Laparoscopic-assisted repair of Morgagni–Larrey hernia by anterior abdominal wall fixation technique: a report of two cases

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Various techniques have been described to repair Morgagni–Larrey hernia. There is still concerns on the sufficiency of a simple laparoscopic anterior abdominal wall fixation. We aim to report of two children undergoing the laparoscopic-assisted anterior abdominal wall repair for Morgagni–Larrey hernia, and to discuss this method. *Ann Pediatr Surg* 11:30–32 © 2015 Annals of Pediatric Surgery.

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Introduction

Morgagni–Larrey hernia (MLH) is uncommon and accounts for less than 6% of all diaphragmatic hernias [1–5]. It is usually situated in the right side. Patients with MLH are often asymptomatic and diagnosed incidentally by a chest radiograph. Surgical repair is inevitable when respiratory symptoms are present, although the risk for intestinal incarceration is rare. The conventional repair of MLH is performed either by transabdominal or transthoracic route; however, recently, laparoscopic or thoracoscopic approaches have been described, each of which is stronger and less invasive [1–5]. One of them is laparoscopic-assisted technique, in which is the fixation of the diaphragm to the anterior abdominal wall, with extracorporeal knot tying [1]. In this paper, we aimed to present two children undergoing laparoscopic-assisted anterior abdominal wall fixation for MLH repair and to discuss the sufficiency of this method.

Case report

Case 1

A 4-year-old boy with trisomy-21 had shown the presence of bowel loops in the right thoracic cavity incidentally in a chest radiograph obtained for respiratory disease. He had been admitted several times to another hospital as a case of respiratory disease before he was referred to us for further management. Physical examination on admission revealed normal vital signs and a mild decreased breath sounds on the right base side of the chest. Laboratory test showed that the patient was mildly anemic (9.8 g/dl). A computed tomography (CT) showed that this mass was the part of the transverse colon in a MLH. An informed consent was obtained from the parents. The patient was properly prepared for elective laparoscopic hernia repair with mechanic colon emptying.

Case 2

A 7-year-old boy was referred to our Department for management of MLH, which was diagnosed incidentally during the workup for repeated respiratory infections in the Department of Pediatrics of our hospital. Physical examination only revealed mildly reduced respiratory sounds in the right lower hemithorax. Hematologic tests were normal. Chest radiography showed an unusual air shadow in the lower right chest. CT confirmed a MLH containing the loops of intestine in the hernial sac. We decided to perform elective surgery on the basis of his history of respiratory symptoms. An informed consent was obtained from the parents before surgery.

Laparoscopic procedure

Following the introduction of general anesthesia, a nasogastric tube was placed, and the patient was placed in the supine position. The surgeon stood on the patient's left side and the assistant and scrub nurse stood on the right. The monitor and laparoscopy rack were placed on the left side of the patient's head. A pneumoperitoneum was established through an intraumbilical inserted Veress needle with CO_2 insufflation up to 10 mmHg. A 5 mm umbilical trocar was placed for an angled 30° telescope. Two additional 3 mm working ports were also placed to both sides of the midclavicular lines in the subcostal area under direct endovision. Finally, the patient was placed in the 30° reverse Trendelenburg position. The herniated bowels were gently pulled down and the falciform ligament was taken down with hook electrocautery dissection to allow better demonstration of the margins of the diaphragmatic defect (Fig. 1a and b). The hernia sac was not removed. Three interrupted figure-of-eight sutures of 2-0 polypropylene (Ethicon; Johnson–Johnson, Brussels, Belgium), passing twice through the skin, were placed at the posterior margin of the defect to close strongly (Fig. 1c), so that the ends of the sutures remained outside the abdomen. The intra-abdominal pressure was then lowered, and the sutures tied on the skin, thus closing the diaphragmatic defect, as could be confirmed under direct laparoscopic visualization (Fig. 1d). The technique of hernia defect is illustrated in Fig. 2. The nodes were embedded into subcutaneous area. No chest tube or intra-abdominal drain was placed.

The operations were completed successfully, with no intraoperative complications. The mean operative time was about 45 min. Oral feeding was initiated within 6 h following surgery, and patients were discharged on the third postoperative day. At 1, 2, 6, 12, and 24 months

