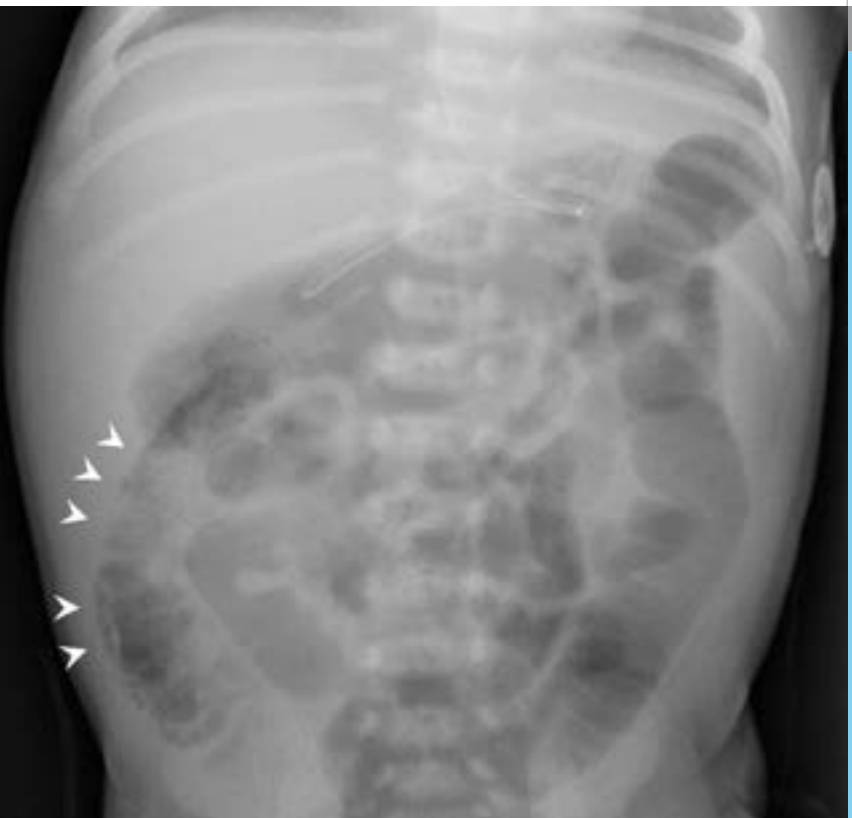
SWISS SOCIETY OF NEONATOLOGY

Neonatal pneumatosis coli – a mild form of classical necrotizing enterocolitis?



August 2008

Steurer M, Stocker M, Caduff JH, Neonatal and Pediatric Intensive Care Unit (SM, SM), Pediatric Radiology (CJH), Children's Hospital of Lucerne, Switzerland

This male infant was born to a 31-year-old G1/P1 at 33 3/7 weeks of gestation following PROM by an uncomplicated vaginal delivery at another hospital. His birth weight was 2670 g (P 90). The postnatal course was complicated by a respiratory distress syndrome with a pneumothorax requiring drainage and mechanical ventilation for two days. An umbilical arterial catheter was in place from day 2 to 4 of his life and dopamine was given for 2 days. Initially, he was fed with formula milk, changing to breast milk on the 6th day of his life. On day 13, the infant was drowsy and nursing less. He passed bloody stools twice but was otherwise in good general condition. He was transferred to our institution for further evaluation. There were no pathological findings on clinical examination apart from a slightly distended abdomen.

Laboratory parameters including C-reactive protein, procalcitonin and differential blood count were normal. The abdominal X-ray revealed intestinal pneumatosis localized in the ascending colon (Fig. 1) which was confirmed by an ultrasonography. Enteral feeding was reduced immediately to a trophic amount of breast milk and antibiotic therapy with amoxicillin and meropenem was started. Serial laboratory inflammation parameters over the next 36 hours remained normal and the abdominal X-ray five days later showed no more evidence of intramural air. Enteral feeding was slowly reassumed only one day after the beginning of the episode (day 14) and advanced to full feeds seven days later (day 21). Antibiotics were stopped after seven

