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Laparoscopic repair of bilateral inguinal hernias each containing sigmoid colon in a premature infant

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Abstract

Inguinal hernias are rare in the general population but are more frequently seen in premature infants. Risk factors include male gender, small for gestational age, low birth weight and respiratory distress. Infant inguinal hernias most frequently contain small bowel. Other contents can include the appendix and cecum, and rarely, the sigmoid colon. Sigmoid colon as content of inguinal hernia in children has only been reported twice in literature, and in both cases it was unilateral. We present the first reported case of bilateral inguinal hernias containing the sigmoid colon in a premature boy, who additionally had the appendix and the cecum in the right hernia. This is also the first reported laparoscopic repair of such a hernia.

Keywords

Inguinal hernia; Sigmoid colon; Laparoscopy; Pediatric surgery

1. Introduction

Inguinal hernias, although overall uncommon in children, are more frequently encountered in premature infants, with incidences as high as 30% reported [1,2]. Most incarcerations occur during the first year of life [3,4] and premature infants with inguinal hernias often undergo hernia repair prior to hospital discharge [5]. Inguinal hernias affect male children approximately six times more than females and occur on the right side in two-thirds of cases [6].

The most common content of the hernia is small intestine [7]. Other possibilities include the ovaries, fallopian tubes, urinary bladder, and the appendix may be found as content within an inguinal hernia [8]. Sigmoid colon as content of inguinal hernia has only been reported

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Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

Patient consent

Written informed consent to publish this case report was obtained from the patient's parents.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

in two pediatric patients in literature, and in both cases, the hernia was unilateral [4,7]. Although sigmoid is rarely reported as content of inguinal hernias, in cases of spontaneous or pre-operative manual hernia reduction, it can be difficult to know the hernia contents, which means the true incidence of each type of organ herniated may be higher than reported [7].

We present a case of a 3-month-old boy with a history of prematurity with bilateral inguinal hernias containing the sigmoid colon on both sides, as well as the appendix and the cecum on the right side. This is the first reported laparoscopic repair of such an inguinal hernia.

2. Case report

A 3-month-old boy with a history of prematurity was transferred to our institution for repair of bilateral inguinal hernias. He also required gastrostomy tube placement due to poor oral intake and nasogastric tube dependence. Prior to transfer, the patient spent 76 days at the referring hospital after being born at 29 weeks via emergency Cesarean section, weighing 635 g at birth. Prenatal and maternal history was significant for severe intrauterine growth restriction (IUGR), severe pre-eclampsia, and decreased fetal movement.

Shortly after birth, the patient was diagnosed with respiratory distress syndrome (RDS) and intubated for the first week of life. He was then extubated on day of life (DOL) 7 to continuous positive airway pressure therapy (CPAP) but required re-intubation due to sepsis from pneumonia and a urinary tract infection on DOL 20. He was subsequently extubated five days later. CPAP was discontinued at 37 weeks corrected gestational age, and the patient was weaned from respiratory support ten days prior to his transfer to our facility.

Bilateral inguinal hernias were diagnosed at 2 months of age by physical exam. There was no discoloration, and the groins did not appear tender on exam. An inguinal ultrasound done at the referring facility showed bilateral inguinal hernias measuring 1.5 cm in greatest dimension bilaterally with underlying peristaltic loops of bowel. The patient had no symptoms of intestinal obstruction.

Surgery for both bilateral inguinal hernias and gastrostomy tube placement was planned under the same anesthetic when the patient was 3 months old after he was transferred to our center (42 weeks corrected gestational age). His weight at transfer was 3.285 kg. He was placed under general anesthesia in a supine position. The peritoneal cavity was accessed via a transumbilical incision and a 5 mm port was placed to insufflate the abdomen to 15 mmHg. He was then placed in Trendelenburg position and a 5mm laparoscope was inserted. Bilateral inguinal hernias containing the sigmoid colon in both sides were noted (Fig. 1). Furthermore, the cecum and appendix were found on the right side. A stab incision was made in the left upper quadrant under direct visualization at the planned site for the gastrostomy tube placement. The sigmoid colon, cecum, and appendix were carefully reduced. The technique reported by Dutta and Albanese [9] was used to repair the hernia.

A Maryland grasper was used to cauterize the upper outer aspect of both internal rings, causing a scar reaction. A finder needle was used to identify the upper outer aspect of the right internal inguinal ring. The internal inguinal ring was encircled with 2–0

non-absorbable braided suture on a CT-1 needle, taking care to skip over the vas and spermatic cord vessels. The suture was then backed upon itself subcutaneously and brought out through a small nick in the skin. This was followed by a second pass to capture a small defect in the peritoneum. The repair was airtight, and the suture was tied down and skin released with skin hooks to bury the knot.

