

Case report

Advanced necrotizing enterocolitis with tension pneumoperitoneum in a full-term Nigerian neonate: A case report

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Abstract

Background: Necrotizing enterocolitis (NEC) is a life threatening condition in the newborn period, predominantly found in very low birth weight preterm neonates. Tension pneumoperitoneum usually occurs following trauma, surgery and invasive procedures. Its occurrence in the setting of NEC is rare. We present a term neonate who had advanced NEC with tension pneumoperitoneum

Case summary: A six day old male term neonate who presented with abdominal distension and respiratory distress, there was background perinatal asphyxia. Examination revealed grossly distended, tense, tympanitic abdomen. Abdominal radiograph showed large hyperlucency in the right hemi-abdomen outlining the liver and displacing bowel loops and the liver to the contra lateral side. There were also well delineated inner and outer bowel loop walls (Rigler's sign), in keeping with massive pneumoperitoneum. Exploratory laparotomy revealed a gush of air and perforation at the transverse colon which was repaired. He thereafter developed wound dehiscence which required secondary closure. He deteriorated post-operatively, and succumbed to overwhelming sepsis and disseminated intravascular coagulation.

Conclusion: Prevention and early identification of NEC remain critical to reducing the mortality. Tension pneumoperitoneum complicating NEC in a term infant is an unusual complication portending poor prognosis.

Introduction:

Necrotizing enterocolitis (NEC) is the most common life-threatening emergency of the gastrointestinal tract in the newborn period.¹ It is predominantly a disease of very low birth weight preterm neonates and has remained a common indication for surgical intervention, in spite of recent advances in neonatal care.^{1,2} Tension pneumoperitoneum usually occurs follows gastrointestinal perforation from trauma, surgery, invasive procedures and ventilation.³ It is a surgical emergency with a high mortality rate. Its occurrence in the setting of NEC is rare. We present a term neonate who had advanced NEC with tension pneumoperitoneum

Case Summary:

I.B a 6 day old male neonate referred from a peripheral centre with complaints of failure to cry at birth and abdominal distension noticed on the fourth day of life.

He was delivered at term via emergency caesarean section on account of obstructed labour. Following delivery, he was resuscitated for about four hours, before he achieved spontaneous respiration; the APGAR scores were however not stated. He was nursed with the mother and fed with dextrose water till the third day of life when mother established lactation. He developed abdominal distension on the fourth day of life. This progressively worsened, with no

change in bowel habits, vomiting or bloody stools.

Examination revealed grossly distended abdomen with periumbilical erythema. It was tense, hypertympanic, with abdominal girth of 37.5cm (6cm from the xiphisternum), organomegaly was difficult to elicit. He had hypoactive bowel sounds. He was dyspnoeic with normal respiratory rate and breath sounds, he also had poor suck and global hypertonia.

He was assessed as having advanced NEC with pneumoperitoneum complicating Perinatal Asphyxia with Hypoxic Ischemic Encephalopathy stage II.

Abdominal radiograph showed large hyperlucency in the right hemi-abdomen outlining the liver and displacing bowel loops and the liver to the contra lateral side. There were also well delineated inner and outer bowel loop walls (Rigler's sign) and elevation and splinting of the diaphragm. The features were in keeping with massive tension pneumoperitoneum (Fig 1).

Blood investigations showed leucopenia (WBC of $4,300\text{cells}/\text{mm}^3$) with normal electrolyte values.

He was placed on IV Cefotaxime, Metronidazole, Gentamicin and fluids. He was jointly managed with general surgeons and had an emergency laparotomy which revealed pneumoperitoneum with gush of air and deflation. There was a perforation measuring 0.5cm at the distal one third of the transverse colon with pyogenic membrane which was repaired. His post-operative condition remained stable till the third day post op, when he developed hypokalemia (2.9mmol/l) with paralytic ileus and features of wound infection that was

managed with daily povidone iodine dressing and change of antibiotics.

In spite of wound care and change of antibiotics, the infection worsened leading to dehiscence on the 9th day post op, for which he had secondary operative closure. His condition remained critical and he developed overwhelming sepsis with disseminated intravascular coagulopathy leading to his demise on the sixth day post closure.

Discussion

The definite cause of NEC is unclear, but risk factors such as prematurity, microbial colonization, enteral feeding, circulatory instability and congenital heart disease are well established.^{4,5} NEC is predominantly a disorder of preterm infants (90% of cases), occurring in 6-10 % of neonates weighing less than 1500gm.⁴ Infants usually present with feeding intolerance, vomiting, abdominal distension and passage of bloody stool. It is quite uncommon in term infants, with an estimated incidence of 0.2- 0.7 per 1000 live births, and accounting for 10% of all cases.^{6,7} It typically occurs in term neonates with medical conditions such as perinatal asphyxia, congenital heart disease, sepsis, polycythemia and respiratory distress.^{4,5}

