



NEONATAL GASTRIC PERFORATION: REVIEW OF 5 YEARS' EXPERIENCE IN A TERTIARY CARE CENTRE.

Paediatric Surgery

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ABSTRACT

Background: Gastric perforation among neonates is a rare but frequently fatal condition of uncertain etiology. Although historically gastric perforation has often been described as “spontaneous”, some cases are non-spontaneous. The aim of this study was to review the clinical course of neonatal gastric perforation in a tertiary care center over the last five years. **Aim:** Neonatal Gastric Perforation: Review of 5 Years' Experience in a tertiary care center. **Material And Methods:** It is a retrospective study where we obtained 5 years (2016-2021) data of neonates who were diagnosed with gastric perforation. Data of total 13 neonates were reviewed and tabulated. Factors were noted including age, sex, term or preterm (Gestational age), birth weight, mode of delivery, sign & symptoms, associated anomalies, respiratory distress at birth, mechanical ventilation before the development of signs & symptoms, site of perforation, Total leukocyte count and clinical outcome in terms of survival. **Results:** In our series, there were 10 male and 3 female neonates with mean age of presentation was 18 days. Eight of them were born full term while 5 neonates were preterm. Mean birth weight was 2.1 kgs. Most common anomaly was cardiac anomaly, seen in 3 neonates and club foot with digital anomaly was seen in 1 neonate. The most common initial manifestations were abdominal distension 12 (92.3%), fever 6 (46.2%) and vomiting 5 (38.5%). The overall mortality was 6 (46.2%). Most common site of gastric perforation was greater curvature, 10 (76.9%). We also have seen in our study that mortality was high among preterm neonates (80% mortality among all preterm neonates), those who required mechanical ventilation (71.4% mortality among all neonates requiring mechanical ventilation), those with sepsis as suggested by Low TLC counts (50% mortality among those with low TLC) and Metabolic acidosis (83.3% mortality among those with metabolic acidosis), blood in stools (mortality in only neonate who presented with blood in stools) and those with perforation at lesser curvature (70% mortality among those who had perforation at lesser curvature). **Conclusion:** We have concluded that neonatal gastric perforation is associated with high mortality, particularly those presented with preterm, required mechanical ventilation, sepsis, blood in stools/coffee ground vomitus and those with perforation at lesser curvature.

KEYWORDS

Neonatal Gastric Perforation (NGP), Gastrointestinal, Prematurity, Respiratory distress, Mechanical ventilation

INTRODUCTION

Neonatal gastric perforation (NGP) is a rare problem and associated with high mortality. It accounts for approximately 7% of all gastrointestinal perforations in neonates, and has a poor prognosis[1,2]. There is still much debate about the etiology of this condition. Now the recent studies have shifted the focus on the identification of possible prognostic factors for clinical outcomes. Probable factors associated with NGP include prematurity, respiratory distress at birth, congenital anomalies, increased intragastric pressure caused by overzealous resuscitative measures [3,4], while Mechanical ventilation, sepsis and prematurity associated with worse outcomes [5,6]. The purpose of this study was to review and share our 5 years' experience of managing neonates with gastric perforation and discuss the underlying etiology of this rare condition.

METHODOLOGY

It is a retrospective study where we obtained 5 years (2016-2021) data of neonates who were diagnosed with gastric perforation. Data of total 13 neonates were reviewed and tabulated. Gastric perforation was diagnosed at the time of surgery. Factors were noted including age, sex, term or preterm (Gestational age), birth weight, mode of delivery, sign & symptoms, associated anomalies, respiratory distress at birth, mechanical ventilation before the development of signs & symptoms, site of perforation, Total leukocyte count and clinical outcome in terms of survival. Data were tabulated and analysed statistically by calculating the mean and range of the data for different measures.

RESULTS

In our series after reviewing the data of 13 neonates with gastric perforation, there were 10 male and 3 female neonates with mean age of presentation was 18 days. Eight of them were born full term while 5

neonates were preterm. Of the preterm neonates, one was born at 31 weeks, two at 34 weeks, and two at 36 weeks of gestation. Mean birth weight was 2.1 kgs and 9 out of 13 neonates were low birth weight (<2500gms). Associated anomalies were associated with 4 neonates with gastric perforation. Most common anomaly was cardiac anomaly, seen in 3 neonates and club foot with digital anomaly was seen in 1 neonate. The overall mortality was 6 (46.2%). Demographic profile is summarised in **Table 1**. The most common initial manifestations were abdominal distension 12 (92.3%), fever 6 (46.2%) and vomiting 5 (38.5%). 6 (46.2%) neonates presented with respiratory distress at birth and 7 (53.8%) neonates required mechanical ventilation before the development of abdominal distension or other signs and symptoms. Average total leukocyte count was 3200/mm³ while 10 (76.9%) patients had low TLC counts and 7 (53.8%) patients developed severe metabolic Acidosis (pH<7.25). Clinical characteristics are tabulated in **Table 2**. Most common site of gastric perforation was greater curvature 10 (76.9%). Average size of perforation was 1.2cms. Primary repair was done in 9 (69.2%) patients and additional gastrostomy was done in 4 (30.8%) patients. Surgical findings are tabulated **Table 3**. We also have seen in our study that mortality was high among preterm neonates (80% mortality among all preterm neonates, 4 out of 5 preterm neonates), LBW babies (55.6% mortality among LBW babies, 5 out of 9 LBW babies), those who required mechanical ventilation (71.4% mortality among all neonates requiring mechanical ventilation, 5 out of 7 neonates requiring ventilation support), those with sepsis as suggested by Low TLC counts (50% mortality among those with low TLC, 5 out of 10 neonates with low TLC) and Metabolic acidosis (83.3% mortality among those with metabolic acidosis, 5 out of 7 neonates with metabolic acidosis), blood in stools (mortality in only neonate who presented with blood in stools) and those with perforation at lesser

curvature (70% mortality among those who had perforation at lesser curvature). Possible Prognostic factors from the study are tabulated in **Table 4**.

