Neonatal surgical respiratory Emergencies

PROF
MAMDOUH ELKASABY
Cystic Hygroma

- Multiloculated cystic spaces lined by endothelial cells
  - Separated by fine walls containing numerous smooth muscle cells
  - Cystic Hygroma Result of maldevelopment of lymphatic spaces
- Incidence about 1 in 12,000 births
  - 50-65% appear at birth, 85-90% appear by age 2
  - Neck-75%, Axilla 20%; can be seen in mediastinum, retroperitoneum, pelvis, groin
  - Nuchal/post cervical CH’s have been associated with chromosomal abnormalities—high mortality rate
Cystic Hygroma

• Complications
  – Respiratory—large hygromas can extend into oropharynx and trachea
  – Inflammation/Infection
  – Hemorrhage
Cystic Hygroma

- Treatment
  - Dependent on size, location, symptoms/complications
  - Some pts require emergent surgery due to airway compromise
  - Best treatment is complete excision
  - Aspiration typically not effective due to rapid refilling of fluid
  - Sclerotherapy—Bleomycin, hypertonic saline, doxycycline, fibrin glue
Congenital Diaphragmatic Hernia
Congenital Diaphragmatic Hernia

Herniation of abdominal viscera into the thorax

Result from failure of the pleuroperitoneal canal to close at ~ 8th wk of gestation or early return of midgut to the peritoneal cavity

Most challenging and frustrating of all neonatal surgical emergencies
Congenital Diaphragmatic Hernia

50% mortality regardless of the method of treatment

Incidence: 1:2,000-5,000 live births

M<F 1:1.8, frequently full term

Etiology: unknown
   no genetic factors have been implicated

Antenatal history: polyhydramnios
Congenital Diaphragmatic Hernia

Classification

- Absent diaphragm: rare
- Diaphragmatic hernia
  - 80% posterolateral L > R (Bochdalek)
  - 2% anterior (Morgagni)
  - 15 - 20% paraesophageal
- Eventration (15 - 20%)
Pathophysiology

- It involves three major defects.
- A failure of the diaphragm to completely close during development.
- Herniation of the abdominal contents into the chest.
- Pulmonary hypoplasia.
pathology

- Hypoplastic lungs:
  - decrease in the number of alveoli and bronchial generation
  - abnormal pulmonary vasculature (decrease in volume and increase in muscular mass)
  - Pulmonary hypertension
Congenital Diaphragmatic Hernia

Associated anomalies (20-50%)

- cardiovascular 13 - 23%
- CNS 28%
- gastrointestinal 20%
- genitourinary 15%

• increase the mortality rate
Congenital Diaphragmatic Hernia

Classic Triad

Dyspnea

Cyanosis

Apparent dextrocardia
Congenital Diaphragmatic Hernia

Physical Exam
- scaphoid abdomen and barrel chest
- bowel sounds in the chest
- displaced heart sounds

Laboratory Studies
- CBC
- ABG
- electrolytes
- calcium
- glucose
Congenital Diaphragmatic Hernia

Diagnosis: chest x-ray

- loops of bowel in the chest
- mediastinal shift
- absent lung markings
Congenital Diaphragmatic Hernia

**IMMEDIATE**

Intubation

+ Stomach Decompression
Congenital Diaphragmatic Hernia

Determinants of Survival

• degree of pulmonary hypoplasia

  ipsilateral lung > contralateral lung

• development pulmonary vasculature
Congenital Diaphragmatic Hernia

Goals of Management

• maximize arterial oxygenation
  
  mechanical ventilation: use low inflating pressures
  
  increases pulmonary blood flow

• correction of acidosis
Congenital Diaphragmatic Hernia

Standard Management Strategy

Reduce pulmonary HTN

Moderate alkalosis

$\text{pCO}_2 < 40 \text{ mmHg}$

$\text{PaO}_2 > 100 \text{ mmHg}$
Recent Strategy

- Permissive hypercapnia and hypoxemia
- Pressure-limited ventilation (<25 cmH$_2$O)
- Postductal pCO$_2$ 40-65 mmHg
- Preductal SpO$_2$ 85-90%
- Postductal SpO$_2$ ignored unless pH is < 7.20 or pCO$_2$ > 65
Congenital Diaphragmatic Hernia
Intraoperative