The onset of NEC in term neonates is typically within the first five days, earlier than the second to third week postnatal age in preterms.^{3,6,7} Tension pneumoperitoneum is a surgical emergency that requires urgent, adequate surgical intervention to prevent mortality. It usually occurs following gastrointestinal perforation from abdominal surgeries, trauma, invasive procedures and ventilation.⁸⁻¹² It is rarely seen in advanced NEC. It is described as intra-peritoneal gas under pressure, due to ball-

valve effect allowing the one way accumulation of gas.³ This results in elevation and splinting of the diaphragm reducing lung volume, compression of IVC & other veins, resulting in reduced venous return and cardiac output.³

This patient was term, had severe perinatal asphyxia and was given hyperosmolar fluids enterally in the first few days of life. The ischemic insult on the gut from perinatal asphyxia is likely to be a major predisposition in this patient. He developed abdominal distension on the fourth day of life, there was however no history of vomiting or bloody stools. Bloody stool is actually not an early feature of NEC and is documented in about 40% of cases.⁴

Our patient showed clinical signs as well as classical radiological features of tension pneumoperitoneum which includes: large amount of air in the peritoneal cavity and under the diaphragm, displacement of the intestines liver, pushing the diaphragm upward, resulting in low lung volumes.⁸

This patient had no history of invasive GIT procedure, trauma, or high pressure ventilation, therefore the tension pneumoperitoneum must have resulted from advanced NEC with gut perforation. The factors predisposing this neonate to this uncommon complication are unclear. Leucocytosis or normal WBC counts are the usual findings in NEC, however, this patient presented with leucopenia which is a poor prognostic factor in neonatal sepsis generally.⁴ It is therefore not particularly unusual that our patient succumbed to overwhelming sepsis. Necrotizing enterocolitis can affect any segment of the small intestine or colon, but it commonly affects the ileum or jejunum in preterm infants

and the colon in term infants, as was the case in this patient, where the transverse colon was involved.^{3,7} The reason for the difference in sites affected is not yet established.

The delay in presentation in this patient may have contributed to the severe complications observed; it is also possible that the underlying asphyxia which independently carries a high mortality further compounded the patient's clinical condition. The initial surgical intervention in this patient was timely, considering the low-resource environment; however, in hindsight, such an extremely ill patient may have benefited from a peritoneal drain under local anaesthesia. This is an important temporizing measure that is recommended in such cases to improve outcome.¹³

Conclusion: The prevention of and early identification of NEC remain critical to reducing mortality from this condition. Tension pneumoperitoneum complicating NEC in a term infant is an unusual finding. It carries very poor prognosis, particularly if not detected early and managed adequately.⁸ Great caution is recommended in the management of full-term infants with risk factors for NEC.



Figure 1: Plain abdominal radiograph at presentation.

References

1. Akhil Maheshwari, Waldemar A. Neonatal Necrotizing enterocolitis In Behrman R, Kliegman R, Jenson H. Nelson Textbook of Paediatrics. 19th edition. Philadelphia W. B Saunders Publishers. Pages 601-603
2. Parikh M, Samujh R, Kanojia RP, Rao KLN. Decision making on surgical neonatal NEC. J Indian Assoc Paed Surg. 2009;14:1-8.
3. Henry Knipe, Frank Gaillard, et al. Tension pneumoperitoneum. <http://en.radiopaedia.org>. Accessed 06/02/2015
4. John P. Cloherty. Necrotizing enterocolitis. In Manual of neonatal care. 6th edition. Lippincott Williams and Wilkins publishers. 2008. pages 769-775
5. Shelley C. Springer. Necrotizing enterocolitis. <http://en.emedicine.medscape.com>. Accessed 10/12/2014
6. Ostie DJ, Splide TL, St Peter SD, Sexton N, Miller KA, Sharp RJ et al Necrotizing enterocolitis in full term infants. J Pediatr Surg. 2003;38(7):1039-42
7. Maayan-Metzger A, Itzhak A, Mazkereth R and Kuint J. Necrotizing enterocolitis in full term infants: Case-control Study and Review of the Literature. Journal of perinatology. 2004;24:494-499.
8. Siamak M, Daniel RM, Nicholas NN. Tension pneumoperitoneum: management of a surgical emergency. <http://en.hcplive.com>. Accessed 06/02/2015
9. Pascu M, Hanke B, Wiedenmann B, et al. complication of Waldenström's macroglobulinaemia following ERCP. Gut. 2004;53(12):1793
10. Bender J. Tension pneumoperitoneum after resection of an anus praeternaturalis. Tijdschr Gastroenterol. 1974; 17(4): 253-258
11. Diaz JH. Tension pneumoperitoneum-pneumothorax during repair of congenital diaphragmatic hernia. Anesth Analg. 1987;66(6):577-580
12. Canivet JL, Yans T, Piret S, et al. Barotrauma-induced Tension pneumoperitoneum. Acta Anaesthesiol Belg. 2003;54(3):233-236
13. Moss RL, Dimmitt RA, Henry MCW, et al: A meta-analysis of peritoneal drainage versus laparotomy for perforated necrotizing enterocolitis. J Pediatr Surg. 2001; 36:1210