Preparing the Unstable or Surgical Neonate For Transport

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March 2016
Learning Objectives

- Identify and treat hypoglycemia
- Reduce thermal stress events through risk assessment and prevention
- Review methods for vascular access and support
- List methods for successful airway stabilization and management
- Discuss recognition, assessments, interventions and stabilization of infants with certain surgical emergencies
- Briefly review developmental pathophysiology regarding defects requiring surgical intervention
- Discuss causes and initial treatment of the three major types of shock seen in infants: hypovolemic, cardiogenic, and septic shock
- Describe methods to assist families when their infant will be transported
Transport Background

- A significant number of neonates require emergent transfer to a tertiary care center, often because of medical, surgical, or rapidly emerging postpartum problems.
- Studies show that shortened inter-facility transport time leads to improved outcomes for the smallest and most critically ill newborns.
- Because neonatal transport was required for NICU referral centers, and because pediatric transports to pediatric ICUs (PICUs) were increasing, the American Academy of Pediatrics (AAP) formed a Task Force on Inter-Hospital Transport and subsequently developed guidelines (1986).
Transport Considerations

- Because the outcome of an outborn neonate with major medical or surgical problems (including extreme prematurity) remains worse than for an inborn infant, primary emphasis should always remain on prenatal diagnosis and subsequent in-utero (i.e., maternal) transfer whenever possible. Despite advanced training and technology, mothers usually make the best transport incubators
Definitions of Preterm

- Preterm: <37 completed weeks
- Late preterm: 34 to 36 weeks
- Moderately preterm: 32 to 36 weeks
- Very preterm: <32 completed weeks
- Low birth weight: less than or equal to 2500 gm
- Very low birth weight: less than or equal to 1500 gm
- Extremely low birth weight: less than or equal to 1000 gm
Statistics

- According to the CDC pre-term related deaths account for more than 1/3 of all deaths during the first year of life.
- More infants die from preterm causes than any other causes.
- 24,000 infants a year and 80 percent of infants born before 27 weeks of gestation will develop respiratory distress syndrome (RDS).
Late Preterm Concerns

• Late-preterm infants are at a greater risk of morbidity and mortality than term infants
  • Late-preterm infants are more likely than are term infants to be diagnosed with temperature instability, hypoglycemia, respiratory distress, apnea, jaundice, or feeding difficulties
  • During the first month after birth, late-preterm infants are more likely than term infants to be rehospitalized for jaundice, feeding difficulties, dehydration, and suspected sepsis
Risk Factors for the Preterm Infant

- Immature tissues can be damaged by excessive oxygen
- Immature drive to breathe (apnea of prematurity)
- Immature lungs and surfactant deficiency
- Fragile capillaries within their brains may rupture
- Weak musculature-difficult to breathe effectively
- Large surface area relative to body mass → lose heat quickly
- Immature immune systems → susceptible to infection
- Limited glycogen stores → hypoglycemia
Barriers to Providing Care

- Lack of exogenous surfactant
- Size appropriate equipment not available
- Not able to establish secure airway
- Staff that are not trained to resuscitate a preterm/term infant (NRP)
- Significant transport time and/or distance to tertiary care
- Care giver inexperience
- Maternal and/or sociological issues
The STABLE Program

- S-Sugar and Safe Care
- T-Temperature
- A-Airway
- B-Blood Pressure
- L-Lab Work
- E-Emotional Support
Safety

- The goal is to successfully stabilize the infant prior to transport
  - Coordinated, timely, organized and consistent
  - Reduces the possibility of adverse events which may lead to a poor outcome
- Patients deserve and expect quality care
- Minimize preventable events
- Freedom from accidental injury
- If possible transport the mother prior to delivery
Sugar

- Sick infants should not be fed prior to transport
- Establish IV access quickly
  - Peripheral IV
  - UVC
- Provide glucose: (5-8 mg/kg/minute) (100 ml/kg/day=7mg/kg/minute) Note: Less for LBW/ELBW
  - Primary fuel
  - Infant brain needs a steady supply to function
  - Target glucose to at least 45 and 50 is ideal
## Signs of Hypoglycemia

