs to be pulled back.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (Eds). Mosby 2006: 713-731

Q 2:



These x-rays are taken 18 hr apart from a baby who has intermittent vomiting. The most likely diagnosis is:

- A. Duodenal atresia
- B. Malrotation
- C. Perforation
- D. Ileal atresia
- E. None of the above

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of UGI.

Critique:

This UGI with follow through does not fit any of the conditions listed.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (Eds). Mosby 2006: 713-731

Q 3:



This newborn baby is on 70% O₂ by hood and saturating 91-92%. The blood gas obtained from the umbilical catheter is 7.32/ 46/ 52 / 18/-7. True statements in the management of this baby are all EXCEPT

- A. PEEP when used above 5 will augment chest wall and helps in oxygenation
- B. PEEP when used above 5 will increase the compliance resulting in better saturations
- C. Echo will show increase blood flow through both ductus arteriosus and venosus
- D. The blood gas is venous and PO₂ is acceptable
- E. Use of surfactant is indicated

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of CXR and line placement.

Critique:

No information given about PDA, also DV might be closed as UVC traversed to the left hepatic vein. All other statements are correct.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (Eds). Mosby 2006: 713-731

Q 4:



The findings displayed in the x-ray is compatible with

- A. Ski-slope F-V loop
- B. High FRC
- C. Low compliance
- D. High resistance
- E. All of the above

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the radiology findings & pulmonary function test in CLD/ BPD.

Critique:

All are correct statements

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 61

Q 5:



This baby is suspected to have skeletal dysplasia by antenatal US. After birth, the infant is noted to have hypogenitalia. The most like diagnosis is:

- A. Osteogenesis imperfecta
- B. Achondroplasia
- C. Campomelic dysplasia
- D. Thanatophoric dysplasia
- E. Normal variation

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the differential diagnosis of skeletal dysplasia.

Critique:

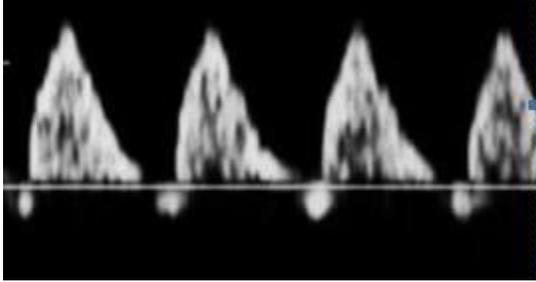
Campomelic dysplasia is a congenital disorder characterized by development of abnormal curvature of the long bones, particularly from lower extremities, such as femur and tibia.

Reference:

<http://www.thefetus.net/page.php?id=337>

Jones KL. Smith's Recognizable Pattern of Human Malformation, Elsevier Saunders 2006; pg 388

Q 6:



The finding shown in the picture (UA Doppler study) is associated with all EXCEPT

- A. Maternal APLA syndrome
- B. Fetal growth restriction
- C. Maternal protein C & S deficiency
- D. Factor V Leiden mutation
- E. Gestational diabetes

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of UA Doppler study

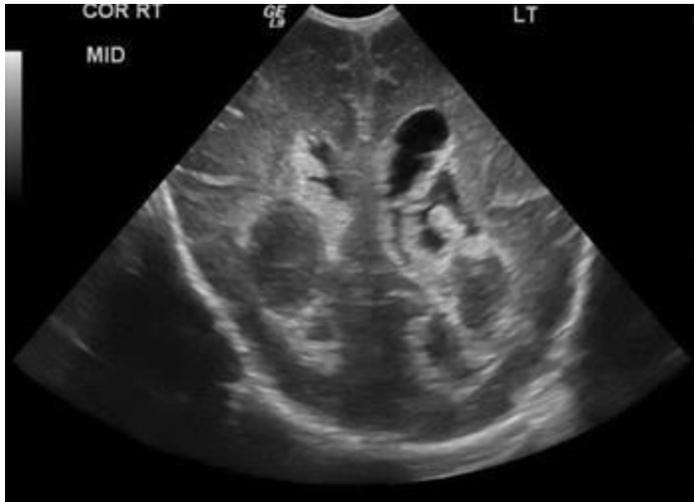
Critique:

The UV Doppler is showing reverse End Diastolic Flow that is suggestive of high placental resistance seen with all except E.

Reference:

<http://www.adhb.govt.nz/newborn/Guidelines/Maternal/DopplerStudiesInHighRiskPregnancies.htm>

Q 7:



The condition shown above could be

1. Prevented by using indomethacin
2. Managed by no intervention
3. Mostly associated with prematurity
4. Associated with high morbidity
5. All of the above

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation cranial US and IVH.

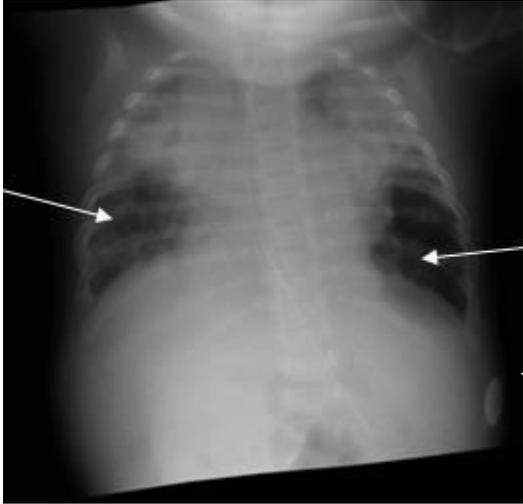
Critique:

Grade IV hemorrhage is associated with all.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 142

Q 8:



This x-ray s obtained from an infant with CLD requiring increase FiO_2 . The true statement about the observed findings is

- A. Left arrow suggests aspiration
- B. Right arrow suggests sequestered lung
- C. Left arrow suggests pneumatocele
- D. Right arrow suggests pneumothorax
- E. None of the above

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of CXR and pneumatocele.

Critique:

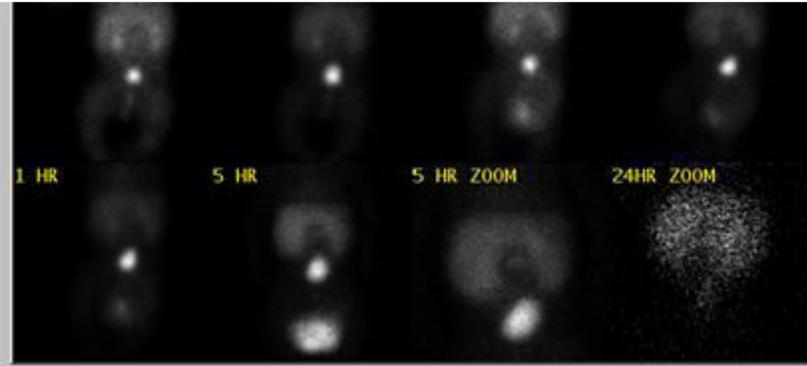
White patches bilaterally suggest chronic changes. Localized air suggests pneumatocele rather than pneumothorax.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Manzar S, Khan L. Neoreviews 2017, September issue

Q 9:



This scan is taken from a baby who had prolonged jaundice. True statement about this HIDA scan is

- A. Time will take care of the problem
- B. Ursodeoxycholic acid will help
- C. Crigler- Najjar syndrome type I is likely diagnosis
- D. Infant is suffering from Gilbert syndrome
- E. Liver biopsy should be done

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the differential diagnosis of cholestasis and interpretation of HIDA scan.

