Nonfixation of the falciform ligament discovered during laparoscopic pyloromyotomy in a 3-week-old infant: A potential cause of intestinal obstruction

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ABSTRACT

Failure of the peritoneum to fuse with the umbilical vein can lead to nonfixation of the falciform ligament. The exposed remnant of umbilical vein persists as a congenital band spanning the peritoneal cavity from the umbilicus to the liver. This abnormality has been associated with internal herniation and bowel obstruction in infants. We describe a case of pyloric stenosis in an infant who, at the time of laparoscopic pyloromyotomy, was found to have nonfixation of the falciform ligament causing a volvulus of the transverse colon without clinical signs of obstruction.

1. Background

Involvement of the umbilical vein typically occurs within a week following birth [1]. The remnant of the umbilical vein becomes ensased by a broad, thin, antero-posterior fold of peritoneum extending from the abdominal wall to the hilum of the liver. Failure of the peritoneum to fuse with the obliterated umbilical vein can lead to nonfixation of the falciform ligament [2]. The umbilical vein persists as a firm, band-like structure. This abnormality has been implicated in 0.2% of internal hernias, with small bowel herniation being the most common [3]. In 1960, Hoffbert and Strachman reported a case of an aberrant umbilical vein causing intestinal obstruction in an infant with pyloric stenosis [4]. We describe a case of pyloric stenosis in an infant who, at the time of laparoscopic pyloromyotomy, was found to have nonfixation of the falciform ligament with the transverse colon volvulized around the band.

2. Case report

The patient is a boy born at 39 weeks gestation by emergent cesarean section for maternal fever and fetal tachycardia. The baby was born vigorous and crying but was transferred to the neonatal intensive care unit for antibiotics and evaluation for possible sepsis.

The baby did well and after 48 h and negative blood cultures, the antibiotics were discontinued and the patient was transferred to the newborn nursery and discharged home. On day of life 23 the baby was brought to the emergency room for non-bilious projectile vomiting. The mother stated the symptoms began five days prior to admission, where she noticed the baby was vomiting milk after each feed. After consulting with the pediatrician, the feeds were switched from breast milk to a combination of formula and Pedialyte, which appeared to briefly improve symptoms but the emesis returned and became increasingly projectile. This was associated with a 2 oz weight loss. The parents brought the baby to the emergency room for evaluation.

On admission the infant was lethargic, with dry mucus membranes and a flat, non-tender abdomen. No gastric peristaltic waves were noted. Laboratory examination revealed a white blood cell count: 10,200/mm³ with 12% polymorphonuclear cells; hemoglobin of 11.8 mg/dL; a platelet count of 452,000/mm³; blood chemistry revealed sodium: 139 mmol/L; potassium: 5.3 mmol/L; chloride: 103 mmol/L; BUN: 6.0 mg/dL; creatine: 0.29 mg/dL and anion gap: 12. Ultrasonic examination of the abdomen demonstrated hypertrophy of the pyloric wall, measuring about 5.5 mm in thickness, and a target appearance of the pylorus which was 19 mm in length and 4 mm in thickness with no evidence of gastric emptying, all consistent with hypertrophic pyloric stenosis.

The baby was hydrated with intravenous fluids and within 12 h was taken to the operating room for laparoscopic pyloromyotomy. The abdomen was entered with an umbilical incision and...
insufflation achieved using the STEP-Veress technique. Upon insertion of the laparoscope the transverse colon was found to be dilated and wrapped around what appeared to be a congenital band (Fig. 1A). This large band traversed the peritoneal cavity connecting the umbilicus to the hilum of the liver. The structure was presumed to be a remnant of the umbilical vein but the peritoneal fold that normally comprises the falciform ligament was absent. Two 3 mm stab incisions were made, one in the RUQ and one in the LUQ and bowel graspers were placed in the abdomen. The transverse colon was detorsed from the congenital band in a counterclockwise fashion a full 360° and the colon on both sides appeared pink and viable (Fig. 1B). A decision was made to complete the pyloromyotomy before addressing the congenital band itself. A pyloric mass was identified and held using a laparoscopic pyloric grasper and a pyloromyotomy was performed from the duodenal end of the pylorus toward the stomach in standard fashion. There was no sign of excess bleeding or mucosal injury and no air leak was noted on insufflation of the stomach via the nasogastric tube.

The congenital band was then inspected and it was determined that it could become a lead point for future bowel obstruction and should be resected. The inferior aspect of the band was held using a Maryland dissector and the band was transected using electrocautery in case a remnant of the umbilical vessels remained patent. The remainder of the band was cauterized as it entered the liver. The proximal umbilical remnants retracted into the undersurface of the umbilicus (Fig. 2). Hemostasis was maintained throughout the procedure. The ports were removed and the umbilical fascia and skin were closed in standard fashion. There were no complications during the procedure and the patient left the operating room in stable condition.

The baby experienced one episode of emesis within 24 h of the operation but otherwise the postoperative course was uncomplicated and he passed stool and tolerated formula feeds. He was discharged home on postoperative day 2. Two weeks later the infant was seen in the office and is tolerating feeds and gaining weight.

3. Discussion

Abnormalities of the falciform ligament are a rare cause of bowel obstruction in the general population [3]. Defects in the falciform ligament have ranged from a complete nonfixation or “free floating falciform” to small openings within the ligament. While most defects in the falciform have been attributed to congenital malformations, iatrogenic and traumatic injuries have been reported. In the adult population, defects in the falciform ligament associated with prior laparoscopic surgery have been described [5]. Trocar placement through the falciform as part of laparoscopic cholecystectomy and Nissen fundoplication have been implicated in the development of small bowel obstruction due to internal hernia [6]. Sykes et al. describe an internal hernia through the falciform ligament following blunt abdominal trauma in a pediatric patient causing bowel strangulation [7]. Although iatrogenic injuries to the falciform have not been described in children it should be considered as an etiology of bowel obstruction in a child with a prior history of abdominal surgery or trauma.

A literature search revealed only 7 cases of nonfixation of the falciform causing bowel obstruction in neonates [8–11]. Most commonly these internal hernias involve the small bowel, with two cases resulting in bowel atresia from in-utero obstruction [9,11]. Our case is one of two reports of nonfixation of the falciform involving the colon. Interestingly there have been two cases where nonfixation of the falciform has been associated with gastric antral obstruction and one case where this anomaly was discovered in a baby with pyloric stenosis [4,8]. Typically resolution of the bowel obstruction is accomplished by ligation and resection of the umbilical vein remnant.

Nonfixation of the falciform ligament is a rare anomaly that must be considered in the differential diagnosis of bowel obstruction when other identifiable causes are not encountered. If this abnormality is found incidentally we recommend resection of the umbilical vein to prevent future internal hernia or volvulus of the small bowel or colon.

Fig. 1. A. Congenital band extending from umbilicus to liver with colon volvulized around it. B. Detorsing the volvulized colon.

Fig. 2. Umbilical vein remnant retracted into the umbilicus.
References


