

Typical Radiographic Findings in a Critical Case of Acute Necrotizing Enterocolitis in a Neonate

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Abstract

Case Report

Necrotizing enterocolitis (NEC) is a major contributor to illness and death in newborns. Despite many years of research, there has been little progress in mitigating the effects of this condition. The only consistently identified risk factor for NEC is prematurity, and clinical indicators have not been able to reliably predict which infants are susceptible to the disease. Therefore, it is critical to incorporate specific radiographic findings, known as pathognomonic, to avert severe complications that can result in fatality. This case report sheds light on the typical radiographic characteristics of NEC that must be recognized to facilitate early detection and prevent critical complications.

Keywords: Necrotizing enterocolitis - pneumatosis intestinalis - pneumoperitoneum -football sign.

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INTRODUCTION

Necrotizing enterocolitis (NEC) is a prevalent gastrointestinal disorder among premature neonates, characterized by inflammation, ischemia, and increased permeability of the neonatal intestinal wall to bacterial penetration. This condition poses a significant threat to neonatal survival and can result in substantial morbidity. Diagnosis is typically straightforward and can be established through a combination of clinical evaluation, laboratory analysis, and radiological imaging [1, 2].

CASE REPORT

A neonate, who was 2 days old, was admitted to the neonatal intensive care unit, from a 38-year-old mother with a non-consanguineous marriage. The neonate was delivered via cesarean section due to suspected fetal distress. The neonate received an APGAR score of 10/10, had immediate crying, a cephalic presentation, meconium-stained amniotic fluid, and a negative infectious history. On day 2, the neonate was hospitalized for non-cholestatic neonatal jaundice with no other associated symptoms. The total bilirubin level was 249.01 $\mu\text{mol/l}$ with a predominant indirect level of 245.49 $\mu\text{mol/l}$. The physical examination showed a jaundiced, responsive neonate with spontaneous gesturing, normal heart rate at 126 bpm,

eupneic breathing at 42 cpm, apyretic temperature of 37.3 C°, TRC <3 sec, and SaO₂ of 97%. The abdomen was soft without hepatosplenomegaly or masses, normal-colored stools and urine, and no other abnormalities, including no subcutaneous blood collection or cephalhematoma.

In the following two days the neonate developed bilious vomiting with abdominal distension and cessation of feces and gas, along with a fever of 38.5 C°, and a highly positive nosocomial infection screening. An abdominal supine X-ray was ordered and revealed dilated bowel loops with asymmetrical distribution, loss of normal polygonal gas shape, and pneumatosis intestinalis Figure 1. A diagnosis of stage II necrotizing enterocolitis was made and the neonate was treated medically. Two days later, the neonate had five hours of uncontrollable bilious vomiting, persistent abdominal distension and jaundice, an abdominal ultrasound was performed and showed a small amount of peritoneal fluid, and a repeat abdominal supine X-ray revealed a massive pneumoperitoneum with the appearance of the "football sign" Figure 2. A complementary decubitus dorsal view confirmed the presence of a voluminous pneumoperitoneum Figure 3. A surgical exploration was indicated and revealed a colon suffering over its entire length with multiple colic perforations.

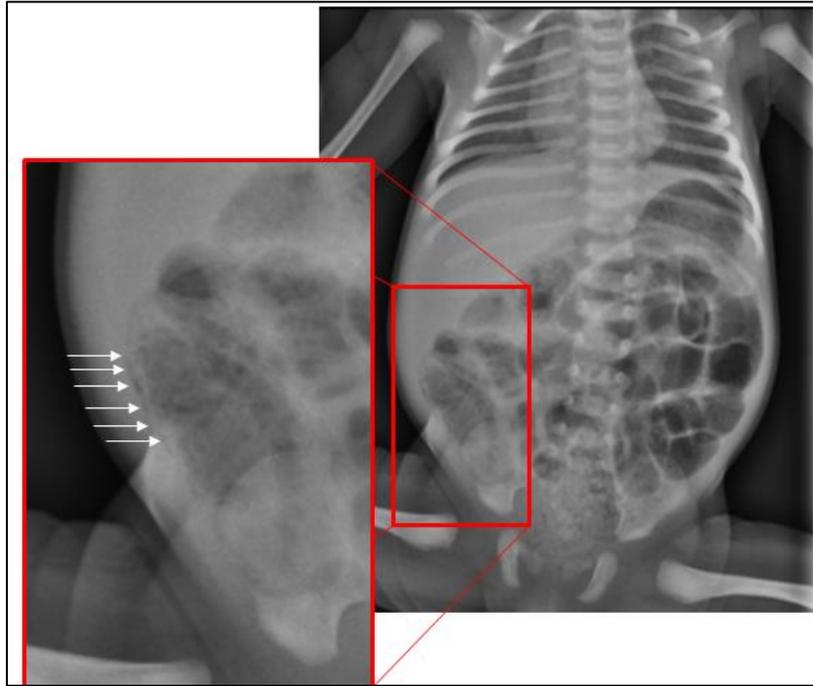


Figure 1: An abdominal supine X-ray revealed a dilated bowel loops with asymmetrical distribution, loss of normal polygonal gas shape, and pneumatosis intestinalis (Arrows)



