



Neonatal Gastric Perforation: A Case Series

V R Aravind¹; Kopalle S K Vasanthi²; Sudha Reddy V R³; Krishnappa J⁴; P N Sreeramulu⁵; Krishna Prasad K⁶

1. Associate Professor / Paediatric Surgeon/ Primary Author

2. 2nd Author

3. Professor & HOD Paediatrics Department

4. Professor in Paediatrics & Medical Superintendent

5. Professor General Surgery

6. Professor General Surgery Department

Sri Devaraj Urs Academy of Higher Education and Research Centre, Kolar, Karnataka 563103

ABSTRACT

Introduction: Gastric perforation in neonates is a rare surgical emergency of uncertain etiology. **Case series:** We report a case series of five neonates diagnosed with gastric perforations in the first week of life requiring urgent surgical intervention. All five patients had no associated gastrointestinal anomalies contributing to the gastric perforation. **Conclusion:** Neonatal gastric perforation is extremely rare and is associated with high mortality. Early diagnosis and prompt surgical intervention are essential to improve the outcomes.

Keywords: Gastric perforation, Pneumoperitoneum, Early intervention, Neonate, Gastrointestinal anomalies.

INTRODUCTION

Neonatal gastric perforation is a rare and catastrophic condition with high mortality. Various factors and theories have been proposed as a possible cause [1–7] but the etiology remains obscure. Early identification and treatment are essential and may improve the outcome. It is, therefore, imperative to highlight the need for increased awareness of NGP to optimize outcome through urgent surgical intervention in a timely manner. We hereby describe five cases of NGP with no distal obstruction requiring prompt surgical intervention.

CASE SERIES

Case 1

An 8-day-old term male neonate, born by elective c-section for breech, presented with a history of vomiting, abdominal distension and grunting. Antenatal period and scans were uneventful. Feeding was commenced immediately after birth and was well tolerated until 7 days of life when he developed abdominal distension, vomiting, grunting, and remained unsettled. Abdominal X-ray revealed free air in the abdomen and Naso-Gastric Tube (NGT) was on right side of abdomen (Figure 1). On exploration, undigested milk was found all throughout the peritoneal cavity. A gastric perforation of 5 cm was seen on the anterior wall along the greater

curvature. This area was excised. No other obvious gastrointestinal abnormality was seen. Primary repair was done in single layer and abdomen was closed. Specimen was sent for Histopathology (HPE) and Microbiology for culture & growth. HPE revealed extensive hemorrhagic necrosis of the mucosa and submucosa associated with severe congestion. Culture revealed Fungal Hyphae. Child was started on feeds from Post op Day (POD) 3. Child was started on Intra-Venous Fluconazole initially and then converted to oral. Child is hail and healthy till the writing of this article.

Case 2

Preterm (32weeks) Normal Delivery (ND) born 6days old male child presented with vomiting, lethargy, distended abdomen, and metabolic acidosis. Abdominal X-ray showed classical 'football' signs of perforation (Figure 2). On exploratory laparotomy, a large volume of a grossly contaminated peritoneal fluid containing undigested foul-smelling milk was found. A 5-mm gastric perforation on the lesser curvature near the esophagogastric junction. Edges were freshened and perforation closed in single layer. Rest of the bowel was normal. Histology of debrided tissues showed mucosal necrosis and hemorrhage. Blood culture had grown Klebsiella Sp. Unfortunately, child expired on POD 5.

Figure 1



Figure 2

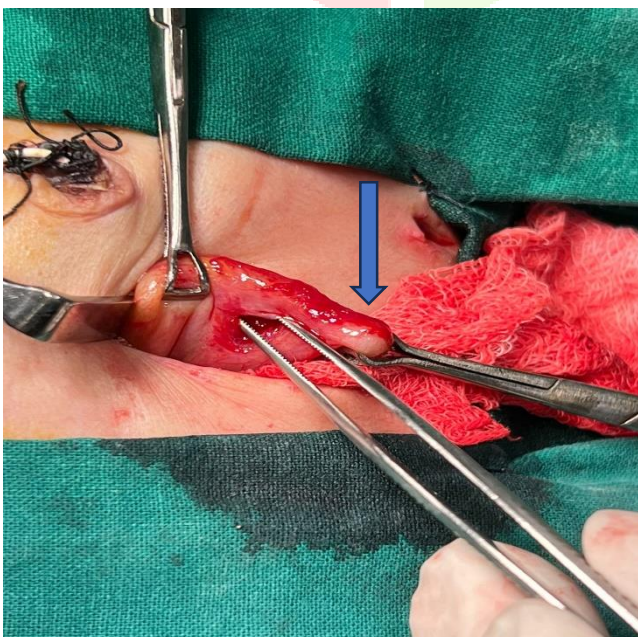
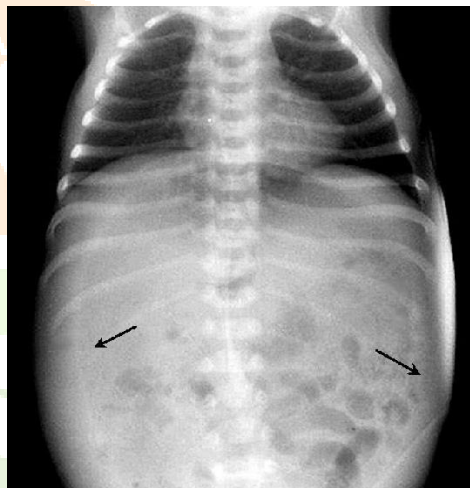


