

Acute diaphragmatic rupture following open type IV paraesophageal hernia repair

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ABSTRACT

Open primary transthoracic repair is a well established treatment for large paraesophageal hernias. The rate of major post-operative complications has been reported to be low, and no cases of acute diaphragmatic injury have previously been reported. Here we present a case of open primary transthoracic repair of a type IV paraesophageal hernia that was complicated by rupture of the left diaphragm in the immediate post-operative period, and was successfully repaired with Gore DualMesh® (W.L Gore and Assoc. Flagstaff, AZ).

INTRODUCTION

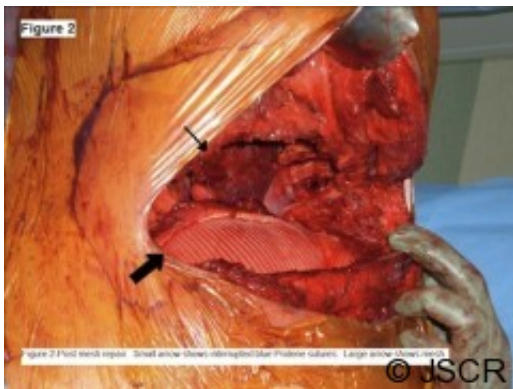
Large paraesophageal hernias are associated with a high risk of complications. The mortality associated with observation has been reported to be as high as 27% (1). Paraesophageal hernias have been repaired through the abdomen and through the chest (2). Laparoscopic repair has become the gold standard for smaller hernias, but the high recurrence rates associated with laparoscopic repair have resulted in the use of mesh at the hiatal closure (3). A number of complications have been seen with mesh (4). Open primary transthoracic repair doesn't utilise mesh, and has an operative mortality of 1.7%, and a 10% anatomic recurrence rate (5). With either the abdominal or thoracic approach, no cases of acute diaphragmatic rupture following repair have been reported. Here we present a case of acute diaphragmatic rupture in the immediate post-operative period following the completion of an open primary transthoracic repair of a type IV paraesophageal hernia, requiring emergent re-operation for repair with Gore DualMesh® (W.L Gore and Assoc. Flagstaff, AZ).

CASE REPORT

A 60 year old man with a muscular habitus and a remote history of reflux treated with an open Nissen Fundoplication 20 years prior, presented with an asymptomatic type IV paraesophageal hernia (Figure 1A). Intraoperative findings confirmed that the stomach, transverse colon, and omentum were in the chest. The hernia was reduced and the hiatal defect was repaired primarily with multiple simple 1-0 Silk sutures. The previous Nissen repair was intact, and his oesophageal length was adequate and without tension. For these reasons, a Collis-gastroplasty was not performed. The addition of mesh reinforcement was considered, but given the well placed sutures and concerns of complications with mesh, this was decided against. He tolerated extubation well, and was transferred to the recovery room.



Soon after arriving in recovery, he began to experience significant respiratory distress. A chest x-ray revealed diffuse left sided air-filled opacities (Figure 1B). He was taken to the operating room urgently for re-exploration with the concern that he re-herniated through his hiatal closure. He was found to have abdominal contents in the chest through a large anterolateral diaphragm rupture from the chest wall. The previous primary paraoesophageal repair was clearly intact. A tension free repair of the diaphragmatic tear was completed with an 18 x 24 cm piece of Gore DualMesh® anchored to diaphragm edge and to the 8th and 9th ribs, using horizontal mattress stitches with 2-0 prolene suture (Figure 2). He was transferred to the ICU in critical condition, and he subsequently experienced a prolonged and complicated ICU course. He required prolonged ventilator support and was extubated thirteen days later. He developed atrial fibrillation and acute renal failure that required hemodialysis. He had a Barium oesophagogram that showed normal position of this stomach and a patent gastro-oesophageal junction, and he was eventually transferred to a rehabilitation facility, and later home. A chest x-ray after full recovery shows a raised left hemi-diaphragm (Figure 1C).



DISCUSSION

In 2004, Patel et al published a large retrospective review of a 25-year experience with 240 consecutive open primary transthoracic paraoesophageal hernia repairs (5). They had an operative mortality rate of 1.7%, a major postoperative complication rate of 8.5%, and an anatomic recurrence rate of 10%, though only 2% of patients required a re-operation in long-term follow-up. They did not experience a single diaphragmatic injury. A similar retrospective review of 94 patients undergoing transthoracic repair showed a similar operative mortality, a 19% rate of significant postoperative complications, and no diaphragm injury (6). Luketich and colleagues reported their experience of 662 laparoscopic repairs of giant paraoesophageal hernias. They had a 30-day mortality of 1.7%, a radiographic recurrence rate of 15.7%, and a reoperation rate of 3.2%. They used crural mesh reinforcement in 13%

of patients. They also saw no diaphragmatic complications in their clinical series (7).

A thorough review of the English literature was conducted in PubMed, using “complications,” “hiatal hernia” and “paraesophageal hernia”. This search did not reveal any articles or reports that mention acute diaphragmatic injury related to this operative repair. One case report did however describe the complication of a left diaphragmatic tear nine months following a robot-assisted laparoscopic type II paraesophageal hernia repair. On re-operation, the initial repair was found to be intact, and a 3x5 cm defect was found in the left diaphragm, extending from the right crus transversely through the tendinous center. This was thought to be the result of excessive tension on the initial repair, and was repaired with PTFE mesh. The patient did well (8).

The question arises how to predict this rare complication. In our situation, it appeared to be the result of increased intra-abdominal pressure after reducing the hernia. The previous Nissen was completely intact, and the oesophagus was carefully inspected and found to lack any significant upward tension. It is likely the increased abdominal pressure during extubation contributed to the tear. Unfortunately, normal precautions to prevent ruptures of abdominal wall hernia repairs, such as external reinforcement as the patient awakens, would not have helped in this case. The only possible preventive measure would have been to incise the diaphragm at the initial repair and perform a tension free mesh repair of the iatrogenic diaphragmatic hernia. Given that this is the only incident reported in the English literature, prophylaxis to prevent this complication may be unwarranted.

In summary, though seemingly previously unrecognized, acute diaphragmatic rupture causing sudden clinical deterioration is a rare but serious complication of primary repair of large paraesophageal hernias. Surgeons should be aware of this as a possible complication when presented with the signs and symptoms of acute decompensation following this operation, and should be prepared to return to the operating room for immediate definitive management.

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