A newborn with duodenal atresia and a gastric perforation

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ABSTRACT

Congenital duodenal atresia complicated by gastric perforation (GP) is a very rare and a very mortal condition. Only three newborns could be cured in the reported 13 cases. We report a successfully treated newborn with this complicated disease. A 2-day-old male was hospitalized with prediagnosis of duodenal obstruction. Twelve hours later, significant abdominal distention occurred promptly. At laparotomy, GP and preampullary duodenal atresia were detected. Gastrorrhaphy and duodenoduodenostomy were performed in the same operation. The patient was discharged on the 15th postoperative day. This complicated disease can be treated by early diagnosis and surgical intervention. We choose one-stage operation because of the clean peritoneal cavity. However, generalized peritonitis may require two-stage operation in delayed cases.

Key words: Duodenal atresia, gastric perforation, newborn

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INTRODUCTION

Neonatal gastric perforation (GP) accompanying duodenal atresia is a very rare and mortal condition. An investigation of the literature has revealed 13 cases, only 3 of whom survived.[1,2] We report a newborn with duodenal atresia which was complicated by perforation of the stomach that was treated successfully by a one-stage operation. Here we discuss treatment modalities on the basis of our case.

CASE REPORT

A 2-day-old, full-term male was admitted with nonbilious vomiting after breast feeding. His birth weight was 2500 g. The abdomen was scaphoid. A supine abdominal radiograph revealed paucity of bowel gas in the distal of stomach which suggested pyloric or proximal duodenal obstruction [Figure 1]. An 8 French nasogastric tube (NGT) was inserted and prophylactic antibiotic (ceftriaxone) was initiated.

The abdominal distension, tachypnea and respiratory distress occurred suddenly 12 h after hospitalization. Plain upright abdominal radiography showed subdiaphragmatic free air [Figure 2]. At laparotomy, a gush of air and obvious relief of the abdominal distention were seen when the peritoneal cavity was opened. A linear tear (4 cm) along greater curvature of the posterior gastric wall was detected [Figure 3]. Localized peritonitis limited to the retrogastric area was determined. Primary repair of the perforation was performed by two-layer running sutures. At abdominal exploration, proximal duodenum was seen as hypertrophied and severely dilated. The atresia was detected in the preampullary region of the duodenum, and diamond-shaped duodenoduodenostomy was performed. Neither trans-anastomotic tube insertion nor gastrostomy was performed. The abdomen was closed after a silicon drain placing in the perigastric area.

The patient was allowed for breast feeding on the 7th postoperative day, and was discharged uneventfully on the 15th postoperative day.



Figure 1: Plain abdominal radiography showing a gastric and a duodenal air bubble with no gas distally

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Figure 2: Erect radiography of the abdomen showing the massive pneumoperitoneum

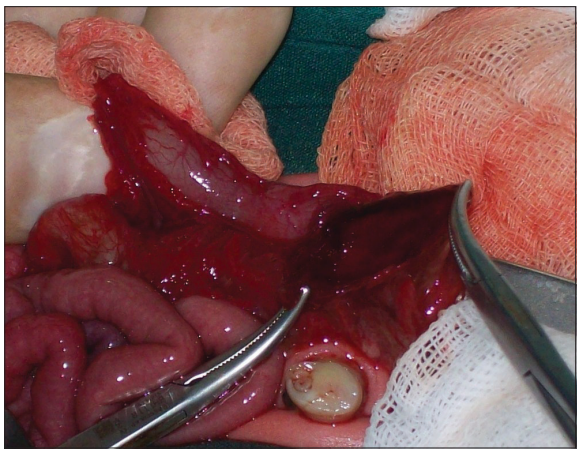


Figure 3: Intra-operative view of the large gastric tear

DISCUSSION

Neonatal GP is a rare entity which requires prompt diagnosis and surgical intervention. The exact aetiology of the condition is unclear, although various theories have been published.