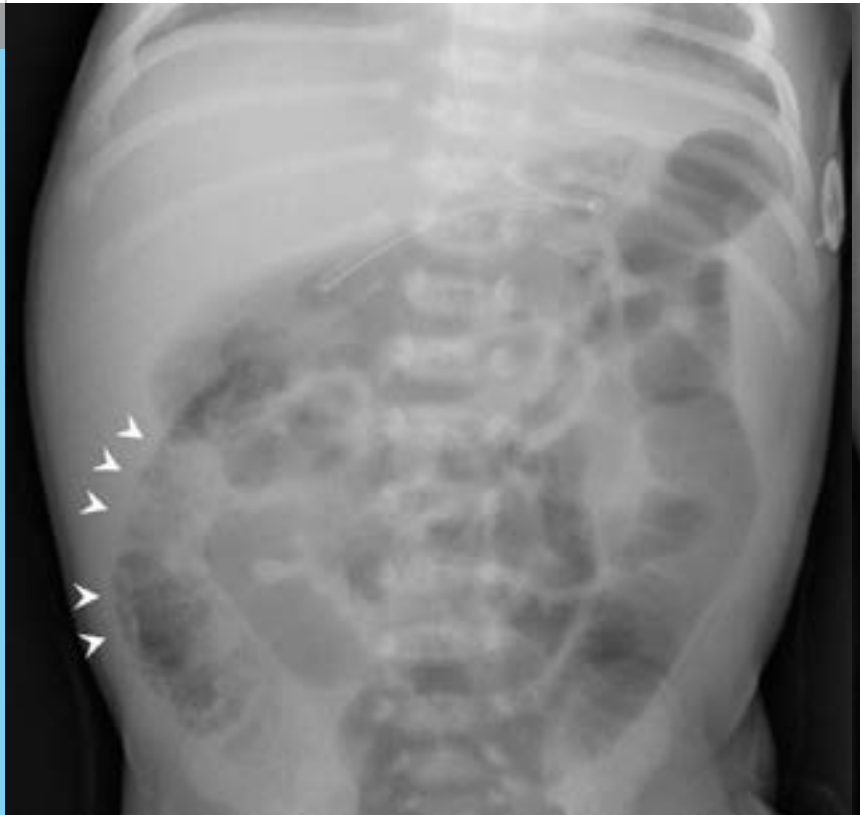
days. The child was discharged at a gestational age of 37 1/7 weeks (day 26).

CASE II

This male twin was born to a 33-year-old G1/P1+2 at 28 0/7 weeks of gestation by C-section due to intractable contractions. His birth weight was 1020 g (P 10). An umbilical arterial catheter was in place from day 1 to day 6 and he required cardiovascular support with dobutamine and norepinephrine on day 1 and dopamine

Case I: pneumatosis of the ascending colon (arrow heads).

Fig. 1



from day 1 to 4. On day 52, the infant developed temperature instability. Some hours later, he passed bloody stools several times while being in good general condition and having a normal abdominal examination. At this time, the child was nursed with the full amount (160 ml/kg/d) of fortified breast milk. The abdominal X-ray was suggestive for intramural air localized in the descending colon, sigmoid and the rectum (Fig. 2). Abdominal ultrasonography showed intrahepatic air proving intestinal pneumatosis. Serial C-reactive pro-

Case II: pneumatosis of the descending colon (arrow heads), sigmoid colon and rectum.

