

Laparoscopic Repair of an Incidental Morgagni Hernia During Roux-En-Y Gastric Bypass in A Severe Obese Adult: A Case Report

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Received: 13 January 2021; Accepted: 25 January 2021

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ABSTRACT

A Morgagni hernia was found in a 53-year-old male patient during a laparoscopic Roux-en-Y gastric bypass procedure. The hernia was closed using a direct suturing technique. The hernial sac was not excised. A 12-month follow-up showed no hernia recurrence. This case indicated that laparoscopic approach is a suitable and safe procedure for treatment of Morgagni's hernia in obese patients.

Keywords: Morgagni Hernia; Bariatric Surgery; Incidental Hernia

Introduction

Roux-en-Y gastric bypass (RYGB) is a widely performed primary bariatric procedure in the world with almost 200.000 procedures in 2016 (Angrisani *et al.*, 2017; IFSO, 2017). During this procedure, a small stomach pouch is created and connected directly to the small intestine to restrict food intake and reduce caloric absorption, followed by connecting the biliopancreatic and alimentary limbs, and closure of the mesenteric defects. The procedure is performed laparoscopically through 5 small horizontal incisions in the upper abdomen and usually takes about an hour to complete (Schlottmann and Buxhoeveden, 2018; Mingrone *et al.*, 2012). Several types of laparoscopic bariatric procedures exist, e.g., sleeve gastrectomy (Rosenthal and Panel, 2012), adjustable gastric banding (O'Brien *et al.*, 2019), One Anastomosis Gastric Bypass (Rutledge, 2001), Biliopancreatic Diversion with Duodenal Switch (Hess and Hess, 1998), and Single Anastomosis Duodenal-Ileal bypass with Sleeve, derived from the biliopancreatic diversion (Sánchez-Pernaute *et al.*, 2007). During these laparoscopic procedures, rare anatomical findings can occur.

One of these extreme rare findings are congenital Morgagni hernias in which an incomplete fusion of the muscle fibers of the sternum and the costal margin leads to a triangular-shaped defect behind the

xiphoid process (Angrisani *et al.*, 2007; Young *et al.*, 2019; Aghajanzadeh *et al.*, 2012; Horton *et al.*, 2008). Incidence of this hernia represents up to 5% of surgically treated diaphragm hernias. Treatment consists of direct suturing (Young *et al.*, 2019; Aghajanzadeh *et al.*, 2012; Dalvi *et al.*, 2001).

Case Report

Case History

A 53-year-old man was referred to our center for bariatric surgery due to morbid obesity with a Body Mass Index (BMI) of 42.6. The patient suffered from dyspnea d'effort and cardiac and pulmonary examinations diagnosed the patient with Obstructive Sleep Apnea Syndrome (OSAS), treated with continuous positive airway pressure (CPAP) therapy. He reported no medication use, allergies, additional comorbidities and had no prior surgical history. He completed the bariatric screening program by the Bariatric Multidisciplinary Team (BMDT) a few months later and started preoperative counseling with a dietician and a two-month prehabilitation program under supervision of a physical therapist in group setting. Nine months after initial referral, the patient was admitted for the Roux-en-Y gastric bypass procedure.

Laparoscopic Procedure

According to our standard RYGB procedure, French position was applied at 45° anti-Trendelenburg. Closed CO₂ pneumoperitoneum (15 mmHg) was performed with a Veress needle. A 12mm trocar was placed in midline approximately 20cm below the xiphoid process and used for optical introduction. Four additional trocars were placed in the right and left axillar (5mm) lines below the costal arch and two trocars in the midclavicular line (12mm). When identifying anatomical structures after introduction, the transverse colon seemed to disappear in a space ventral to the right liver lobe. Approximately one meter of colon, gastric antrum and a large bulk of omentum were retracted. A large diaphragmatic defect was detected, which created a cavity ventral to the heart in the left mediastinum (Fig. 1).



Figure 1: A large diaphragmatic defect was detected, which created a cavity ventral to the heart in the left mediastinum.

Due to a large defect and weak ventral support tissue dorsal of the rib and retrosternal peritoneum, simple separated suture technique was applied with non-resorbable monofilament (ethibond excel 0, Ethicon, Johnson & Johnson, US). To reinforce the closure, a Keith needle was positioned percutaneously through the abdominal wall into the peritoneal cavity and brought back over one of the ventral costae with respect to the neurovascular bundle to create a “hang-up” construction at the middle part of the defect. The suture was tied percutaneously outside the peritoneal cavity, ventral to the costal cartilage. The closure was finalized by using a running V-loc 2-0 suture (Medtronic, US; (Fig. 2). No mesh was used and the hernia sac was not resected. Finally, we proceeded with a standard Roux-en-Y gastric bypass with an alimentary limb of 75cm and a biliopancreatic limb of 150cm. Total duration of surgery was 150 minutes.

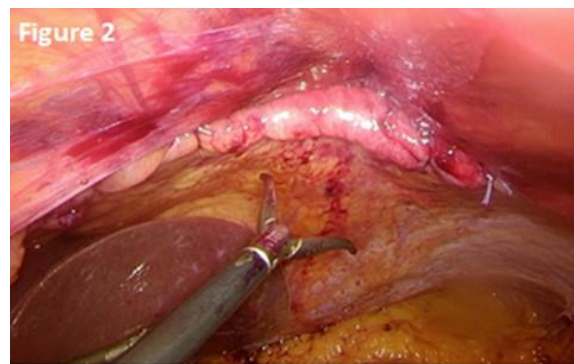


Figure 2: The suture was tied percutaneously outside the peritoneal cavity, ventral to the costal cartilage. The closure was finalized by using a running V-loc 2-0 suture.

