A thoracoabdominal approach for gastrobronchial fistula repair post complicated laparoscopic sleeve gastrectomy

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ABSTRACT
INTRODUCTION: There has been a recent surge in bariatric surgery. Consequently, identification of new complications is imminent. Gastrobronchial fistula is one of the newly identified severe complications. The medical community is yet to come up with a consensus on management, which is further complicated by the lack of literature on par with its rarity. Therefore, we aim to contribute to a better understanding and add to the managerial approach.

PRESENTATION OF CASE: We report a case of a 36-year-old female. Post-operative stenting and esophageal dilatation was performed. 15 months post LSG patient presented with productive cough with green sputum, food particle and left sided chest pain. Endoscopic clip placement was attempted with no avail. The surgical approach involved posterolateral thoracotomy for left lower lobe resection with debridement of eroded diaphragm. The abdominal cavity was accessed via a mediastinal diaphragmatic incision. The situation necessitated a splenectomy. Singular repair, with omental patch was performed. The jejunum was brought to the site of the fistula and the opening was covered with clean serosa.

DISCUSSION: The management of gastrobronchial fistulas involves a comprehensive clinical evaluation. In the absence of red flags, an initial conservative management should be undertaken. When all else fail, surgery is the only route towards a permanent and definitive treatment.

CONCLUSION: The need for further research and consensus is of utmost importance to guide future surgeons and to increase awareness among the medical community, due to its presentation under the facade of common symptoms.

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1. Introduction

Since 1999, laparoscopic sleeve gastrectomy (LSG) has become a popular validated bariatric procedure. It was first performed by Gagner and Patterson as part of a duodenal switch procedure [1]. Overtime, surgeons have highlighted many advantages and adverse effects of this technique. Advantages can be summarized in eliminating the risk of late bowel obstruction from internal herniation and the risk of spillage and erosion that could happened with the gastric band procedure. On the other hand, the most common complications are staple line bleeding, strictures, and gastric leak along the staple line in approximately 2 percent of LSG procedures [1,2]. Leaks can evolve into gastrobronchial fistulas (GBF) as a result of diaphragmatic rupture from a subphrenic abscess despite sufficient supportive measures. Although the number of patients undergoing bariatric surgeries is increasing, physicians are still unaware of such complications. Unfortunately, there is no consensus on the management of GBFs, which is further complicated by lack of sufficient literature [2,3]. Herein, we report a case of 36-year-old woman who underwent a LSG procedure, complicated by a GBF that was managed through a thoracoabdominal approach. Moreover, we provide a brief literature review on the etiology, symptomatology, imaging and management of GBF. The work has been reported in line with the SCARE criteria [5].

2. Case presentation

A 36-year-old woman presented to our clinic with 1 month history of fever, productive cough, green sputum and left-sided chest pain. Past surgical history was remarkable for LSG procedure done 15 months ago, complicated by wound dehiscence and gastric leak 4 days postoperatively, then managed with lower esophageal stenting and drainage. Physical examination was unremarkable except for mild cracks on the left lower lateral chest.

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Contrast-enhanced CT scan confirmed a GBF with thickening of visceral and parietal pleura as well as cavitation of left lower lobe of the lung (Fig. 1). A contrast swallow study showed a gross leak from the fundus of the stomach to the left subdiaphragmatic area. From this collection, a fistula is seen through the posterior part of the diaphragm directly to the left lung with contrast filling seen of bronchi in the left lower lobe (Fig. 2).

Using upper GI Endoscopy, multiple clips were placed over the fistula site, which failed to resolve the issue.

Based on the imaging findings, a surgical repair was planned. Patient underwent a left posterolateral thoracotomy via the 7th intercostal space. The GBF passing through the posterior basal segment of left lung was visualized (Fig. 3). A pus cavity containing food particles was identified between the posterior basal segment of left lung and the diaphragm. The cavity was irrigated multiple times with saline. Then, the small bronchi were closed using a Prolene 3-0 followed by debridement of the eroded diaphragm. In the same setting of left posterolateral thoracotomy, the abdominal cavity was accessed via medial diaphragmatic incision. The procedure necessitated splenectomy. A 2-cm opening was visualized at the fundus with opened staple line. After refashioning of the edges, the opening was closed with polydioxanone 3-0 sutures and overruled by silk sutures, then the jejunum was brought to the site of fistula and the opening was covered with clean serosa. Approximately 60 cm distal to the patch, an entero-enteric anastomosis was done. This was considered the simplest and safest approach.

Postoperatively, the patient was transferred to the ICU and intubated for 24 h. Patient had an uneventful recovery following surgery, and was discharged home on day 16. Follow up assessment at 18 months, the patient was doing well, asymptomatic, with normal chest xray and contrast swallow (Figs. 4 & 5).
3. Discussion

There is a surge in bariatric surgeries, the most common ones being Roux-en-Y gastric bypass and LSG procedures [2]. The most prevalent acute complications are gastric fistulas and hemorrhage, whereas the most prevalent long-term complications are gastric strictures and gastroesophageal reflux disease [2].

The frequency of leak at the staple line is between 1.4 and 2.8% [3]. Mechanical fistulas are usually discovered within the first 2 days whereas classic ischemic fistulas appear 5–6 days after surgery [4]. GBF may occur early or late. If early it arises from extensive dissection, vessel manipulation or ischemia. If late: non-healing ulcers in the gastric conduit, anastomotic leaks, infection, inflammation or iatrogenic trauma [4]. Our patient presented 4 days post operatively with gastric leak, therefore it is logical to assume an ischemic leak cause.