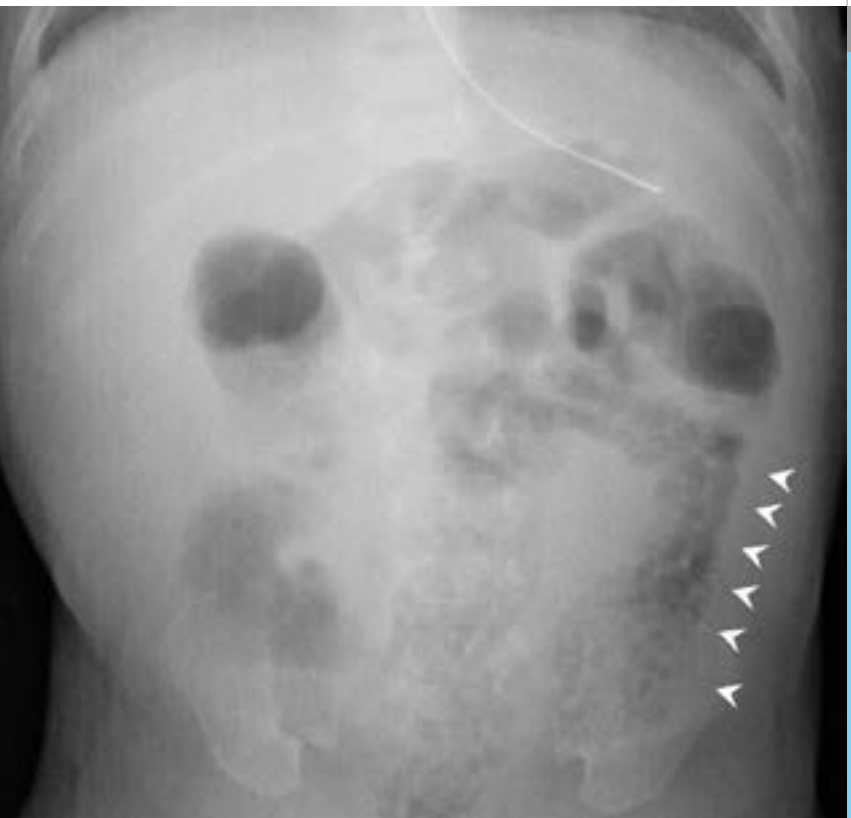


Fig. 2

tein measurements and complete blood counts over the next 36 hours remained normal. The stool culture was negative for adeno- and rotavirus, as well as for bacterial pathogens. No Clostridium difficile toxin could be detected. Eosinophilic granulocytes indicating an allergic manifestation were not elevated in the blood and not found in the stool. Gavage feeding was immediately stopped and only a trophic amount was given by mouth. Antibiotic therapy with amoxicillin and meropenem was started for seven days. The abdominal X-ray five days later (day 57) was normal. Enteral feeding was resumed only two days after the beginning of the episode (day 54) and he was receiving the full amount by mouth one week later (day 61).

A second episode of bloody stools occurred when the neonate was 72 days old (almost 3 weeks after the beginning of the first episode) with identical clinical presentation. Radiologically pneumatosis was shown in the ascending colon. The same antimicrobial therapy was initiated for 10 days. The further course of the infant was unremarkable and no further episodes occurred. He was discharged home at a gestational age of 41 3/7 weeks.

CASE III

This female infant was born to a 22-year-old G1/P1 by C-section at a gestational age of 29 3/7 weeks because of preeclampsia. Her birth weight was 1120 g (P 25). No umbilical arterial catheter or vasopressor support was required and the initial postnatal course was unre-

markable. After day 13, she was fed enterally with the full amount (160 ml/kg/d) of fortified breast milk. On day 14, the infant developed temperature instability and one day later passed bloody stools several times. She remained in very good general condition and the clinical abdominal examination was without pathologic findings. The abdominal X-ray was suggestive for intramural air in the left colonic flexure and the distal descending colon (Fig. 3). Ultrasonography two days later was normal without evidence for intramural or intrahepatic air. Inflammatory laboratory parameters remained

Case III: pneumatosis in the area of the left colonic flexure (arrow heads) and possibly the distal descending colon.

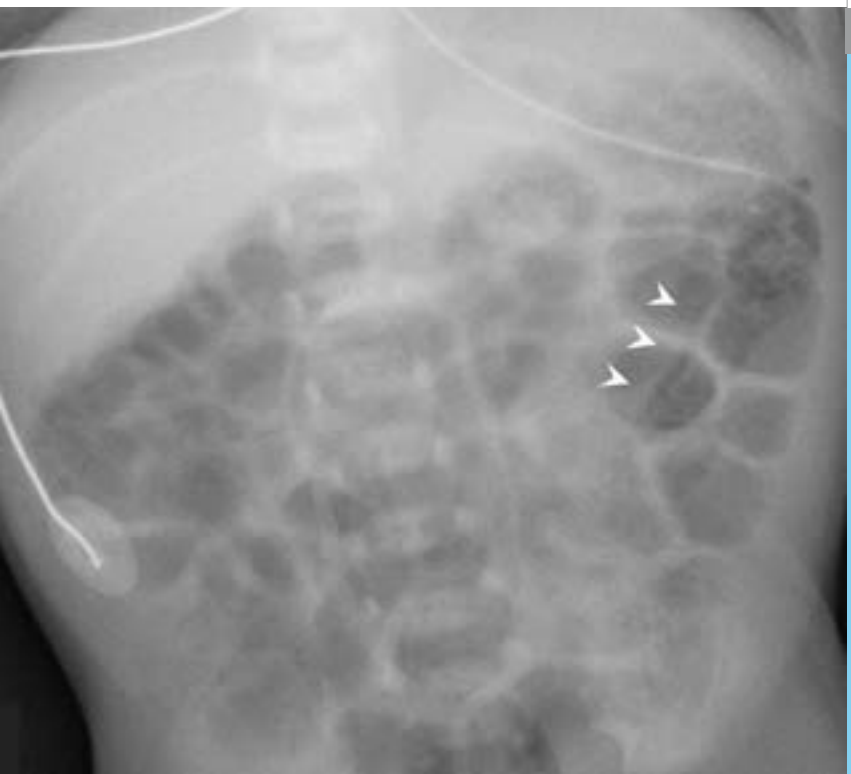


Fig. 3

normal over 36 hours. Stool cultures were negative and no Clostridium difficile toxin could be detected. Gavage feeding was reduced to a trophic amount and antibiotic therapy with amoxicillin and meropenem was given for 10 days. The abdominal X-ray 5 days later (day 19) was normal, and enteral feedings were reassumed, reaching full amounts after six days (day 25). The child was discharged at a gestational age of 37 6/7 weeks.

