Surgical Repair of a Traumatic Gastrobronchial Fistula

ADEF 1,2  Sven C. Schmidt  
BEF 1,2  Julia Möller  
BE 3  Hartwig Schütte  
BF 4  Robert Matz  
B 5  Bert Matthees  
AEF 1,2  Frank Marusch

Corresponding Author: Sven C. Schmidt, e-mail: sven-christian.schmidt@klinikumevb.de  
Financial support: None declared  
Conflict of interest: None declared

Patient: Female, 49-year-old  
Final Diagnosis: Traumatic gastrobronchial fistula  
Symptoms: Hemoptysis  
Medication: —  
Clinical Procedure: —  
Specialty: Surgery

Objective: Rare disease

Background: Gastrobronchial fistulas mostly occur as a result of postoperative complications, including those of bariatric, esophageal, and spleno-pancreatic surgery. Other causes are pneumonia, neoplasm, gastric ulcer, and subphrenic abscess. Traumatic fistulous communications between the stomach and the lung tissue are rare, with only 8 cases reported in the English-language literature (PubMed search) until now.

Case Report: We report a 49-year-old female patient with a gastrobronchial fistula secondary to diaphragm rupture 7 years prior, with intrathoracic herniation of the gastric fundus. She underwent thoracotomy for surgical repair. She presented in our Emergency Department with recurrent hemoptysis and painful cough. The diagnosis of the gastrobronchial fistula was confirmed by computed tomography and simultaneous bronchoscopy and esophagogastroscope, with injection of toluidine blue. As a multidisciplinary team, we opted for surgical repair owing to the fistula extent and severity and the need of repair of the diaphragm hernia. The patient underwent left-sided thoracotomy. However, owing to dense adhesions and chronic inflammation, we converted to an open procedure. The herniated gastric fundus was repaired by wedge resection. The affected lung tissue was debrided and reconstructed by suture repair. The diaphragmatic defect was closed by sutures with mesh augmentation. The patient’s postoperative course was uncomplicated, and she was discharged in good clinical condition on postoperative day 7.

Conclusions: Owing to the scarcity of the disease, the management of a gastrobronchial fistula is not standardized. The establishment of the diagnosis of the disease is often challenging. Therapeutic options include conservative measures, endoscopic options, and surgical repair. Our case showed that a multidisciplinary workup is essential for successful treatment.

Keywords: Bronchial Fistula • Gastric Fistula

Full-text PDF: https://www.amjcaserep.com/abstract/index/idArt/938506
**Background**

Gastrobronchial fistulas are reported to be associated with upper gastrointestinal surgery, such as bariatric procedures, but also esophagectomy [1]. Traumatic fistulous communications between the lung tissue and the stomach are extremely rare events with only a few case reports in the literature [2]. In the present paper, we report on a female patient who presented at our Emergency Department (ED) with late onset of hemoptysis and cough 7 years after thoracic trauma in a car accident.

**Case Report**

A 49-year-old women presented to our ED with recurrent hemoptysis. She was hemodynamically stable. She was anamnestic and had a traffic accident 7 years ago for which she underwent a left thoracotomy due to traumatic diaphragm rupture. Except of the traumatic event, her medical history was uneventful. The car accident was in the Ukraine, and the patient was unable to recall any details of the operation. However, the patient told us that she underwent some endoscopies and bronchoscopies in the early postoperative period owing to massive and dark-colored fluid in the thoracic drainage. After discharge from the hospital, she had a recurrent sputum-rich cough. The new flare-up of coughing blood led her to present to our ED. The patient was admitted to the Pulmonology Department for further diagnostic tests. A computed tomography (CT) scan from the abdomen and thorax showed a huge diaphragm hernia and a suspected fistula between the gastric fundus and the lung (Figure 1A, 1B). An endoscopic examination revealed the presence of a fistula orifice in the gastric fundus (Figure 2A, 2B). The diagnosis was confirmed by gastroscopic toluidine blue injection under simultaneous bronchoscopy. Immediately after the injection, the solution was identified in the lung. The patient was subsequently presented to our Surgery Department. In a further bronchoscopy, a central fistula to the main bronchus or trachea could be definitely excluded. Due to the concomitant recurrent diaphragmatic hernia, we decided to perform surgery. Under 1-lung ventilation, we started with a thoracoscopy from the left side, but due to dense adhesions and a situation of chronic inflammation in the area of the fistula, the procedure was converted to an open thoracotomy. During surgery, we identified the herniation of the gastric fundus through a diaphragmatic defect localized some centimeters to the left of the hiatus esophagus. After mobilization of the protruded stomach and adhesiolysis from the lung tissue, the herniated fundus was

