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Spontaneous gastric perforation in neonates: case series and review of literature.

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Abstract

Spontaneous gastric perforation is a rare cause of pneumoperitoneum in neonates. It is an acute emergency in neonates requiring urgent laparotomy and repair of the perforation. Many theories have been discussed with respect to its aetiology but none has clearly defined the cause. This paper attempts to give justification for the prematurity theory which is associated with poorly developed gastric musculature. We report two preterm neonates who presented with progressively distending abdomen from massive pneumoperitoneum. Both of them had laparotomy with repair of the gastric perforation. Spontaneous gastric perforation is associated with high mortality in preterm neonates.

Keywords: Spontaneous, gastric perforation, prematurity, neonates.

Introduction

Spontaneous gastric perforation (SGP) in neonates is a perforation or tear on the wall of the stomach of the neonate causing escape of air, commonly swallowed air into the peritoneal cavity, thus causing pneumoperitoneum in the neonates. Pneumoperitoneum in neonates is however commonly caused by bowel perforation. Spontaneous gastric perforation is a rare occurrence in the newborn. Not so many cases have been reported in the literature.[1,2,3] SGP as a cause of pneumoperitoneum can frequently be missed for more common causes of neonatal pneumoperitoneum like necrotizing enterocolitis. Diagnosis in many cases is intra-operative. In SGP, there is usually massive air in the peritoneal cavity coming from the stomach compared to that seen with bowel perforations.SGP usually occurs within the first five days of life[4]. Different mechanisms have been proposed for the cause of the perforation and it is believed to be commoner in blacks and males.[5]

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The distended abdomen from the pneumoperitoneum can be a source of severe respiratory distress for the neonate thus requiring urgent decompression of the abdomen and repair of the perforation.

The two cases reviewed in this article had their diagnosis made intra-operatively. Causes of neonatal pneumoperitoneum include commonly necrotizing enterocolitis and long-segment Hirschsprung's disease.

Case One

A 8-day-oldmale preterm with low birth weight delivered at Estimated Gestational Age of 34 weeks viaspontaneous vaginal delivery with birth weight of 2.1kg. APGAR score was 4 in one minute and 8 in five minutes. He had some resuscitation with ambu-bagging.

He is the 1st of a set of twins. He presented with a 4-day history of progressive abdominal distension and difficulty with breathing. There was no history of bilious vomiting, delayed passage of meconium, haematemesis or haematochezia. He was commenced on breast milk and was tolerating it.

Examination findings revealed a preterm low birth weight male neonate, in respiratory distress, pale, a febrile, anicteric, acyanosed was well hydrated. Pulse rate was 162 beats per minute, respiratory rate was 68 cycles per minute, temperature was 36.8 degrees centigrade, oxygen saturation was 86% in room air and 96-100% on oxygen. The nasogastric tube passed was draining coffee ground effluent.

The child was dyspneic and tachypneic with subcostal and intercostal recession, with vesicular breath sound. The abdomen was markedly distended, moved with respiration, with visible anterior abdominal wall veins and erythema. There was a 3cm umbilical defect, percussion was hyper-tympanitic with hypoactive bowel sound. The diaper was filled with soft stool. The patient was resuscitated and broad-spectrum antibiotics were commenced. Babygram (Fig 1) showed massive pneumoperitoneum with compression of abdominal visceral medially.

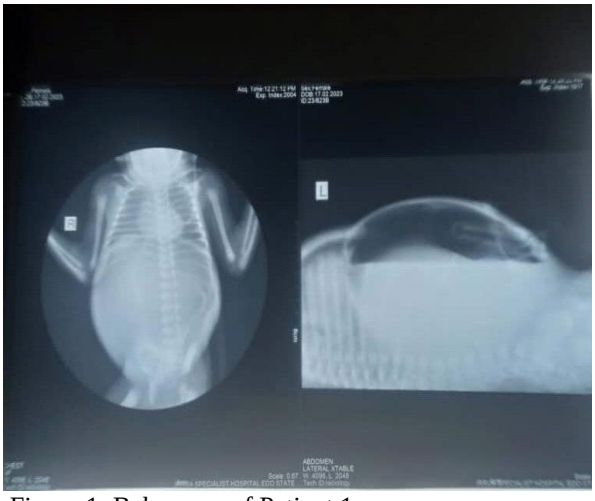

Figure 1: Babygram of Patient 1

Findings included a gush of air, multiple(4) perforations about 0.3cm each on the anterior surface of the stomach, normally rotated small and large bowel with no peritoneal spillage. He had laparotomy and repair of gastric perforations one in 2 layers.