Image showing Perforation
on greater curvature of
stomach

Case 3

Term ND born 2day old male child presented with abdominal distension at 36 hours of life. Abdominal x-ray revealed gas under diaphragm. On exploration, perforation was found on greater curvature measuring 1cm. edges were freshened, perforation closed in single layer. Rest of the bowel was normal. Blood culture had E.coli Sp growth. Tissue culture had no growth. Sadly, child on POD 2.

Case 4

Preterm (34weeks) LSCS (previous LSCS) born 4 days old female child presented with abdominal distension & feed intolerance for 1 day. Abdominal x-ray revealed gas under diaphragm & NGT on right side of abdomen. On exploration, perforation was found on greater curvature measuring 7mm. edges were freshened, perforation closed in single layer. Rest of the bowel was normal. Blood culture had E.coli Sp growth. Tissue culture had no growth. Sadly, child expired on POD 1.

Case 5

Term ND born 2day old male child presented with feed intolerance and abdominal distension for 2 days. Abdominal x-ray revealed classical football sign. On exploration, grossly contaminated peritoneal fluid along with 1cm gastric perforation were found. Perforation was on lesser curvature. Edges were trimmed, closed in single layer. Feeds were started on POD 3. Peritoneal fluid culture had Fungal hyphae. Child was discharged on POD 10. Child is on follow up.

DISCUSSION

- Neonatal gastric perforation is extremely rare and associated with poor prognosis [1, 2, 4]. NGP represents 10-16% of neonatal gastrointestinal perforation.

Various theories have been proposed describing the etiology and prognosis but it remains obscure [1-3, 5]. Congenital absence of gastric musculature [6, 8], high gastric acid production [9], abdominal trauma [7, 10], and other associated gastrointestinal conditions like ischemic bowel, necrotising enterocolitis (NEC), intestinal malrotation, duodenal web, hiatus hernia, Meckel's diverticulum, and gastroschisis have all been proposed as possible causes of NGP [3, 11-14]. Few authors have reported that gastric perforation was seen in the setting of a distal mechanical obstruction [3, 5, 15]. Shaw et al. [15] through their experiments suggested that gastric perforation was caused by a mechanical rupture of the stomach secondary to increased gastric pressure.

In our series, we had not seen any of the above etiological factors. Irrespective of the cause, neonatal gastric perforation most commonly occurs in the first week of life [3, 17-20] consistent to that observed in our series. Although predominantly seen in preterm and low birth weight newborns [2, 4, 21], neonatal gastric perforation can occur in healthy term infants [1-3] as seen in our series.

Early diagnosis of neonatal gastric perforation is often difficult since the presentation and symptoms are non-specific and can mimic sepsis, respiratory distress, poor feeding, NEC, intestinal obstruction, and pneumoperitoneum without gastrointestinal perforation [3, 22]. Abdominal distension can be striking and infants may also develop rapidly progressive pneumoperitoneum with associated cardiopulmonary compromise. Most of the infants are critically unwell on presentation needing intensive care support both pre and post operatively.

Neonatal gastric perforation is a serious and lifethreatening condition, hence prompt and urgent surgical exploration is crucial. Broad spectrum antibiotics are essential to prevent mortality due to peritonitis and sepsis. Despite the availability of the advanced neonatal intensive care facilities and parenteral nutrition, the mortality rate remains high (30-83%) [3, 16, 22-24]. Studies have reported that male sex [1, 16], hyponatremia (serum sodium < 130 mEq/L) [16], metabolic acidosis (pH < 7.3) [16], persistent leucopenia and thrombocytopenia [3], prematurity and low birth weight [1, 2, 4] are associated with poor prognosis.

In our study, two children with fungal hyphae growth survived. Other children with bacterial growth succumbed to sepsis.

CONCLUSION

In summary, NGP is extremely rare and is associated with high mortality. Early diagnosis and prompt surgical intervention are essential to improve the outcome. Although the etiology remains unclear, tissue & peritoneal fluid culture for fungal hyphae appears to be a contributing factor as seen in our study.

