

Laparoscopic treatment of type III para-oesophageal hernia

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Summary

Type III congenital para-oesophageal hernia is a rare condition in children and is characterised by the herniation of both a substantial portion of the stomach and the gastro-oesophageal junction into the chest. This report describes the laparoscopic repair of 4 para-oesophageal hernias in children between 2002 and 2010. All hernias were treated successfully using the laparoscopic method. There were no recurrences. The laparoscopic repair of a para-oesophageal hernia is technically challenging, but is feasible and safe in the hands of paediatric surgeons familiar with laparoscopic anti-reflux surgery.

Congenital type III para-oesophageal hernia is a very rare condition characterised by the herniation of both a substantial portion of the stomach and the gastro-oesophageal junction into the chest.¹⁻³ This abnormality can be explained on an embryonic basis, the presence of a right pneumoenteric recess or an abnormality of the lumbar component of the diaphragm, which developed from the mesoderm around the aorta.⁴ Most patients are symptomatic and present with vomiting and reflux symptoms, or acute complications which include volvulus, perforation and bleeding.^{1,5} Surgery is always indicated, either to prevent complications or to treat symptoms. Since this is a rare problem, few reports have been published on the laparoscopic technique. We present our experience in the laparoscopic treatment of 4 patients with type III para-oesophageal hernias. Between 2002 and 2010 we conducted 4 laparoscopic repairs in children with type III para-oesophageal hernias. There were 3 boys and 1 girl. Two of the patients were neonates, and the other 2 were aged 10 and 12 months, respectively. One of the patients had an associated Pierre Robin syndrome. The neonates presented with vomiting and the other 2 with chronic lung problems secondary to reflux.

Surgical procedure

The patients were placed in a supine position. Five 3 mm or 5 mm ports were used, depending on the size of the babies. In all the patients the stomach was incarcerated in the chest. Partial organo-axial volvulus was present in 2 patients. The operation was started by pulling the stomach into the abdomen. The hernia sac was then removed from its attachments and resected. Extensive mobilisation of the oesophagus was necessary in order to place the gastro-oesophageal junction 2 - 3 cm below

the diaphragm. No short oesophagus was present in any of our patients.

Reconstruction of the hiatus was done by approximating the left and right crura posteriorly with interrupted Ethibond sutures. In all cases the crura were flexible and could be closed without excessive tension. Two to four sutures were placed between the oesophagus and the left and right crura to prevent the stomach from migrating back into the mediastinum. Because of the mobility of the stomach, it was not necessary to ligate the short gastric vessels.

A retro-window was developed through which the fundus was pulled. A 2 - 3 cm wrap was formed around an intra-oesophageal stent and secured with 2 - 3 non-absorbable sutures. We did not fix the wrap to the crura or the oesophagus. We also placed sutures between the oesophagus and the crura to secure the oesophagus in the intra-abdominal position and obliterate the space between the oesophagus and the crura to prevent migration of the wrap into the chest.⁶

An anterior gastropexy was performed in 3 patients to prevent recurrence of the hernia and volvulus of the sometimes very mobile stomach, and a gastrostomy in 1. Two small stab incisions were made in the anterior abdominal wall. Two non-absorbable sutures were placed through the abdominal wall and the anterior gastric wall. The suture was grabbed with a wound closure device and pulled to the outside, tied extracorporeally and buried in the subcutaneous tissue. Care was taken not to place the sutures too close to the wrap to prevent any tension on the wrap.

Results

Operative time ranged from 95 to 125 minutes. There were no intra- or postoperative complications. No blood transfusions were necessary. Oral feeds were started within 6 hours postoperatively. Three patients were discharged on the 3rd postoperative day. The 4th patient, with Pierre Robin syndrome, remained in hospital for 24 days because of problems not related to the laparoscopic surgery. Postoperative follow-up ranged from 4 months to 8 years. No symptomatic or radiological recurrence has occurred.