### Symptoms
- Hypotonia, lethargy, apathy
- Poor feeding
- Jitteriness, seizures
- Congestive heart failure
- Cyanosis
- Apnea
- Hypothermia

### Autonomic Nervous System Manifestations
- Anxiety, tremulousness
- Diaphoresis
- Tachycardia
- Pallor
- Vomiting
Establish Vascular Access

- PIV
- UVC
- UAC
- PAL
- PICC
PICC Line Indications

- Greater than 6 days of IV therapy needed
- High osmolar load or low or high pH of IVF needed
- Infant less than 1500 gm or with minimal PIV sites due to anomaly
PICC Line Nursing Assessments

- Dressing integrity
- Sterile line changes
- Rounding on lines
- Frequent discussions regarding the continued use
- Monitor location of catheter tip
- Care when removing, slow, making sure tip is intact
- Use 10 mL syringes for flushing
- Catheter migration is increased with: HFOV, rapid infusion or flushing, forceful vomiting, increased movement, coughing
- Redness or tenderness in neck or shoulder
- Edema in the arm or shoulder area
- Monitor or dysrhythmias
- Breath sounds
PICC Line Complications

- CLABSI
- Occlusion, dislodgement, leaking, bleeding
- Serious complications are secondary to location of catheter tip
  - Pleural effusion
  - Dysrhythmias
PAL Indications

- Unable to place UAC
- Short term duration
- Need more than 1 or 2 ABGs to manage care
Nursing Assessment and Management of PAL

- Heparinize fluids
- Do not flush
- Verify circulation prior to placement
- Closed system for blood draws
- Monitor transducer wave pattern
- Parent teaching
PAL Complications

- Circulatory compromise
- Vascular damage
- Embolism
- Clotting
- Vasospasm
- CLABSI
Perform Allen Test prior to placement.

Never flush a PAL. Assess frequently for circulatory status or leaking into tissues.
An umbilical vein catheter should pass through the umbilical vein into the left portal vein. Then through the ductus venosus into a hepatic vein and the inferior caval vein (IVC). The tip should be positioned in the IVC at the level of the diaphragm. Low lying UVCs can be used for resuscitation inserted just into the vein.
Contraindications to UVC

- Abdominal surgery requiring an incision above the umbilicus
- Infection:
  - Omphalitis
  - Necrotizing Enterocolitis
  - Peritonitis
- Abdominal wall defect:
  - Omphalocele
  - Gastroschisis
  - Umbilical fistula
Nursing Assessment UVC

- Urine output
- Breath sounds/Bowel sounds
- Abd assessment
- Location of catheter
- Cardiac rate and rhythm
- Liver enlargement
- Insertion site assessment
- Alcohol impregnated caps on all IV ports
- Monitor all connections
- LFT
- O2 Needs
- Secure connections
- Aseptic technique when changing solutions/tubing
Complication of UVC

- Infection
- Thromboembolism Thrombophlebitis
- Blood loss:
  - From umbilical stump
  - Accidental disconnection of UVC
- UVC malposition in heart and great vessels:
  - Perforation through heart muscle
  - Pericardial effusion/cardiac tampanade
  - Cardiac arrhythmia
  - Thrombotic endocarditis
  - Hemorrhagic infarction of lung
  - Hydrothorax
- UVC malposition in portal system:
  - Necrotizing enterocolitis
  - Perforation of colon
  - Hepatic necrosis
- Hepatic cysts
- CLABSI
- Portal hypertension
- Vascular perforation
- UVC rupture
  - Transaction or fragmentation migration of fragmented UVC
Umbilical artery catheterization provides direct access to the arterial system and allows accurate measurement of arterial blood pressure, blood sampling and intravascular access for fluids and medications. The catheter should be passed through the umbilical artery and enter the aorta via the internal iliac artery. It should demonstrate the typical loop from the umbilicus inferiorly into the internal iliac artery. In order to avoid placement into aortic branches, the catheter should be either in a high position above the celiac, mesenteric and renal arteries or in a low position below the inferior mesenteric artery:

