

CASE REPORT

Concurrent Mesh Repair of a Morgagni and Umbilical Hernia during a Laparoscopic Sleeve Gastrectomy in a Morbidly Obese Individual

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Abstract:

Morgagni Hernia is a rare form of diaphragmatic hernia. It is mainly asymptomatic and often identified incidentally during surgery. Tension-free synthetic mesh repair is the preferred treatment modality. However, the use of synthetic mesh concurrently during a clean-contaminated surgery such as sleeve gastrectomy remains controversial due to the remote possibility of mesh infection. A middle-aged female with BMI of 47 Kg/m² was admitted electively for laparoscopic sleeve gastrectomy with concurrent umbilical hernia repair. Intra-operatively, a left Morgagni Hernia containing omentum and a segment of transverse colon was noted. She underwent a laparoscopic sleeve gastrectomy and simultaneous laparoscopic tension-free composite mesh repair of both Morgagni and umbilical hernia. Outpatient review three months later revealed excess weight loss of almost 30% with no recurrence of either hernia. In conclusion, the advantages of concurrent hernia repair during bariatric surgery outweigh the risk of mesh infection and should be performed to prevent future risk of visceral herniation and strangulation. Laparoscopic mesh repair of a Morgagni Hernia and umbilical hernia in the setting of an electively planned sleeve gastrectomy is feasible, effective and safe in the hands of a trained laparoscopic surgeon.

Keywords: Mesh, Morgagni, Gastrectomy, Obesity, Laparoscopy

Introduction:

Morgagni hernia refers to an anterior defect of the diaphragm. It is uncommon and represents less than 3% of all diaphragmatic hernias [1]. Morgagni hernia was first described in 1769 whereby abdominal contents were observed to herniate substernally into the thoracic cavity during autopsy [2]. Less than a century later, Larrey described a triangular defect in the anterior diaphragm, bounded by muscular fibers seen stretching from the xiphisternum to the diaphragmatic central tendon [3]. Foramen of Morgagni and Space of Larrey are names denoted to the same defect [1]. The abdominal contents herniating into and occupying the Foramen of Morgagni is termed Morgagni hernia.

Similar to other abdominal hernias, a Morgagni hernia may be present since birth. It can also occur as a result of an increase in the intrabdominal pressure such as an obesity, trauma, and pregnancy. Morgagni hernia may contain omentum, small bowel loops, stomach or colon, and mandates surgical repair of the defect [4]. Traditionally, a Morgagni hernia repair was carried out via an open transabdominal or transthoracic approach involving primary suture repair and the reattachment of the diaphragm to the endothoracic fascia or the posterior rectus sheath [5]. In the past,

surgeons would have shivered at the thought of placing a synthetic mesh simultaneously during a clean surgery. The high morbidity and mortality rates associated with a mesh infection then would have prevented them from doing just that. With the turn of the century came improvement in aseptic measures, emphasis on gentle tissue handling, advancements in surgical technology and introduction of laparoscopic surgery. These factors have been acknowledged as key to reduction of the overall incidence of mesh infection and the catastrophic effects that ensued.

Numerous reports have been published to reinforce the safety and efficacy of laparoscopic tension-free mesh repair in patients with ventral and diaphragmatic hernia repair undergoing concurrent bariatric surgery for obesity [6, 7]. We aimed to highlight a case of concurrent laparoscopic repair of an incidental Morgagni hernia in a morbidly obese patient who was otherwise electively admitted for laparoscopic sleeve gastrectomy and umbilical hernia repair.

Case Report:

A 57-year-old female patient of South-East Asian ethnicity, and a non-smoker with Body Mass Index (BMI) of $47\text{kg}/\text{m}^2$ was referred to the Surgical outpatient clinic for obesity surgery. Consent was taken prior to surgery. She had underlying hypertension, dyslipidemia and ischemic heart disease with dilated cardiomyopathy. She had been on strict fluid restriction therapy of 1 litres per day for the past 5 years. She was recently diagnosed to have Obstructive Sleep Apnoea (OSA) with an apnoea-hypopnea index of 100, requiring use of Continuous Positive Airway Pressure (CPAP) at night. She has had total abdominal hysterectomy and bilateral salphingo-oophorectomy for endometriosis twelve years earlier. She did not have any surgery to her chest or back. Her weight gain began following the birth of

her third child, 20 years earlier. Her three older siblings were also obese. Prior attempts to achieve weight loss by dietary modification and exercise were short-lived and unsuccessful. There were no symptoms of regurgitation such as heart-burn or chest discomforts. She generally consumed heavy meals and had an increase in inclination towards sweet food.

