NEONATAL EMERGENCIES

JUST THE FACTS!

Katharine C Long, MD

GOALS & OBJECTIVES

- Establish differential diagnosis for the critically ill infant
- Create management approach for the critically ill infant
- Identify laboratory tests and interventions in the emergent setting

OVERVIEW

- Neonatal Medical Emergencies
- Neonatal Surgical Emergencies
- Neonatal "Other" Emergencies*

A NEWBORN WALKS IN…

26 day old female cc poor feeding

What do you want to know? You have 2 minutes…

A NEWBORN WALKS IN…

26 day old female cc poor feeding

- Breastfed exclusively
- Decreased UOP and PO intake (worse latch)
- Sleepier than previously
- No known fevers
- FT NSVD no complications good prenatal care

PHYSICAL EXAM

- VS: T: 37.2 HR: 165 RR: 32 BP: UTO (crying) O2: 98% RA
- HEENT: anterior fontanelle flat, red reflex b/l, OP clear
- CV: S1/S2 no m/r/g
- Chest: CTA b/l no wheezes no crackles
- Abdomen: Soft NT/ND no organomegaly
- GU: normal external female genitalia
- Extremities: cap refill </= 2 sec.
- Skin: neonatal rash

THE MISFITS

- Trauma (accidental and non-accidental)
- Heart disease and hypovolemia
- Endocrine (CAH and thyrotoxicosis)
- Metabolic (hypocalcemia, hypoglycemia etc)
- Inborn errors of metabolism
- Sepsis
- Formula Dilution
- Intestinal catastrophes (NEC, Volvulus, intussusception)
- Toxins
- Seizures

OH NO!

- Okay now the baby is noted to have a temperature rectally of 35.8 or perhaps 39.1
- Now what is on your differential ?

DIFFERENTIAL

- Sepsis !
- Sepsis !
- Sepsis !
- Hypoglycemia
- Viral Syndrome

FEBRILE OR SEPTIC NEONATE

- History and physical exam findings can be subtle
- Hypothermia or Hyperthermia (38 or >/= 100.4 rectally)
- Incidence SBI in febrile neonates (<28 days) ~20%
- Full septic work up 0-28 days
  - CBC, Bld Cx, UA enhanced, Ucx, CSF Cx/Gram stain/Profile
  - POC glucose!
  - 0-21 days LFTs
  - CXR ?

BUGS AND DRUGS

- Bugs
  - What organisms common in 0-28 day range?
  - What else in the 0-21 day range?
- Drugs
  - What antibiotics do you want?
  - Why do you want them?
  - What if there's gram positive organisms on CSF stain?

NEONATAL HSV INFECTION

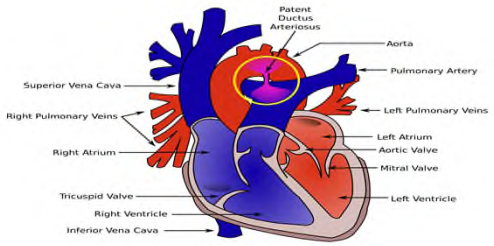
- Approximately 1500 cases annually
- Highest risk if primary infection at time of delivery ~ 30%
- 3 types of infection
  - Skin & mucosa ~ 45% (12 days)
  - CNS +/- skin & mucosa ~ 30% (19.7 days)
  - Disseminated disease ~25% (11.4 days)
- 90% of patients have symptoms prior to 21 days of age

A NEW NEWBORN WALKS IN…

18 day old female cc lethargy

- VS: T: 37.2 HR: 182 RR: 68 O2: 78% RA
- Gen: ill appearing grey poor tone
- HEENT: anterior fontanelle flat, red reflex b/l, OP clear
- CV: S1/S2 ? Systolic murmur
- Chest: CTA b/l no wheezes or crackles
- Abdomen: Soft NT/ND no hepatomegaly
- Extremities: cap refill >3 sec.

PHYSIOLOGY & FETAL CIRCULATION



MANAGEMENT & DIFFERENTIAL DIAGNOSIS

- Management:
  - ABCD!
- Differential Diagnosis:
  - SEPSIS!
  - Congenital Heart Disease ….