- high position: T6-T9
- low position: L3-L5

The high position is advisable since it leads to less vascular complications.
Contraindications to UAC

- **Infection:**
  - Omphalitis
  - Necrotizing Enterocolitis
  - Peritonitis

- **Abdominal wall defect:**
  - Omphalocele
  - Gastrochisis
  - Umbilical fistula
  - Cord anomalies

- Vascular compromise to the kidneys, buttocks or lower limbs
Nursing Assessment UAC

- Malpositioned catheter
  - Note catheter insertion depth
  - Monitor q shift
  - Note position on x-ray and know where it is supposed to be

- Vascular compromise
  - Clotting-Heparinized IV solution, clearing the line, used of closed system devices for drawing blood, slow return of clearing blood
  - Vasospasm-monitor for changes in leg or abdominal color
  - Monitor urine output
  - Monitor feeding tolerance

- Bleeding
  - Monitor insertion site
  - Monitor all connections

- Urine output
  - Monitor transducer wave form
  - Breath sounds/Bowel sounds
  - Abd assessment
  - Insertion site assessment
  - Alcohol impregnated caps on all IV ports
  - LFT
  - O2 Needs
  - Secure connections
  - Aseptic technique when changing solutions/tubing
  - Do not open line
UAC Complications

- Thrombosis
- Femoral artery resulting in limb ischemia, gangrene
- Renal artery infarct or circulatory compromise resulting in hypertension, hematuria and renal failure
- Infarct or circulatory compromise of mesenteric artery resulting in gut ischemia, NEC
- Aortic thrombosis causing heart failure
- Embolism / infarction
- Vasospasm of the femoral artery causing blanching of toes and foot
- False aneurysm
- Loss of extremity
- Air embolism
- Paraplegia
- CLABSI
3 Primary Factors that Impact Blood Glucose

- Inadequate glycogen stores
- Hyperinsulinemia
- Increased glucose utilization
Hypoglycemia Risk

- Preterm infants less than 37 weeks gestation
- SGA infants
- LGA infants
- IDM
- Stressed/sick infants
- Medications given to pregnant women
  - Beta-sympathomimetics
  - Beta-Blockers
  - Chlorpropamide-used in diabetic mothers
  - Benzothiazide diuretics
  - Tricyclic antidepressents in the 3rd trimester
Temperature Stabilization

- Hypothermia is preventable
- Well-documented impact on morbidity and mortality
- Especially dangerous in preterm infants
- Maintenance of normal body temperature MUST BE A PRIORITY in all infants, sick or well
Infants at Greatest Risk

- Premature, low birth-weight infants, especially those less than 1500 g
- SGA/IUGR
- Prolonged resuscitation, especially if hypoxic
- Acutely ill (infection, cardiac, neurologic, endocrine or surgical issues {especially those with open body wall defects})
- Decreased activity secondary to sedation
Physical Signs of Hypothermia

- Grunting, flaring, retracting
- Mottling and poor peripheral perfusion
- Maybe shivering
- Decreased muscle tone
- Initially flexed body position followed by extension
Prevention of Hypothermia

- Remove wet linens
- Bundle in warm blanket and cover head with a hat
- Naked skin-to-skin with mom, cover with warm blanket
- Keeping the infant clothed
- Turning up the room temperature
- Maintain temperature:
  - Axillary between 36.5 C (97.7F) and 37.5 C (99.5F)
  - Rectal between 36.8 C (98.2F) and 38.0 C (100.3)
Additional Interventions