An identical repair was performed on the contralateral side. Both hernias were repaired successfully laparoscopically. Gastrostomy tube placement was then performed. Both procedures were uncomplicated, and the postoperative course was uneventful. The patient was discharged on the 6th post-operative day. At follow-up at 5 months of age, there had been no recurrence of either hernia.

3. Discussion

We present a case of a 3-month-old former 29-week premature boy with bilateral inguinal hernias containing sigmoid colon in both inguinal rings as well as the appendix and cecum in the right side. There are two other reported cases of sigmoid-containing inguinal hernias [4,7]. However, this is the first reported case of bilateral sigmoid-containing inguinal hernias. The hernias were successfully reduced and repaired laparoscopically.

Sigmoid colon-containing inguinal hernias are extremely rare. This case report represents the third known publication on such a hernia, and the first bilateral case. The first case was reported in 2006, which described a 1-year-old boy who presented with scrotal swelling and vomiting [4]. The second case of sigmoid colon as inguinal hernia content was reported in a 6-month-old full-term boy in 2012 [7]. The patient had groin and scrotal swelling and chronic constipation, but no overt symptoms of intestinal obstruction [7]. In both cases, the hernias were successfully repaired and the sigmoid was reduced [4,7].

In addition to the sigmoid colon, the patient in the case described here also had the appendix and the cecum located in the right inguinal orifice. Inguinal hernia containing the appendix is termed an Amyand hernia after the surgeon who performed the first successful appendectomy on a patient with an appendix-containing inguinal hernia [10,11]. Amyand hernias account for a rare subset of inguinal hernias, with prevalence ranging from 0.14% to 0.6% in the general population [12–14], and slightly higher in the pediatric population, reaching almost 1% [12,15]. They are naturally more likely to occur on the right side because of the anatomical position of the appendix and may carry the cecum or the ascending colon along with it, although there are some reports of left-sided Amyand hernias [3]. A potentially dangerous complication of the Amyand hernia is incarceration and potential appendiceal inflammation, resulting in appendicitis, although this is extremely rare [16]. A study by Cankorkmaz et al. on symptoms of Amyand hernias in male children with a median age of 40 days noted masses in the inguinal region and intestinal obstruction symptoms in almost all patients [17]. In the case presented here, there were no intestinal obstructive symptoms or evidence of appendiceal inflammation, possibly due to the large size of the hernial orifices.

There are several risk factors that contribute to the development of inguinal hernias. One of the most important variables predisposing to inguinal hernias is male gender [18], as many studies have found inguinal hernias to occur from three to eight times more frequently in men than women [6,19–21]. Another risk factor is prematurity. More specifically, inguinal hernias occur in 4–5% of full-term infants [22], while preterm infants have an incidence of 5–30% [1,23], with the incidence decreasing as gestational age increases [18]. Low birth weight can also predispose to the development of an inguinal hernia, with children weighing under 1000 g at higher risk [1,18,23,24]. Increased intraabdominal pressures, such as in cases of chronic lung disease or gastrointestinal dysfunction, can also lead to inguinal hernias [18].

Additional factors include RDS, days on mechanical ventilation, CPAP, and need for supplemental oxygen, as a proxy for severe lung disease [18,19,25]. Impaired nutritional status can also predispose to inguinal hernias, although it is likely that the factors that require infants to be placed on parenteral feeding may be responsible for hernia development, rather than parenteral feeding itself [18,26]. The patient presented here had several of these predisposing factors: male gender, prematurity, low birth weight, RDS, gastrointestinal dysfunction, prolonged hospitalization, and need for parenteral nutrition.

Once an inguinal hernia is identified, the standard of care is surgical repair. There have been debates regarding the timing of repair in neonates because of concerns about the impact of anesthesia on cardio-pulmonary function and neurodevelopment, however, a recent systematic review found no conclusive evidence of detrimental effects of a single short-duration anesthetic in early childhood [27]. Furthermore, there have been some reports of spontaneous regression around 6–9 months of age, however, that is more common in female patients, and can be followed by recurrence later in childhood [28]. Despite this, it is recommended to avoid delaying surgery because there may be a higher risk of incarceration with delay [19,29]. Repair of an incarcerated hernia is associated with complications including recurrent herniation, infection, and testicular/ovarian atrophy [29,30]. However, the optimal timing of neonatal inguinal hernia repair is an area of active research [31].

