



Large hiatus hernia requiring hiatoplasty - An ongoing challenge: A case series

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ARTICLE INFO

Article history:

Received 26 May 2025

Received in revised form

14 August 2025

Accepted 16 August 2025

Keywords:

Pediatric

Hiatus hernia

Hiatoplasty

Biological membrane

ABSTRACT

Aim: Evidence for the management of large hiatus herniae (HH) in children is lacking. Adult literature is conflicting with regard to risk vs. benefit profile of prosthetic mesh use; rates of dysphagia or recurrence are up to 25 % and 38 %, respectively. We aimed to assess the efficacy of using a biological tissue matrix to augment hiatoplasty.

Methods: Retrospective review of consecutive children with preoperatively identified large primary hiatal hernias by three sub-specialist surgeons between 2019 and 2024. All children underwent repair with a biological tissue matrix. Data are presented as median (IQR).

Results: Fifteen children were included, median age 2.2 years (1.5–10.4) and weight 13.5 kg (9.8–13.3). Follow-up was 1.0 years (0.3–3.3). U-shaped hiatoplasty used OviTex® 1S and was performed laparoscopically (n = 12, 75 %) or open (n = 4, 25 %) and included a Nissen fundoplication. All had symptoms of gastro-oesophageal reflux disease (GORD). Comorbidities included cerebral palsy (n = 3, 20 %), oesophageal atresia (n = 2, 13 %), malrotation (n = 1, 7 %), oesophageal duplication cyst (n = 1, 7 %) and neurofibromatosis type 1 (n = 1, 7 %). Four (27 %) were congenital para-oesophageal hernias. The rate of resolution of GORD was 71 %. Two (13 %) had recurrence seen at endoscopy or contrast study. One of these previously had a failed open repair, and then further failed open redo HH repair and fundoplication. One patient (7 %) has dysphagia, despite having a widely patent gastro-oesophageal junction at endoscopy. There were no complications from mesh erosion.

Conclusion: Large HH remains a challenging condition. Our approach of augmenting hiatoplasty with an ovine reinforced tissue matrix shows favourable rates of GORD resolution, recurrence and dysphagia compared to similar pediatric series.

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1. Introduction

Hiatus hernia in children is uncommon. The incidence is not confidently quoted in the literature, nor is their embryological aetiology fully understood. They are congenital or acquired. They are classified I-IV. Type I is a sliding hernia where the gastro-oesophageal junction (GOJ) herniates through to the chest via the oesophageal hiatus. Type II-IV are paraoesophageal hernias (type II when the fundus herniates through the oesophageal hiatus, type III a combination of I & II and type IV when other intra-abdominal viscera herniate into the chest).

They are acquired post-operatively following anti-reflux surgery or by traumatic means. At five years, Desai showed that hiatal dissection was related to recurrence of hiatus hernia in 36.5 % vs 12.2 % in those with minimal dissection [1]. Rates of recurrence in the paediatric population range from 0 to 31 % [2–5]. Adult literature does not give clarity to the optimal operative technique regarding the use of a mesh or solely using crural sutures. In the paediatric literature it has been suggested that the use of a porcine derived mesh has shown a decreased recurrence rate [5]. In adults, one series showed no recurrences when using an ovine reinforced tissue matrix (ORTM), OviTex® (TELA Bio, Malvern, PA, USA) [6]. There has been no series published regarding an ORTM for hiatus hernia repair in the paediatric population.

The main outcome measures in the repair of hiatus hernia are resolution of symptoms and recurrence. We present the results of our experience using the ORTM for augmented hiatoplasty.

This article is part of a special issue entitled: BAPS 2025 published in Journal of Pediatric Surgery.

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2. Methods

A retrospective review was performed on a consecutive series of patients undergoing hiatoplasty using an ORTM, performed by three sub-specialist surgeons from 2019 to 2024. These were the only surgeons repairing hiatal herniae, and all used the same technique. Cases were identified from an operative database. Operative details, demographic data including gender, age and weight, presence of neurological impairment, returns to theatre, outcomes and follow up period were gathered from hospital records. Data are presented as median (IQR).

