Neonatal Surgical Emergencies

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Objectives

Upon completion of this lecture the nurse will be able to:
- Describe the difference between gastroschisis and an omphalocele
- State the reason why a left diaphragmatic hernia is more common than one on the right
- Give the most common reason why a chest tube is placed for a TEF repair

Transition Period

- The transition period following birth can be complicated by conditions that require emergent surgical management

Topics that will be covered will include:
- Congenital Diaphragmatic Hernia
- Myelomeningocele
- Abdominal Wall defects
- Necrotizing Enterocolitis
- Tracheoesophageal Fistulas

Prenatal Detection

- Fetal Ultrasound
- AFP/amniotic fluid testing
- Antepartum surveillance

Proactive Management

- Giving birth at a specialty Hospital
- Advanced therapeutics
- Pediatric Surgery
ECMO Circuit

Congenital Diaphragmatic Hernia

- A tendon that is developed from 4 structures
  - Septum Transversum
  - Pleuro-peritoneal membrane
  - Dorsal mesentery of the esophagus
  - Lateral body walls

Congenital Diaphragmatic Hernia

- Occurs in 1:2,200 to 1:4,000 births
- Left sided defects occur 75-90%
- Fusion of the pleuroperitoneal membrane
- Presentation
- Treatment
Congenital Diaphragmatic Hernia

Treatment

- Intubation
- Normalize ventilation
- Sedation
- Saturation monitoring
- Surgical repair
HYDROCEPHALUS

• 3 Critical Events
  – Choroid plexus secretes CSF
  – Roof of the 4th ventricle perforates
  – The subarachnoid villi are able to absorb

Etiology of Hydrocephalus

Arnold Chiari defect 28%
Communicating hydrocephalus 22%
Dandy Walker malformation 7%
Aqueduct stenosis 33%
Other

Neurologic Development

• Dorsal induction
• Ventral induction
• Proliferation
• Migration
• Organization
• Myelination

Arnold Chiari Malformation

1. Inferior displacement of the medulla and the 4th ventricle into the upper cervical canal
2. Elongation and thinning of the medulla and pons
3. Inferior displacement of the cerebellum through the foramen magnum into the upper cervical region
4. A variety of boney defects of the foramen magnum, occiput +/- upper cervical canal
The Gut

1. The foregut
2. The midgut
3. The hindgut

Foregut

- Structures formed from the foregut are:
  - Oral cavity
  - Esophagus
  - Duodenum
  - Liver, biliary tree and the pancreas

Esophageal Atresia

- Incidence is 1:3,000-4,500 births
- 85% are TEF’s
- 1/3 are born premature

Esophageal Development

Types of Tracheoesophageal Fistulas
Foregut

- Structures formed from the foregut are:
  - Oral cavity
  - Esophagus
  - Duodenum
  - Liver, biliary tree and the pancreas

Duodenal & Pancreas Development

Duodenal stenosis/Atresia

- Incomplete recanalization or anular pancreas
- 20-30% will be associated with Down’s Syndrome
- 20% will be born premature
- Bilious vomiting
- Mid line work up

Duodenal Obstruction
Duodenal Atresia

Duodenal Stenosis

Anular Pancreas

Midgut
- Small intestines, jejunum, ileum, cecum, ascending colon, and 2/3rds of the transverse colon arise from the midgut.
- Superior mesenteric artery supplies these structures
- Umbilical herniation
- Midgut anomalies

Midgut Herniation

Omphalocele
- Occurs in 1:5,000 births
- Persistent herniation of the abdominal contents into the umbilical cord
- Failure of the intestines to return to the abdominal cavity
Omphalocele

- Occurs to the right of the umbilical cord
- Incomplete closure of the lateral folds, in the ventral abdominal wall
- Does not involve the umbilical cord
- Occurs more frequently in males

Gastroschisis Silo
**Malrotation/Nonrotation**
- Fairly common defect
- May be part of other syndromes or defects
- Failure of the midgut loop to rotate as it enters the abdomen
- Complication of rotation - Volvulus

**Jejunum/Ileal Atresia**
- Occurs usually as a result of interrupted blood supply to a segment of bowel
- The necrotic bowel forms a fibrous cord between two normal segments of bowel
- Not usually associated with other anomalies
- May be found in infants with Cystic Fibrosis

**Ileal Atresia**

**Pathogenesis of NEC**
- Patient population
- Feedings
- Gut colonization/Bacteria
- Mesenteric ischemia

**NEC**
- Incidence
  - Occurs in about 6% of all NICU admissions
- Patient population
  - 90% - premies
  - 10% - term
- Presentation
  - 3 days to 3 months
**NEC Feedings**

- 90-95% have had enteral nutrition
- **CHO** must be present in the intestine to form pneumotosis
- Breast milk protection

**Benefits of Breast Milk**

- Lactobacilli
- Immunoglobins
- Complement components
- Lysozymes
- Lactoperoxidase
- Lactoferrin
- Macrophages & lymphocytes

**NEC Gut colonization**

- Initiate or opportunistic
- Over growth, abnormal flora
- Ileus and dysmotility
- Gastric pH protection

**NEC Mesenteric Ischemia**

- Re-distribution of blood flow
  - Asphyxial insult to the GI tract
  - Cytotoxic edema
  - Translocation of gut flora
- Umbilical lines

**Mesenteric Ischemia**

- Re-distribution of blood flow
  - Asphyxial insult to the GI tract
  - Cytotoxic edema
  - Translocation of gut flora
- Umbilical lines
Hindgut

- Last part of the transverse colon, descending colon, sigmoid colon and rectum arise from the hindgut.
- Inferior mesenteric artery provides the blood supply to these structures

Hirschsprungs/Megacolon

- Failure of the neural crest to migrate to the colon
- Most common of the abdominal obstructions 33%
- 4:1 more common in males than females

Hirschsprungs

Imperforate Anus

- 1:5,000 births
- More common in males than females
- Low versus high lesions
Low imperforate anus lesions
1. Anal agenesis with or without fistula
2. Anal stenosis
3. Imperforate (membranous covering) anus

Low Lesions

Anal Stenosis

Imperforate Anus

High Imperforate anus lesions
- Most common of the imperforate anus lesions
- Usually associated with a fistula
High Lesion - Girl

High Lesion - Male

Germ Layer Derivatives

All’s well that ends well

References


