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Beyond necrotizing enterocolitis and focal intestinal perforation: unusual gastrointestinal complications in preterm infants



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Necrotizing enterocolitis (NEC) and focal intestinal perforation (FIP) are two well-known gastrointestinal complications in preterm infants (1-4). While the precise pathogenesis of NEC remains a subject of debate (1), there appears to be a strong association between FIP and intrauterine growth restriction and exposure to postnatal steroids and indomethacine (particularly when used in combination) (2-4).

We present three preterm infants with gastrointestinal complications requiring surgical interventions. Preoperative imaging studies, particularly ultrasound examinations, allowed us to suspect diagnoses other than NEC and FIP.

This male infant was born at 26 3/7 weeks and a birth weight of 860 g by Cesarean section after failed tocolysis to a 28-year-old G1/P1. He was intubated in the delivery room and received surfactant at 15 minutes of life. In the NICU, he was put on conventional mechanical ventilation. On the first three days of life, his cardiovascular support included dopamine, norepine-phrine and hydrocortisone. After 4 days, he was extubated to nasal CPAP. On the 36th day of life, he was reintubated because of recurrent apnea spells requiring vigorous stimulation, abdominal distension, leucopenia and an increasing C-reactive protein. Broad-spectrum antibiotics were started. On plain X-ray, there were distended loops of bowel, possible pneumatosis

INTRODUCTION

CASE REPORT 1

intestinalis in the right upper abdominal quadrant but no free air (Fig. 1). Ultrasound examination with color Doppler demonstrated a corkscrew pattern of mesenteric blood vessels (Fig. 2). At surgery, volvulus of the terminal ileum was confirmed (Fig. 3). The ischemic segment (25 cm) was resected, sparing the ileocecal valve, and temporary ileostomies were created. The infant's recovery, including reanastomosis, were uneventful, and he was discharged home at a corrected age of 39 weeks on full enteral feeds.



Fig. 1

Case report 1: Babygram revealing distended loops of bowel and possible intestinal pneumatosis in the right upper abdominal quadrant, raising the suspicion of NEC.



echogenic mass (B).



Case report 1: Intraoperative finding: ischemic bowel can easily be recognized.

Fig. 3

CASE REPORT 2

This male infant was born at 23 2/7 weeks of gestation and a birth weight of 550 g by spontaneous vaginal delivery at an outside institution. Prior to delivery, the prognosis of this infant was felt to be very poor and primary non-intervention was agreed upon. At 2 hours of life, the infant was breathing spontaneously and was pink in room air. At this point, our neonatal transport team was called, and the baby was intubated and brought to our NICU. Neonatal enterococcal sepsis was treated with amoxicillin and gentamycin. On the 8th day of life, thrombocytopenia and an increasing left shift of the neutrophils were noted. Antibiotics were changed to vancomycin and meropenem. The following day, a distended abdomen and bilious gastric residuals were noted (Fig. 4 A). Plain abdominal X-rays revealed a suspicious intestinal gas pattern and, on a lateral view, free air (Fig. 4 B, C). Findings on preoperative abdominal ultrasound examination were compatible with intussusception (Fig. 5) which was confirmed at surgery (Fig. 6). Whether small bowel necrosis was secondary to invagination or the primary pathology that led to intussusception could not be clarified. The patient recovered following resection, ileostomies and later reanastomosis. He was discharged home fully breastfed at a corrected age of 42 weeks



Fig. 4

Case report 2: Day 9 of life: distended abdomen (A), gasless region in the right hemiabdomen without clear evidence of pneumoperitoneum (B), demonstration of free air on a lateral abdominal view (C).



Case report 2: Abdominal ultrasound examination revealing intussusception (A: transverse view, B: longitudinal view).



Case report 2: Intraoperative views: intussusception is confirmed (A) and, following reduction, a necrotic

Fig. 6

section of small bowel is detected (B)

CASE REPORT 3

This female infant was born by Cesarean section after failed tocolysis to a 32-year-old G2/P1 at 29 1/7 weeks of gestation and a birth weight of 1220 g. The infant adapted well and was supported with nasal CPAP for 4 days because of mild hyaline membrane disease. At one week of age, increasing apnea and bradycardia spells were noted. Nosocomial sepsis was suspected and antibiotic treatment with ceftriaxone and vancomycin was started. Clinically, the abdomen was nondistended and soft, but a small resistance was persistently felt in the right lower quadrant. On day 9 of life, conventional X-ray examinations were unrevealing (Fig. 7), however, on ultrasound, a suspicious area of bowel was recognized and thought to possibly reflect an invaginated Meckel's diverticulum. At laparotomy, there was an acutely inflamed appendix vermiformis with a small perforation (Fig. 8). Appendectomy was performed and recovery was uneventful. The infant was discharged home fully breastfed at a corrected age of 37 weeks.



Fig. 7

Case report 3: Imaging studies on day 9 of life: A) babygram without distinct pathology and no free air; B) ultrasound examination demonstrating a suspicious area of bowel (target sign).



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Fig. 8

Case report 3: Intraoperative finding: acute appendicitis with a small perforation.

This case series illustrates three major points. First, the differential diagnosis of gastrointestinal complications in preterm infants extends beyond NEC and FIP. While these two entities are typical in preterm infants, other diagnoses that usually occur in older infants and children must be considered.

Second, preoperative ultrasound examination of the abdomen by a skilled pediatric radiologist can be very helpful and useful to plan the surgical procedure. In NEC, ultrasound is very sensitive to detect intestinal pneumatosis with intramural air and portal venous gas (5, 6). Absence of such findings in the presence of pneumoperitoneum in an otherwise uncompromised preterm infant is highly suggestive of FIP. In our patients, preoperative ultrasound examinations correctly identified volvulus (patient 1) and intussusception (patient 2), whereas acute appendicitis was misdiagnosed as an invaginated Meckel's diverticulum (patient 3).

Third, in contrast to surgical NEC, the prognoses of FIP (not shown here), volvulus, intussusception, and acute perforated appendicitis can be favorable in preterm infants, provided that diagnoses are made promptly and surgery is performed without delay (7, 8).

DISCUSSION

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