Herbut *et al.* reported that 'congenital absence' of the muscular layer of stomach is a predisposing factor in spontaneous gastric ruptures.[3] However, Shaw *et al.* experimentally concluded that this histological appearance is likely to be a result of retraction of the muscular layer from the perforation site.[4]

Increased intraluminal pressure of the stomach due to distal obstruction by atresia, stenosis or bands have also been reported as causes of the GP. In addition, positive pressure mask ventilation during resuscitation may trigger the GP. Vigorous NGT placement occasionally causes a GP which usually appears as a puncture wound or as a short tear.[5]

Prematurity and perinatal stress are the most important risk factors for GPs. A low-perfusion states that leads to gastric wall injury is a widely accepted theory.[5,6] However, predisposing factors could not been identified in at least 20% of the patients.[7]

The first clinical sign in the majority of newborns with a GP is prompt abdominal distension which may cause severe respiratory distress. Signs of hypovolemic shock and sepsis usually add to the clinical picture.[8] The proper therapeutic regimen includes fluid and electrolyte replacement, broad-spectrum antibiotics' administration and prompt surgical repair. Percutaneous needle aspiration of the air from the peritoneal cavity before surgery may be required to relieve the acute respiratory distress due to massive pneumoperitoneum.[4] The mortality rate is approximately 55%. The mortality is significantly higher in premature than in term infants.[9,10]

Congenital duodenal atresia is not rare, with an incidence of about 1 per 5000–10,000 live births.[11] The clinical presentation of duodenal obstruction is usually characterized by feeding intolerance and vomiting in the first 48 h of life. Since 80% of obstructions are located in the postampullary region of the duodenum, there is bilious vomiting in the majority of cases.[12] The current treatment method of duodenal atresia is diamond-shaped doudenoduodenostomy. In recent years, early postoperative survival rate has increased from 60 to 90% due to improved operative technique and neonatal intensive care units.[13]

Congenital duodenal atresia complicated by a GP is a very rare and a very mortal condition. According to a case report and literature review by Takebayashi *et al.*, there were 12 reported cases of GP-related duodenal atresia, generally from the Japanese literature, between years 1940 and 1975.[1] One additional case was reported then.[2]

Each of GP and duodenal atresia may be mortal. It is obvious that combination of both will have a higher mortality rate than either of the single disease.[1] Only three newborns could be cured in the reported 13 cases.[1,2] Ogawa *et al.* reported first successfully treated patient by one-stage operation in 1966. Takebayashi *et al.* performed second successful treatment by two-stage operation which included duodenojejunostomy after repairing gastric rupture. [1]

We performed both gastrorrhaphy and duodenoduodenostomy in the same operation. Although the stomach had a wide perforation,

generalized peritonitis was absent in our patient. This condition may be related with several factors such as the preoperative antibiotic use, early diagnosis of the GP and the type of duodenal atresia. The existence of preampullary duodenal atresia had prevented peritoneal irritation by pancreatic and bilious fluids. For these reasons, we chose one-stage operation in the patient. Two-stage operation may be an alternative treatment method in especially delayed cases with generalized peritonitis which threats safety of duodenal anastomosis.

Our patient had two risk factors including duodenal obstruction and NGT insertion for the neonatal GP. However, we do not believe that neither of them had caused the GP in our patient. The NGT had a proper length and consistency. In addition, the perforation type was different than NGT-related perforation which generally has a small diameter.[14] Increased hydrostatic pressure of the stomach due to distal obstructions such as atresia may cause a GP. However, we do not think that this mechanism had a causative effect in our patient because the stomach was decompressed by a NGT during hospitalization.

All newborns with a stomach rupture should be explored during operation for intestinal obstructions such as pyloric atresia, duodenal atresia, annular pancreas and malrotations, although intestinal obstructions are seldom causes of neonatal GP.

In conclusion, duodenal atresia complicated by the GP can be treated by prompt diagnosis and proper surgical intervention.

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