

Neonatal Surgical Emergencies

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Neonatal Surgical Emergencies

- Objectives
- Upon completion of this lecture the nurse will be able to:
 - Describe the difference between a 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

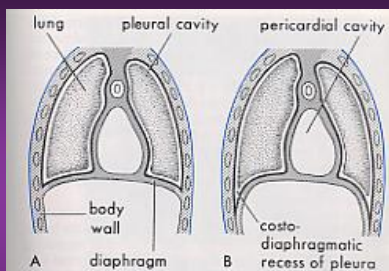
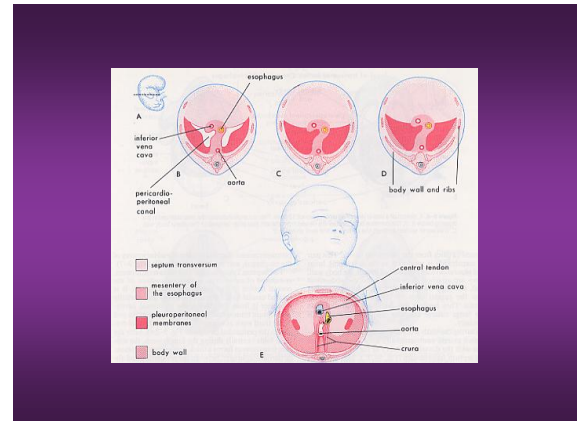
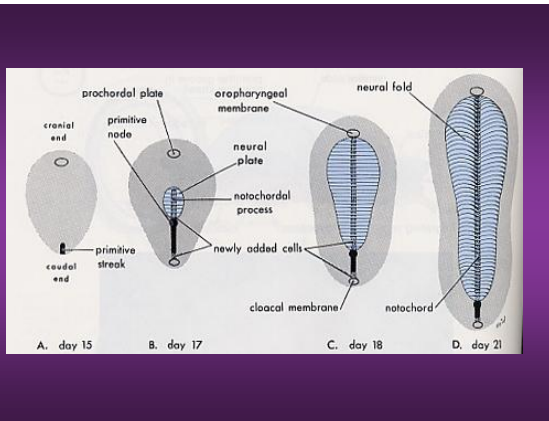
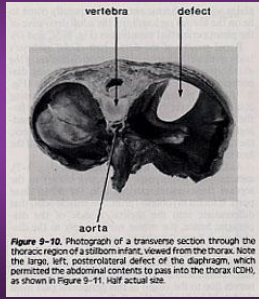


Figure 9-8. Diagrams illustrating extension of the pleural cavities into the body walls to form peripheral portions of the diaphragm, the costodiaphragmatic recesses, and the establishment of the characteristic dome-shaped configuration of the diaphragm. Note that body wall tissue is added peripherally to the diaphragm as the lungs and pleural cavities enlarge.

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

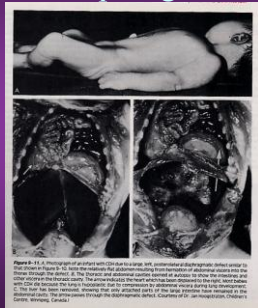
Congenital Diaphragmatic Hernia



Congenital Diaphragmatic Hernia



Congenital Diaphragmatic Hernia



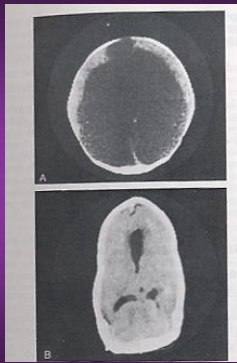
Congenital Diaphragmatic Hernia



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 bony defects of the foramen magnum, occiput +/- upper cervical canal