Funding: None

Conflict of Interest: None

References

1. Lin CM, Lee HC, Kao HA, et al. Neonatal gastric perforation: Report of 15 cases and review of the literature. *Pediatr Neonatol* 2008 Jun;49(3):65–70.
2. Kara CS, İlçe Z, Celayir S, Sarimurat N, Erdogan E, Yeker D. Neonatal gastric perforation: Review of 23 years' experience. *Surg Today* 2004;34(3):243–5.
3. Yang CY, Lien R, Fu RH, et al. Prognostic factors and concomitant anomalies in neonatal gastric perforation. *J Pediatr Surg* 2015 Aug;50(8):1278–82.
4. Grosfeld JL, Molinari F, Chaet M, et al. Gastrointestinal perforation and peritonitis in infants and children: experience with 179 cases over ten years. *Surgery* 1996 Oct;120(4):650–5; discussion 655–6.
5. Leone RJ Jr, Krasna IH. 'Spontaneous' neonatal gastric perforation: Is it really spontaneous? *J Pediatr Surg* 2000 Jul;35(7):1066–9.
6. Herbut PA. Congenital defect in musculature of stomach with rupture in newborn Infant. *Arch Pathol* 1943;36(91).
7. Arnold GG. Perforation of the stomach in the neonatal period; report of a survival in a premature infant. *J Pediatr* 1955 Mar;46(3):276–9
8. Aydin M, Zenciroglu A, Hakan N, Erdogan D, Okumus N, Ipek MS. Gastric perforation in an extremely low birth weight infant recovered with percutaneous peritoneal drainage. *Turk J Pediatr* 2011 Jul– Aug;53(4):467–70.
9. Jawad AJ, Al-Rabie A, Hadi A, et al. Spontaneous neonatal gastric perforation. *Pediatr Surg Int* 2002 Sep;18(5-6):396–9.
10. Byun J, Kim HY, Noh SY, et al. Neonatal gastric perforation: A single center experience. *World J Gastrointest Surg* 2014 Aug 27;6(8):151–5.
11. Young AE, Sury MR. Spontaneous neonatal gastric perforation. *Paediatr Anaesth* 1996;6(2):143–5.
12. Sharma AK, Kothari SK, Sharma C, Mehta S, Gupta C. Surgical emphysema: An unusual finding in spontaneous neonatal gastric perforation. *Pediatr Surg Int* 2001 Mar;17(2–3):213–4.
13. Sharma A, Rattan KN, Nanda S, Ahlawat KS. Spontaneous gastric perforation in neonates. *Indian J Pediatr* 1993 Nov-Dec;60(6):822–4.
14. Durham MM, Ricketts RR. Neonatal gastric perforation and necrosis with Hunt-Lawrence pouch reconstruction. *J Pediatr Surg* 1999 Apr;34(4):649–51.
15. Shaw A, Blanc WA, Santulli TV, Kaiser G. Spontaneous rupture of the stomach in the newborn: A clinical and experimental study. *Surgery* 1965 Sep; 58:561–71.
16. Chung MT, Kuo CY, Wang JW, Hsieh WS, Huang CB, Lin JN. Gastric perforation in the neonate: Clinical analysis of 12 cases. *Zhonghua Min Guo Xiao Er Ke Yi Xue Hui Za Zhi* 1994 Sep–Oct;35(5):460–5.
17. Byun J, Kim HY, Noh SY, et al. Neonatal gastric perforation: A single center experience. *World J Gastrointest Surg* 2014 Aug 27;6(8):151–5.

18. Kshirsagar AY, Vasisth GO, Ahire MD, Kanojiya RK, Sulhyan SR. Acute spontaneous gastric perforation in neonates: A report of three cases. *Afr J Paediatr Surg* 2011 Jan–Apr;8(1):79–81.
19. Lawther S, Patel R, Lall A. Neonatal gastric perforation with tension pneumo-peritoneum. *J Pediatr Surg Case Reports* 2013;1(2):14–6.
20. Cardiel-Marmolejo LE, Peña A, Urrutia-Moya L. et al. Neonatal gastric perforation: A case report. *Revista Médica del Hospital General de México* 2016.
21. Aydin M, Zenciroglu A, Hakan N, Erdogan D, Okumus N, Ipek MS. Gastric perforation in an extremely low birth weight infant recovered with percutaneous peritoneal drainage. *Turk J Pediatr* 2011 Jul Aug;53(4):467–70.
22. Jawad AJ, Al-Rabie A, Hadi A, et al. Spontaneous neonatal gastric perforation. *Pediatr Surg Int* 2002 Sep;18(5-6):396–9.
23. Holgersen LO. The etiology of spontaneous gastric perforation of the newborn: A reevaluation. *J Pediatr Surg* 1981 Aug;16(4 Suppl 1):608–13.
24. Rosser SB, Clark CH, Elechi EN. Spontaneous neonatal gastric perforation. *J Pediatr Surg* 1982 Aug;17(4):390–4.