Table 1 : Demographic Characteristics Of Patients

	n (%)
Mean Age (in days)	18 days
Sex (M:F)	10 : 3
Gestational Age (Full Term : Preterm)	8 : 5
Mode of delivery (Normal Vaginal delivery : C-Section)	9 : 4
Mean Birth weight (in kgs)	2.1 kg
Low Birth weight (<2500gms)	9 (69.2%)
Associated anomaly	4 (30.8%)
Clinical outcome	Mortality 6 (46.2%)
	Discharge from hospital 7 (53.8%)

Table 2: Clinical Characteristics Of Patients

	n (%)
Respiratory distress at birth	6 (46.2%)
Mechanical ventilation before signs & symptoms	7 (53.8%)
Clinical Symptoms	
Fever	6 (46.2%)
vomiting	5 (38.5%)
Abdominal distension	12 (92.3%)
Blood in stools	1 (7.7%)
Coffee ground aspirates	3 (23.1%)
Mean TLC count (/mm ³)	3200
Low TLC count	10 (76.9%)
Metabolic Acidosis (pH< 7.25)	7 (53.8%)

Table 3: Surgical Findings And Operative Procedures

Site of perforation	Greater Curvature	10 (76.9%)
	Lesser Curvature	3 (23.1%)
Mean Size of perforation (cms)		1.2
Surgical procedures	Primary Repair	9 (69.2%)
	Primary Repair + Gastrostomy	4 (30.8%)

Table 4: Possible Prognostic Factors From The Study

	Survival (n=7)	Non-survival (n=6)
Mechanical Ventilation (n=7)	2	5
Preterm (n=5)	1	4
LBW (n=9)	4	5
C-Section (n=4)	2	2
Low TLC count (n=10)	5	5
Metabolic acidosis (pH< 7.25) (n=7)	2	5
Blood in stools (n=1)	0	1
Coffee ground aspirates (n=3)	0	3
Site of perforation	Greater curvature (n=10)	6
	Lesser curvature (n=3)	1

DISCUSSION

In previous studies, NGP is found to be occurred mostly between 2 to 7 days of age [7] but in our study mean age of presentation was 18 days, which is higher than usual age of presentation. Many authors have found that gestational age is a significant prognostic factor in outcome of neonates with NGP and prematurity is a common finding in patients with NGP [8,9]. In our study, 38.6% (5/13) of patients were preterm which is higher than normal and 4 of them were non-survivors. Byun et al [10] reported 33.3% (3/9) of patients were preterm while Lin et al [5] reported 40% (6/15) neonates were preterm and 60% (3/5) reported by Duran et al [11] suggested that premature infants are more prone to develop a spontaneous gastric perforation due to the immaturity of the gastric tissue.

In our study 69.2% (9/13) neonates were low birth weight. Study by Lin et al [5] shows higher incidence (52%) of NGP among LBW babies while Sato et al [12] reported 11 out of 42 neonates with gastric perforation were LBW. Shashikumar et al [13] reported 63.2% [12/19] neonates with NGP were LBW. Overall mortality was 46.2% (6/13) in our study and 66.7% (4/6) of them were preterm neonates while 83.3% (5/6) were low birth weight babies. Similar findings were seen in study by Lin et al [5] that reported overall mortality of 47% (7/15) and higher mortality among neonates with LBW and prematurity. Duran et al [11] showed overall 60% mortality (3/5) and all of them were LBW while Shashikumar et al [13] reported overall mortality of 42.1% (8/19) and 6 out of 8 were LBW.

In our study 7 (53.8%) neonates required mechanical ventilation before the development of signs and symptoms while 6 (46.2%) of them had a history of respiratory distress at birth. Mortality was seen among 71.4% (5/7) who were on mechanical ventilation support. Duran et al [11] reported 4 out of 5 neonates required mechanical ventilation, all of them had a history of respiratory distress at birth and similar mortality rate (75%, 3/4) was observed among those who were on mechanical ventilation support.

Metabolic acidosis (pH<7.25) has been described as a poor prognostic factor in previous studies [14]. In our study 7 (53.8%) neonates developed metabolic acidosis and mortality was seen among 71.4% (5/7) neonates who had metabolic acidosis.

Most common site of gastric perforation in our study found to be greater curvature of stomach (10/13, 76.9%). Studies like yang *et al.* [15] reported, the most common site of perforation was the curvature minor (73.5%). The surgical strategy included both primary repair or with gastrostomy depending upon the size of perforation but in any case prompt surgical intervention is encouraged and lifesaving.

Abdominal distension (92.3%), low TLC count (76.9%), Metabolic acidosis (53.8%), respiratory distress (46.2%) and fever (46.2%) were among the common presenting symptoms with neonatal gastric perforation. Other studies like byun *et al.* [10] also featured similar findings. Among the risk factors we investigated, gestational age, birth weight, mechanical ventilation, low TLC count and metabolic acidosis found to be important prognostic factors in terms of overall mortality while associated anomaly, perforation location, and pathologic findings seem to have no significant prognostic impact on the overall mortality.

Limitations of our study are that it was performed retrospectively and sample size was too small. However, NGP is extremely rare condition and findings of our study should help neonatologists and surgeons with their decisions and management.

CONCLUSION

We have concluded that neonatal gastric perforation is associated with high mortality, particularly those presented with preterm, required mechanical ventilation, sepsis, blood in stools/coffee ground vomitus and those with perforation at lesser curvature.

Early recognition and prompt surgical management are essential to improve the outcomes.

Conflict of Interest

None declared

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