Postoperatively, antibiotics and proton pump inhibitors were continued.

Oral feeding was commenced on the sixth post-operative day and was passing stool normally until discharge.

Case Two

A 3-day-old female preterm neonate was delivered via emergency caesarean section for abruption placenta at 37 weeks gestation. Her birth weight was 2.5 kg. APGAR score was 5 in one minute and 8 in 10 minutes. She was resuscitated. She passed meconium on the second day of life and was making adequate urine.

She was commenced on oxygen via nasal prongs, intravenous fluid and antibiotics.

Examination findings were that of a preterm female neonate, not pale, dyspneic with a respiratory rate of 66 cycles per minute, heart rate was 146 beats per minute and oxygen saturation on oxygen was 97% and 87-89% in room air. The chest was clear.

The abdomen was grossly distended, moved minimally with respiration, and soft and non-tender. A diagnosis of Necrotizing enterocolitis was initially entertained.

The neonate had a babygram (Fig 2) done which showed massive pneumoperitoneum.

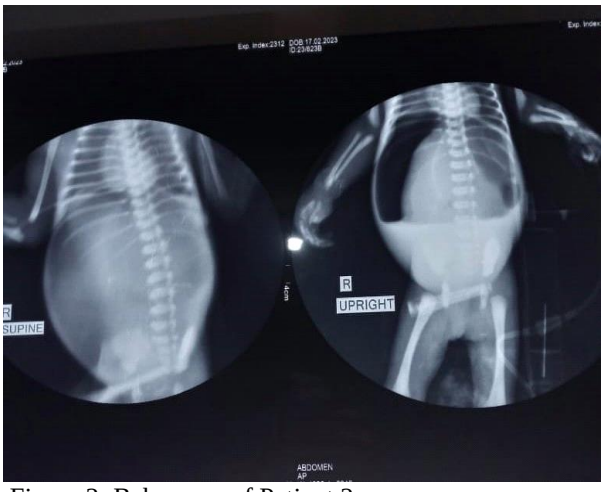

Figure 2: Babygram of Patient 2

The neonate had exploratory laparotomy and the findings included a gush of air and a4cm laceration on the greater curvature of the stomach. This was repaired in layers and a nasogastric tube was left in place.

The neonate made progressive clinical improvement, the nasogastric tube was removed on the 6th day post-op, was commenced on oral intake and was discharged on the 13th day after the surgery.

Discussion

Spontaneous gastric perforation is a cause of pneumoperitoneum in neonates. However, SGP is not commonly considered a topmost differential cause. Other causes of pneumoperitoneum are usually considered first and hence most diagnoses of SGP are made intraoperatively. This was seen in the two cases presented here.SGP is thus majorly a diagnosis of exclusion.

The pathogenesis of gastric perforation is greatly debated. Congenital absence or deficiency of musculature of the gastric wall has been suggested as a possible cause [1,2]but this explanation is questionable.

Many theories attempt to describe the cause of SGP, however, none has been clear on the exact aetiology. Prematurity with associated poorly developed gastric wall muscles may be a leading SGP cause. Perforation can occur in poorly developed gastric muscles if there is a compounding presence of gastric distension. Cases of neonatal gastric distension can be seen in neonates who had neonatal resuscitation with ambu-bagging following poor APGAR scores and neonatal asphyxia at delivery. The distended stomach could cause ischaemia of the already poorly developed gastric wall from prematurity thus leading to perforation of that portion of the stomach. This could account for the two cases considered here. Prematurity, asphyxia neonatorum, birth stress, aggressive respiratory resuscitation at birth, anatomic pathologies causing gastric outlet obstruction, and a few associated congenital anomalies have been reported to be the most important factors causing SGP in the literature.[4,6,7,8,]

The two neonates presented here were preterm and had poor APGAR scores and neonatal asphyxia. Resuscitation of the neonates can lead to abdominal distension from continued ambu-bagging. This could account for the perforation seen in the two preterm neonates.

In older children, some possible aetiologies include congenital defects of the gastric wall, mechanical disruption, stress ulceration secondary to neurogenic disorders and ischaemia of the gastric wall secondary to vascular shunting.SGP is however rare outside the neonatal period. Most neonatal gastric perforations occur on the anterior side of the greater curvature.

Conclusion

SGP commonly occur in preterm neonates and this can be a result of poorly developed gastric wall muscles. An increase in the intragastric pressure from gastric distension can lead to gastric wall ischemia, weakening the wall further leading to perforation.

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