

# NECROTIZING ENTEROCOLITIS (NEC)

## RECOGNITION AND ASSESSMENT

### Definition

NEC is characterised by the triad of abdominal distension, gastrointestinal bleeding and pneumatosis intestinalis (intramural gas)

### Modified Bell's criteria

#### **Stage 1 – Suspected NEC**

- Signs suggestive but not diagnostic
- Systemic signs:
  - temperature instability
  - apnoea
  - bradycardia
  - lethargy
- Intestinal signs:
  - elevated pre-gavage residuals
  - mild abdomen distension
  - emesis
  - haem-positive stools (exclude local pathology)
- Radiological signs:
  - normal or intestinal dilatation
  - mild ileus
- Intestinal signs:
  - bright red blood from rectum (exclude local pathology)

#### **Stage 2 – Definite NEC (mild to moderately ill)**

- Systemic signs: see **stage 1** ± mild metabolic acidosis, mild thrombocytopenia
- Intestinal signs: see **stage 1**, plus absent bowel sounds, ± abdominal tenderness, abdominal cellulitis or right lower quadrant mass
- Radiological signs: intestinal dilatation, ileus, pneumatosis intestinalis, portal vein gas, ± ascites

#### **Stage 3 – Advanced NEC (severely ill, bowel intact or perforated)**

- Systemic signs: see **stage 2** + hypotension, bradycardia, severe apnoea, combined respiratory and metabolic acidosis, DIC, neutropenia
- Intestinal signs: see **stage 2** + signs of generalised peritonitis, marked tenderness, distension of abdomen
- Radiological signs: see **stage 2** + definite ascites ± pneumoperitoneum

### Risk factors

- Prematurity
- Reverse umbilical flow antenatally
- Low systemic blood flow during neonatal period
- Formula milk
- No antenatal steroids
- Infections with – klebsiella, enterobacter, anaerobes
- H<sub>2</sub>-blocker (reduced gastric pH)

### Differential diagnosis

- Sepsis with ileus
- Bowel obstruction
- Volvulus
- Malrotation
- Spontaneous intestinal perforation:
  - associated with early postnatal corticosteroids or indometacin
  - often seen at the terminal ileum with normal bowel
  - abdominal XR does not show evidence of pneumatosis intestinalis

- Systemic candidiasis:
- clinical signs can mimic NEC with abdominal distension, metabolic disturbances, hypotension and thrombocytopenia

## INVESTIGATIONS

### Abdominal X-ray

- Supine AP
- + left lateral if concern about perforation

***Not all infants will have radiological findings associated with NEC***

### Bloods

- FBC – anaemia, neutropenia and thrombocytopenia often present; early return to normal carries good prognosis
- Blood film – evidence of haemolysis and toxic changes (e.g. spherocytes, cell fragments, polychromatic cells)
- CRP
- U&E
- Blood gas – evidence of acidosis (base excess <-10)
- Coagulation screen
- Blood cultures

## IMMEDIATE TREATMENT

***Always discuss management with senior neonatologist***

### Stage 1-Suspected NEC

- Transfer baby to neonatal intensive care and nurse in incubator to avoid cross infection
- Nil by mouth
- Gastric decompression
  - free drainage with large nasogastric tube (size 8) or continuous suction with 10 cm water
- IV fluids/TPN (without Intralipid in the acute stage) – total volume 150 mL/kg or less
- Long line when stable
- Pain relief – consider morphine/diamorphine infusion (see **Pain and Stress** guideline)

### Stage 2-Proven NEC (confirmed radiologically)

- As for Stage 1
- Antibiotics:
  - penicillin/ampicillin + gentamicin + metronidazole
  - cefotaxime and vancomycin not routinely necessary: discuss with senior neonatologist
- If coagulation abnormal, give FFP
- If thrombocytopenia and/or anaemia occur, transfuse – see **Thrombocytopenia** guideline
- If hypotension occurs, see **Hypotension** guideline
- Discuss with surgical team – may need transfer to surgical centre

### Stage 3-Advanced NEC (intestinal perforation or fulminant NEC)

- Refer to surgical team – may need laparotomy or resection of bowel in surgical centre

## SUBSEQUENT MANAGEMENT

### In recovery phase

- If baby fully recovered at 48 hr and NEC no longer suspected, restart feeds
- In Stage 1, if no progression after 3-5 days, consider restarting feeds slowly (see **Nutrition** guideline)
- In Stage 2, if abdominal examination normal after 10 days, consider restarting feeds
  - some may need longer period of total gut rest
- In Stage 3, discuss with surgeon and dietitian before restarting feeds

### Late complications

- Recurrence (in about 10%)

- Strictures (in about 10% non-surgical cases)
- Short bowel syndrome and problems related to gut resection

## **MONITORING TREATMENT**

- Observe general condition closely and review at least 12 hrly
- Daily
  - acid-base
  - fluid balance
  - electrolytes (twice daily if condition unstable)
  - FBC and coagulation
- Repeat X-ray daily until baby becomes clinically stable. Discuss with consultant

## **LONG-TERM MANAGEMENT**

- Advise parents about signs of bowel obstruction
- Medical ± surgical follow-up after discharge
- Contrast studies if clinically indicated for stenosis
- Appropriate developmental follow-up