

Necrotizing Enterocolitis

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16 Oct 2020

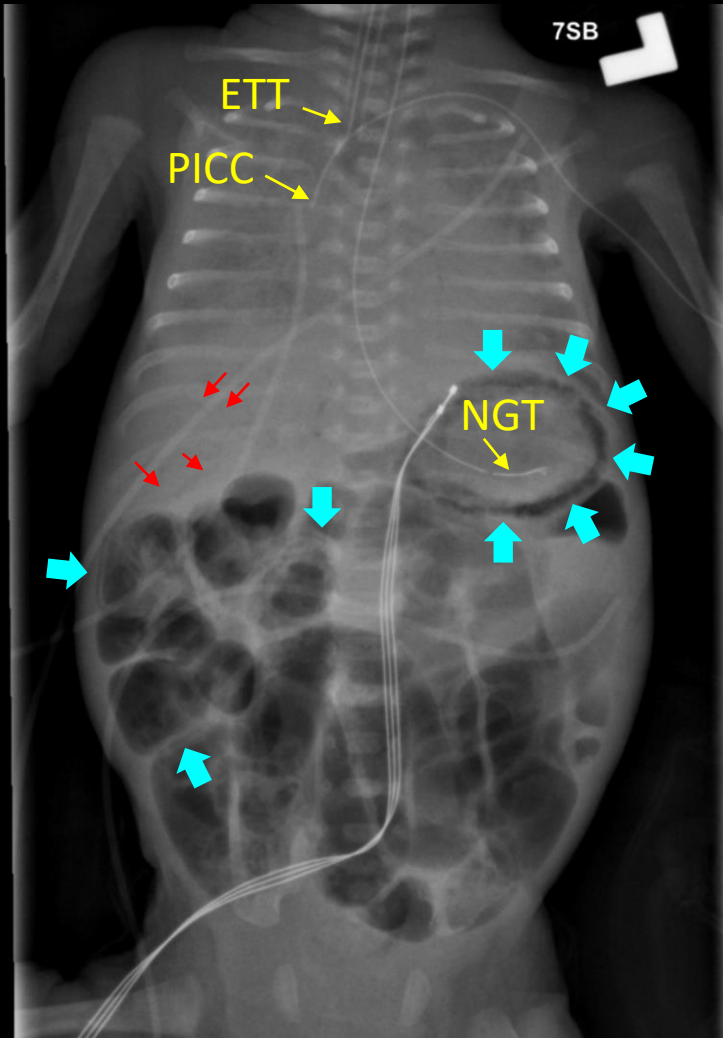
Diagnostic Radiology – RAD 4001

Susan John, MD



Clinical History

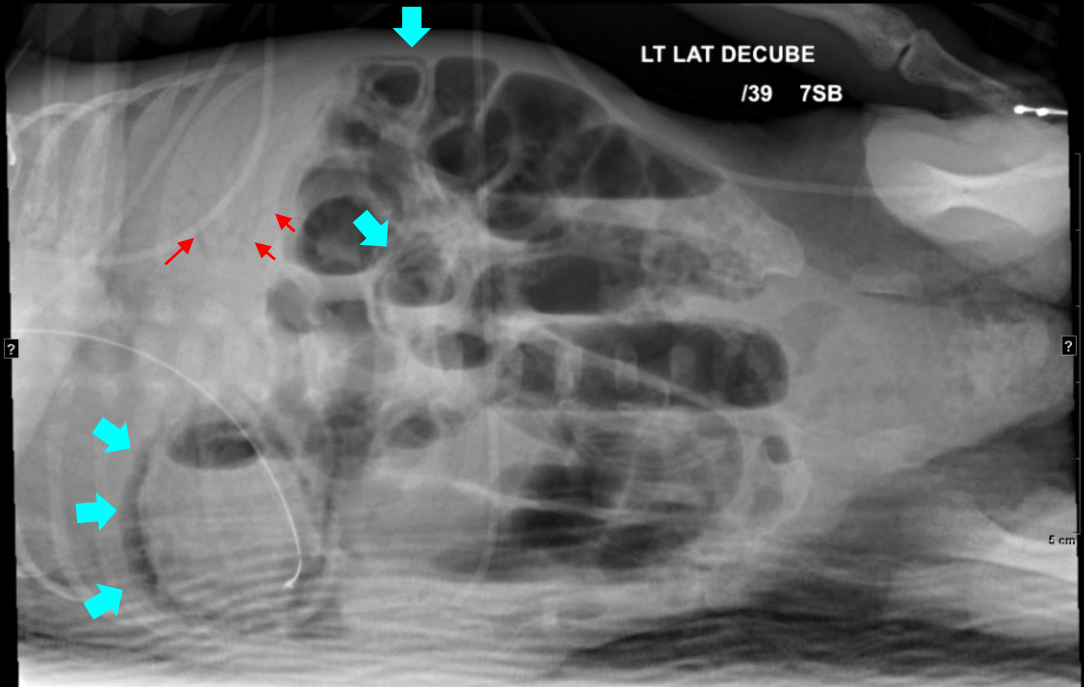
- 11-day-old preterm male delivered at 25 weeks due to maternal preeclampsia w/ severe features, BW @ 770 g
- H/o PDA and lung disease of prematurity, intubated @ 14h of life; received TPN & expressed breast milk
- Overnight 9/23-9/24, increased gastrointestinal residuals resulting in held feeding.
- Vitals T_{\max} 98.2F, BP 58-62 mmHg/28-38 mmHg, MAP 37-43 mmHg, HR 149-170 bpm, SpO2 87-95%
- BMP – K 7.1C, BUN 40; ABG 7.01C/>97C/34C/26; Coag – PT 16.9H, Fibrinogen 244L, aPTT 42.3L