Critique:

No uptake and no secretion suggest biliary atresia. In C & D HIDA would show some uptake or secretion in gall bladder.

Reference:

Wong RJ, DeSandre GH, Sibley E, Stevenson DK. Neonatal Jaundice and liver disease, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 1419-65

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Q 10:



This preterm infant is extubated to NC within 24 hrs of life. The x-ray is taken at 4 day of life. The lesion shown in the x-ray is

- A. Most common presentation of lobar emphysema
- B. Supplied by branch of aortic arch
- C. Loculated pneumothorax
- D. Pleural bleb
- E. Localized emphysema

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of CXR

Critique:

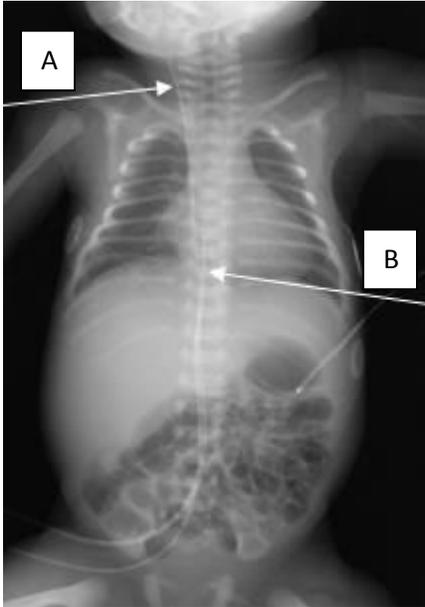
Left UL is the most common presentation for congenital lobar emphysema. Pneumothorax or bleb is very less likely.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 81-82

Q 11:



The x-ray is taken on a 2 hrs old male infant. True statement about the finding is

- A. Catheter A in right internal jugular vein
- B. Catheter A is superimposed with NG tube
- C. Blood obtained from Catheter B would have a $pO_2 >$ catheter A
- D. Blood obtained from Catheter A would have a $pO_2 >$ catheter B
- E. Hb saturation would be higher in catheter A than B

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of CXR and line placement

Critique:

Both lines are UVC. Line A is going through SVC to IJV.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Q 12:



This infant's saturations are running low. The best strategy would be to

- A. Increase tidal volume
- B. Change NGT
- C. Exploratory laparotomy
- D. Extubate and reintubate
- E. Suction the NGT

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of CXR and lung inflation.

Critique:

Due to abdominal distension, the lungs are pushed up with loss of volume.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Q 13:



This infant's blood gas showed pH 7.26, PCO_2 78, PO_2 45. The best treatment would be

- A. Removal of foreign body
- B. Use of high tidal volume
- C. Selective intubation of left side
- D. Pleural tap
- E. Posture adjustment

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of CXR and lung field.

Critique:

Left lung is completely collapsed. Left side up ventilation should be tried followed by increase in Vt.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Q 14:



This is a 14-day old 23 wks baby. The risk of developing severe BPD is

- A. 20%
- B. 30%
- C. 40%
- D. 50%
- E. 60%

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of CXR and the complications of CLD.

Critique:

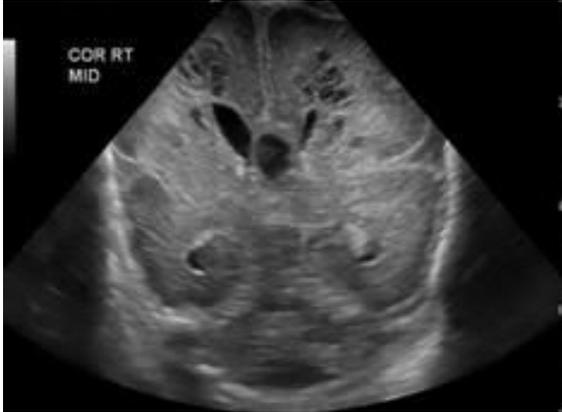
Classic x-ray of early CLD. 40% is the right choice

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1156

Q 15:



This is a 16 day-old 24 wks infant. The risk of CP is

- A. 10%
- B. 20%
- C. 30%
- D. 40%
- E. 50%

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of CUS and the complications of PVL.

Critique:

Classic CUS of early PVL. 50% is the right choice

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 964

Q 16:



The pathology shown could be caused by all EXCEPT

- A. Fluctuating BP
- B. Decrease cerebral venous pressure
- C. Use of HCO_3
- D. High Protein C
- E. Low platelets

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation cranial US. Know the complications of IVH.

Critique:

IVH is associated with all except B.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 924-36

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 142

Q 17:



This renal US is obtained from a 4 hrs old baby with history of spontaneous pneumothorax. The best intervention is to

- A. Order renal doppler
- B. Obtain US of liver
- C. Order serum creatinine
- D. Order VCUg
- E. Observation for resolution

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation renal US.

Critique:

The kidney size is normal. No intervention is needed.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Q 18:



The findings shown in the x-ray above

- A. Is highly associated with cardiac lesions
- B. Is the most common type of TEF/ EA lesions
- C. Should be treated with parental antibiotics
- D. Suggest need for urgent exploration
- E. Suggest need for bronchial lavage

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of x-ray with EA/TEF and complication of barium study.

Critique:

The infant has aspirated barium in bronchi. The esophageal atresia is evident. Can't tell the type as no air is seen in stomach. Highly associated with CHD. Lavage, Antibiotics and surgery are not indicated now.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 1373-77

Q 19:



This x-ray is obtained on a baby who is vomiting. The most likely cause for vomiting is

- A. Pneumonia
- B. Pulmonary edema
- C. Congestive cardiac failure
- D. Perforated viscus
- E. Obstructed viscus

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of KUB.

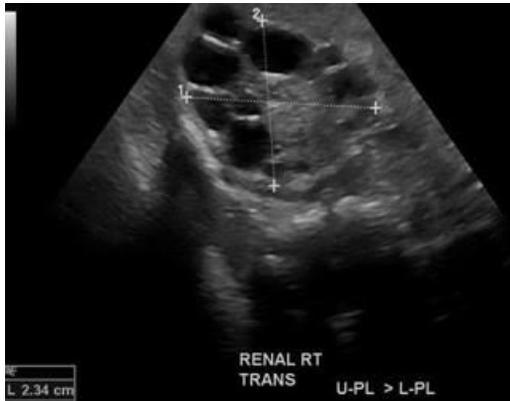
Critique:

There is left inguinal hernia which is incarcerated.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Q 20:



This renal US is obtained at 12 hrs of age on a term male neonate who had history of unilateral dilated kidney on antenatal US. There is no family history of any renal disease. The neonate has been urinating well and BP is normal. The true statement of this infant is

- A. The kidney is dysplastic and spontaneous resolution is very unlikely
- B. As parents are normal, autosomal polycystic kidney disease is the likely diagnosis
- C. This condition is high associated with pneumothorax or/and pulmonary fibrosis
- D. A voiding cystourethrogram (VCUG) would be diagnostic
- E. The ultrasound is false positive as it is done very early with low GFR

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation renal US.