Figure 2: Abdominal supine X-ray showing a massive pneumoperitoneum with the appearance of the "football sign"

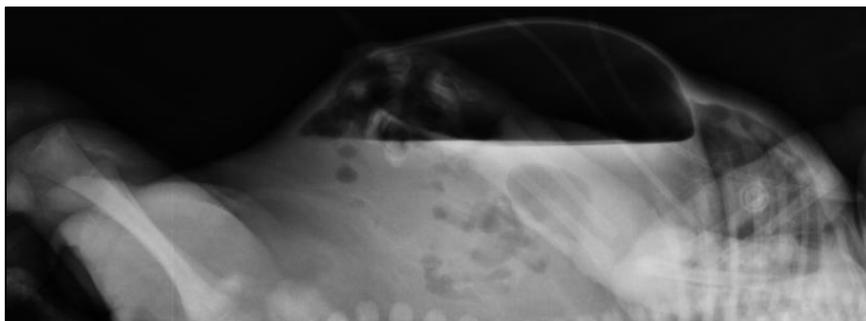


Figure 3: A complementary decubitus dorsal view confirmed the presence of the voluminous pneumoperitoneum

DISCUSSION

Necrotizing enterocolitis (NEC) is a serious gastrointestinal condition that affects premature neonates and is characterized by inflammation, ischemia, and permeability of the neonatal bowel wall to bacteria [3]. This condition is most commonly seen in premature neonates, with 90% of cases developing within the first 10 days of life and with an incidence of approximately 1 in 1000 births. However, the incidence can be as high as 20% in low birth weight infants weighing less than 1500 grams [4]. The risk factors for NEC include prematurity (50-80%), congenital heart disease, perinatal asphyxia, and decreased umbilical flow in utero [5]. The clinical presentation of NEC typically includes poor feeding, bile-stained vomitus, abdominal distension, blood-stained stools, explosive diarrhea, respiratory distress with acidosis, and sepsis [6].

The exact cause of NEC is still unknown, however, a combination of ischemic and infective etiology along with immature immunity and translocation of intestinal flora through the immature mucosa have been proposed as contributing factors. NEC typically starts with inflammation of the mucosal surface and progresses to hemorrhagic and coagulative necrosis, leading to loss of mucosal integrity, transmural necrosis, and perforation. The terminal ileum is the most commonly affected part of the large or small bowel, but the right colon and stomach may also be involved [6].

Plain abdominal radiography is the standard currently used imaging modality for the evaluation of necrotizing enterocolitis; diagnosis of NEC is primarily done through supine abdominal x-rays, and in cases where perforation is suspected, cross-table lateral or left-lateral decubitus view may be used for increased sensitivity. Findings on x-rays include dilated bowel loops, loss of the normal polygonal gas shape, bowel wall edema with thumbprinting, pneumatosis intestinalis, portal venous gas, and pneumoperitoneum, which indicates severe disease [7, 8]. Ultrasound may also be used to show bowel wall thickening, alteration of the vascular state, hypervascular and hypovascular, intramural gas, and free fluid with echogenic debris, suggesting perforation.

NEC can be managed both medically and surgically, with medical management consisting of supportive measures, cessation of oral feeding, broad-spectrum antibiotics, and gastric aspiration. Surgery is typically reserved for patients with evidence of perforation and entails resection of clearly necrotic bowel and the creation of a proximal enterostomy [9]. Despite therapy, mortality remains significant with rates ranging between 9% and 28%, and approximately 20% of surviving patients go on to develop stricture, which is more common in the large bowel and can result in

bowel obstruction weeks to months later. The prevention of necrotizing enterocolitis (NEC) has the potential to yield the most significant impact in reducing unfavorable outcomes. While numerous theories exist regarding preventive measures for this condition in vulnerable neonates, the strategies with the strongest evidential support for their efficacy are the promotion of human breast milk feeding, cautious advancement of feeding, and prophylactic administration of probiotics to patients at risk [10].

In the correct clinical scenario, it is important to keep in mind other conditions such as pneumatosis coli, neonatal appendicitis, meconium ileus, Hirschsprung disease, and infectious enterocolitis [11].

CONCLUSION

Necrotizing enterocolitis (NEC) is a significant contributor to neonatal mortality in intensive care units, and despite advancements in neonatal care, such as advanced medical and surgical interventions, the incidence of NEC has increased in recent years. Early detection of NEC is critical in order to avoid severe complications, and imaging has an essential role to play in achieving this goal. Thus, effective preventive strategies hold significant potential for reducing the morbidity and mortality associated with NEC.

Disclosure of Interest: The authors declare that they have no conflicts of interest concerning this article.

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