TOOL BOX

- History
  - Poor weight gain, feeding intolerance (sweating or crying with feeds), long BF sessions
- Physical Exam
  - Murmur, Hepatomegaly, Femoral Pulses
  - Right upper and lower extremity blood pressure difference >10 mm Hg
  - SPO2 differential > 3% or < 94% in LE or < 90% in any extremity
- Tests/Images

HYPEROXIA TEST

- Ideal Condition
  - Obtain ABG
  - Place patient on 100% oxygen for 10 minutes
  - Obtain repeat ABG
  - PaO2 should >150 mm Hg if oxygen sat issue
- Poor Man Version = Pulse ox
- Concern vasodilator could increased pulmonary flow

3 BROAD CATEGORIES OF LESIONS

- Shunting or mixing lesions
  - Congestive heart failure or respiratory distress > 1 month
- Right-sided obstructive ductal dependent
  - Cyanotic and typically < 1 month presentation
- Left–sided obstructive ductal dependent
  - Hypoperfused and typically < 1 month presentation

3 DIFFERENT TYPES OF CHD INFANTS

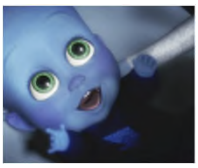
- Pink Baby : 1-6 months of age
- Blue Baby
  - < 2 weeks of age
  - 1-6 months of age
- Grey Baby
  - < 2 weeks of age

PINK BABY: CONGESTIVE HEART FAILURE

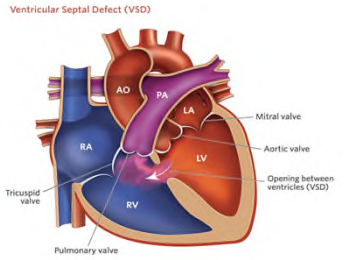
- Problem = too much pulmonary blood flow
  - R → L shunt
- Physical Exam: tachypnea, hepatomegaly, crackles, murmur
- Goals: Increase PVR, Decreased SVR, Diuretics, Inotropes
- Toolkit: CXR (white lungs) , PE (hepatomegaly/murmur)
- Lesions: PDA, VSD, AVM, AV canal defect

DIFFERENTIAL BLUE BABY

- Shock
- Congenital Heart Disease
- Persistent Pulmonary HTN
- Methemoglobinemia



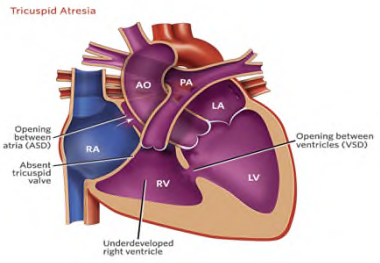
PINK BABY: VENTRICULAR SEPTAL DEFECT



BLUE BABY: CYANOTIC < 2 WEEKS

- Problem = too little pulmonary blood flow
  - Right obstructive lesions
- Goals: Shunt L->R (PGE), Decrease PVR (O2 or iNO)
- Toolkit: CXR (black lungs), EKG RVH, SpO2< 80, Fail hyperoxia test
- Lesions: Tricuspid atresia, Pulmonary Atresia, Pulmonary Stenosis, TGA no VSD, TET

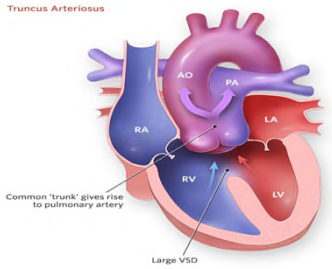
BLUE BABY: TRICUSPID ATRESIA



BLUE BABY: CYANOTIC 1–6 MONTHS

- Problem = obstructed pulmonary blood return
  - Mixing R→ L shunt
- Goal: do not increase pulm blood flow, diuretics, limit fluids, increased R->L shunt (inotropes)
- Toolkit: CXR (white lungs), SPO2 < 80, Hepatomegaly, Fail hyperoxia
- Lesions: Truncus arteriosus, TAPVR, DORV, TGA w/ VSD