Critique:

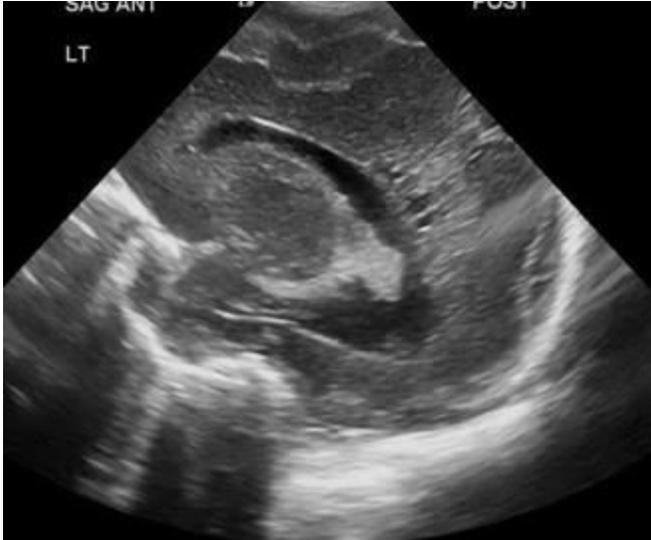
The kidney is multi-cystic NOT polycystic & it is unilateral.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 1676

Q 21:



This US is obtained on a 26 wks, 21-day-old preterm infant. This infant is at increased risk of

- A. Ventriculomegaly
- B. Seizures
- C. Optic N atrophy
- D. Growth delay
- E. Cerebral palsy

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of CUS and the complications of PVL.

Critique:

Classic CUS of early PVL. CP occurs in ~50% of the cases.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 964

Q 22:



This term baby is delivered at level 2 NICU with history of thick meconium. He is on 60% oxygen with sats of 89-92%. The lines are removed soon after this x-ray. The case is at highest for

- A. Malpractice lawsuit
- B. Negligence law suit
- C. Vascular thrombosis
- D. NEC
- E. PPHN

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the implications of procedures in NICU. The need to remove the wrongly placed line ASAP.

Critique:

As the lines are removed the risk remains high for PPHN and low for all others.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Q 23:



This infant is 6 days-old. He was born NSVD at 35 wks with well followed uncomplicated pregnancy. He required one dose of surfactant and then extubated to RA on day 2. Started on feeds and tolerated it. On day 4 he was back on oxygen. CXR showed increased radiolucencies on the left. Chest CT was done (as shown). The most likely diagnosis is

- A. Congenital cystic adenomatoid malformation
- B. Congenital lobar emphysema
- C. Mediastinal teratoma
- D. Pulmonary sequestration
- E. Localized emphysema

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of chest CT and DIFFERENTIAL DIAGNOSIS of air lucency in lungs.

Critique:

The finding is not characteristics of A-D.

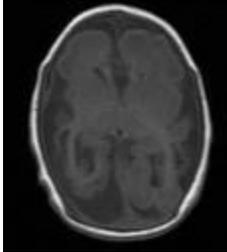
Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 1128-34

Manzar S, Khan L. Neoreviews 2017, September issue

Q 24:



The MRI above is consistent with

- A. Porencephalic cyst
- B. Leukomalacia
- C. Encephalomalacia
- D. Pachygyria
- E. Cerebral atrophy

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of brain MRI.

Critique:

Porencephalic cyst appears as localized lesions. Leukomalacia is white matter disease. Pachygyria has wide gyri.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 989-1006

Q 25:



This 12-day-old 600 gm preterm infant is nursed supine in the incubator with 60% humidity. He is ventilated with conventional vent (PRVC-SIMV mode) with Vt of 8ml/kg, rate of 60/min and IT of 0.35 sec, PEEP 5, Pressure Support 5. He is tolerating trophic feeds with TPN via PICC line. He is afebrile and other vital signs are stable. Am lab showed WBC 6.7, segs 43% band 1%. Na 134, K 4.2, gluc 89. Blood gas: 7.23/ 64/ 44/ 21/-3. Physical examination showed decreased air entry on the left side. Rest of the exam is normal. Best statement about further management of this infant is

- A. Increase rate and decrease IT
- B. Increase pressure support and increase IT
- C. Give surfactant via ETT x 1 dose
- D. Increase tidal volume to 10 ml/kg
- E. Change infant's position

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of CXR and lung field.

Critique:

Left lung is hazier than the right. Left side up ventilation should be tried followed by increase in Vt.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Q 26:



This preterm infant is most likely to present with

- A. Bloody stool
- B. Bilious vomiting
- C. Abnormal UGI
- D. Abnormal Barium Enema
- E. Sepsis

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of NEC.

Critique:

Pneumotosis is seen in KUB. Bleeding per rectum is most likely.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Q 27:



The most likely cause for the finding displayed is

- A. High alveolar O₂
- B. Low plasma CO₂
- C. Low WBC
- D. High Hb
- E. Low Hct

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the causes of PVL.

Critique:

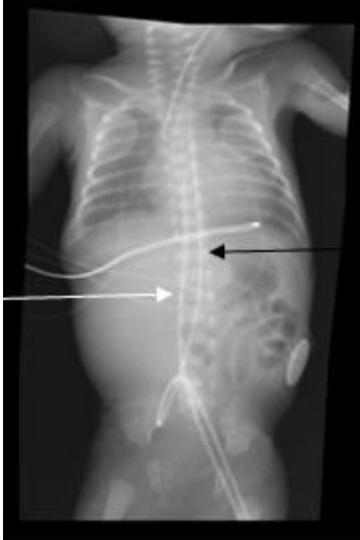
The image showed bilateral PV blush- early PVL. PVL is associated with low PCO₂ decreasing cerebral blood flow resulting in ischemic injury.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 912-924

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 140

Q 28:



This 2-hr old baby has O₂ saturation of 86-91% after surfactant administration. A soft systolic murmur is heard on examination. True statement about this infant is

- A. The umbilical lines are both UVCs
- B. UVC is fine but UAC is high
- C. UAC is fine but UVC is high
- D. ETT needs adjustment
- E. Echocardiogram should be done

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation UAC, UVC and ETT placement.

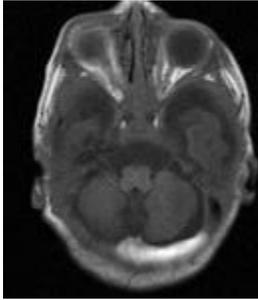
Critique:

UAC & UVC both are high. ETT tube is low. No indication for Echo now at 2 hr of life.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Q 29:



This MRI scan is obtained on a term infant with seizure. The most likely diagnosis is

- A. Cerebral venous sinus thrombosis
- B. Post-ischemic injury
- C. Dandy-Walker variant
- D. Subdural hematoma
- E. CSF leak in posterior fossa

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation brain MRI.

Critique:

The scan is compatible with SD hematoma.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1005-6

Q 30:



This 6-day old infant had history of Hypoxic Ischemic Encephalopathy. He is currently stable on room air. The ECG showed PACs. The echo showed tricuspid gradient of 35 mm Hg and RVSP of 40 mm Hg. The most appropriate action would be to

- A. Start nasal iNO
- B. Start oral digoxin
- C. Give IV bumetanide
- D. Remove UVC
- E. Adjust PICC

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation UVC and PICC placement.

Critique:

PICC is in right atrium causing arrhythmias. The echo shows mild PPHN.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Q 31:



This 26-wk 6-day old preterm infant is stable on CPAP of 6 cm of H₂O and 40% O₂. The vital signs are stable. The infant is treated with surfactant and extubated to CPAP with stable gases. This x-ray was obtained after PICC insertion to see placement and incidental pneumothorax was noted. The best explanation of the findings noted is

- A. The cause is surfactant therapy with poor ETT placement
- B. The cause is increase resting FRC due to high CPAP
- C. The cause is decrease chest compliance
- D. It is complication of a procedure
- E. The need for chest tube is urgent

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation CXR and lung fields.

