Mini-laparoscopic Gastropexy in a Preterm 10-day-old Baby with Acute Gastric Volvulus

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Acute gastric volvulus is rare in neonates and has never been reported in preterm babies. We present a 10-day-old preterm baby boy, who presented with vomiting and respiratory distress after birth. Barium study of the upper gastrointestinal tract showed a low-lying gastro-esophageal junction and an upside-down greater curvature, which crossed the esophagus. He underwent mini-laparoscopic gastropexy successfully. He was well at the one year of follow-up. Mini-laparoscopic gastropexy is efficient and safe, even in neonates. Improved cosmetics and avoidance of wound complications are major benefits of this procedure.

Key words: gastric volvulus, mini-laparoscopic gastropexy, neonate

Introduction

Gastric volvulus, an abnormal degree of rotation of one part of the stomach around another, typically occurs in adults and has its peak incidence in the fifth decade of life with equal distribution in men and women¹. This disease entity has also been observed in children with a mean age of onset of 2.4 years²³; however, is rarely observed in the newborn⁴⁶ and has never been reported in a preterm baby. Subacute and chronic gastric volvulus can be treated either conservatively or surgically, and the choice is still controversial³. In contrast, surgery is mandatory for the treatment of acute gastric volvulus because any delay may result in gastric ischemia and perforation²⁷. Traditionally, gastropexy is performed via a laparotomy; in recent years, laparoscopic gastropexy has been applied to treat acute gastric volvulus in several children⁸¹⁰.

Here we present a preterm 10 day-old baby with acute primary organo-axial gastric volvulus, which was successfully treated by mini-laparoscopic gastropexy.

Case Report

A preterm baby boy suffered from intermittent vomiting and respiratory distress after birth. He was born at a gestational age of 35 weeks with a birth weight of 1780gm. He was admitted to the neonatal intensive care unit due to respiratory distress and non-bilious vomiting. A plain abdominal roentgenogram showed marked gastric dilatation. A nasogastric tube was inserted and the symptoms improved. A subsequent barium study of the upper gastrointestinal tract showed a low-lying gastroesophageal junction and an upside-down greater curvature, which crossed the esophagus suggesting organo-axial gastric volvulus (Fig. 1A).
A mini-laparoscopic gastropexy was performed at the age of 10 days. The baby was put in reverse Trendelenburg position. A pneumoperitoneum was created by injecting CO$_2$ via a Veress needle at a pressure of 6mmHg. A 3-mm 0-degree videoscope was inserted into the abdomen via a 3-mm port at the umbilicus. Under videoscope visualization, another two 3-mm ports were introduced in the right and left sides of the upper abdomen. Two straight 3-mm graspers were used for holding the stomach and needle. During surgery, the greater curvature was found to lie upward and anterior to the esophagus. After detorsion of the stomach, the gastrocolic ligament was found to be lax. Then a 0.8 cm-long transverse skin incision was made at a level near the greater curvature of the stomach. A 3-0 polyglactin needle was inserted through the fascia into the peritoneal cavity. The anterior wall of the stomach near the greater curvature was then sutured to the anterior abdominal wall and the needle was brought out to the incision wound (Fig. 1B). There were a total of three sutures and the anterior wall of the stomach was attached to the anterior abdominal wall by extracorporeal ties. The knots were buried in the subcutaneous layer (Fig. 1C). The total operating time was 45min and the patient withstood the procedure well. No respiratory distress was noted immediately after the operation and the arterial blood gas data were within normal limits before and after pneumoperitoneum. The post-operative course was smooth and oral feeding was started the day after the operation. After one year of follow-up, he was doing well with satisfactory body weight gain.

**Discussion**

The stomach is normally affixed by four gastric ligaments and by gastroperitoneal attachments; an abnormal degree of rotation of one part of the stomach around another results in gastric volvulus. Gastric volvulus may occur acutely, subacutely, or chronically, and is divided into primary and secondary types according to its cause\(^\text{11}\). Primary gastric volvulus is defined as a gastric rotation due to absence or attenuation of these anatomic anchors and accounts for one-third of cases. In the other two-thirds of cases, gastric volvulus is secondary to other causes, such as paraesophageal hiatus hernia, traumatic diaphragmatic hernia, eventration of the diaphragm, abdominal bands or adhesions\(^\text{11}\). Furthermore, the rotation may occur around a line joining the hiatus and pylorus in cases of organo-axial volvulus, or around a line joining the greater and lesser curvatures in mesentero-axial volvulus\(^\text{11}\).