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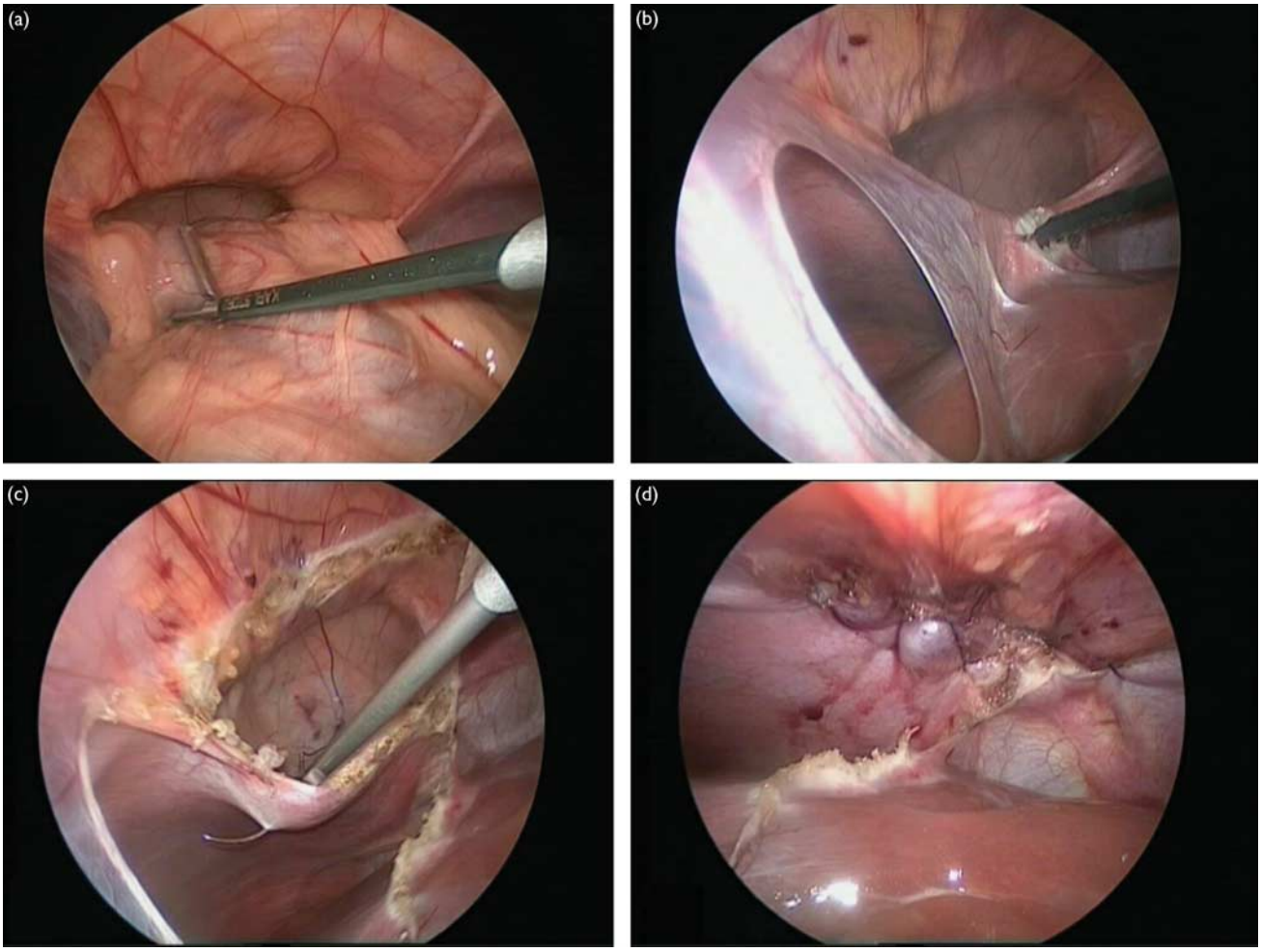
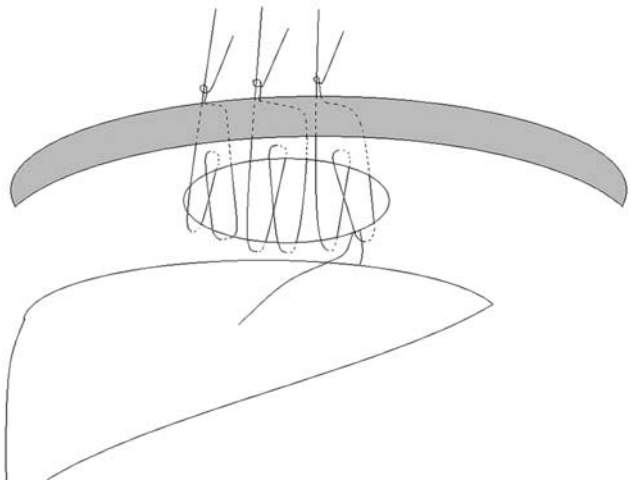
Fig. 1



(a) Laparoscopic view showing the omentum and transverse colon in the Morgagni–Larrey hernia. (b) After reducing the hernia content, the falciform ligament is divided using electrocautery to allow better visualization of the margins of the defect. (c) The posterior rim of the defect is sutured to the anterior abdominal wall using laparoscopic needle holder. (d) Laparoscopic view of complete repair of defect.

Fig. 2



Suture technique illustrated.

follow-up visits, the patients were asymptomatic, and no recurrence of MLH was seen. All nodes have been spontaneously buried into the subcutaneous space.