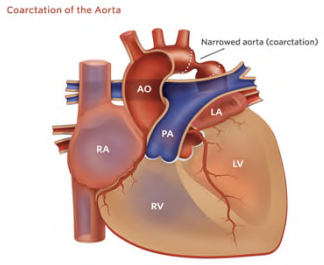
BLUE BABY: TRUNCUS ARTERIOSUS



GRAY BABY: CIRCULATORY COLLAPSE

- Problem = poor perfusion and oxygenation
  - Left obstructive lesion
- Physical: SPO2 diff, BP diff, Delayed cap refill
- Goal: R->L shunt (PGE), Vol support, ?Pressors, Antbx
- Toolkit: CXR (white), Physical exam, ECG LVH < 7 DOL
- Lesions: Critical Coarct, Interrupted aortic arch, Aortic stenosis/Atresia, ALCAPA

GREY BABY: CRITICAL COARCT



THIS IS NOT YOUR DAY…

26 day old female cc lethargy

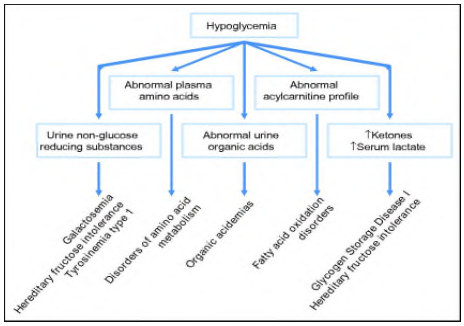
- VS: T: 37.2 HR: 182 RR: 68 O2: 98% RA
- HEENT: anterior fontanelle sunken, red reflex b/l
- CV: S1/S2 no m/r./g
- Chest: CTA b/l no wheezes no crackles + retractions
- Abdomen: Soft NT/ND hepatomegaly
- GU: normal external female genitalia
- Extremities: cap refill </= 3 sec.

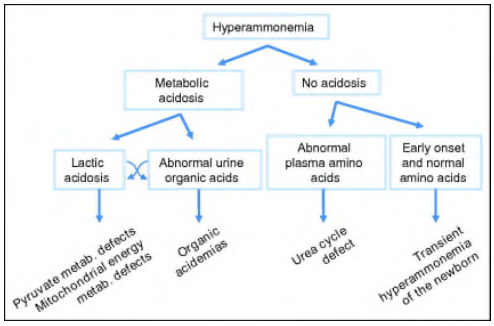
SEPSIS? CARDIAC? METABOLIC?

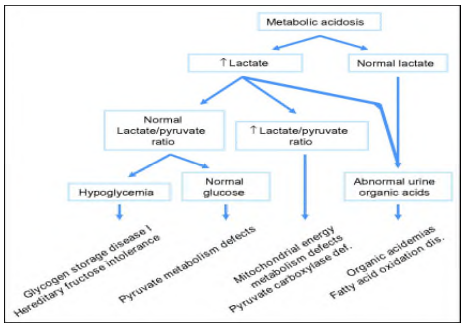
- Can have similar vital signs
  - Tachycardia (dehydration)
  - Hypothermic
  - Tachypnea (acidotic or hyperammonemia)
- Usually however lethargic/altered but with normal BP

LABORATORY EVALUATION

- VBG
- Lactate
- Complete metabolic panel w/ LFTs
- Urine
- Ammonia
- CBC
- * bonus CK







MANAGEMENT

- NPO
- IV
- D10 0.2 NS at 1.5 M (D5 0.2NS at 2M)
- +/- NS bolus for dehydration but DO NOT stop dextrose to do so
- Consult Metabolism
  - Co factor administration
  - Tx hyperammonemia

TIPS AND TRICKS OF THE TRADE

- Elevated Anion Gap > 20 = Abnormal
  - DDx: Dehydration, DKA, Shock, Renal Failure, Poisoning & Metabolic disease
- Ammonia level > 150-200 micromolar = Urea cycle defect

CONGENITAL ADRENAL HYPERPLASIA

- Endocrine emergency
- Presentation:
  - Progressive irritability, vomiting, lethargy & poor feeding
  - infant with virilization or ambiguous genitalia
- Electrolyte abnormalities:
  - hyponatremia, hyperkalemic, hypoglycemic
- Treatment: Steroids, Tx electrolyte derangement, hydrate

IS THIS SHIFT OVER?!?!!