- Pre-warm objects that will come into contact with baby
- Place insulation (warm blanket) between baby and cold surface
- Chemical thermal mattress (cover with a thin surface)
- Use servo control with temp probe
First, Do No Harm

- Do not overheat surfaces
- Do not leave infant on warmer for more than 10” without servo
- Use a temperature controlled blanket warmer
  - Do not use top of warmer or microwave
- Do not heat fluids to surround baby in a microwave. Do not let warmed fluids actually touch infant
- Do not apply heat directly to poorly perfused extremities
Airway-General Principles

- Infants with some form of respiratory distress account for the largest number of transports

- Determine the reason for respiratory distress
  - Maternal history
  - Infant history
  - Presenting signs
  - Time of symptom onset
  - PE
  - Lab work
  - X-ray

- Respiratory failure occurs quickly in children
  - Continuous assessment for changes
  - Evaluate the degree of respiratory distress
  - Tailor support to improve symptoms
Respiratory Support

- Supplemental oxygen
- Hood
- NC/HFNC
- CPAP
- SiPAP
- Assisted ventilation
Treat and Monitor Underlying Conditions

- Establish airway

- Surfactant
  - Prophylaxis—after initial resuscitation
  - Rescue—progressive FiO2 requirements during day 1

- Pneumothorax

- Arterial access

- Pre and Post Ductal Saturation Monitoring
  - Pre-ductal saturation is monitored on the R hand
  - Pre-ductal ABG from R radial artery
  - Post-ductal saturation is monitored on either foot
  - Post-ductal ABG from a UAC or posterior tibialis artery
  - PGE1 if positive
Transillumination of Pneumothorax
Transillumination Technique
Pneumothorax

Place chest tube or Needle aspirate air
Endotracheal Intubation

• Place appropriate size ETT

- Tube Size | Birthweight | Gestational Age
- 4.0 | > 3kg | Term
- 3.5 | 2-3 kg | 34-38 wks
- 3.0 | 1-2 kg | 28-34 wks
- 2.5 | < 1kg | <28 wks

• Secure
  • Tape, device
  • Place OG tube

• Verify placement
  • Chest excursion
  • BS
  • CXR
ETT Taping
ETT Holder
ETT

The tip of an endotracheal tube should be between the thoracic aperture and 1 cm above the carina. The tip travels downward if the neck is flexed or upward if the neck is extended. The most common malpositioning is in the right mainstem bronchus, because of the shallower angle of the right main bronchus. Here a well positioned tube in a patient with a pneumothorax on the left.
Shock

- Inadequate organ perfusion and oxygen delivery
- A complex state of circulatory dysfunction resulting in insufficient O2 and nutrient delivery to the tissues
- Failure to promptly recognize and treat this state may lead to multiple organ failure and death
- Treatment is prompt and aggressive
3 Types of Shock in the Neonate

Hypovolemic, Cardiogenic, Septic
Hypovolemic

- Results from low circulating blood volume
- Acute blood loss during the intrapartum period
  - Fetal-maternal hemorrhage
  - Placenta previa or abruption
  - Umbilical cord accident
  - Twin-to-Twin transfusion
  - Organ laceration (liver or spleen)
Symptoms of Hypovolemia

- Birth history
- Pallor
- Poor peripheral perfusion
- Tachycardia and Tachypnea
- Respiratory distress
- O2 Sats may be normal=don’t be fooled
- Decreased BP
- Hypothermia
Principles of Cardiac Output

- Heart fails as a pump
- Cardiac output (CO) is influenced by heart rate (HR) and stroke volume (SV)
  - HR x SV = CO
- The neonatal myocardium is not very compliant
  - Limited capacity to increase stroke volume
  - In response to shock the infant will attempt to increase CO by increasing HR → tachycardia
Neonatal Cardiac Function - Negative Factors

- Decreased volume of venous return to the heart (preload) = less blood to pump with each contraction
- Increased systemic vascular resistance (afterload) = extra work to pump blood to the body
- Decreased myocardial contractility = heart contraction is inefficient so less blood is ejected with each beat
Symptoms of Cardiogenic Shock