Critique:

Use of high CPAP may lead to air leak. The infant is stable with stable vital signs, no urgency is placing chest tube. Surfactant reduces the incidence of pneumothorax. PICC was inserted on the left side. Chest compliance is high in preterm infants.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 73

Q 32:



You are taking care of this preterm baby. He was born by emergency CS secondary to fetal distress. He required ventilation since birth and noted to have metabolic acidosis. He is 3 days - old now and receiving TPN and is NPO. His BP is 55/32 in all extremities and he is receiving dopamine for UO of 1.2 ml/kg/h. His CBC is normal and TORCH titers are pending. Serum lactate is 2 and albumin is 2.8. Abdominal US showed ascites. Urine organic acid screen report is as under:

4-OH phenyl pyruvate and N-acetyl tyrosine- markedly elevated

Succinylacetone – not detected

Vanillylmandelic acid and homovanillic acid- markedly elevated

The most likely diagnosis is

- A. Tyrosinemia
- B. Adrenal tumor
- C. Nephrotic syndrome
- D. Hydrops fetalis
- E. Congenital parvovirus infection

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the x-ray finding and DIFFERENTIAL DIAGNOSIS of hydrops fetalis.

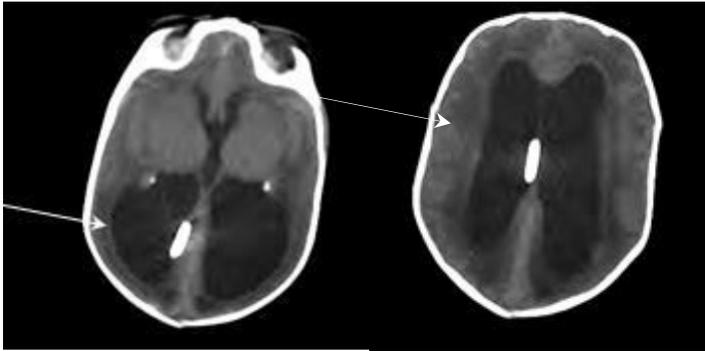
Critique:

The infant is on TPN and dopamine thus the NBS (elevated OA and VMA) is invalid. X-ray showed skin edema and US showed ascites confirming HF.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 420-26

Q 33:



This preterm infant has a stormy course with gram negative sepsis, meningitis and grade II IVH with progression requiring shunt placement. The areas marked by the white arrows point out to

- A. Pressure effect of ventriculomegaly
- B. Hypo-attenuation
- C. Cystic Leukomalacia
- D. Brain edema
- E. Normal premature cortex

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of brain CT scan.

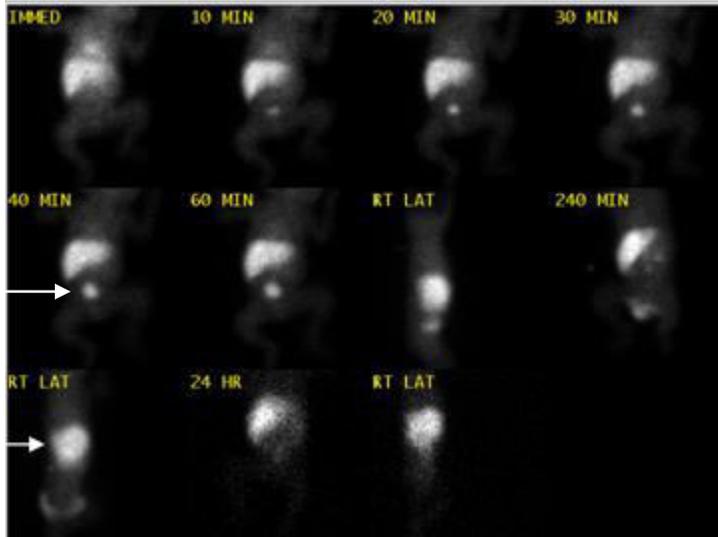
Critique:

To see white matter changes MRI is preferred but CT could be informative as well. The decrease signals (hypo-attenuation) as indicated by arrows suggest chronic ischemia.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 948

Q 34:



The true statement about this HIDA scan is

- A. It's an incomplete hepatobiliary iminodiacetic acid scan
- B. Hepatic uptake and excretion are delayed
- C. Upper arrow indicates radioactive tracer in the gall bladder
- D. The study is suggestive of chronic hepatitis
- E. The study is suggestive of biliary atresia

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of HIDA scan.

Critique:

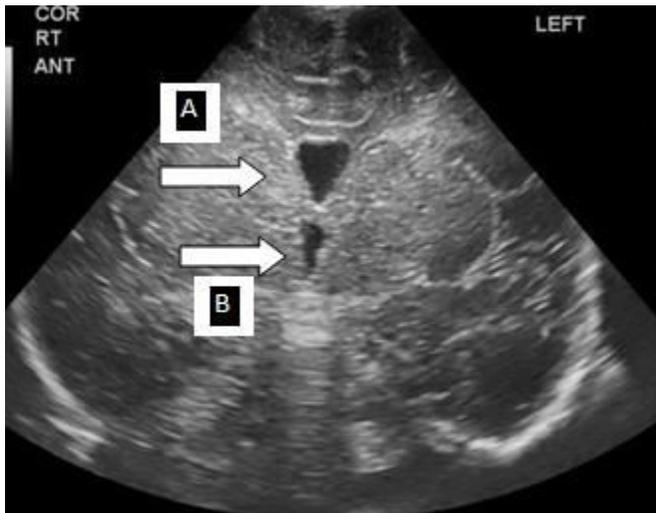
Good uptake but no secretion suggests biliary atresia. The arrow indicates urinary bladder not gall bladder.

Reference:

Wong RJ, DeSandre GH, Sibley E, Stevenson DK. Neonatal Jaundice and liver disease, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 1419-65

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Q 35:



True statements about the findings shown in the cranial US are all EXCEPT

- A. Arrow A points to cavum pellucidum
- B. Arrow B points to third ventricle
- C. Lateral ventricles are compressed
- D. Mild parenchymal bleeding is evident
- E. Corpus callosum seems intact

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of cranial US scan.

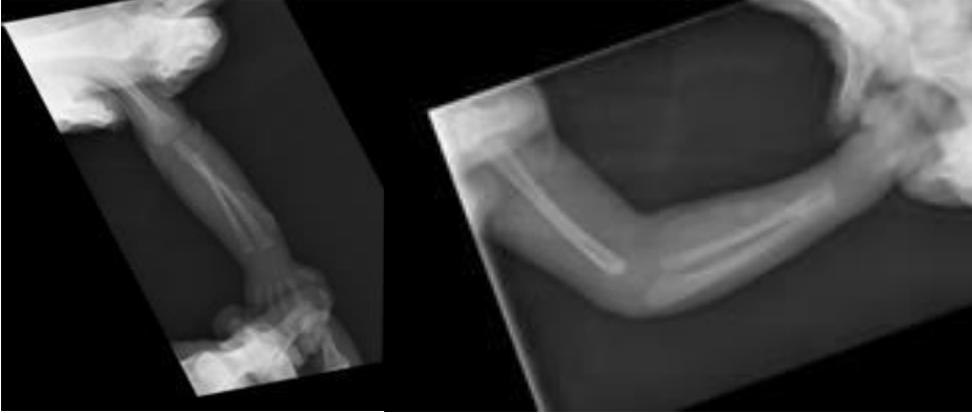
Critique:

There is no evidence of bleed.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Q 36:



This infant is at increased risk of

- A. Bleeding
- B. Heart problems
- C. Growth delay
- D. Fractures
- E. None of the above

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of limb x-ray.