27 day old male presents cc vomiting

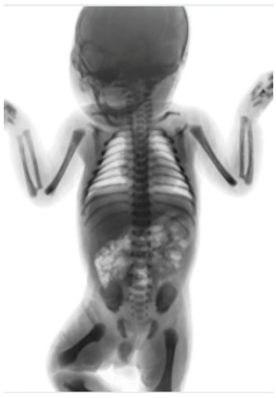
- VS: T: 37.2 HR: 142 RR: 38 O2: 98% RA
- HEENT: anterior fontanelle flat, OP clear
- CV: S1/S2 no m/r./g
- Chest: CTA b/l no wheezes no crackles
- Abdomen: Soft unable assess if tender
- GU: normal external male genitalia testicles descended!
- Extremities: cap refill </= 2 sec.

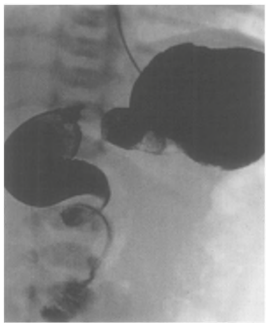
DIFFERENTIAL DIAGNOSIS

MOM THEN SHOWS YOU THIS….

NEONATAL SURGICAL EMERGENCIES (URGENCIES)

- Malrotation and Midgut Volvulus
- Duodenal Atresia
- Necrotizing Enterocolitis
- Other considerations
  - Intussusception
  - Congenital diaphragmatic hernia
  - Hirschsprung
  - Appendicitis



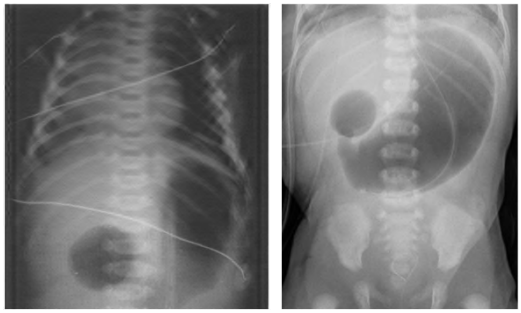


MALROTATION & MIDGUT VOLVULUS

- Overview
  - 1 in 500 live births
  - 50% present in 1st month of life
  - Male predominance in neonatal period
- Early signs
  - Bilious emesis *, abdominal tenderness (crying)
- Later signs
  - Abdominal distention, bloody stools

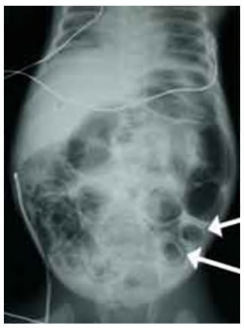
MALROTATION & MIDGUT VOLVULUS

- Bilious emesis in neonate = Emergent UGI
- If hemodynamically stable do NOT delay diagnosis
- Management: NG tube, NPO, IVF, Broad spectrum antibiotics
- Surgical intervention: ASAP



DUODENAL ATRESIA W/OBSTRUCTION

- Presentation = bilious emesis +/- abdominal distention
- Abdominal Xray shows "double bubble" sign
- Management: NG tube to decompress stomach, NPO, IVF
- Surgical consult for urgent but not emergent correction



NECROTIZING ENTEROCOLITIS

- Most common in premature infants but can happen in FT babies
- Risk factors: CHD, Perinatal asphyxia, hypoglycemia, maternal cocaine use or maternal pre-eclampsia
- Management: OG tube to LIS, NPO, Broad spectrum antibiotics
- Surgical indication: Perforation or evidence intestinal necrosis

THE MISFITS: QUESTIONS?

- Trauma (accidental and non-accidental)
- Heart disease and hypovolemia
- Endocrine (CAH and thyrotoxicosis)
- Metabolic (hypocalcemia, hypoglycemia etc)
- Inborn errors of metabolism
- Sepsis
- Formula Dilution
- Intestinal catastrophes (NEC, Volvulus, intussusception)
- Toxins
- Seizures