- Poor peripheral perfusion
- Active precordium: https://www.youtube.com/watch?v=Ot0HA1H1dnw
- Heart murmur
- Weak pulses
- Cyanosis
Early Onset Infection Risk

- Neonatal sepsis is a blood infection that occurs in an infant younger than 90 days old
- Can be devastating in the neonatal period
- Early-onset sepsis is seen in the first week of life most often appears within 24 hours of birth
- The baby gets the infection via the mother before or during delivery
- The following increases an infant's risk of early-onset sepsis:
  - Group B streptococcus + after 36 weeks gestation
  - Preterm delivery
  - Rupture of membranes more than 24 hours before birth
  - Infection of the placenta tissues and amniotic fluid (chorioamnionitis)
Top Priority

• Evaluation and treatment is a top priority in the pre-transport period

• Review maternal and infant history

• In any infant who appears sick
  • It is common to begin antibiotics until infection is ruled out
  • Be certain to obtain a CBC and Blood Culture prior to the start of antibiotics
Signs and Symptoms of Sepsis

- Lethargy
- Poor feeding
- Temperature instability
- Hypoglycemia
- Respiratory distress
- Poor peripheral perfusion
- Fussy or very quiet
Assessments

• Capillary refill
  • Press firmly for 5 seconds and release → count how many seconds it takes to refill → compare the upper body to the lower body → if greater than 3 seconds on the upper or lower body OR if lower is greater than the upper body → report findings

• HR
  • Apical pulse
  • Off monitor
  • Minimize extremes → bradycardia → tachycardia

• RR and Respiratory Characteristics
Blood Pressure

• Unless the baby has an in-dwelling arterial line, the only reliable and accurate way of measuring blood pressure indirectly is by using the oscillometric method

• To minimize errors of noninvasive BP measurements, the following guidelines are recommended
  • Cuff width to arm (or calf) circumference ratio as indicated on cuff
  • BP measurement during quiet or sleep state
  • Obtain average of two or three measurements if making management decisions
  • Use mean BP to monitor changes as less likely to be erroneous
  • Noninvasive BP may overestimate BP measurements in VLBW

• To minimize errors when using in-dwelling arterial lines, the following factors should be noted
  • Narrow catheters will underestimate systolic BP
  • Occlusion of the tip of the catheter (vessel wall or clot) may dampen wave & underestimate BP
  • Even small air bubbles may have an effect on measurement
  • Peripheral lines read higher than umbilical lines
Lab Tests to Evaluate Shock

- **ABG**-metabolic acidosis is present if the pH and HCO\textsubscript{3} are low, if respiratory distress, the PCO\textsubscript{2} may also be elevated and acidosis will be mixed
  - pH < 7.30 = abnormal
  - pH < 7.25 is concerning in combination w/poor perfusion, tachycardia and/or low BP
  - pH < 7.20 is significantly abnormal
  - pH < 7.10 indicates the infant is in crisis
Lab Tests to Evaluate Shock

- **Glucose** - In response to stress, may initially be hyperglycemic. Evaluate frequently until stable.

- **Electrolytes** - High or low Na and K
  - Check anion gap if metabolic acidosis is present; normal is 5-15 mEq/L
  - Ionized Ca
  - LFT
  - Renal Function tests
  - Coags
  - Lactate
Other Tests to Evaluate Shock

- Echocardiogram to evaluate cardiac function and R/O CHD
- Evaluate urine output for oliguria/anuria
- Evaluate for Sepsis
  - CBC and BC
- If concerned about inborn error of metabolism
  - Obtain NH₃
  - Metabolic screens
  - Urine and serum AA
Treatment of Shock

- Identify source

- Correct underlying problems that may impair cardiac function
  - Hypovolemia
  - Tamponade or pneumothorax
  - Excessive airway pressure
  - Electrolyte imbalance
  - Hypoglycemia
  - Hypoxemia
  - Arrhythmias
  - Improve pH
  - Thermal stability
Cardiac Support