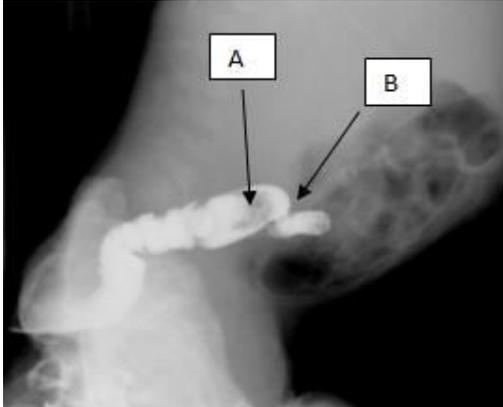
Critique:

Radius and thumb both are present, TAR and Fanconi less likely. Extravasation of Ca containing fluid in the soft tissue gives the radio-opaque shadow.

Reference:

Silvit J C. Diagnostic Imaging, In: Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: 713-731

Q 37:



This barium enema is obtained from an infant who had ileostomy after NEC. The true statement about the findings displayed is

- A. Letter A suggests air in the lumen
- B. Letter B suggests stricture
- C. The caliber suggests microcolon
- D. Distal rectal dilation is indicated
- E. The study is inconclusive

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of Ba enema & complications of NEC.

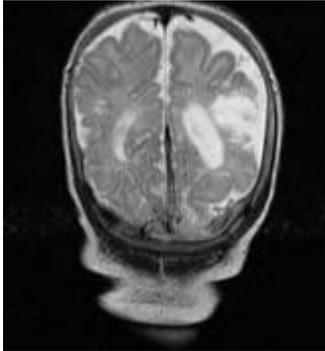
Critique:

Stricture is of the common complications of NEC and its repair. Letter B indicates stricture. Letter A suggests stool. Caliber is normal distally so there is no need for distal rectal dilation. The study is conclusive to document stricture.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1403-10

Q 38:



This MRI scan is obtained from an infant with microcephaly. This infant is most likely to develop

- A. Spastic diplegia
- B. Left sided hemiplegia
- C. Fine motor delay
- D. Pyramidal CP
- E. Extrapyrarnidal CP

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the MRI correlates of CP

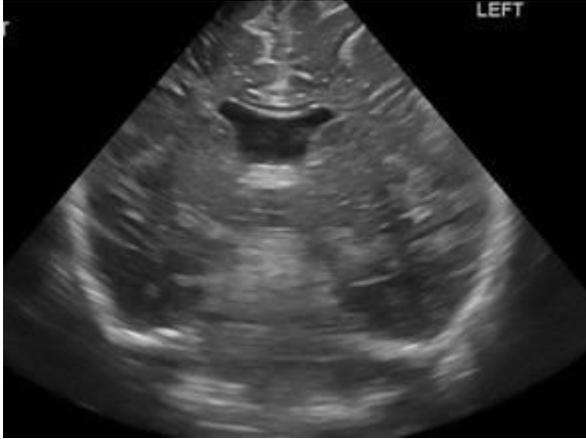
Critique:

The lesion is on the left involving cortex and not involving basal ganglia making A, B, C and E the incorrect choices.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 152

Q 39:



The Cranial US is obtained on a 15-day-old premature infant. The finding shown indicates the need for

- A. VP Shunt
- B. Cardiac evaluation
- C. Neurological evaluation
- D. Ophthalmic evaluation
- E. CSF analysis

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of cranial US

Critique:

The scan showed absent septum pellucidum, association with optic N hypoplasia should be consider- Septo-optic dysplasia (DeMorsier syndrome).

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 992

Q 40:



This x-ray is obtained from a newborn baby born by difficult vaginal delivery. The birth weight is 4.6 kg. The true statement regarding the etiology of his condition is

- A. Maternal obesity
- B. Maternal hypocalcemia
- C. Maternal hypermagnesemia
- D. Maternal hyperglycemia
- E. Maternal hyperparathyroidism

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complications of macrosomia and difficult labor.

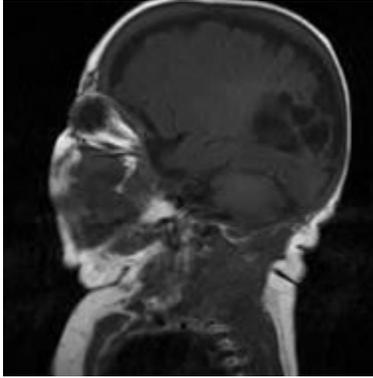
Critique:

Difficult delivery is the most common cause of humerus fracture. IDM are macrosomic and are prone to this.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 326 & 551

Q 41:



This sagittal view of MRI brain is obtained from a neonate with history of prolong hypoxia. This infant is most likely to develop

- A. Ataxic cerebral palsy
- B. Diplegic CP
- C. Hydrocephalus
- D. Cortical blindness
- E. Hearing deficit

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the MRI correlates of outcome

Critique:

The lesion is on the occipital lobe, the visual cortex. Ataxic & diplegic CP are not associated with HIE.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 152

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 179

Q 42:



This study was obtained on a 21-day-old preterm infant who continues to vomit despite change in formulas. This infant will benefit from all EXCEPT

- A. Lowering caffeine dose
- B. Raising the head end of the bed
- C. Increasing the metoclopramide dose
- D. Using hypocaloric formula
- E. Using low dose Lansoprazole

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the radiological feature and management of GER

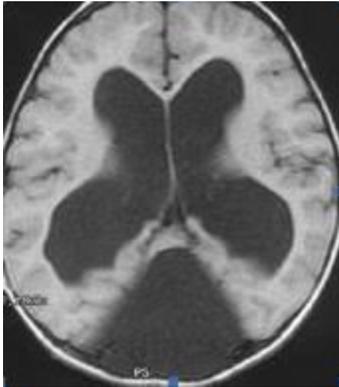
Critique:

Hypocaloric feed will aggravate the symptoms.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1379-80

Q 43:



This MRI scan is obtained on a male infant presented with macrocrania. The findings displayed correlates with

- A. History of grade 3-4 bleed
- B. History of aggressive resuscitation at birth
- C. History of maternal exposure to cats
- D. History of abnormal antenatal US
- E. History of same findings in two brothers

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the MRI brain findings in different pathology

Critique:

Cystic enlargement of post fossa favor Dandy-Walker, it is easily picked up by antenatal US. There are no signs of bleed. Cortex looks normal and there are no calcifications. Aqueductal stenosis (x-linked) will have both lateral ventricular dilatation.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 998-1005

Q 44:



This Cranial US is taken on a 26 week 6-day old baby. The infant is on breast milk feeds and has normal growth parameters. The finding (arrow) is most likely is suggestive of

- A. Choroid plexus cyst
- B. Foreign body
- C. Tuberos sclerosi
- D. Congenital CMV
- E. Congenital Toxoplasmosis

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know about interpretation of cranial US ad cystic lesion in ventricle