GBF was classified by Moeller and Carpenter in 1985 [2]. Then, its relation to bariatric surgery was established in 2006 [3]. The exact incidence has not been established but some studies show a range between 0.2% [2] and 0.37% [3].

Most GBF cases may present with productive cough, fever, thoracoabdominal pain, recurrent pneumonia, vomiting, dyspnea, wheezing, mild hypoxemia and expectoration of food [2]. Our patient presented with productive cough, fever, abdominal pain, dysphagia and food particles in sputum.

Imaging plays a crucial role in the diagnosis of GBFs. Such imaging modalities include: CT, x-ray, upper endoscopy and bronchoscopy [2]. X-ray is not diagnostic but an initial x-ray guides us towards definitive tests. However, CT with intravenous and oral contrast is the key to diagnosis and has been indicated in all cases; it helps in abscess identification and drainage [3]. Endoscopy can identify the internal opening and aids in various therapeutic procedures [3]. Bronchoscopy may suggest fistulation via methylene blue, however, it is largely proven ineffective due to distal location [3].

Nutritional status is of interest and importance in the line of management. In previous reported cases, most patients were malnourished and needed nutritional support prior to intervention [4]. In our case, the patient was started on total parental nutrition (TPN) 14 days prior to the surgical procedure.

Proper management of GBFs involves a comprehensive evaluation of the clinical condition. In the absence of red flags, an initial conservative management should be undertaken [2,3]. Antibiotic administration is essential [2,3]. Whenever deemed necessary, CT-guided aspiration and drainage can be attempted [3]. Endoscopic balloon dilatation, self-expanding plastic stent, stricturotomy or septoplasty, are some minimally invasive techniques that can be implicated in resolving gastric stenosis — a leading cause of perpetuation of fistula [2,3]. One study included the use of one-way endobronchial valve placement for the management of GBF [3].

In our study, endoscopy was performed during the initial management, with a failed attempt of clip placement to control the fistula. In a recently published systematic review [2], 18 out of 20 GBFs resolved via endoscopic approach. In one previous multicenter study including 15 patients, it led to 93.3% success rate in GBF closure with no recurrence [3] which may be attributed to systematic repetitive dilatations and stricturotomy [3]. Some studies were unfavorable and endoscopy did not resolve the fistula [3].

When conservative management fails, surgery is the route towards definitive treatment. The surgical approach may be conservative or aggressive. Conservative surgical treatment consists of drainage along with supportive treatment of TPN, antibiotics, and somatostatin analogs [2]. Aggressive surgical treatment is numerous [2] and summarized in (Table 1). The choice of aggressive surgical approach depends on patient condition, age and agreement. Based on Clavien classification of surgical complications, Silva et al. [2] classified GBFs from grade I to V; where grade III requires surgical, endoscopic or radiological intervention.

### Table 1

| GBF Type                                                                 | Surgical Management                                                                 |
|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Exploratory laparotomy + open pouch resection + Roux-en-Y esophagojejunostomy with long alimentary limb + drainage + omental patch on diaphragmatic defect (no thoracotomy) | 1. Exploratory laparoscopy + open pouch resection + Roux-en-Y esophagojejunostomy with long alimentary limb + drainage + omental patch on diaphragmatic defect (no thoracotomy) |
| Total gastrectomy + gastrojejunal anastomosis + splenectomy (all) + distal pancreatectomy + segmental lung resection (LL + diaphragm flap) + prosthesis | 2. Total gastrectomy + gastrojejunal anastomosis + splenectomy (all) + distal pancreatectomy + segmental lung resection (LL + diaphragm flap) + prosthesis |
| Thoracoabdominal approach: left lower lobe resection + debridement of eroded diaphragm + completion gastrorectomy + Roux-en-Y esophagojejunostomy | 3. Thoracoabdominal approach: left lower lobe resection + debridement of eroded diaphragm + completion gastrorectomy + Roux-en-Y esophagojejunostomy |
| Laparoscopic conversion to RYGB | 4. Laparoscopic conversion to RYGB |
| Total gastrectomy + intrathoracic esophagojejunostomy + left inferior lobectomy + diaphragm reconstruction with latissimus flap | 5. Total gastrectomy + intrathoracic esophagojejunostomy + left inferior lobectomy + diaphragm reconstruction with latissimus flap |
| Thoraotomy + rib resection + left lower lobe/hemi diaphragm resection + total gastrectomy + intrathoracic esophagojejunostomy + diaphragm reconstruction w/latissimus dorsi + chest/abdominal drainage | 6. Thoraotomy + rib resection + left lower lobe/hemi diaphragm resection + complete gastrectomy + intrathoracic esophagojejunostomy + diaphragm reconstruction with latissimus flap |

4. Conclusion

GBF is a relatively rare complication after LSG with an expected rise in recent years, parallel to the increase in bariatric surgeries. Clinicians should be alerted when patients have long-lasting pulmonary and abdominal signs despite optimal management. Hence, there is a need for a multidisciplinary management approach in the evaluation of such patients given the complexity of the nature of this complication.

Conflicts of interest

The authors disclose no conflict of interest in this manuscript.

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Ethical approval

This type of articles are exempted from ethical approval in our institute.

Consent

Consent has been obtained from the patient for the publication of this case report.

Author contribution

Abdullah AlShammari and Fatima Alam has contributed to the writing of the paper and collecting the data and literature review. Mohammed Hussein and Khaled AlKattan has contributed to the study concept and reviewing and accepting the final draft of it.

Registration of research studies

Not applicable.

Guarantor

Abdullah AlShammari is the Guarantor of this work.

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