The clinical manifestations of gastric volvulus depend on the degree of rotation and obstruction\(^\text{7,12}\) and are usually nonspecific in infants. Therefore, the diagnosis of gastric volvulus in infants is relatively difficult. The classic Borchardt's triad (unproductive retching, acute localized epigastric distension, and inability to pass a nasogastric tube) or the pentalogy of clinical manifestations (intermittent colicky abdominal pain, non-bilious vomiting, upper abdominal distension, failure to thrive, and hematemesis) described by Samuel et al are mainly noted in adults\(^\text{13,14}\). Therefore, the diagnosis in infants is usually dependent on imaging studies\(^\text{7,12}\). Our patient had an acute clinical presentation and barium study of the upper gastrointestinal tract revealed a low-lying gastroesophageal junction and an upside down greater curvature of the stomach, which crossed the esophagus. These radiological features were compatible with the typical roentgenographic manifestations of organo-axial gastric volvulus\(^\text{13}\). In addition, the operative findings showed the stomach rotated around an axis joining the hiatus and pylorus, with the greater curvature rotating upward and anterior to the esophagus, with a lax gastrocolic ligament. Thus, he was considered to
Fig 1  (A) Barium study of the upper gastrointestinal tract shows a low-lying gastroesophageal junction and an upside-down greater curvature, which crosses the esophagus, suggesting organo-axial gastric volvulus; (B) The anterior wall of the stomach near the greater curvature was sutured to the anterior abdominal wall and the needle was brought out to the incision wound, (C) Three 3-mm ports were used and the stomach was attached to the anterior abdominal wall by extracorporeal ties. The knots were buried in the subcutaneous layer.

have an acute primary organo-axial gastric volvulus and the cause was probably due to the laxity of the gastrocolic ligament. This is the first preterm baby with acute gastric volvulus reported in the literature.

Surgical treatment for secondary gastric volvulus, either acute or chronic, is mandatory\(^3\). The treatment strategy for chronic or subacute primary gastric volvulus is controversial\(^3\), but surgical gastropexy is considered the treatment of choice for the acute form\(^\text{8,10}\). Traditionally, gastropexy is performed via a laparotomy\(^\text{8,10}\). In recent years, gastropexy using laparoscopy with a combination of endoscopy and/or gastrostomy has been described\(^\text{8,15,16}\). This technique has been used to treat gastric volvulus in several children in the literature, with the youngest 26 days old\(^\text{9,10,17}\). All these patients tolerated the surgery well\(^\text{9,10,17}\). Laparoscopic gastropexy was performed safely in our patient and in patients reported previously\(^\text{10}\).

Although many complex procedures for managing congenital abnormalities have been reported to be feasible, neonatal laparoscopic surgery still involves very specific physiologic constraints. A multicenter study revealed that 12% of patients had anesthetic incidents during insufflation, including desaturation, transient hypotension requiring vascular expansion, hypercapnia (>45mmHg), hypothermia (<34.9 degrees C), and metabolic
acidosis\(^{18}\). Thus, we advocate laparoscopic surgery in the neonate only if the preoperative condition is stable and the operative time is short, such as in the present case. We feel induction of pneumoperitoneum at a pressure of 6mmHg is safe in neonates under careful blood gas monitoring to prevent CO\(_2\) retention. The extracorporeal tie we did in this case can shorten the operative time to facilitate laparoscopic gastropexy in neonates. Induction of pneumoperitoneum at a pressure of 6mmHg also provides enough space for gastropexy; the extracorporeal tie is simple and fast and the knot can be buried subcutaneously. Using a 3-mm videoscope and a 3-mm grasper is enough for visualization and suturing, especially in neonates, since their abdominal wall is thin. We feel that with careful monitoring, mini-laparoscopic gastropexy is a safe and efficient approach in a preterm baby, with improved cosmetics, avoidance of wound complications, and a significantly shorter recovery period than conventional surgery.

References

利用迷你腹腔鏡胃固定術治療十天大早產兒的急性胃扭結

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急性胃扭結在新生兒並不常見，在早產兒則沒有被報告過。我們報告一位十天大的早產兒男嬰發生嘔吐與發绀的現象。上消化道攝影顯示胃食道交界處胃大彎的倒置，診斷為急性胃扭結。他順利的接受了迷你腹腔鏡的胃固定術，術後一年的追蹤都很順利，進食無礙。由文獻回顧與本病例的經驗，我們認為迷你腹腔鏡胃固定術是一個相當安全有效的治療，甚至是用在新生兒上。改善美觀也減少傷口併發症是最大的好處。

關鍵詞：胃扭結，迷你腹腔鏡胃固定術，新生兒

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