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Clinical Case Seminar CCS1 (1-5)

Robotic approach to Morgagni-Larrey hernia in pediatric surgery: a case report

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Abstract

Morgagni-Larrey hernias represent a subgroup of Congenital diaphragmatic hernias (CDHs), involving the anterior part of the muscle. They are complex developmental defects often representing a diagnostic and treatment challenge for both pediatricians and pediatric surgeons.
We report our first case of a robot-assisted laparoscopic repair of a Morgagni hernia in an 8.3 kg 14-month-old girl with the use of the Da Vinci® Surgical System (Intuitive Surgical®, Sunnyvale, CA, USA).

KeyWords: Morgagni; Larrey; hernia; diaphragm; congenital; child

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Introduction

Congenital diaphragmatic hernias (CDHs) are complex diaphragmatic developmental defects that often represent a diagnostic and treatment challenge for both pediatricians and pediatric surgeons. According to the fact that the defect involves the posterior or the anterior part of the diaphragmatic dome, we classify CDHs in Bochdalek (more than 90% of cases) and Morgagni hernias (around 2%), respectively (1).

We report our first case of a robot-assisted laparoscopic repair of a Morgagni hernia in an 8.3 kg 14-month-old girl with the use of the Da Vinci® Surgical System (Intuitive Surgical®, Sunnyvale, CA, USA).

Case report

An 8.3 kg 14-month-old girl born from an uncomplicated pregnancy hesitated in a caesarean section (birth weight 2.8 kg).

She was brought to the attention of Paediatric Gastroenterology Department of our centre because of the suspicion of a Gastro-Esophageal Reflux Disease (GERD).

No previous gastrointestinal-diseases family history or personal anamnestic perinatal anomalies were reported. The girl was exclusively breastfed until weaning, carried out at the age of 4 months. National program of vaccination was fully respected up to the day. Stature and ponderal growth were documented to be regular.

Since the first days of life, the child claimed daily gastric appearance vomiting episodes occurring within 30 minutes from the meal, without any other associated symptoms. Since she was 5-month-old, supplementation with food thickeners was started with mild reduction in episodes frequency; a Proton Pump Inhibitors therapy was also undertaken.

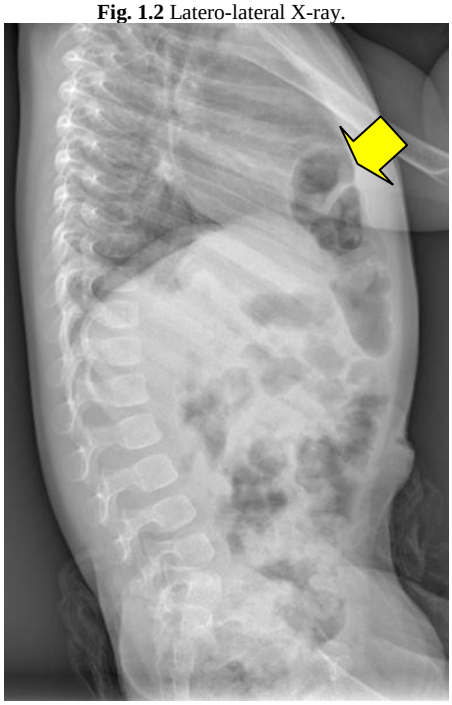
For six weeks, parents referred a progressive refusal of food with a slowdown in growth curve.

Physical examination reported no noteworthy anomaly, except for slight skin dehydration and hypo-elasticity.

Radiological investigations were so performed. Complete abdominal US primarily put the suspicion and esophageal-gastric-duodenal transit study (Figg. 1-2) confirmed the herniation of a great part of transverse colonic segment toward the chest cavity, occupying the precordial space, in the median anterior part, establishing the diagnosis of a Morgagni-Larrey hernia. No alteration in stomach site, tone and emptying was described. No other anatomic anomaly concerning duodenum, cecum or parenchymatous organs was reported. Mild gastro-esophageal reflux was documented.

Fig. 1.1 Antero-posterior X-ray.

Fig. 1.2 Latero-lateral X-ray.



A robot-assisted laparoscopic repair of the diaphragmatic defect was discussed with parents and decided. Informed consent was obtained from the child's parents. The statements of the 1964 Declaration of Helsinki were followed.

On the operating table, the patient was placed in a supine position. A mini-laparotomy umbilical incision was performed, an 8 mm 30° laparoscope was introduced. Twelve mmHg CO_2 pneumoperitoneum was established, and two other 8 mm trocars as working ports were placed along the transverse umbilical line, crossing with right and left mid-clavear line respectively. Da Vinci® Surgical System docking was accomplished. To the abdominal cavity inspection, the antero-median side of the diaphragmatic dome showed a serosa-covered orifice, with no anatomic structure engaged inside because of a spontaneous emptying.