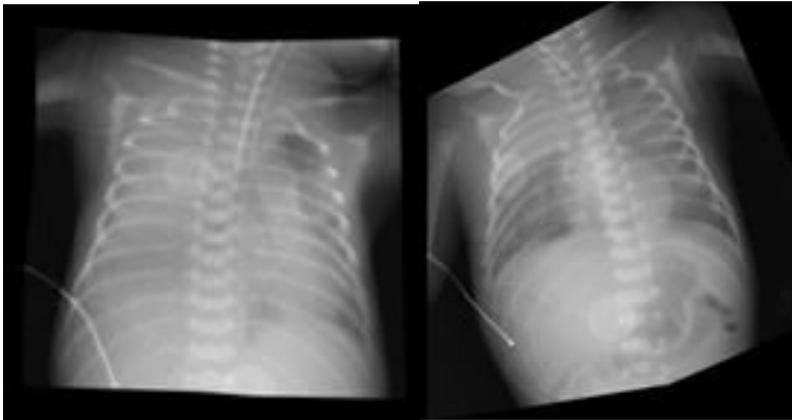
Critique:

Normal growth parameters (head circumference) ruled out C, D & E. FB is less likely- no history of intervention.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 133

Q 45:



This 5-day old premature baby developed increased respiratory distress with increase need for ventilatory support. A pleural tap was performed. The fluid analysis report is

Glucose 375 mg/dl

Triglyceride 2385 mg/dl

RBC 350

Nucleated cells 1425

Neutrophils 54%

The most likely cause of his deterioration is

- A. Infection
- B. Lymphatic blockade
- C. Venous congestion
- D. Extravasation
- E. Cardiac failure

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know about the causes and x-ray finding of pleural effusion

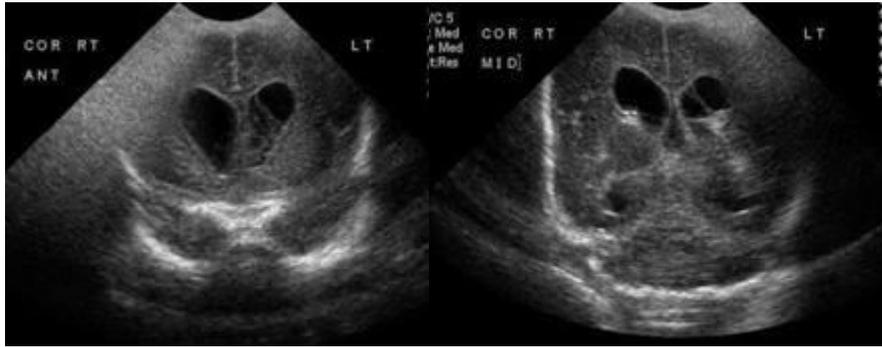
Critique:

The cause is extravasation from PICC. The PICC is removed (not present in 2nd x-ray) with radiological improvement. The fluid analysis is not supportive of infection, chylothorax or CHF.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 78

Q 46:



The findings shown in the cranial US above is consistent with

- A. A term IUGR infant with congenital infection
- B. A preterm infant with grade IV bleed
- C. A preterm infant with meningitis
- D. A term infant with hydrocephalus
- E. A term infant with Hypoxic Ischemic Encephalopathy

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of cranial US

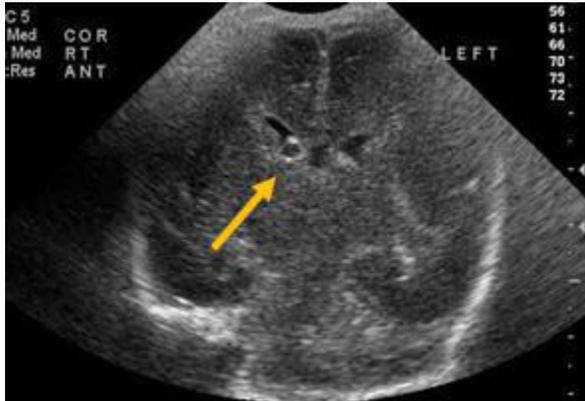
Critique:

Sludge with septation noted in the ventricles is suggestive of infection. No calcifications are seen. Grade 4 bleed would involve parenchyma. Ventricles are not that prominent enlarged. CUS is poor test in HIE.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 727-29

Q 47:



The abnormality shown above is associated with

- A. Trisomy 13
- B. Trisomy 18
- C. Trisomy 21
- D. 45 X
- E. 47 XXY

Preferred response is B.

P C R (Pearl, Critique, Reference)

Pearl:

To know the association of choroid plexus cyst with Trisomy 18

Critique:

Choroid plexus cysts are associated with Trisomy 18.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 133

Q 48:



This image is obtained from a 20-week fetus. The arrow showed compression of the frontal bones. This condition is most likely associated with

- A. Bicornate uterus
- B. Hydrocephalus
- C. Neural tube defect
- D. Achondroplasia
- E. Uterine fibromas

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know about 'Lemon sign' and its implication.

Critique:

The finding displayed the 'lemon sign' suggesting CSF leak and skull compression, associated with NTD

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 16

Q 49:



This x-ray is taken on a newborn baby who presented with abdominal distension and meconium noted in urine. The most beneficial intervention would be

- A. Colostomy
- B. Rectal biopsy
- C. Contrast enema
- D. Penrose drain
- E. Laparotomy

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the differential diagnosis of dilated large bowel

Critique:

This is case of imperforate anus- see marking.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1399-1403

Q 50:



This is a 4-days old 3.5 kg baby who is weaned from ventilator to BCPAP with PEEP of 5 cm of H₂O and flow of 5 lpm. O₂ requirement ranged from 30-35%. He was doing fine since this morning when the nurse noted severe desaturations requiring bagging. A NG size French 5 was placed and put on Gomco suction of 15 cm of H₂O. Baby had not pass stool for last 48 hrs. The best intervention is to

- A. Decrease PEEP & Flow
- B. Increase Gomco suction pressure
- C. Give glycerin suppository
- D. Change NG tube to French 8
- E. Intubate the baby with size 3.5 ETT

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the interpretation of x-ray (Chest/ abdomen)

Critique:

Lung are hazy intubation is the best action.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 712-722

Q 51:

A term Newborn develops bilious vomiting. He was made NPO and started on IVF. KUB showed dilated bowel loops. Contrast study was inconclusive. You called for surgical consultation. While waiting for surgeon to arrive, the baby developed seizure. The most likely cause of seizure in this case is

- A. Hypoglycemia
- B. Hypocalcemia
- C. Hypernatremia
- D. Sepsis
- E. Enterocolitis

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complications of gastrografin

Critique:

Gastrografin extracts water to the bowel lumen causing hypovolemia which may lead to hypernatremia and seizure.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; pg 280

Q 52:



The condition shown above is associated with maternal history of

- A. Use of thalidomide
- B. Use of valproic acid
- C. Use of lithium
- D. Elevated alpha fetoprotein
- E. Elevated Hb A1c

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the complications of maternal diabetes.

Critique:

Caudal regression syndrome occurs 200-400 times more often in IDM than normal NB.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 326

NEPHROLOGY

Q 1:

A 1.2 kg preterm infant is edematous on examination. The serum Na is 126 & creatinine is 1.4 mg/dl. Urine output for 24 hrs is 180 ml. The urine Na is 40 and creatinine is 14mg/dl. The creatinine clearance would be:

- A. 0.2 ml/min
- B. 0.5 ml/min
- C. 1 ml/min
- D. 1.2 ml/min
- E. 1.5 ml/min

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know how to calculate creatinine clearance from given data.

