

Minimally invasive Morgagni-Larrey hernia repair in children

A new and simple trick in suturing technique

**A. L. Bulotta F. Torri M. Garcia G.
Giannotti M. L. Brena M. Cheli D. Alberti**

Table of Contents

1. INTRODUCTION	1
2. MATERIALS AND METHODS	2
3. RESULTS	4
4. DISCUSSION	4
5. CONCLUSIONS	5

ABSTRACT

Background: Literature is littered with descriptions of the minimally invasive repair of Morgagni-Larrey hernias in children. However, there are few reports about the diaphragmatic defect suture. The aim of this study is to describe a simplified trick to perform a simple and safe suturing technique.

Methods: 2 children with left Morgagni-Larrey hernia underwent primary laparoscopic repair. The closure of diaphragmatic defect was performed by several simple interrupted sutures. An i.v. needle cannula was adopted like a track for returning back out of the suture, though the anterior abdominal wall at 3 mm distance from the site where the stitch is placed according to a U configuration.

Results: No cases required open conversion. No complications and hernia recurrences were observed.

Conclusions: Our suturing technique simplifies the surgical gesture, improves operative time and assure a safe, effective and nice cosmetic result. Furthermore, it is easily reproducible by every surgeons and it may be also used in similar operations.

1. INTRODUCTION

Morgagni-Larrey Hernia (MLS) is a congenital retrosternal diaphragmatic defect making up about 5% of all diaphragmatic hernias. Generally its clinical presentation is tardive with a high rate of incarceration. Because of this, age of children at surgical treatment is older compared to Bochdaleck hernia (1).

The evolution of minimally invasive surgery allowed to adopt this approach also to treatment of MLS. Since the first report by Georgacopulo et al in 1997 there have been many

improvements in the laparoscopic techniques, but difficulties about defect closure in a narrow working space are still the critical point of the available techniques (2, 3).

This report describes a simpler, alternative and safe method of suturing technique we adopted in two patients affected by MLS.

2. MATERIALS AND METHODS

Records of 2 children who underwent laparoscopic repair for MLS between January 2010 and January 2015 were retrospectively reviewed. Data gathered included age, sex, body weight, clinical presentation, way of diagnosis, hernia contents, operative details, hospital stay, complications, follow-up and outcome.

Technique

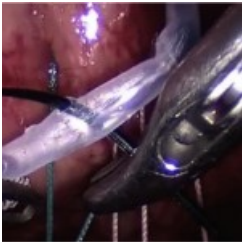


Fig. 1 The cannula is kept steady by the 3 mm grasper and pierced by the needle.

Under endotracheal general anesthesia, the patient is placed supine with legs extended on an abducted leg support and in a 30° reverse Trendelenburg position. The surgeon stands between the legs of the patient, the assistant to the right of the surgeon and the scrub nurse on the left.

The first 5 mm trocar is inserted infraumbilically with an open technique. Pneumoperitoneum is achieved up to 9-10 mmHg, 1 l/min. A 30°, 5 mm telescope is inserted into the port to confirm the diagnosis. One 3 mm and one 5 mm trocar are inserted respectively in right and left subcostal space, lateral to the rectus muscle. After gently reduction of the herniated contents into the abdomen, confirmation of the anterior diaphragmatic defect together with a proper evaluation of its location and size are done. By the hook, the posterior rim of the defect is freed from the overlying peritoneum and in addition, the hernia sac should be circumferentially excised too.

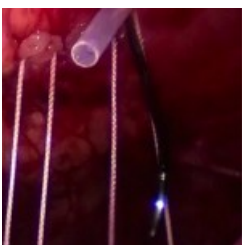


Fig. 2 The cannula is pulled out dragging the stitch along together with its attached needle.