Surgical repair

primary closure

staged procedure

Transabdominal subcostal incision

Thoracosscopic repair has been reported
Congenital Diaphragmatic Hernia

Postoperative Care
  Ventilatory support
  Close fluid management
  Hemodynamic monitoring

“Honeymoon Period” followed by deterioration
  increase abdominal pressure
  impaired peripheral and visceral perfusion
  limited diaphragmatic excursion
  worsening of pulmonary compliance
Congenital Diaphragmatic Hernia

Criteria for ECMO

• Gestational age $\geq 34$ wks
• Weight $\geq 2000$ grams
• Predicted mortality $\geq 80\%$
Congenital Diaphragmatic Hernia

Contraindications

- Gestational age < 34 wks
- Weight < 2000 grams
- Preexisting intracranial hemorrhage (≥ grade II)
- Aggressive respiratory treatment > 1 wk
- Congenital heart disease
- Congenital or neurological abnormality incompatible with good outcome
TracheoEsophageal Fistula (TEF)
Tracheoesophageal Fistula

Incidence: 1:4000 live births

M > F (25:3)

10-40% are preterm

Antenatal history: polyhydramnios (60%)

Etiology: failure in mesenchymal separation of upper foregut
Tracheoesophageal Fistula

Clinical Presentation

- Choking on 1st feed
- Coughing
- Cyanosis
- Excessive salivation
- Aspiration pneumonia
Tracheoesophageal Fistula

Diagnosis

• inability to pass a suction catheter into the stomach

• CXR: coiled orogastric tube in the cervical pouch; air in the stomach and intestine
Tracheoesophageal Fistula

Esophageal Atresia

Tracheoesophageal Fistula

TracheoEsophageal Fistula

5 Types (Gross and Vogt)

A: 7.7%
B: 0.8%
C: 86%
D: 0.7%
E: 4.2%

Tracheoesophageal Fistula

35-65% have associated anomalies

VATER and VACTERL

V  vertebral anomalies or VSD
A  anorectal malformation
C  cardiac anomalies (common)
T  TEF
E  esophageal atresia
R  renal abnormalities
L  limb/radial malformation
Tracheoesophageal Fistula
Preoperative Preparation

Minimize pulmonary complication

  npo

  head-up position

  sump tube (repogle) on low continuous suction

  ± gastrostomy under local anesthesia

  CXR, abdominal x-ray, renal ultrasound

  12-L EKG and Echocardiogram : mandatory

  IV access ± arterial line
Tracheoesophageal Fistula
Intraoperative Management

Lateral decubitus position

Posterolateral thoracotomy
Tracheoesophageal Fistula
Intraoperative Management

Surgical repair

• ligation of fistula
  check air leak in suture line

• esophageal repair
  identify the pouch
  placement of feeding tube

• chest tube placement and closure of thoracic cavity
Tracheoesophageal Fistula
Intraoperative Management

Berry FA, Anesthetic Management of Difficult and Routine Pediatric Patients, 2nd Ed. 1990
Tracheoesophageal Fistula
Postoperative Management

Early extubation desirable
caution: disruption of surgical repair with reintubation

Postop Pain Management
1. IV narcotics
2. epidural infusion: 0.1% bupivacaine + fentanyl 0.5 mcg/ml at 0.1-0.2 ml/kg/hr
3. rectal Tylenol + LA infiltration of incision
Tracheoesophageal Fistula

Main Cause of Mortality

associated anomalies

survival rates 85-90%

Long Term Complications

GE reflux

anastomotic stricture

tracheomalacia
THANK YOU