Critique:

Formula: UV/P (U= urinary Cr (mg/ml), V= urine volume (ml/min), P= plasma Cr (mg/dl))

Urine vol= 180 ml in 24 hr (7.5 ml /hr or 0.125 ml/min)

Clearance Cr = $14 \times 0.125 / 1.4 = 1.25$ ml/min

Clearance Na = $40 \times 0.125 / 120 = 0.04$ ml/min (not asked in the Q)

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 402

Q 2:



This term baby is a 4-day old IDM with Hct of 67% and glucose of 59 mg/dl. This infant is at increase risk for developing

- A. Abdominal obstruction
- B. Respiratory distress
- C. Rectal bleeding
- D. Cardiac failure
- E. Hematuria

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the renal vascular thrombosis as complications of IDM.

Critique:

The umbilical catheter is low risk of thrombosis is high (IDM, high hct, increase viscosity). Lungs are clear with normal size heart and there is no sign of microcolon.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1674-1675

Q 3:

A 20-day-old 2.3 kg baby, who is recovering from surgery, is receiving TPN @ 14 ml/hr (D 10%, Protein 3 g/kg/d, Na 4 mEq/kg/d, K 3 mEq/kg/d). Her urine output is 220 ml in last 24-hr. The serum electrolytes are: Na 137, K 2.8, Cl 104, HCO₃ 20. Blood gas showed pH 7.24/ PCO₂38/PO₂ 34/ HCO₃ 17/BA-8. Urine analysis showed no Protein, Glucose, Red cells or WBC, specific gravity 1010, pH 6.5. The most likely cause for the hypokalemia in this infant is

- A. Uncompensated acidosis
- B. Excess intravenous fluids
- C. Low total intake of K⁺
- D. High urine output
- E. Distal RTA

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the causes of hypokalemia and lab values of distal RTA.

Critique:

TF is 146 ml/kg/day, UO is 3.9 ml/kg/hr, K intake is 3 mEq/kg/day- all adequate. CO₂ is low showing some compensation for metabolic acidosis. Acidosis with high urine pH is suggestive of distal RTA- hypokalemia occurs in lieu of H⁺ (K⁺ excreted for retained H⁺) to maintain electronegativity.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 708-09

Q 4:

A preterm infant is receiving TPN via PICC is noted to have positive urine dipstick for glucose. Complete UA showed no protein, no WBC, no RBC, pH of 5.5 and specific gravity of 1012. The CBC showed WBC 12, band 8, segs 34, platelets 165K. The electrolytes are Na 136, Cl 98, HCO₃ 21, BUN 21, Creatinine 0.3, glucose 90. The most likely cause for observed glycosuria is

- A. Subclinical candidemia
- B. TPN related glycosuria
- C. Renal glycosuria
- D. Renal dysgenesis
- E. Fanconi syndrome

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the DIFFERENTIAL DIAGNOSIS of glycosuria.

Critique:

Glycosuria with normal serum glucose is renal glycosuria. TPN associated glycosuria is seen when serum glucose is high secondary to high GIR. No signs for candida, normal CBC. Fanconi is less likely-normal urine pH. Dysgenesis is less likely- normal renal functions.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1667-68

Q 5:

A 4.2 kg African American male born to diabetic mother looks plethoric. The CBC showed Hct of 72%. You perform partial exchange via UVC and repeat Hct is 62%. By evening the bilirubin is up to 14 and phototherapy was started. The night shift nurse calls you to assess vesicular rash and red urine she noticed while changing the diaper. The urine analysis showed no red blood cells and dipstick for blood is negative. The investigation of choice to confirm the diagnosis is

- A. Renal US with Doppler flow
- B. Serum uric acid level
- C. Serum porphyrins level
- D. Platelet & coagulation studies
- E. G6PD screen

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know the DIFFERENTIAL DIAGNOSIS of red urine.

Critique:

Red urine- positive dipstick & red cell present- glomerular disease (Renal vein thrombosis, coagulation & platelet disorder, trauma)

Red urine- positive dipstick & red cell absent- Hb-uria (G6PD), myoglobinuria

Red urine- negative dipstick & red cell present- urates or porphyrin pigments

This is a case of congenital erythropoietic porphyria.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 1445 & 1667

Q 6:



This picture is of a neonate who is delivered via CS due to absent diastolic flow on UA Doppler. The antenatal US showed IUGR, normal kidneys and amniocentesis showed 46XY. On examination, you note transverse palmer crease with fused 2nd and 3rd toes. Scrotal sac is empty. Maternal history is negative for any hormonal therapy and there is no family history of same condition. Father had MI recently. Father and mother are second degree cousins. The true statement about this infant is

- A. 17 OH progesterone should be obtained immediately
- B. A genitogram with abdominal US should be ordered
- C. Serum Na, K, Ca and glucose should be checked
- D. Serum cholesterol should be checked
- E. Serum insulin, growth hormone and TSH should be ordered

Preferred response is D.

P C R (Pearl, Critique, Reference)

Pearl:

To know the DIFFERENTIAL DIAGNOSIS of Hypospadias

Critique:

Hypospadias, cryptorchidism, syndactyly and IUGR suggest Smith-Lemli-Optiz syndrome. The cholesterol synthesis is defective.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; 174-75

Q 7:



The finding shown above is noted during physical examination of a newborn ready to go home. The true statement about the finding is

- A. Audiology testing should be done as outpatient
- B. ENT referral is required as inpatient
- C. Chest x-ray should be done before discharge
- D. Renal US should be scheduled as outpatient
- E. No intervention, reassurance only

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the role of renal US in ear tag

Critique:

Contrary to popular belief renal US is NOT required for isolated ear tags.

Reference:

Deshpande SA, Watson H. Renal ultrasonography not required in babies with isolated minor ear anomalies. Arch. Dis. Child. Fetal Neonatal Ed. 2006; 91: F29-30

Q 8:

A 52-day old male infant former 26 wks is on NC 0.5 lpm, 21% O₂. He is being fed by NGT. His birth weight was 860 gm and now he weighs 1200 gm. His feedings are being fortified to 24 cal with supplementation of Beneprotein 1g/kg/d, Polycose 1g/kg/d and MCT oil 1 ml/kg/d. During his hospital stay he received 3 courses of antibiotics (3, 7, and 10 days). His diaper rash is being treated with nystatin. He has recovered from two IV burns and suspected NEC. His last CBC showed 14 WBC, 6 bands, 42 segs and 131 K Platelets. His electrolytes showed Na 132, Cl 99, K 3.4, HCO₃ of 17, Alb 2.4. Blood pH is 7.28 while urine pH is 6.7. The most likely cause for infant's condition is

- A. Bruton's disease
- B. Wiscott Aldrich syndrome
- C. Bartter syndrome
- D. Proximal renal tubular acidosis
- E. Distal renal tubular acidosis

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know Labs in distal RTA.

Critique:

A & B are less likely as infant no document infections- mainly r/o sepsis. Diaper rash is common. In Bartter, there will be met alkalosis and in proximal RTA urine pH would be acidic < 6.5 (intact distal acidification)

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 708-10

Important Calculations

Q 1:

A 3-day-old 33-week preterm infant is receiving 100 ml/kg/d of total fluids. His growth is AGA: weight 1815 gm, length 44 cm, HC 32 cm. His urine output is 1.8 ml/k/hr. His electrolytes showed Na 130, K 5.6, Creatinine 1.4, BUN 32. What would be his estimated GFR?

- A. 10 ml/min/m²
- B. 12 ml/min/m²
- C. 14 ml/min/m²
- D. 16 ml/min/m²
- E. 18 ml/min/m²

The correct response is A.