A transverse 10 mm skin incision is made in the epigastric region and the subcutaneous tissue is circumferentially dissected from the rectus muscle fascia; that allows to extend further laterally the stitch placement. For suturing the diaphragmatic defects we use 2/0 Ethibond stitches (Ethicon, Johnson and Johnson, Sommerville, NJ) as anchoring sutures. Under laparoscopic view, the first needle stitch is placed from the outside of the abdomen, at the right corner of the epigastric skin incision, across the abdominal wall. Once inside the

peritoneal cavity, the needle is picked-up by the laparoscopic needle holder and the posterior rim of the diaphragmatic defect is then transfixed. A-18-gauge i.v. Needle cannula is passed at 3 mm distance from the stitch entry at the rectus muscle fascia, crossing the abdominal wall, up into the peritoneum.

After that, the steel stylet is withdrawn, leaving only the cannula. Inside the abdomen the cannula is kept steady by the 3 mm grasper, pierced by the needle (Fig 1) and eventually pulled out, dragging the stitch along together with its attached needle (Fig 2).



Fig. 3 The technique allows precise multiple suture placement in a U configuration.

The procedure is repeated as much as needed at different sites of the epigastric skin incision moving from the right towards the left side of the incision. This technique allows precise multiple suture placement in a U shape (Fig 3).

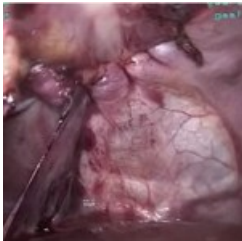


Fig. 4 The laparoscopic view confirms the complete closure of retrosternal defect.

After positioning several stitches, they are closed with knots tied over the rectus muscle fascia and buried in the subcutaneous tissue. The laparoscopic view confirms the complete closure of the retrosternal defect (Fig 4).

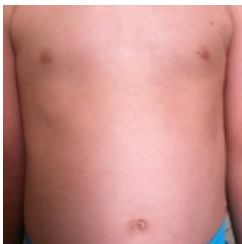


Fig. 5 Postoperative result after 2 years revealed a nice cosmetic aspect of the surgical incisions.

Trocars are removed, the epigastric skin incision is closed by Vycril 5/0 intradermic suture, glue is used for the remaining skin incisions at trocar sites (Fig 5).

3. RESULTS

Between January 2010 and January 2015, two male children were admitted to our department of pediatric surgery with a diagnosis of MLH. The first patient was presented with recurrent respiratory infection while the second one for a persistent epigastric bulging. In both cases, diagnosis was done by chest X ray followed by and a barium enema showing the herniation of the transverse colon in the left anterior mediastinum.

Their mean age was 26 months (4 – 48 months).

The transverse colon in both patients and some jejunal loops in the first one were found to be herniated into the thorax. The hernia sac was left in place in the first patient and removed in the second one.

Operative time was 120 min and both patients were extubated at the end of the procedure. They were fed in first post-operative day and discharged home on postoperative day 2.

There were no intraoperative or postoperative complications (Clavien II or greater). At 2 and 5 years, patients are doing well with no MLH recurrence.

4. DISCUSSION

MLH is an anomaly of the sternal insertion of the diaphragmatic bundles which results in congenital retro-sternal-xyphoid opening.

Generally there is a female predominance and the majority of patients are symptomatic. The most common symptoms are upper abdominal complaints and respiratory difficulties (1).

Still nowadays, MLH is repaired mostly by an open abdominal approach (4, 5), but the advent of laparoscopy revolutionized the treatment because it increases the precision of the repair, decreases postoperative pain and wound complications reduces the hospital length of stay and gives better cosmetic results (1, 6, 7).

Currently the technique for the defect closure is still debated. Some surgeons choose to close it primarily with a continuous suture, others prefer to use interrupted nonadsorbable suture or both (8, 9). In agreement with some Authors, in our patients we performed an interrupted nonadsorbable full thickness suture of the posterior rime of the diaphragmatic defect in the abdominal wall, with knots extracorporeally tied over the rectus muscle fascia and buried into the subcutaneous tissue.