Surgical options for neonatal inguinal hernias include both open and laparoscopic repairs. Traditional open inguinal hernia repair, with high ligation of the hernia sac, remains the most commonly performed method of repair [32]. Laparoscopic repairs for inguinal hernia were first introduced in the 1990s [33,34] and have since become more commonly used because of potentially quicker recovery, decreased hospital length of stay, better wound healing, and ease of diagnosis and repair of any contralateral hernia during the index operation [34]. Additionally, similar recurrence rates have been found following both repair modalities in a meta-analysis of studies with an average follow-up of less than two years; the rates were 0–6.3% in open repair and 0–5.7% in laparoscopic repair [34]. The short follow-up is a significant limitation as most recurrences occur in the first 5 years [34,35]. However, a study of laparoscopic inguinal hernia repairs with a mean follow-up of nearly 6 years found a recurrence rate less than 1% [36]. Operative times are additionally similar for both types of repair, however, this differs for bilateral repairs, for which laparoscopic repair has a shorter surgery because a single access point is used [34,37]. Complication rates of bleeding, testicular atrophy, and hydrocele are similar in both repair types, although infections were

more common following laparoscopic repair, while ascending testis and metachronous hernia rates were higher in open repair [34]. In instances where the hernia is incarcerated, Abdulhai et al. describe the advantages of laparoscopic repair such as bypassing edematous tissue [38], avoiding cord structures, and visualizing reduction and the organ at the end of the procedure [29], which were utilized in the presented case.

A potential explanation for variation among outcomes following laparoscopic repair is different laparoscopic approaches that vary based on the number of ports, extraperitoneal or intraperitoneal access, and suture types [29]. For example, Kantor et al. reported that single-incision laparoscopic percutaneous extraperitoneal closure (SIL-PEC) had higher infection rates than three port approach or single-incision subcutaneous endoscopically assisted ligation (SEAL) technique [34]. To better understand the advantages and disadvantages of laparoscopic repair, studies are needed to address follow-up times, variation in laparoscopic techniques, and differences in skills of surgeons performing the procedure.

4. Conclusion

Bilateral inguinal hernias, although uncommon in the general population, are more prevalent in premature infants. Finding intraabdominal contents within inguinal hernias is rare, but it is especially unusual to find the sigmoid colon in these hernias. Inguinal hernias are not always symptomatic, so it is important to know the risk factors that predispose patients to them, such as male gender, low gestational age, low birth weight, and respiratory distress. Treatment options include open and laparoscopic repair, with the latter rising in prevalence, especially for bilateral hernias.

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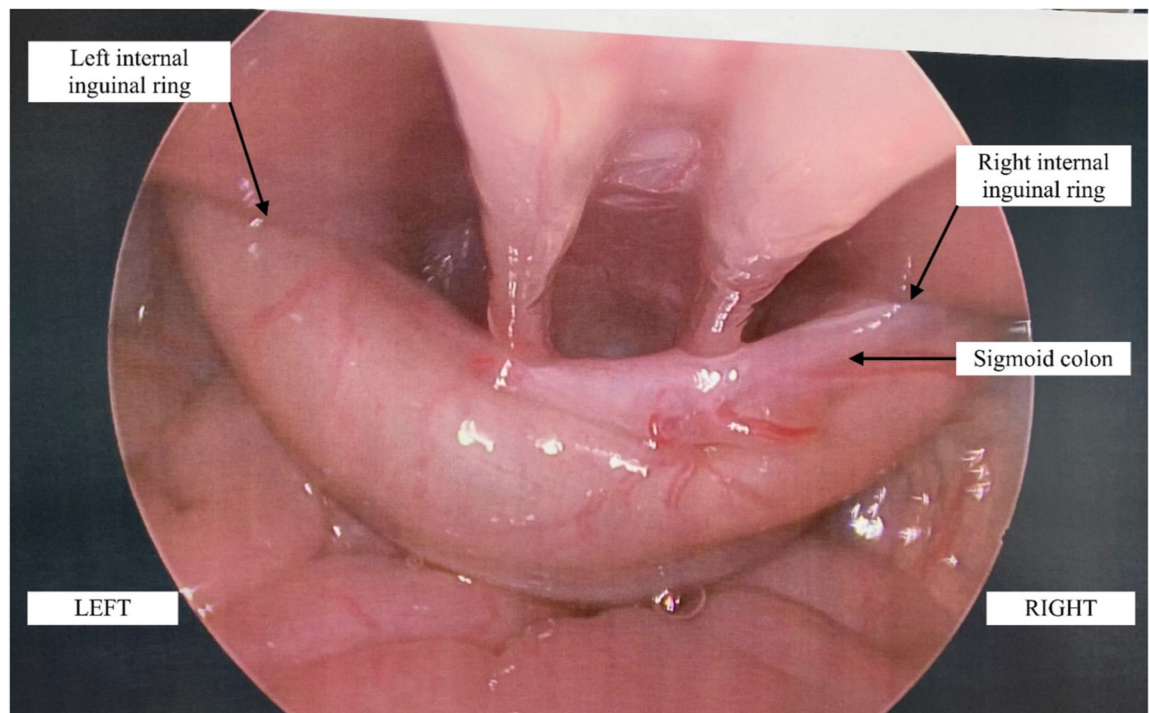


Fig. 1. Intraoperative appearance of bilateral inguinal hernias containing the sigmoid colon on each side. View is looking down into the pelvis.