The Gut

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

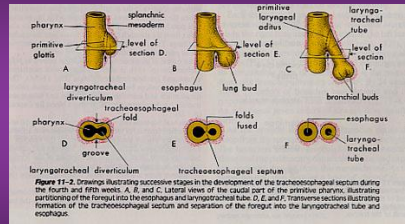
Foregut

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

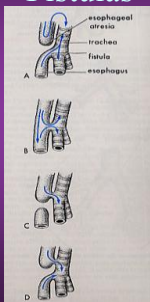
Esophageal Atresia

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

Esophageal Development



Types of Tracheoesophageal Fistulas



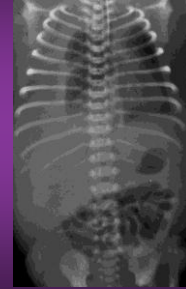
Esophageal Atresia



Esophageal Atresia



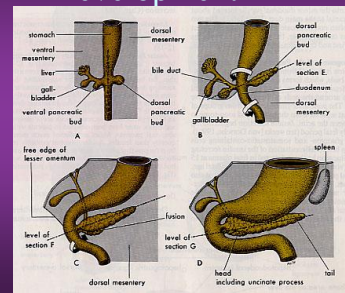
Chylothorax



Foregut

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

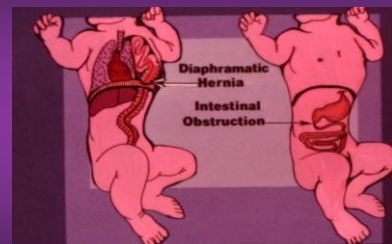
Duodenal & Pancreas Development



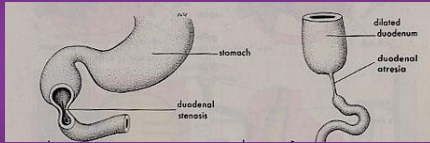
Duodenal stenosis/Atresia

- 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

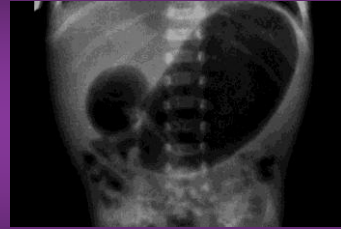
Duodenal Obstruction



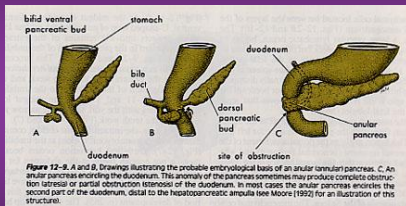
Duodenal Atresia



Duodenal Stenosis



Anular Pancreas



Midgut

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

Midgut Herniation



Omphalocele

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

Omphalocele



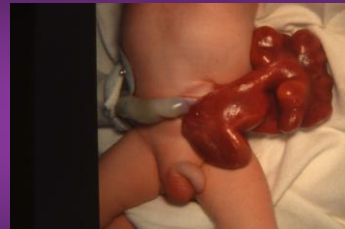
Omphalocele



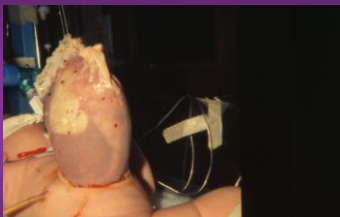
Gastroschisis

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

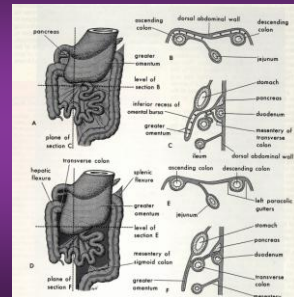
Gastroschisis



Gastroschisis Silo



Malrotation



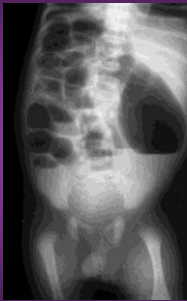
Malrotation/Nonrotation

- o Fairly common defect
- o May be part of other syndromes or defects
- o Failure of the the midgut loop to rotate as it enters the abdomen
- o Complication of rotation - Volvulus