However the laparoscopic procedure has a major drawback: as extracorporeal knot tying is considered the best way to repair the diaphragmatic defect (9), it might be very challenging to exit from the planned point in the anterior abdominal wall while passing the U-shaped sutures. For this reason some authors described the use of an epidural needle with a silk suture inserted to form a loop (10, 11). Others authors used a 16 gauge needle like to guide out the suture needle tip through the anterior abdominal wall (4). More of these experiences are reached in the adult population. In fact, in pediatric age, there have been not many reports regarding the suture technique in laparoscopic repair of MLH (4,10,11).

Because of this we elaborated a new trick simplifying the procedure. In fact, thanks to the use of a i.v. needle cannula instead of the above mentioned reported tricks (4,10,11), we were able to pull out the stitches much more easily and just exactly at the planned point of anterior abdominal wall we want they were. That reduces the operative time because it is a simple

surgical gesture that allows placing the suture in a symmetrical way guaranteeing an excellent closure of the diaphragmatic defect.

5. CONCLUSIONS

Based also on our experience, we think that for its rapid recovery, shorter hospital stay and lesser tissue trauma compared with the traditional open approach, laparoscopy could be considered the first choice for surgical treatment of MLH. In comparison to others, our laparoscopic technique for MLH reduces the operative time, assures a nice cosmetic result, but above all it can be easily performed by every not a particularly skilled laparoscopic surgeon. Finally, it may be also used in similar operations.

References

1. Lima M., Dòmini M., Aquino A. Laparoscopic Treatment of Morgagni-Larrey Diaphragmatic Hernia. *Endoscopic surgery in infants and children* 558–56, 2008.
2. Van der Zee DC, Bax NMA, Valla JS. Laparoscopic repair for diaphragmatic conditions in infants and children. In: Bax NMA, Georgeson KE, Najmaldin A, Valla JS (eds) *Endoscopic Surgery in Children*. Springer, Berlin, 323–328, 1999.
3. Georgacopulo P., Franchella A., Mandrioli G et al. Morgagni-Larrey hernia correction by laparoscopic surgery. *Eur J Pediatr Surg* 7:241-242, 1997.
4. Azzie G., Maoate, K., Beasley S., Retief W., Bensoussan A. A simple technique of Laparoscopic full-thickness anterior abdominal wall repair of retrosternal (Morgagni) hernias. *J Ped Surg* 5:768-770, 2003;
5. Taha Alkhatrawi, Radi Elsherbini and Djamel Ouslimane. Laparoscopic repair of Morgagni diaphragmatic hernia in infants and children: do we need to resect the hernia sac? *Annals of Pediatric Surgery* 8:1:1-4, 2012.
6. Arca MJ, Barnhart DC, Lelli JL, et al Early experience with minimally invasive repair of congenital diaphragmatic hernias: results and lessons learned. *J Pediatr Surg* 38:1563–1568, 2003.
7. Hussong RL, Landreaneau RJ, Cole FH. Diagnosis and repair of a Morgagni hernia with video-assisted thoracic surgery. *Ann Thorac Surg* 63:1474-1475, 1997.
8. Van De Winkel N, De Vogelaere K, De Backer A, Delvaux G Laparoscopic repair of diaphragmatic Morgagni hernia in children: review of 3 cases. *J Pediatr Surg* 46(2):23-6, 2011.
9. Adrian Park, Courtney Doyle. Laparoscopic Morgagni Hernia Repair: How I do it. *J Gastrointest Surg.* 18;1858-62, 2014.
10. Ayman Al-Jazaeri. Simplified technique for minimally invasive repair of congenital diaphragmatic hernia using hollow-needle snare and transthoracic traction stitches. *J Ped Surg* 47:258-63, 2012.
11. Akkoyun I., Kececioglu M. A new, easy, and safe suturing technique for laparoscopic repair of Morgagni hernias. *J Ped Sur* 47:1626-28, 2012.