

Title:	Necrotising Enterocolitis		
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Necrotising Enterocolitis (NEC) is the most common serious gastrointestinal disorder affecting very preterm or very low birth weight infants. The risk is inversely proportional to gestational age and weight at birth. Foetal growth restriction and vascular compromise may be additional specific risk factors.

Key Points:

- Preventive measures should always be part of care:
 - Early trophic feeding with human milk
 - Careful increment of feeds
 - Avoid prolonged use of early empirical antibiotics
- Early symptoms may be non-specific and there should be a low threshold to investigate for this condition.
- Sick infants may require urgent resuscitation, stabilisation with ventilatory and inotropic support, including need of fluids/blood products.
- Monitor haematological, biochemical, inflammatory markers; obtain blood cultures and start broad-spectrum antibiotics.
- Consider early discussion with surgical team and network center

Clinical findings of NEC (Modified Bell Classification):

(I) "Suspected" NEC:

- Temperature instability, apnoea, bradycardia, lethargy
- Gastric retention, abdominal distention, emesis, blood in stool
- Normal or intestinal dilation and mild ileus on abdominal radiograph

(II) "Definite" NEC:

As above plus

- Absent bowel sounds \pm abdominal tenderness \pm abdominal cellulitis or right lower quadrant mass
- Radiological evidence of intestinal dilation, ileus, or pneumatosis intestinalis \pm ascites

(III) "Advanced" NEC:

As above plus

- Hypotension, bradycardia, severe apnoea, respiratory and metabolic acidosis, coagulopathy, or neutropaenia
- Signs of peritonitis, marked tenderness, and abdominal distention \pm radiological evidence of intestinal perforation (pneumoperitoneum)

Risk factors

1. Prematurity
2. Intrauterine growth restriction
3. Absent or reversed end-diastolic flow on umbilical arterial Doppler antenatally
4. Perinatal asphyxia
5. Low systemic blood flow during neonatal period (including duct-dependent congenital heart disease)
6. Patent ductus arteriosus
7. Exchange transfusion
8. Formula milk
9. No antenatal corticosteroids
10. Infections with: klebsiella, enterobacter, anaerobes

Differential diagnoses

1. Sepsis with ileus
2. Bowel obstruction
3. Volvulus
4. Malrotation
5. Spontaneous intestinal perforation:
 - Associated with early postnatal corticosteroids or Indomethacin
 - Often seen at terminal ileum with normal bowel
 - Abdominal X-ray does not show evidence of pneumatosis intestinalis
6. Systemic candidiasis: clinical signs can mimic NEC with abdominal distension, metabolic disturbances, hypotension and thrombocytopenia

Investigations:

1. Abdominal X-ray:
 - Supine antero-posterior view
 - If perforation suspected but not clear on supine view, left lateral view
2. Blood tests:
 - FBC: anaemia, neutropenia and thrombocytopenia often present; early return to normal carries good prognosis
 - Blood film: evidence of haemolysis and toxic changes (e.g: spherocytosis, cell fragments, polychromatic cells)
 - C-reactive protein, but a normal value will not be helpful in initial phase
 - Urea and electrolytes
 - Blood gas: evidence of metabolic acidosis (base excess > -10)
 - Coagulation screen
 - Blood cultures

Immediate Treatment:

Always discuss management with senior neonatologist

In all stages:

1. Transfer baby to neonatal intensive care and nurse in incubator to avoid cross infection
2. If respiratory failure and worsening acidosis, intubate and ventilate
3. Nil-by-mouth
4. Gastric decompression
5. Free drainage with large nasogastric tube (size 8).
6. NEC often associated with significant third spacing of fluid into mesentery needing fluid resuscitation
7. Triple antibiotics: Benzylpenicillin, Gentamicin and Metronidazole.
8. IV fluids/TPN: total volume 150 mL/kg or less. Maintenance fluid restriction maybe required.
9. Long line when stable
10. Pain relief, consider morphine/diamorphine. Ensure adequate analgesia is given. Apply Pain scoring.
11. Take blood cultures, FBC, clotting profile and CRP

Stage II: Proven NEC (confirmed radiologically)

1. If breathing supported by nasal CPAP, elective intubation to minimize gastric distension.
2. Give IV fluid resuscitation 10mL/kg sodium chloride 0.9% for shock and repeat as necessary. Shock is most common cause of hypotension in babies with NEC. If >20ml/kg of sodium chloride 0.9% was administered, commence Dopamine at 10 microgram/kg/min.
3. If coagulation abnormal, give FFP 15ml/kg.
4. If thrombocytopenia and/or anaemia occur, transfuse with appropriate blood product.
5. Discuss with surgical team: may need transfer to surgical centre

Stage III: Advanced NEC (fulminant NEC with or without intestinal perforation):

- Treat as for stage 2 and refer to surgical team: may need laparotomy or resection of bowel in surgical centre.

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