Discussion

Laparoscopic repair of para-oesophageal hernia is established in adults, but the literature in children is limited and several issues regarding operative technique are unresolved. There is a high rate of recurrence, with an incidence of 10 - 40% in adults with both open and laparoscopic approaches,^{2,7} and many techniques

have been developed to reduce this. These include anterior gastropexy, gastrostomy, fixation of the fundoplication and different techniques of crural repair.^{2,8,9}

It is important to remove the sac to facilitate proper closure of the hernia. Its removal also prevents traction on the stomach that might lead to recurrence. Care must be taken not to injure the vagus nerve, blood vessels or pleura. The laparoscopic method provides excellent vision to identify these structures.^{9,10}

To prevent undue angulation of the oesophagus, anterior crural sutures can be placed to close the defect. It is important not to damage the peritoneal layer on the crura during initial dissection, as this layer adds strength to the repair. Prosthetic material to close the defect was not needed in any of our patients. Serious complications (stricture, or erosion into the oesophagus) have been described with the use of prostheses, and many surgeons are reluctant to use them. The new types of biosynthetic mesh should cause less oesophageal injury.¹¹

A high incidence of gastro-oesophageal reflux is present in patients with type III hernias, and an anti-reflux procedure is essential.¹² This is supported by Yazici *et al.*¹³ and Karpelowsky *et al.*,⁴ who reported an incidence of reflux of 60 - 68%. The reasons for this are the abnormal anatomy, as well as the extensive dissection and mobilisation, which destroy the mechanisms that control reflux.^{4,5}

Laparoscopic repair of a para-oesophageal hernia is technically challenging, but is feasible and safe in the hands of paediatric surgeons familiar with laparoscopic anti-reflux surgery. It has all the advantages of laparoscopic anti-reflux surgery, including less pain, shorter recovery and hospital stay, as well as no postoperative ileus. An important advantage of

the laparoscopic approach, especially in the para-oesophageal hernia, is the superior vision provided by the laparoscope in identifying important structures at particular risk during this procedure.

REFERENCES

1. DeUgarte DA, Hirchl RB, Geiger D. Robotic repair of congenital paraesophageal hiatal hernia. *J Laparoendosc Adv Surg Tech* 2009;19:S-187-S-189.
2. Yagi M, Nose K, Yamauchi K, et al. Laparoscopic intervention for intrathoracic stomach in infants. *Surg Endosc* 2003;17:1636-1639.
3. Mutabagani KH, Teich S, Long FR, et al. Primary intrathoracic gastric volvulus in a newborn. *J Pediatr Surg* 1999;34:1869-1871.
4. Karpelowsky JS, Wiesenthaler N, Rode H. Primary paraesophageal hernia in children. *J Pediatr Surg* 2006;41:1588-1593.
5. Imamoglu M, Cay A, Kosucu P, et al. Congenital paraesophageal hiatal hernia: pitfalls in the diagnosis and treatment. *J Pediatr Surg* 2005;40:1128-1133.
6. St Peter SD, Valuse LPA, Calkins CM, et al. Use of esophageal crural sutures and minimal esophageal dissection reduces the incidence of postoperative transmigration of laparoscopic Nissen fundoplication wrap. *J Pediatr Surg* 2007;42:25-29.
7. Hashemi M, Peters JH, de Meester JR. Laparoscopic repair of large type III hernia: objective follow-up reveals high recurrence rate. *J Am Coll Surg* 2000;190:553-561.
8. Ponsky J, Rosen M, Fanny Y, et al. Anterior gastropexy may reduce the recurrence rate after laparoscopic paraesophageal hernia repair. *Surg Endosc* 2000;17:1036-1040.
9. Fisichella PM, Patti MG. Laparoscopic repair of paraesophageal hiatal hernias. *J Laparoendosc Adv Surg Tech* 2008;18:629-631.
10. Van der Zee DC, Bax NMA, Kramer WLM, et al. Laparoscopic management of a paraesophageal hernia with intrathoracic stomach in infants. *Eur J Pediatr Surg* 2001;11:52-54.
11. Oelschlager BK, Barreca M, Chang L, et al. The use of small intestine submucosa in the repair of paraesophageal hernias: initial observations of a new technique. *Am J Surg* 2003;186:4-8.
12. Fuller CB, Hagen JA, DeMeeste TL, et al. The role of fundoplication in the treatment of type II paraesophageal hernia. *J Thorac Cardiovasc Surg* 1996;111:655-661.
13. Yazici M, Karaca I, Etensel B. Paraesophageal hiatal hernias in children. *Dis Esophagus* 2003;16:210-213.