- PGE1 is also used in maintaining a PDA
- Useful to prevent ductal closure in an infant with a ductal dependent cardiac lesion
  - pulmonary atresia/stenosis
  - tricuspid atresia/stenosis
  - transposition of the great arteries and
  - acyanotic lesions
    - coarctation of the aorta, hypoplastic left heart syndrome, critical aortic stenosis, and interrupted aortic arch
Surgical Problems
Esophageal Atresia and Tracheal-Esophageal Fistula

- Esophagus dead-ends in a blind pouch.
- TE fistula is an abnormal passage between the esophagus and trachea.
- Occur together in 85% of cases.
- Results from failure of trachea and esophagus to divide at 34-36 days of gestation.
- Not always obvious on prenatal US
Incidence and Symptoms

- Incidence: 1 in 4500
- Frequently, history of polyhydramnios
- Identification
  - Cannot swallow saliva with atresia
  - Choking or cyanosis with feeding
  - Gastric Tube will not pass to stomach
  - May develop gastric distension if there is a fistula, as air cannot get out of stomach
VACTERRR (or VACTERL)

- Refers to the non-random co-occurrence of birth defects
- Vertebral anomalies
- Anal atresia
- Cardiac defects
- Tracheoesophageal fistula and/or Esophageal atresia
- Renal & Radial anomalies
- Limb defects

The reason it is called an association, rather than a syndrome is that while the complications are not pathogenically related they tend to occur together more frequently than expected by chance.

In general, the etiology of "associations" are not defined.

Each child with this condition can be unique.
Types of EA and TEF

Fig 2. The five types are (a) esophageal atresia with distal tracheoesophageal fistula, (b) isolated esophageal atresia, (c) esophageal atresia with proximal and distal tracheoesophageal fistula, (d) tracheoesophageal fistula without esophageal atresia, and (e) esophageal atresia with proximal tracheoesophageal fistula.
Tube meets resistance at T2-3. (8-12 cm)
Do NOT force

**Air in stomach indicates** TE fistula. No air means isolated esophageal atresia
Management

- Elevate head of bed 30° - keep supine
- NPO
- IV fluids
- Feeding tube or Replogle to low suction in pouch – continuous or frequent
- Assess for associated anomalies (30-70%)
- Most commonly cardiac abnormalities such as ventricular septal defect, patent ductus arteriosus or Tetralogy of Fallot
Front-Back Open Lesions

- Oomphalacele
- Gastroschesis
- Spina Bifida
Care Prior to Transport
Front-to-Back Defects

- Airway support
- IV access 150/mL/kg/day in upper extremity
- Antibiotics/Culture if leaking fluid or noted rupture
- Replogle tube to low suction/NPO
- Keep pressure off the diaphragm
- No pressure on defect
- Position to facilitate venous return

- Prevent hypothermia and hypovolemia
- Place infant in sterile bowel bag OR if not available
- Wrap in sterile gauze soaked in warm sterile NS, then cover with dry gauze (place feeding tube in wrap to facilitate remoistening), cover with plastic
Preparation Prior to Transport
Omphalacele

• Herniation of the abdominal viscera into the base of the umbilical cord.

• Usually covered by a sac (or remnant) with umbilical arteries and vein inserted into the base of the defect.