Chest/ABD 1 view, AP supine
9/24/2020 @ 0821



Chest/ABD 1 view, AP supine
9/24/2020 @ 0355



Chest/ABD 1 view, AP LLD
9/24/2020 @ 0835



Chest/ABD 1 view, AP supine
9/24/2020 @ 0355

Summary of Findings

- LTDs: ETT 1 cm above carina, NGT tip in proximal stomach, LUE PICC line tip in SVC-RA junction
- Lungs/Pleura: increased diffused hazy opacification bilaterally w/o pneumothorax or pleural effusion
- Heart/mediastinum: Normal heart size, pulm vasc not clearly visible
- Abdomen:
 - Gas distention, mildly dilated loops of bowel throughout abdomen
 - Air within intestinal wall & stomach vs. chest/abd 1 view from 0355
 - Portal venous gas (especially in LLD film)
 - No pneumoperitoneum

Differential Diagnosis

- **Necrotizing enterocolitis (NEC) – pneumatosis intestinalis on X-ray**
 - Occurs in preterm neonates; clinical signs of ab distention & gastric residuals
- Spontaneous intestinal perforation of newborn – single intestinal perforation, typically @ terminal ileum or colon
 - Occurs in ELBW infants, similar to NEC
 - No pneumatosis intestinalis on imaging; clinical findings of hypotension, ab distention, bluish discoloration of abdominal wall
- Infectious enteritis due to nosocomial viral infection
 - E.g., rotavirus
 - Can cause gastric residuals, abdominal distention, intestinal dilation

Necrotizing Enterocolitis

- Pathophysiology
 - Ischemic necrosis of intestinal mucosa
 - Assoc. w/ transmural inflammation, enteric gas-forming organism invasion, dissection of gas into portal venous system & muscularis
 - Occurs primarily in preterm infants; pathogenesis remains unknown
 - Multifactorial process: susceptibility inversely related to GA, select risk factors & triggers, host inflammatory response (TLR of innate immune system)
- Diagnosis
 - Clinical findings (e.g., abdominal distention)
 - Imaging: abdominal radiography → pneumatosis intestinalis

Treatment

- Supportive care: NPO, NG suction, TPN, parenteral fluids, CV/respiratory support
- Antibiotic therapy: broad-spectrum antibiotics after obtaining cultures
- Serial abdominal imaging q8-12h
- Surgery: indicated w/ pneumoperitoneum or persistent clinical deterioration

Mortality

- 11% percent for term infants w/ NEC & BWs >2500 g
 - Rate attributed to risk factors (e.g., congenital anomalies, chromosomal abnormalities, sepsis)
- Preterm infants: mortality inversely related to gestational age, also increases for pts undergoing surgical intervention
 - Extremely preterm infants who undergo surgery → **59% mortality rate**
 - Other factors: mechanical ventilation, treatment w/ vasopressors
 - Fulminant disease factors: portal venous air, anemia, rapid feeding escalation, high banded to total neutrophil ratio, low lymphocyte count

Aftermath

- Ped surg consulted at 0845 → taken to OR @ 1050 for emergent ex-lap w/ silo tube placement
- Findings of black, necrotic stomach w/ bowel ischemia/necrosis throughout colon
- Persistent clinical deterioration → pt was extubated per family's request, died 9/24 @ 1845

Take Home Points / Teaching points

- Abdominal radiography → imaging modality of choice
- Key finding of pneumatosis intestinalis +/- pneumoperitoneum & portal venous air
- Risk & mortality inversely related to GA; worse outcomes w/ surgery

References

- Kim, JH. Neonatal necrotizing enterocolitis: Pathology and pathogenesis. In: UpToDate, Post, TW (Ed), UpToDate, Waltham, MA, 2020.
- Kim, JH. Neonatal necrotizing enterocolitis: Clinical features and diagnosis. In: UpToDate, Post, TW (Ed), UpToDate, Waltham, MA, 2020.
- Kim, JH. Neonatal necrotizing enterocolitis: Management. In: UpToDate, Post, TW (Ed), UpToDate, Waltham, MA, 2020.



Questions?