Clinical examination revealed a 2 by 1 cm, soft, reducible, non-tender umbilical mass with normal overlying skin. Visible and palpable cough impulse were both positive. A pre-operative chest radiograph demonstrated cardiomegaly with clear pulmonary field bilaterally whilst an abdominal ultrasound revealed early changes of fatty liver. Oesophagoduodenoscopy was unremarkable. Echocardiogram revealed good left ventricular function with ejection fraction of 60%. She was discharged home following a 3-day hospital stay for pre-operative investigation and medical optimization. Two weeks later, she was readmitted electively and underwent Laparoscopic Sleeve Gastrectomy (LSG), laparoscopic umbilical hernia repair with concurrent laparoscopic Morgagni hernia repair; the latter being an incidental intraoperative finding.

The surgery was performed with the patient in supine and reversed Trendelenburg position. Pneumoperitoneum was created using a Veress needle in the left hypochondrium. Peritoneal cavity was insufflated with carbon dioxide at the rate of 6L/min and pressure of 14 mmHg. Three ports were inserted in the left anterior axillary line away from the umbilicus to allow adequate visualization and repair of the umbilical hernia. On laparoscopic exploration of the abdomen, there was a left anterior Morgagni hernia. It measured 5cm by 3cm and contained largely omentum along with a segment of the transverse colon (Fig. 1). The umbilical hernia defect contained omentum (Fig. 2) Contents of the

umbilical hernia was reduced laparoscopically, followed by insertion of 4 more trocars. A 12mm laparoscope port was inserted transumbilically, with another 12mm port placed three finger breath towards the left of the umbilicus followed by a third 5mm trocar at the exact position on the right. Nathanson liver retractor was introduced below the xiphoid process. The sequences of procedures were laparoscopic reduction of umbilical hernia contents, sleeve gastrectomy, Morgagni hernia repair followed by umbilical hernia repair.