• The sac, which is formed from an outpouching of peritoneum, protrudes in the midline, through the umbilicus
Omphalacele Assessments

- Defect can be small.
- Any unusually large umbilical cord should be inspected carefully prior to clamping.
Omphalacele Incidence and Features

- 1/5,000 - 6,000 live births
- Larger defects may include liver, stomach, spleen as well as intestines
- Associated with many anomalies; chromosomal or other structural defects in 50-70%
- Development of abdominal muscle and peritoneal layers incomplete; abdominal cavity often small and underdeveloped
Gastroschisis

• Evisceration of the bowel through a defect beside the umbilicus (no sac) in an otherwise normally formed abdomen

• During fetal development, the abdominal wall fails to close properly, leaving an opening

• The opening is usually to the right of the umbilical cord
Incidence

- Increasing incidence reported in reports from around the U.S. and the world since early 1990’s. (~ 4 in 10,000)
- Teen mothers
Delivery Planning

- Trend is to deliver closer to term
- Delivery based on maternal – fetal wellbeing, not just ultrasound picture of bowel
Features of Gastroschisis

- Defect is small, to the right of the umbilicus
- No sac covering
- Small and large intestine, rarely the liver, stomach, or bladder
- Intestine may be edematous and inflamed due to exposure to amniotic fluid
- An isolated defect - other anomalies uncommon, except malrotation and acquired atresia
Management Cont

- Protect defect and prevent heat and fluid loss
- Place in sterile bowel bag moistened with sterile saline and cinched at the axilla
- Leave intestine visible to watch gut perfusion
- Position on side to prevent tension on defect causing vascular compromise
Gastroschisis Management

- Cut umbilical cord long if possible
Management Cont

- Keep handling to a minimum
- Sterile gloves
- NPO, NG tube or Replogle to low intermittent suction
- IV for fluids at 150 ml/Kg/day -- increased hydration needs
- Antibiotics
- May need FFP
Surgical Repair

- Surgical emergency: repair ASAP
- Primary repair
- Staged reduction: partial replacement of intestine to abdomen, placement of a silastic silo, and daily reduction until closure is possible
- Long postoperative course, requiring TPN and slow feeding
Staged Repair
Bowel Obstruction

• Blockage of the GI tract
• Mechanical (anatomical)
• Acquired mechanical
• Functional
Bowel Obstruction (Causes)

- Atresias (1 in 2,500-5,000 births)
- Hirschprung’s Disease (1 in 5,000 births)
- Meconium ileus/plug (? Cystic Fibrosis)
- Hernia
- Malrotation/volvulus
- Necrotizing enterocolitis (more common in preemies, but can occur in term infants)
Duodenal Atresia (Double Bubble)
Intestinal Malrotation w/Midgut Volvulus
Bowel Obstruction
Features

- History of polyhydramnios
- Abdominal distension with visible bowel loops, absence or hyperactivity of bowel tones
- Vomiting, especially bile-tinged
- Greater than 20-30 ml stomach aspirate at birth
- No meconium
- Depending on cause, timing of onset varies - may be present at birth or develop soon after
Bowel Obstruction Management

- NPO with NG or Replogle to low intermittent suction, or aspirate gently every 20-30 minutes
- IV for fluid, glucose, electrolyte management
- Measure and track abdominal girth
- Abdominal films may help diagnose if air is absent from the distal bowel
- Good surgical outcomes
Neural tube defects result from failure of the neural tube to close normally at 3-4 weeks gestation.

Range of defects from spina bifida occulta (covered with skin) to myeloschisis, in which the whole spinal cord is without dermal or vertebral covering.
Care of Spinal Defects Prior to Transport

- Keep defect clean
- Begin antibiotics, culture defect if fluid leak
- Examine and measure defect
- Cover with sterile warmed saline soaked gauze and dry gauze over (place NG tube to facilitate remoistening)
- MRI, Spinal US
- Prevent contamination from bowel and bladder
- Position off defect and to maintain neurologic function
- Evaluate lower body movement
- Note bowel and bladder control
Myelomeningocele
Incidence and Characteristics

- Prenatal detection by quad screen (blood), ultrasound, and amnio
- 80% in lumbar region
- 0.7 in 1,000 births in U.S.
- Incidence of mental retardation less than 20%, but most develop hydrocephalus and need ventriculoperitoneal shunt
Myelomeningocele Management

- Ventilate or resuscitate from side if necessary.
- Keep on side or abdomen.
- Sterile, NON-LATEX, powder-free gloves for handling
- Measure and examine defect, then dress to keep sterile, moist, and protected. Prevent HEAT LOSS.
- NPO, IV, antibiotics if ruptured (high infection risk)
Secure feeding tube to back of Telfa dressing and attach syringe of sterile saline
Protect with sterile “donut” to cushion spinal cord lesion from injury
Cover the dressing with a piece of steri-drape
Secure the donut and dressing with a 6” piece of Bandnet or Kerlix around the baby’s middle.
For a final touch, the mudflap...