DISCUSSION

The presence of intestinal pneumatosis in a premature infant is indicative for necrotizing enterocolitis (NEC) stage two or higher according to the staging system of Bell (1,2). In general, these infants have systemic signs such as lethargy, apnea and temperature instability combined with intestinal signs such as elevated pregavage residuals, abdominal distension and diminished or even absent bowel sounds. The majority of these signs were absent in all of our cases. In the literature, a rare subtype of neonatal NEC called pneumatosis coli has been described (3, 4). Characteristically, these patients have bloody stools but other intestinal or systemic signs are mild or even absent as it was the case in our three patients. Radiographs reveal pneumatosis limited to the colon without small bowel involvement. This entity is recognized as a benign form of NEC carrying a favourable prognosis (3-5). There is evidence that the location of pneumatosis within the intestine is of great importance. In rotavirus-associated NEC radiographs typically show a less severe and more distal colon involvement than in classical NEC (6).

The pathophysiology of necrotising enterocolitis and pneumatosis coli is multifactorial and remains poorly understood. The colon lies in the watershed area between the superior and inferior mesenteric artery branches rendering it susceptible to ischemic injuries. This could to some extent explain the local occurrence of isolated pneumatosis coli without small bowel involvement (4, 6).
To distinguish classical NEC from isolated pneumatosis coli, serial CRP measurements over 36 hours may be helpful. CRP becomes elevated in both stage II and III NEC. In contrast, normal CRP values are associated with a benign clinical course (7). With regards to therapy, shorter courses of antibiotics and an early resumption of feedings have both been recommended in the literature without giving precise details. Our patients received at least seven days of antibiotics and enteral feedings were restarted early after two to four days of minimal enteral nutrition (trophic feeds).

Anal fissures are often responsible for blood-stained stools in neonates. Interestingly, Bowen (8) has described three patients in whom heme-positive stools were initially attributed to anal fissures, delaying diagnosis and treatment of mild NEC. If the anal fissures were causally related to NEC (as portals of entry for bacteria), a consequence (manifestation of colitis) or a coincidence remains speculative. Another rare cause of lower gastrointestinal bleeding in an otherwise well neonate is allergic colitis which may occur even

before the first enteral feeding suggesting intrauterine sensitization. For its diagnosis, gross eosinophilia in the blood and eosinophils in the stools are required (9,10).

REFERENCES

1. Bell MJ, Ternberg JL, Feigin RD, Keating JP, Marshall R, Barton L, Brotherton T. Neonatal necrotizing enterocolitis: Therapeutic decision based upon clinical staging. Ann Surg 1978;187:1-7

2. Lin PW, Stoll BJ. Necrotising enterocolitis. Lancet 2006; 368: 1271-1283

3. Leonidas JC, Hall RT. Neonatal pneumatosis coli: a mild form of neonatal necrotizing enterocolitis. J Pediatr 1976;89:456-459

4. Hoehn T, Stöver B, Bührer C. Colonic pneumatosis intestinalis in preterm infants: different to necrotising enterocolitis with a more benign course? Eur J Pediatr 2001;160:369-371

5. Travadi JN, Patole SK, Gardiner K. Pneumatosis coli, a benign form of necrotising enterocolitis. Indian Pediatr 2003;404: 349-351

6. Keller KM, Schmidt H, Wirth S, Queisser-Luft A, Schumacher R. Differences in the clinical and radiologic patterns of rotavirus and non-rotavirus necrotizing enterocolitis. Pediatr Infect Dis J 1991;10:734-738

7. Pourcyrous M, Korones SB, Yang W, Boulden TF, Bada HS. C-Reactive Protein in the Diagnosis, management and Prognosis of Neonatal Necrotizing Enterocolitis. Pediatrics 2005;116:1064-1069

8. Bowen A. Mild form of neonatal necrotizing enterocolitis masked by anal fissures. Radiology 1980;137:657-659

9. Faber MR, Rieu P, Semmekrot BA, Van Krieken JH, Tolboom JJ, Draaisma JM. Allergic colitis presenting within the first hours of premature life. Acta Paediatr 2005;94:1514-1515

10. Ohtsuka Y, Shimizu T, Shoji H, Kudo T, Fujii T, Wada M et al. Neonatal transient eoisinophilic colitis causes lower gastrointestinal bleeding in early infancy. J Pediatr Gastroenterol Nutr 2007;44:501-505

concept & design by mesch.ch

SUPPORTED BY

NYCOMED

CONTACT

Swiss Society of Neonatology
www.neonet.ch
webmaster@neonet.ch