Follow Up

Direct postoperatively, after explaining these findings to the patient and his partner, he was positively surprised and he immediately noted improved in- and exhale excursions. He revealed that he was treated for dyspnea in a rural teaching hospital 4 years earlier. The requested tomography showed a diaphragmatic herniation with fatty tissue (omentum or lipoma) located in the hernia sac, stated in the tomography report. No further treatment was indicated, because the dyspnea was thought to be directly associated with the obesity or obesity hypoventilation syndrome (OHS).

At 12-month follow up, he lost 57 kg (BMI of 27). Patient remarkably did not report any dyspnea or related respiratory complaints, and CPAP therapy was stopped shortly after the procedure. At 7 months postoperatively a computed tomography (CT) showed a much smaller pocket with seroma ventral to the mediastinum (Fig. 3 and Fig. 4).

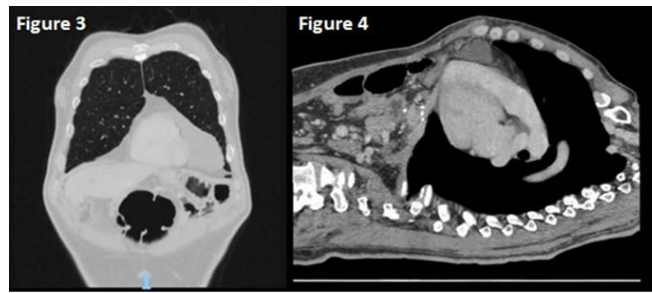


Figure 3 & 4: A computed tomography (CT) showed a much smaller pocket with seroma ventral to the mediastinum.

Discussion

The location of a Morgagni hernia occurs posterolaterally to the sternum to either the left or right of the xiphoid recess as a result of failure of the pars tendinalis part of the costochondral arches to fuse with the pars sternalis, resulting in an incomplete formation of the diaphragm (Nasr and Fecteau, 2009; Loong and Kocher, 2005; Al-Salem, 2007). This hernia is associated with obesity and is often diagnosed in adulthood, which is unusual for a congenital disorder (Aghajanzadeh, 2012; Harris *et al.*, 1993). There are three types of Morgagni hernias: most common is right-sided (91%), followed by bilateral and left sided (Aghajanzadeh, 2012; Horton *et al.*, 2008; Sanford *et al.*, 2018). Morgagni hernias usually have a developed peritoneal sac which can contain intra-abdominal organs, e.g. colon, omentum, stomach, liver and small bowel.¹⁸ Clinical presentation mostly consists of respiratory complaints with dyspnea, cough, or retrosternal pain, followed by gastro-intestinal pain or obstruction (Young *et al.*, 2019; Horton *et al.*, 2008; Harris *et al.*, 1993; Pfannschmidt *et al.*, 2004). Complications such as strangulation or incarceration are uncommon and require immediate surgical treatment (Angrisani *et al.*, 2000; Horton *et al.*, 2008; Sanford *et al.*, 2018; Lee *et al.*, 2016).

Different surgical approaches have been described: transthoracic and transabdominal. In obese patients a transthoracic approach may be easier to access the hernial sac (Horton *et al.*, 2008). In this case report we applied a transabdominal laparoscopic approach in a surgical set-up for upper gastro-intestinal surgery. Since a Morgagni hernia is a ventral defect, the large amount of intra-abdominal fat does not bother the repair too much and reducing the hernia content is easier. Pfannschmidt, *et al.* emphasizes the safety and effectiveness of this abdominal approach in the repair of Morgagni hernia in a series of seven patients, of which 4 with a BMI >30 (Pfannschmidt *et al.*, 2004). Three major laparoscopic techniques have been described; closure with a mesh (Dogaru *et al.*, 2016), using a Keith needle (Newman *et al.*, 1995; Park and Doyle, 2014), or direct suturing¹⁰. All three techniques previously mentioned have proven to be successful. However, there are differences in approach and execution. Closure with a mesh is considered for large defects and requires to leave a foreign body or the use of more expensive options such as biological or biosynthetic mesh types (Dogaru *et al.*, 2016).

The use of a Keith needle appears to be more sensitive for iatrogenic injury and pain (Newman *et al.*, 1995). In a previous case report of Kuster, *et al.* a laparoscopic Morgagni hernia repair was performed by nonabsorbable monofilament with continuous suture joining the subcostal and retrosternal peritoneum to the full thickness of the diaphragmatic edge. A small skin incision was used to incorporate the fascia of the rectus abdominis in the repair and sutures were tied by extracorporeal knotting (Kuster *et al.*, 1992). In this case report we applied a mixture of techniques using direct suturing with separate stitches to prevent tear, an anchoring fixation around the rib with a Keith needle and running stitches with V-loc in between to strengthen the repair. In this way we were able to close a large hernia in a morbidly obese patient without using a mesh. As in most cases in literature, we did not resect the intrathoracic peritoneal sac, because of its tremendous size and proximity to the pericardium, which could lead to a massive pneumomediastinum, pneumopericardium or infection (Angrisani *et al.*, 2000; Sanford *et al.*, 2018; Johnson, 1949; Pokorny *et al.*, 1984). Some case reports state an uneventful resection of the peritoneal sac (Newman *et al.*, 1995; Rau *et al.*, 1994; Fernandez-Cebrian *et al.*, 1996).

Conclusion

In this laparoscopic approach with 12 months follow-up, we elucidated that a direct suturing technique of Morgagni hernia repair can be performed safely without resection of hernial sac nor usage of a mesh, in a morbidly obese patient. Furthermore, it shows that Morgagni hernia repair can safely be combined with other laparoscopic surgery such as gastric bypass.

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