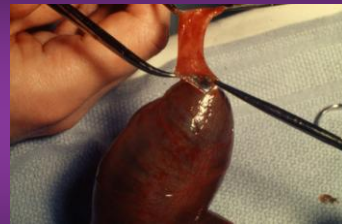
Jejunum/Ileal Atresia

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

Ileal Atresia



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

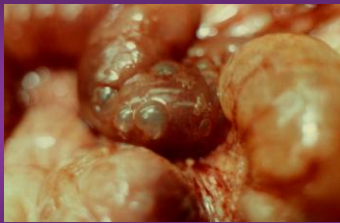
NEC Feedings

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

Benefits of Breast Milk

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

NEC



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

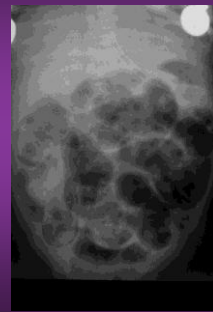
Mesenteric Ischemia



NEC



NEC



Hindgut

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

Hirschsprungs/Megacolon

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

Hirschsprungs



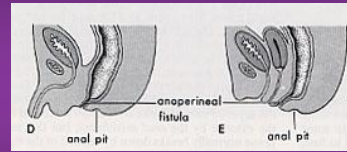
Imperforate Anus

- o 1:5,000 births
- o More common in males than females
- o Low versus high lesions

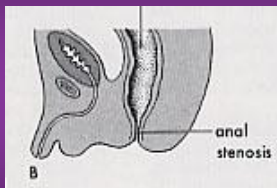
Low imperforate anus lesions

1. Anal agenesis with or without fistula
2. Anal stenosis
3. Imperforate (membranous covering) anus

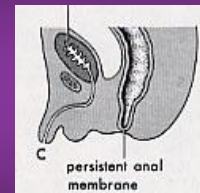
Low Lesions



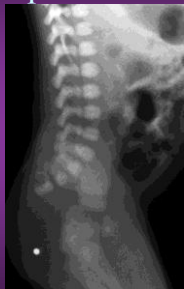
Anal Stenosis



Imperforate Anus



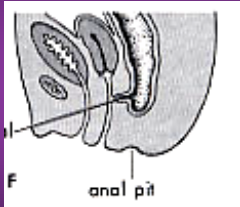
Imperforate Anus



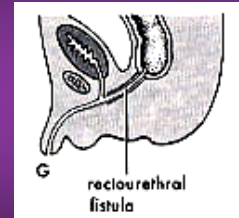
High Imperforate anus lesions

- o Most common of the imperforate anus lesions
- o Usually associated with a fistula

High Lesion - Girl



High Lesion - Male



Germ Layer Derivatives



Ectoderm derivatives

Epidermis, hair, nails, sweat glands, sebaceous glands, mucous glands, lens of eye, inner ear, enamel of teeth, and anterior pituitary

Neuroectoderm

Neural tube

Central nervous system, retina, spinal body wall

Neural crest

Peripheral nervous system, adrenal medulla, pigment cells, hair follicles, cranial and facial cartilage, sympathetic ganglia and nerves, melanocytes

Endoderm derivatives

Epithelium of gut, respiratory tract, thyroid, parathyroids, thymus, pancreas, bladder, urinary bladder, vagina, uterus, endometrium, mammary glands, sweat glands, and salivary glands

Mesoderm derivatives

Heart

all, dermis, muscle and connective tissue

Paraxial

dermis except skull, muscles of trunk, dermis of skin and connective tissue

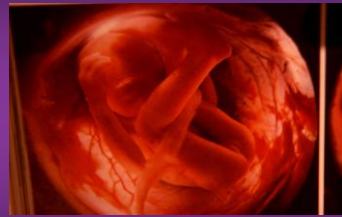
Intermediate

dermis (epidermis, dermis and accessory glands)

Lateral plate

coelothelium, somites, blood cells, lymphatic system, coelothelium, spleen, adrenal cortex, vitreous and lens of eye, dermis of face, dermis of trunk and limbs, dermis of genitalia, pleura and peritoneum

All's well that ends well



References

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