Discussion

Hernia of Morgagni was first described by Giovanni Battista Morgagni; muscular defect seen in this type of hernia occurs through a weakness in the anterior fibers of the diaphragm between its costal and sternal part, in the muscle-free triangular space called the Larrey space [6].

MLH is uncommon at any age, more prevalent in female patients, and occurs ~90% in the right side; 8% are bilateral and only 2% are limited to the left [7,8]. Patients with Down's syndrome have increased risk for MLH [9]. Most patients with MLH are asymptomatic, and others present with gastrointestinal symptoms and signs such as pain or constipation [2]. In contrast, 55% of MLH in children usually present with recurrent chest infections [9,10]. Rarely, MLH may present with complete obstruction, incarceration, or strangulation with necrosis of a hollow viscus contained in hernia sac [2]. Our patients had respiratory symptoms depending on the recurrent pulmonary infections. One patient had the primary diagnosis of trisomy-21 with accompanying repeated respiratory disease.

MLH may be incidental during investigation for respiratory diseases, but the diagnosis must be confirmed by contrast gastrointestinal studies or CT in suspected cases.

The use of the CT as a diagnostic tool in patients with MLH has increased the reliability of preoperative diagnosis [8,10]. In the present report, the diagnosis of MLH was incidental in two cases during the evaluation of respiratory disease and was confirmed by CT in both.

Although most of the patients are asymptomatic, surgical treatment is recommended to prevent possible future complications [11]. The standard procedure of MLH repair consists of transabdominal, or rarely transthoracic, reduction of the hernia contents and excisions of the hernia sac followed by closure of the defect with or without a prosthetic mesh [2]. With the advances in laparoscopic surgery, Kuster *et al*. [12] reported the first experience with laparoscopic repair of MLH, and Georgacopulo *et al*. [13] also reported the first successful laparoscopic repair in a child in 1997. Subsequently, several articles have been published about the advantages of minimally invasive procedures than traditional open surgery, including less discomfort, quicker recovery times, and better outcomes.

Different minimal-invasive procedures were used – for example, primary suture closure, the use of staples, patch repair, or full-thickness anterior abdominal fixation techniques [1,14,15]. In addition, various endoscopic suture techniques have also been reported to allow maximum strength of repair, including an intracorporeal continuous suturing, interrupted suturing, or the laparoscopic-assisted extracorporeal interrupted suturing technique [1–5]. The laparoscopic interrupted or continuous suture technique to repair MLH may be complicated, because it is difficult to knot intracorporeally, and the anterior rim of the defect is less evident in most MLH cases [4]. Newman *et al*. [14] described a laparoscopic-assisted extracoporeal suture technique for closure of the defect using Keith or Reverdine needle as minimally invasive. Azzie *et al*. [1] described a simple and easy technique – that is, to pass the sutures through the posterior rim of the defect and full-thickness anterior abdominal wall and tie the knots extracorporeally in the subcutaneous tissues. In laparoscopic-assisted technique, the extracorporeal stitches are used to decrease tension on the sutures, facilitating the placement of the intracorporeal stitches [5]. In our cases, the MLH was repaired by three nonabsorbable sutures, passing twice from the posterior rim of the defect (figure-of-eight).

Because of the rarity of MLH, it is difficult to decide whether laparoscopic-assisted anterior abdominal wall fixation is sufficient for definitive treatment in children with MLH. In the reported pediatric studies using same method, the defects have been sutured using the laparoscopic-assisted method with laparoscopic needle holder, and the knotting performed as extracorporeally; outcomes were uneventful in all, as in our cases [1,4,11,16–19]. We believe that laparoscopic-assisted anterior abdominal wall fixation technique has several advantages over the others: the borders of the defect could be seen clearly with increased intra-abdominal pressure; hernia content could be removed easily; only strong part of the hernia defect is the posterior rim, and it could be fixed to the anterior abdominal wall only; the figure-of-eight suture and extracorporeal knotting have provided closure of the defect tightly and strongly; and the closure of the defect was confirmed visually.

The issue of removing the sac in the treatment of MLH is still controversial. Some authors advise removing of the hernia sac so as not to leave an endothelial-lined cavity and fluid accumulation in the remaining sac, but others prefer to leave the sac because of the risk for complications such as pneumomediastium and/or pneumothorax, bleeding, or pericardial injuries [1–5,9,19]. Although, we have not attempted to remove a hernia sac, we thought that removing the sac would depend on the experience of the surgeon and the presentation of the patient. However, an attempt to remove the sac is in contrast to practice minimally invasive approach. Any recurrence or residual cavity has not been reported in the long-term follow-up.

Laparoscopic-assisted repair of MLH in children can be easily performed using anterior wall fixation method that allows an excellent view of the defect, provides a safe repair with minimal trauma, and also allows a fast recovery of the children.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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