**Necrotizing Enterocolitis**

_Bugs, Drugs and Things that go_  
_Bump in the Night_

“From ghoulies to ghosties and long leggety beasties & things that go bump in the night, good lord deliver us”

Old Cornish Prayer

- Caring for premature infant with NEC is like riding a mile-high roller coaster without brakes. All you can do is hang on for the ride and watch out for the bumps.”

RA Polin 2005

- Epidemiology
- Pathophysiology
- Diagnosis
- Management
- Prevention

**The Case Begins**

- Baby “M” was a _1150 male infant_ (27 wk gestation), born to a 26 year old woman. Mrs. “M” admitted to recreational use of _cocaine_. Three days prior to delivery she was given _indomethacin_ because of preterm labor.

**The case continued**

- The baby was delivered by emergency cesarean section because of late decelerations. _Apgar scores were 1 & 3_ & baby “M” required endotracheal intubation.
Because of worsening respiratory distress, an umbilical arterial line was placed at L4. A CBC obtained from the UA was remarkable for a Hct = 71%. On day one of life, the infant was placed on TPN.

Within 72 hours, feedings were begun. The baby was advanced to full feedings over 3 days. On day 4 of life, a murmur was heard and an echocardiogram and chest x-ray were obtained. Total fluid intake at that time was 185 ml/kg day.

On day 10 of life, he needed NaHCO$_3$ because of a mild metabolic acidosis. Gastric aspirates increased in volume and were blood-tinged. A CBC was remarkable for leukopenia and thrombocytopenia. On day 11, he became distended & developed erythema of the abdominal wall.
**Epidemiology of NEC**

- Affects 6-8% of VLBW infants
- Widely varying incidence between centers
- Incidence inversely related to degree of prematurity
- No seasonal or sex predilection (? racial effect)

**Pathophysiology of NEC**

- Hypertonic feedings
- Overfeeding?
- Hypoxia/Ischemia
- Cocaine

- Breast feeding
- Phagocytes
- Immunoglobulin
- Growth factors
- PAF acetylhydrolase

- Bacterial Colonization
- Bacterial Replication (+ substrate)
- H₂ gas Production
- Pneumatosis

- Mucosal invasion (endotoxin)
- Cytokine production
  - PAF
  - TNF/cytokine cascade
- Sepsis/shock/SIRS

**Diagnosis of NEC**

- High index of suspicion based on history and physical findings
- Early appearances are subtle and easily confused with neonatal sepsis.

  - Apnea (pause in breathing)
  - Bradycardia (slowing of heart rate)
  - Lethargy
  - Temperature instability
Diagnosis and Staging of NEC

*Early gastrointestinal findings may be non-specific*

- Poor motility
- Blood in stool
- Vomiting
- Diarrhea
- Guarding
- Distension
- Feeding intolerance

*Later signs reflect progression of illness.*

- Abdominal tenderness
- Abdominal wall erythema
- Peritonitis
- Ascites
- Acidosis
- Palpable mass
- Hypotension
- Bleeding disorders

Classification of NEC

**Stage 1:** suspect NEC - signs of sepsis, feeding intolerance ± bright red blood per rectum
**Stage 2:** Proven NEC - all of the above, pneumatosis, ± portal vein gas ± metabolic acidosis ± ascites
**Stage 3:** Advanced NEC - all of the above, clinical instability, definite ascites ± pneumoperitoneum

How Do You Make the Diagnosis?

*Think of the diagnosis!*

- Serial physical examination
- Laboratory testing
- Abdominal x-rays

Necrotizing Enterocolitis

Pneumatosis intestinalis

Necrotizing Enterocolitis

Portal vein gas
Necrotizing Enterocolitis
Pneumoperitoneum

What is the Medical Treatment?
- Stop the feedings
- Parenteral antibiotics
- Nasogastric decompression
- Parenteral nutrition
- Fluid resuscitation

Firm Indications for Surgical Intervention
- Perforated viscus
- Abdominal mass
- Fixed, dilated loop
- Positive paracentesis
Necrotizing Enterocolitis
Intestinal gangrene and perforation

What is the outcome?
- Infants treated medically survival is > 95%
- Infants requiring surgery survival is 70-75%

How Can NEC be Prevented?
- Breast feeding
- Antenatal steroids
- Cautious advancement of feedings (perhaps)
- Cohorting during epidemics

Conclusion
- Prematurity is the single greatest risk factor for NEC & avoidance of premature birth is the best way to prevent NEC
- The role of feeding in the pathogenesis of NEC is uncertain, but it seems prudent to use breast milk (when available) and advance feedings slowly and cautiously