UW/Children’s website:
http://neonatal.peds.washington.edu/NICU-WEB/mcelecov.stm
Diaphragmatic Hernia

- Herniation of abdominal organs into the thoracic cavity through a defect in the diaphragm due to early failure of the closure of the diaphragm.
- This usually results in hypoplasia of the lung.
Diaphragmatic Hernia: Features
Diaphragmatic Hernia: Incidence and Features

• Incidence: 1 in 4000; 90% on left

• Detectable on prenatal ultrasound

• 50% associated with other anomalies: neural tube defects, heart defects, intestinal malrotation

• May be mild and asymptomatic or severe and life-threatening
Diaphragmatic Hernia: Features Cont

- Respiratory distress at birth or soon after
- Cyanosis, decreased breath sounds on one side of chest
- Muffled or displaced heart sounds on (usually) right side of chest
- Bowel tones in chest
- Diagnosis confirmed by X-Ray
May or may not have barrel chest, and/or
scaphoid abdomen:
Diaphragmatic Hernia: Management

- Avoid bag-mask ventilation!
- Early intubation recommended.
- Decompress stomach with OG or Replogle.
- Elevate head of bed
- NPO, IV for fluid and electrolyte management
- Antibiotics if risk of sepsis
Family Support

- Birth means many different things to families
- Parental reactions are sometimes hard to interpret and coping styles vary
- Approach in a non-judgmental way and observe for non-verbal cues
Diaphragmatic Hernia: Management

- Surgical repair usually deferred until pulmonary hypertension is controlled.
- May have lung hypoplasia and need HFOV, INO or ECMO
- Primary closure usually possible
- Patch or muscle flap may be used to close defect.
Diaphragmatic Hernia: Outcomes

• Survival depends on preoperative status. 40-60% survival if severe symptoms appear within the first 6 - 8 hours of life.

• Depends on severity of defect and any other associated anomalies.
Imperforate Anus

- Failure of differentiation of urogenital sinus and cloaca during embryological development.
- May be high or low in colon.
Imperforate Anus: Incidence and Features

- 1 in 5,000 live births
- High imperforate anus associated with lack of innervation
- Low imperforate anus may have dimple or appear normal in rectum.
- 50% or more have associated anomalies, most frequently genitourinary
Parental Emotions

- Guilt
- Anger
- Disbelief
- A sense of failure
- Powerless
- Fear
- Blame
- Depression
Supportive Intervention

- Listen
- Pictures
- Footprints
- Phone numbers, Names and Address
- Allow them to hold or touch their infant if it is safe
- Explanation and education
- Phone call upon safe arrival
- Checking on baby’s status and helping to explain
- Being present
- Spiritual support as requested
Quality Improvement

• **Debrief After Event**
  • Was communication clear?
  • Were roles and responsibilities understood?
  • Was situation awareness maintained?
  • Was workload distribution equitable?
  • Was task assistance requested or offered?
  • Were errors made or avoided?
  • Were resources available?
  • What went well?
  • What should improve?
Questions?

Stop asking me questions.
References


- Universal Newborn Screening for Congenital Heart Disease NANN
References


References


• Stable Program

• AAP Guidelines for transport


• Transport of the Critically Ill Newborn

• Author: Bryan L Ohning, MD, PhD; Chief Editor: Ted Rosenkrantz, MD, Medscape; Jan.9, 2015