Solution: (use 0.45 for term infant)

$$\text{GFR} = \frac{0.33 \times \text{Length}}{\text{Serum creatinine}}$$

$$= 0.33 \times 44 / 1.4 = 10 \text{ ml/min/m}^2$$

Q 2:

You are taking care of a 29 wks IUGR baby. She is NPO with TPN. On day 6 of life you noticed the serum Na to be 128 and creatinine to be 2.3. You obtain urine electrolytes to evaluate the cause. The urine Na is 22 and creatinine is 10.7. The FeNa would be

- A. < 1%
- B. < 2%
- C. < 3%
- D. > 2%
- E. > 3%

The correct response is E.

Solution:

$$\text{FeNa} = \frac{\text{UNa} \times \text{PCr}}{\text{PNa} \times \text{UCr}} \times 100$$

$$\frac{22 \times 2.3}{128 \times 10.7} \times 100$$

$$= 3.6 \%$$

DERMATOLOGY

Q 1:

Positive Wright stain for neutrophils with negative Gram stain is suggestive of

- A. Benign pustular melanosis
- B. Erythema toxicum
- C. Milia
- D. Staphylococcal scalded skin syndrome
- E. Bullous impetigo

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the microscopic interpretation skin lesions.

Critique:

BPM is common among African American infants and is a self-resolving condition.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 367

Q 2:



All are true statements regarding this rash EXCEPT

- A. It has a benign course
- B. It is genetically transmitted
- C. Nails may be hypoplastic
- D. There is no treatment
- E. Wright stain will show eosinophils

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the clinical interpretation skin lesions.

Critique:

Incontinentia pigmenti is X-linked dominant condition. It's not benign. All other statements are true.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 358

Q 3:



The most likely diagnosis is:

- A. Transient neonatal pustular melanosis
- B. Neonatal herpes simplex infection
- C. Acropustulosis of infancy
- D. Congenital candidiasis
- E. Incontinentia pigmenti

Preferred response is A.

P C R (Pearl, Critique, Reference)

Pearl:

To know the clinical interpretation skin lesions.

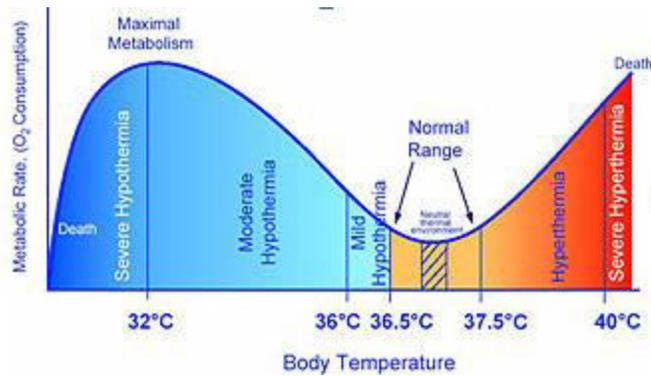
Critique:

NPM is a benign condition and resolve spontaneously without treatment.

Reference:

Brodsky D, Martin C. Neonatology Review, Hanley & Belfus, Inc. 2003; Pg 356

Q 4:



Metabolic rate and O_2 consumption increases beyond normal temperature range. Neutral thermal environment is the temperature at which metabolic rate and O_2 consumption are minimal. You are asked by the nurse to evaluate a 6-day-old 31-week infant for rash on the back. The infant weighs 1700 gm. His skin temperature is $36.2^{\circ}C$ and incubator temperature is $35^{\circ}C$. This indicates

- A. Baby is in positive heat balance
- B. Baby could be weaned to open crib
- C. Incubator temperature is low for the age and weight
- D. Baby is in neutral thermal environment
- E. Baby is at risk of hypothermia if weaned to crib

Preferred response is E.

P C R (Pearl, Critique, Reference)

Pearl:

To know the concept of neutral thermal environment

Critique:

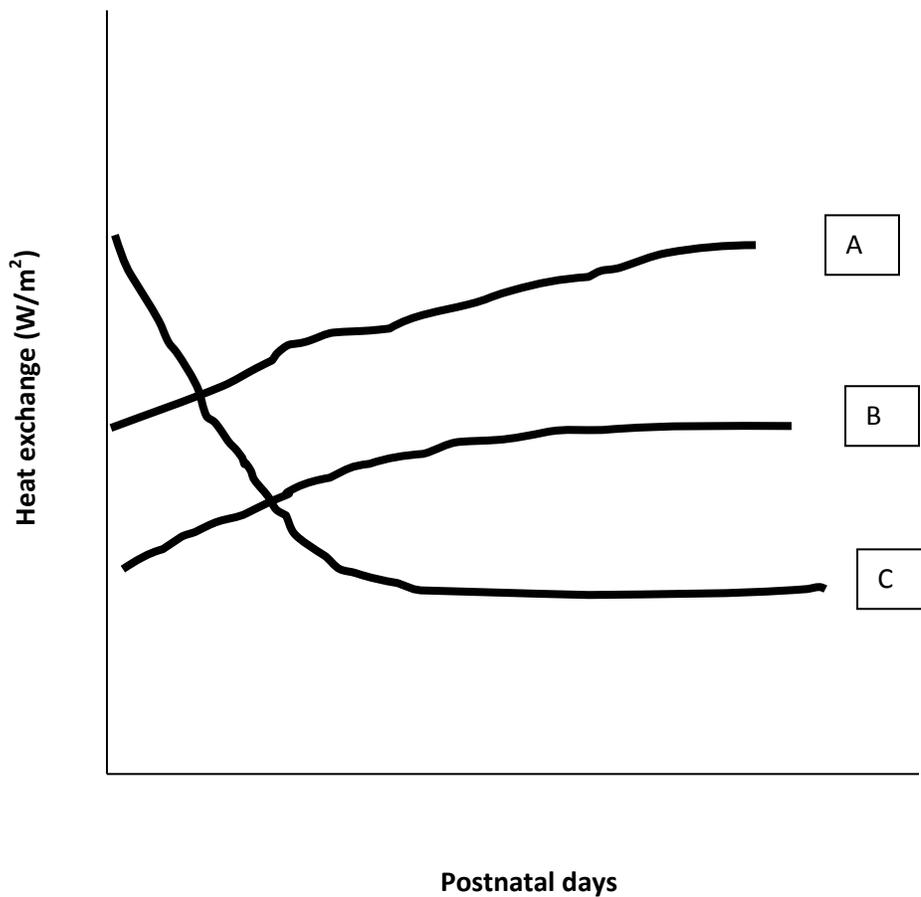
Baby is not in positive heat balance and cannot be weaned to open crib as the incubator temp is still higher than infants temp. 35⁰C is high for gestational age and weight, it should be around 33⁰C for neutral thermal environment.

Reference:

Gomella TL et al. Neonatology: management, procedures, on-call problems, diseases and drugs. Appleton & Lange 1999: pg 38-39

http://www.ucsfhealth.org/childrens/health_professionals/manuals/14_HealthCareMaintenance.pdf

Q 5:



This graph is obtained on a 26 wks premature infant nursed under radiant warmer, line A represents

- A. Heat exchange by evaporation
- B. Heat exchange by convection
- C. Heat exchange by radiation
- D. Heat exchange by conduction
- E. Total heat exchange

Preferred response is C.

P C R (Pearl, Critique, Reference)

Pearl:

To know mode of heat exchange in preterm infants

Critique:

Line A represent radiant exchange, line B conductive and line C Trans epidermal water loss.

Reference:

Fanaroff and Martin's Neonatal-Perinatal Medicine. Diseases of the Fetus and Infant. Martin RJ, Fanaroff AA, Walsh MC (eds). Mosby 2006: pg 590-91