

Necrotizing Enterocolitis

*Bugs, Drugs and Things that go
Bump in the Night*



Morgan Stanley
Children's Hospital
of NewYork-Presbyterian
Columbia University Medical Center

*“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*

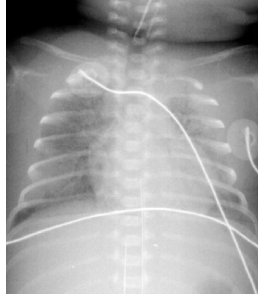
The Case Begins

✓ 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.

The case continued



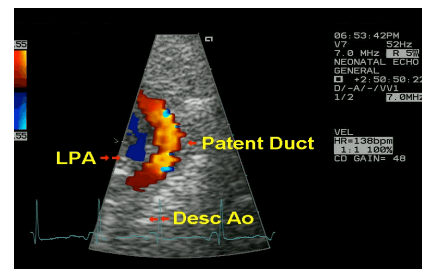
The case continued

✓ 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.

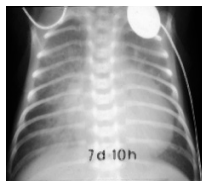
The case continued

✓ 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*.

The case continued



The case continued



The case continued

✓ 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.



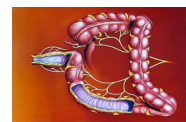
Epidemiology of NEC

- ✓ 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)

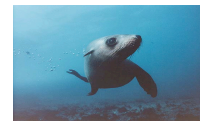
* Age at diagnosis is inversely related to gestational age and degree of prematurity

Gestational age*	Age at onset
≤ 30 weeks	20.2 days
31-33 weeks	13.8 days
≥ 34 weeks	5.4 days
Full term	1-3 days

*Stoll et al J Ped. 96: 447, 1980

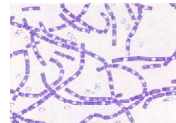


Vulnerable intestine

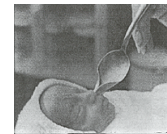


Intestinal ischemia
"Diving seal reflex"

+



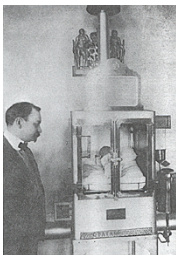
Bacterial Colonization



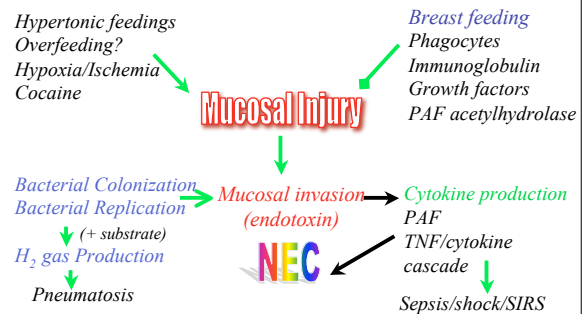
Formula feeding

→ NEC

Martin Couney



Pathophysiology of NEC



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

Diagnosis and Staging of NEC

Later signs reflect progression of illness.

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

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

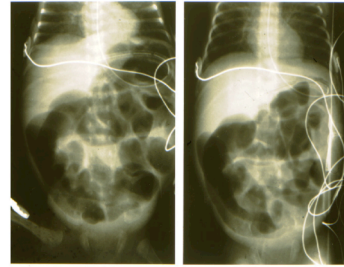
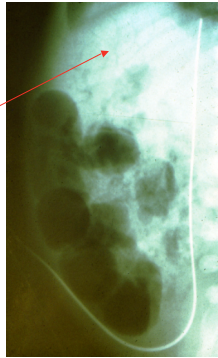
*Necrotizing
Enterocolitis*

Pneumatosis intestinalis



*Necrotizing
Enterocolitis*

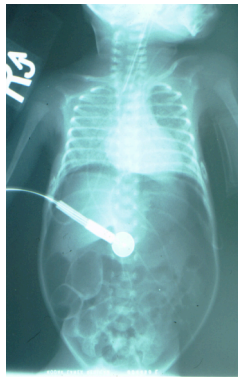
Portal vein gas



*Necrotizing Enterocolitis
Static loops*

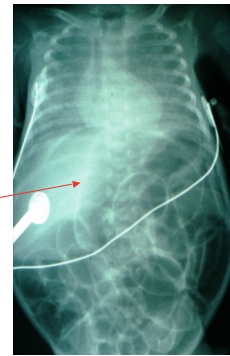
*Necrotizing
Enterocolitis*

Pneumoperitoneum



Necrotizing Enterocolitis

*Pneumoperitoneum
"football" sign*



*Necrotizing Enterocolitis
Pneumoperitoneum/scrotum*

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



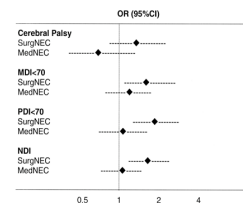
*Necrotizing Enterocolitis
Intestinal gangrene and perforation*

What is the outcome?

- ✓ Infants treated medically survival is > 95%
- ✓ Infants requiring surgery survival is 70-75%

What is the outcome?

- ✓ Surgical NEC (but not medical NEC) was an independent risk factor for the combined outcome of neuro-developmental impairment (blindness, deafness, PDI/MDI < 70 or CP)



Hintz SR & the NICHD network Pediatrics 115: 696, 2005

How Can NEC be Prevented?

- ✓ Breast feeding
- ✓ Antenatal steroids
- ✓ Cautious advancement of feedings (perhaps)
- ✓ Cohorting during epidemics
- ✓ Probiotics

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