Fig. 2.1. Antero-posterior X-ray with contrast

Fig. 2.2. Latero-lateral X-Ray with contrast

The surgeon utilized 8-mm robotic scissors, DeBakey forceps, and robotic needle driver. The hernia sac was not resected. Diaphragmatic orifice margins were cruented and, through an interrupted 2–0 non-absorbable Prolene® (Ethicon, Inc., Johnson & Johnson Int., NJ, USA) suture, the breach was closed, employing an intracorporeal sliding knot tying technique.

Once reviewed the cavity and checked the hemostasis, de-docking procedure was realized, and the abdominal wall was sutured.

Robotic surgery system set up required 15 minutes. Total operating time (skin-to-skin) attests on 45 minutes.

The patient was discharged home after 24 hours from surgery on a regular diet.

Oral contrast medium X-ray control (Fig. 3) was executed as a follow-up at about one month and it showed no recurrence of the hernia.

Fig. 3 Post-operative X-Ray control

Discussion

Morgagni-Larrey hernia repair needs a single-case tailored strategy, taking into account the size and the precise site of the defect, despite of the grade of integrity of the remaining diaphragmatic muscle.

Two of the most important aspect to consider are represented by the feasibility of a CDH repair with or without a patch and the possibility to resect the hernia sac without injuring the surrounding structures.

The extreme variability of procedure which intercourse during surgery make impossible to establish a "gold standard technique".

In 1992, a report of a laparoscopic repair of a Morgagni hernia was first published (4); to have a report of a repair in a child, we had to wait until 1997 (3). The first laparoscopic surgery for CDH in a child without the use of a patch was reported in 1998 (2). Since that year, we could find multiple case reports about laparoscopic approach of Morgagni-Larrey hernia.

Luebbe et al. (6) in 2003 first report a Da Vinci® system -assisted laparoscopic Morgagni hernia repair in a 50 kg, 10-year-old pediatric patient (5). Since then, very few other cases was reported.

The setting up the Da Vinci® system in the operating room required 15 minutes, which consequently make the total operating time increase.

The effective operating time involves the trocars placing and the robot docking, the console

operating time and the wound closure time.

The Da Vinci® system instruments tremor filtration and extra range of motion could surely facilitates suturing the defect, even without the use of a patch, while an improved expertise of the surgeon could potentially reduce the operating time compared to standard laparoscopy procedures.

In conclusion, we report a case of robot-assisted laparoscopic primary repair of a Morgagni-Larrey hernia in a 8.3 kg 14-month-old girl with the Da Vinci® Surgical System.

According to our initial experience and the very few reports in literature we can confirm the feasibility of CDH robot-assisted repair even in small children, below 10 kg. It is still to be seen if there is a measurable outcome advantage deriving from using a robotic surgery system for this kind of repairs compared to the traditional laparoscopic technique.

Conflicts of interest: The authors declare no conflict of interest.
Informed consent: The parentsauthorized the publication of the clinical records and imaging.

References

1. Al-Salem A. H. (2007). Congenital hernia of Morgagni in infants and children. Journal of pediatric surgery, 42(9), 1539–1543. https://doi.org/10.1016/j.jpedsurg.2007.04.033

2. Becmeur, F., Chevalier-Kauffmann, I., Frey, G., & Sauvage, P. (1998). Traitement laparoscopique d'une hernie de Morgagni chez l'enfant. A propos d'un cas, et revue de onze observations dans la littérature adulte [Laparoscopic treatment of a diaphragmatic hernia through the foramen of Morgagni in children. A case report and review of eleven cases reported in the adult literature] Annales de chirurgie, 52(10), 1060–1063.

3. Georgacopulo, P., Franchella, A., Mandrioli, G., Stancanelli, V., & Perucci, A. (1997). Morgagni-Larrey hernia correction by laparoscopic surgery. European journal of pediatric surgery: official journal of Austrian Association of Pediatric Surgery ... [et al] = Zeitschrift furKinderchirurgie, 7(4), 241–242. https://doi.org/10.1055/s-2008-1071103

4. Kuster, G. G., Kline, L. E., & Garzo, G. (1992). Diaphragmatic hernia through the foramen ofMorgagni: laparoscopic repair case report. Journal of laparoendoscopic surgery, 2(2), 93–100. https://doi.org/10.1089/lps.1992.2.93

5. Anderberg, M., Kockum, C. C., & Arnbjornsson, E. (2009). Morgagni hernia repair in a small child using da Vinci robotic instruments--a case report. European journal of pediatric surgery: official journal of Austrian Association of Pediatric Surgery - Zeitschrift fur Kinderchirurgie, 19(2), 110–112. https://doi.org/10.1055/s-2008-1038500

6. Luebbe, B.N., Woo, R., Wolf, S.A.,& Irish, M.S. (2003). Robotically assisted minimally invasive surgery in a pediatric population: initial experience, technical considerations, and description of the da Vinci Surgical System. Pediatr Endosurg Innovat Tech 2003; 7: 385–402http://doi.org/10.1089/10926410332261426.

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