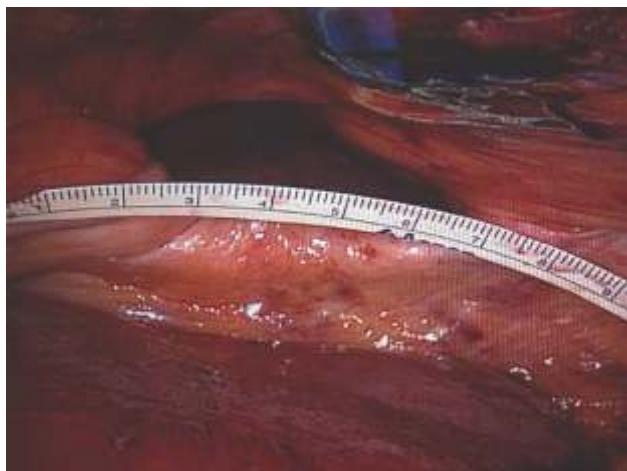


Fig. 1: Morgagni Hernia Measuring 5 cm on Horizontal Diameter

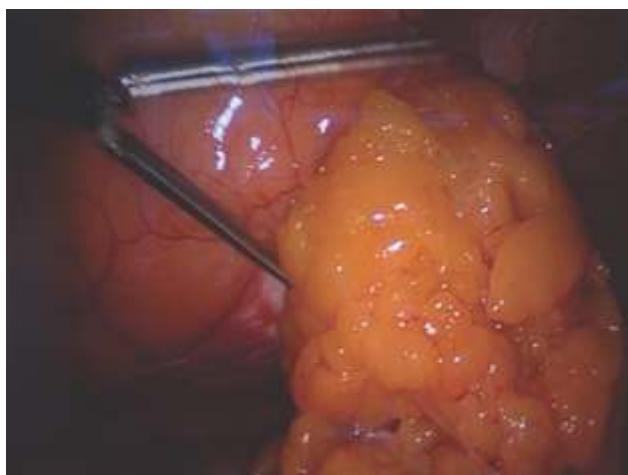


Fig. 2: Umbilical Hernia containing Omentum

Greater curvature of the stomach was mobilized from the greater omentum using Ultracision Harmonic Scalpel (Ethicon Endo- Surgery Inc., Cincinnati, OH, USA). The dissection was carried out meticulously from the pylorus distally to the fundus proximally. The anaesthetist, guided by the surgeon introduced a 36Fr Bougie orally until the prepyloric region. The anaesthetist was then asked to gently pull the bougie back an additional few centimetres. A 60mm ECHELON FLEX™ Powered ENDOPATH® Stapler (ETHICON, Johnson and Johnson), was used to create the gastric sleeve. The first staple was fired 4cm from the pylorus and the firing continued proximally up to 1cm from the Angle of His, all the while retracting and re-inserting the bougie to ensure that it was not caught in the line of staple and to ensure a good tubular sleeve. Two green and three blue staple reload cartridges (ETHICON, Johnson and Johnson) were used during this procedure. The green cartridges were used on the thicker pylorus and the blue on the remaining gastric body (Fig. 3). Intra-operative methylene blue leak test and jacuzzi test was negative for staple line leakage.

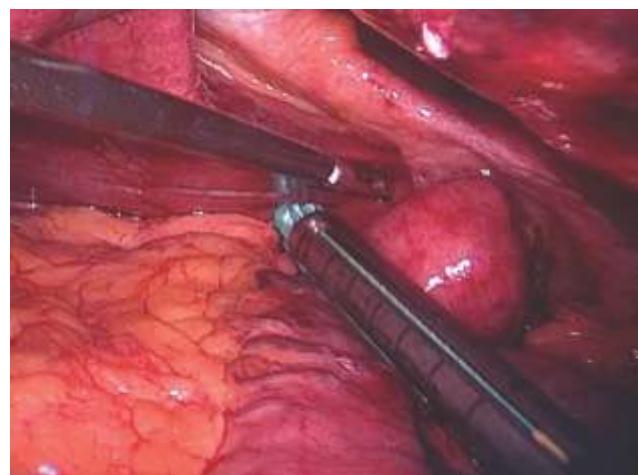


Fig. 3: Performing a Sleeve Gastrectomy in a Background of Morgagni Hernia

The herniated omentum and transverse colon were easily reduced with use of a laparoscopic bowel grasper. Adhesion of omental tissue around the hernia defect was excised following suture ligation. The hernia sac was not excised. The diaphragmatic defect measured 5cm in maximum diameter. The defect was subsequently repaired with a 15 cm x 15 cm PHYSIOMESH® Flexible Composite Mesh (ETHICON, Johnson and Johnson). The mesh was applied over the defect and anchored in place using ProTack® (COVEDIEN), a 5mm surgical tacker device (Fig. 4).



Fig. 4: Mesh with Tackers in Place covering the Diaphragmatic Defect

The omentum occupying the umbilical hernia defect was reduced much earlier during the operation to facilitate the creation of a gastric tube during sleeve gastrectomy. When measured, the umbilical hernia defect was 4 cm x 4 cm. The defect closure was achieved by application of a 15 cm by 15cm PHYSIOMESH® Flexible Composite Mesh (ETHICON, Johnson and Johnson) using the intraperitoneal onlay mesh (IPOM) technique. The mesh was anchored with ProTack® (COVEDIEN) surgical tacker device (Fig. 5). Haemostasis was secured prior to removal the resected gastric sleeve through the 12mm transumbilical laparoscope port.

The remaining trocars were removed and closure of the rectus defect was performed using non-absorbable sutures. The skin was approximated with DERMABOND ADVANCED® Topical Skin Adhesive (Ethicon, Johnson and Johnson). Duration of surgery was approximately 160 minutes. She was observed in the intensive care unit before being transferred back to the general ward 24 hours later. She was allowed liquid diet on post-operative day one and was discharged well the following day. She was well during follow-up one month later having achieved a remarkable 22% excess weight loss.