2.1. Surgical technique

The cranial short gastric vessels and gastrohepatic ligament are divided with hook diathermy. A retro-oesophageal window is created with blunt dissection, cranial to the left gastric vessels. Dissection is performed at the hiatus, preserving both vagal trunks. 2-0 Ti-Cron sutures are placed posteriorly between the crura (this number varies), occasionally one is placed anteriorly. A U-shaped piece of OviTex® 1S or OviTex® LPR is cut from a 8 × 4cm sheet and rolled up to insert it through a port site, it is then laid flat and secured posteriorly to the diaphragm with 2-0 Ti-Cron (See Fig. 1.). A 360°, loose Nissen fundoplication is performed with three 2-0 Ti-Cron sutures, the most cranial incorporating the right crus.

3. Results

Fifteen children underwent repair of their hiatus hernia (11 male). All patients with large, primary hiatal hernias that were identified preoperatively were included. Some likely acquired hiatal hernias were also included, three were following laparoscopic fundoplication and one following repair of oesophageal atresia. As a part of this procedure, all underwent Nissen fundoplication. The median age at operation was 2.2 years (1.5–10.4). The median weight was 13.5 kg (9.8–30.3). There were 16 hiatoplasties as one patient required redo surgery. Median length of stay was four days (3.0–9.3), however this includes patients who remained in hospital for treatment for other co-morbidities. Median follow-up was 1.0 years (0.3–4.1). Procedures were performed laparoscopically 75 % (n = 12) or open 25 % (n = 4).

All patients had gastro-oesophageal reflux disease (GORD) and hiatus hernia was diagnosed at endoscopy or contrast swallow. Most patients (73.3 %) had sliding hernias. Four patients (26.7 %) had para-oesophageal hernias. This group of patients had specific anatomical problems with large hiatus hernias that required

closing to reduce the risk of complications. This is quite separate to neurologically impaired children with GORD in whom previous total oesophago-gastric dissociation is occasionally required.

Twenty-seven percent (n = 4) had neurological impairment, 13.3 % (n = 2) oesophageal atresia, 6.7 % (n = 1) malrotation, 6.7 % (n = 1) oesophageal duplication cyst and 6.7 % (n = 1) neurofibromatosis type 1.

Following their procedure, 73.3 % (n = 11) of patients are now asymptomatic from GORD. This includes one patient that required redo surgery which was performed laparoscopically. Patients were deemed asymptomatic from post-operative consultation with the patients' carer. Patients were not invasively investigated for ongoing signs of GORD or recurrence of hiatus hernia.

In total there were four patients that required unplanned returns to theatre. One patient required a laparotomy for small bowel obstruction, however there were no adhesions to the ORTM. There were two recurrences (13.3 %) of a hiatus hernia following repair (Clavien-Dindo 3b). As mentioned above, one is now asymptomatic following their redo surgery. The other had developed an acquired hiatus hernia, four months following an open fundoplication and Ladd's procedure. Pre-operatively the patient did not have a hiatus hernia. This patient has global developmental delay and frequently vomits. Unfortunately, he has a small recurrence of his open redo surgery. Patients that were deemed symptomatic post-operatively underwent endoscopy (n = 1, 6.7 %) or a contrast study (n = 2, 13.3 %)

One patient (6.7 %) has dysphagia (Clavien-Dindo 3b) and has undergone oesophageal dilatations. However, it is interesting to note that this patient's gastro-oesophageal junction is patent and has normal Endoflip™ (Medtronic, MN, USA) impedance planimetry measurements. There have been no complications from mesh erosion. One patient (6.7 %) had superficial wound dehiscence following open mesh repair of hiatus hernia, redo fundoplication, gastrostomy and closure of ileostomy. This was managed conservatively with vacuum-assisted closure (VAC). (Clavien-Dindo 2).

4. Discussion

The optimal approach to hiatal hernia repair in children continues to be a source of debate amongst paediatric surgeons. An adult randomised controlled trial sought to establish if crural sutures or the use of a mesh had better outcomes. They found 38 % with mesh vs 31 % sutured recurred (p = 0.61) [7] Furthermore, average dysphagia scores for solids remained significantly higher in the mesh group (mean [SD], 1.9 [0.7] vs 1.6 [0.9]; P = 0.01) at 13 year follow up. A meta-analysis of adult studies also concluded

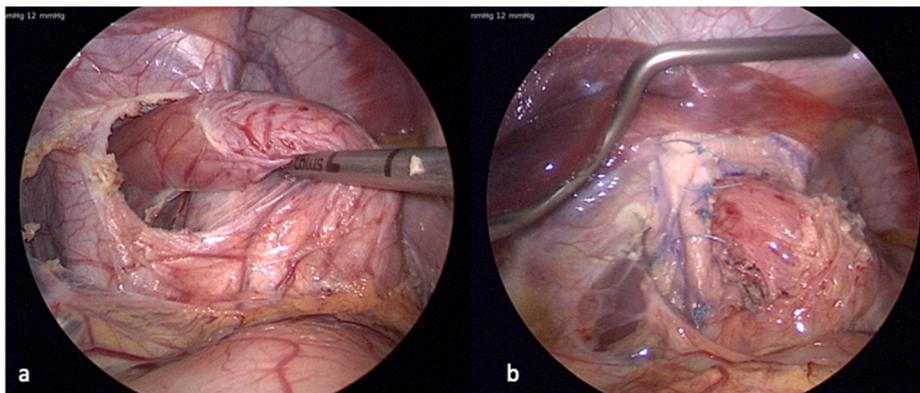


Fig. 1. Significant hiatus hernia (a) and post-repair image (b) demonstrating reinforcement of repair with U-shaped ORTM.

there was no clear benefit quoting a recurrence rate of 30.7 % mesh vs 31.3 % sutured [8]. Due to the uncertainty and complication profile of synthetic mesh or sutured repair, our sub-specialist group opted for a mesh that would maintain strength and integrate into surrounding tissues.

However, some authors have had success with the use of a mesh. A prospective randomised trial by Frantzides et al. [4] showed a sutured recurrence rate of 22 % vs 0 % in the cohort using a polytetrafluoroethylene (PTFE) mesh. There were no mesh related complications, however, the follow up period was half that of Analatos et al. [1] However, another series has shown a 3 % gastric or oesophageal perforation rate and 9 % recurrence rate when using an expanded-PTFE mesh [9]. A limitation of our series is that the follow up period has a median duration of one year, however, as the mesh will have been integrated well before one year, it is likely that any complication from erosion will have arisen much earlier in the post-operative period.

There are other important factors to consider regarding the success of the repair. Such as the degree of hiatal dissection, the material that is utilised or whether a fundoplication is performed. Desai et al. observed that minimal hiatal dissection had a recurrence rate of 12.2 % compared to 36.5 % in those with maximal dissection [2]. The ORTM has been used successfully in adult hiatoplasty with Sawyer quoting a 0 % recurrence rate. There was an 8 % rate of dysphagia, but this was successfully treated with endoscopic dilatation. The follow up period was one year [5]. An advantage of the ORTM is its tissue ingrowth. This means it does not become rigid, nor detached from the tissue. This may be a factor in its low recurrence rate.

A paediatric series by St Peter et al. has shown good outcomes in using a mesh [10]. There were no recurrences. However, most (7/8) procedures were done open, all were post-operative following fundoplication and some were second redo surgery, therefore not directly comparable to our cohort. It would be interesting to know if their recurrence rate has increased as they would now have an 18 year follow up period.

Our outcomes have a favourable rate of recurrence to the adult population using alternative meshes. It is possible our recurrence rate is due to one patient having redo surgery, and another patient having symptoms of persistent vomiting which may have affected the repair. Our patient with dysphagia is undergoing further investigations. There is no extrinsic compression, nor abnormal peristalsis within their oesophagus, so their symptoms are unlikely to be due to the ORTM.

The limitations of this series are that it was performed retrospectively, it has a small sample size, medium follow up period and there is no comparison to other materials or pure suture repair. Ideally a randomised controlled trial with a paediatric population would address this question.

5. Conclusion

Large hiatus hernia remains a challenging condition. Our approach of augmenting hiatoplasty with an ovine reinforced tissue matrix shows favourable rates of GORD resolution, recurrence and dysphagia compared to similar adult and paediatric series. Further studies are required to determine the long term recurrence rate of this technique.

Ethics approval

This case series was an institutional service evaluation. As per the defining research standards, set by the Health Research Authority, NHS, UK, ethical approval was not required.

Availability of datasets and materials

Any data relating to the manuscript can be obtained by contacting the corresponding author.

Consent

Parents signed informed consent regarding publishing photographs of their children.

Funding

The authors did not receive support from any organisation for the submitted work.

Conflict of interest

N.E., D.W., N.L. have no conflict of interest. R.P. has received funding to give a presentation on the use of OviTex® (TELA Bio, Malvern, PA, USA).

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