Fig. 5: Anterior Abdominal Wall Defect Repaired By Mesh and Reinforced with Tackers

Discussion:

Most patients with Morgagni hernia remain asymptomatic throughout their life and are only diagnosed incidentally from chest radiograph or intraoperatively during laparoscopic abdominal surgery. Non-specific symptoms involving the cardiopulmonary and gastrointestinal symptoms may be present in some. Diagnosis is confirmed with use of Contrast Enhanced Computed Tomography (CECT) scan of the thorax and abdomen, Magnetic Resonance Imaging (MRI) or

laparoscopy. The later providing both diagnostic and therapeutic value in the same setting.

Omentum, small bowel, colon and stomach are organs that have been seen to occupy the hernia cavity [1]. In earlier times, it was the norm to delay repair of any ventral diaphragmatic hernia discovered incidentally during the intra-operative period of a bariatric surgery. However, the risk of small bowel obstruction following procrastination of Morgagni hernia repair at the time of bariatric surgery has been reported to be as high as 37.5% [8]. Chiou *et al*, 2012 suggests that the risk of bowel obstruction is augmented by the rapid weight loss post bariatric surgery [7]. We proceeded with laparoscopic repair of Morgagni hernia and umbilical hernia in our patient for this same reason, and were satisfied with the post-operative outcome.

Significant morbidity posed a major problem with the traditional open method of repair. Since the first successful laparoscopic repair of Morgagni hernia was reported in 1992, there has been a boom of various interpretation of the approach with each technique having its own set of advantages and disadvantages [9]. Laparoscopic approach provides better vision, cosmesis with quicker recuperation time as compared to an open approach for the repair of a Morgagni and ventral Hernia [10, 11]. The rarity of this clinical entity prevents a common consensus statement to be developed with regards to the best laparoscopic technique that should be applied. Most recent reports highlight the benefit of tension free mesh repair over primary closure with sutures. The polypropylene mesh can be anchored in place with aid of surgical tacker device, or non-absorbable sutures in either continuous or intermittent fashion. In general, primary repair of any hernia defect more than 3cm violates the concept of tension free repair should be avoided to prevent future recurrence. In such instances, mesh repair is superior [1, 7].

In the past, the trend did not favor application of synthetic mesh concurrently during gastro-intestinal surgery such as sleeve gastrectomy. This was due to fear of catastrophic complication of mesh infection. This trend is changing, and numerous reports have been published supporting surgical success in simultaneous repair of the Morgagni and ventral hernia during bariatric surgery [6, 12-15]. The incidence of mesh infection is extremely rare, and the advantages of concurrent hernia repair outweigh the possible risk by many folds. Prosthetic mesh has also been used with good outcome and minimal risk of infections in numerous other clean contaminated surgeries involving bowel and gallbladder [16-18].

Incidence of seroma collection in larger defects is reduced with mesh repair. The porosity of the mesh itself, allows for natural drainage of seroma into the peritoneal cavity thus reducing risk of seroma infection [19]. There are no reports demonstrating the superiority of any one particular mesh. In most of our laparoscopic ventral hernia repair and even in this particular case, we have used PHYSIOMESH® which is a flexible single layered composite mesh (ETHICON, Johnson and Johnson) for both umbilical hernia repair and Morgagni hernia repair. The smooth composite side is placed in such a way that it faces the peritoneal cavity. This is to protect the viscera from direct contact with mesh during tissue-mesh integration.

Literature review revealed no concrete evidence to link cyst formation or recurrence when the sac is left intact. The decision to leave the sac behind is also influenced by the possibility of iatrogenic pneumoperitoneum and pneumothorax during sac excision. It is for these reasons that we did not and do not routinely attempt to excise the sac.

Conclusion:

We believe that the additional 30 minutes of operating time needed for the both the hernia repair

in our patient did not pose significant anesthetic risk. Benefits of concurrent hernia repair outweigh the risk of mesh infection in a patient undergoing laparoscopic sleeve gastrectomy. In a developing nation such as Malaysia, it is clearly more cost effective for the procedures to be done in the same setting rather than re-admitting the patient for multiple surgeries. To the best of our knowledge, this is the first case of concurrent laparoscopic sleeve gastrectomy with tension-free mesh repair

of umbilical hernia and incidental Morgagni hernia. This procedure is feasible, effective and safe in the hands of a trained laparoscopic surgeon.

Acknowledgement:

The authors would like to thank the Upper Gastrointestinal, Bariatric and Metabolic Unit, Department of Surgery at UKMMC for their contributions to this article.

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