**Figure 1.** (A) Parasaggital view of computed tomography scan with fistula (white arrow left side) and herniated gastric fundus (white arrow right side). (B) Coronal view of computed tomography scan with esophagus (white arrow), diaphragm defect with hernia (blue arrow), and fistula (yellow arrow).
The stomach was reduced into the abdomen and the diaphragmatic defect was repaired tension free with 2/0 monofil non-absorbent suture and additional augmentation with a biologic mesh (Figure 3). The defect in the peripheral lower lobe tissue was sutured with 4/0 monofil absorbent thread and covered with TachoSil (Takeda, Germany). After surgery, the patient recovered quickly and was discharged on day 7. Follow-up gastroscopy 4 weeks later was uneventful, and the patient was in good condition.

Discussion

Gastrobronchial fistulas are extremely rare but potentially life-threatening events. They were first described by Moeller and Carpenter who classified the disease into 5 categories: trauma, esophageal or gastric surgery, neoplasm, gastric ulcer, and subphrenic abscesses [3]. The most common cause for this disease is bariatric surgery, especially sleeve gastrectomy [4-6]. Although the exact pathophysiologic mechanism of the emergence of the disease is not clear, gastroesophageal fistulas are thought to arise from chronic erosion between the lung and the stomach tissue [7]. In addition, the fistula formation can be triggered by local recurrent or chronic inflammation or abscess. In our case, the fistula probably resulted from the chest trauma with diaphragm rupture. Although we do not have any information about the initial operation and postoperative follow-up, one hypothesis of the genesis of the fistula is a postoperative complication with a leakage of the stomach at the time of the index operation after the trauma. In this case, we would have had a very late onset of the fistula, at 7 years after the thoracic trauma. On the other hand, the fistula may have been a result of chronic inflammation with erosion of lung and stomach tissue as a result of the (recurrent) traumatic diaphragmatic hernia. Gastrobronchial fistulas after previous Nissen fundoplication is described in the literature [8]. The authors discuss a microtrauma of the gastric wall during the division of the short gastric vessels. A subsequent postoperative herniation of the gastric wrap into the chest led to close contact between the injured gastric tissue and the bronchial system and triggered the fistula [8].

The time between initial event to diagnosis of a fistula varies between days and several years. The clinical presentation includes fever, hemoptysis, gastrointestinal bleeding, chronic cough, recurrent pneumonia, and expectoration of food particles. The diagnosis of gastrobronchial fistulas can be very difficult owing to the variation in the clinical presentation and the scarcity of the disease. CT scan with or without oral contrast medium, gastrografin swallow, gastroscopy, and bronchoscopy are suggested diagnostic tools [4,7]. In our patient, the fistula

Figure 2. (A) Endoscopic view of the gastric fundus with the fistula orifice (arrow). (B) Endoscopic view after injection of toluidine blue solution.

Figure 3. Diaphragm defect with replaced stomach (white arrow), and lower lobe with inflammation (blue arrow).
was clearly identifiable on CT even without the administration of oral contrast. In more difficult cases, where the fistula is not clearly visible, the administration of oral contrast before the CT scan can be helpful to demonstrate a transfer of the contrast from the stomach to the bronchial system.

There are several options available for the choice of oral contrast agent. In the past, barium sulfate was a popular choice for fluoroscopic examinations because of its high contrast. However, in the event of leakage or fistula formation, barium can lead to severe peritonitis or severe pneumonitis. Less dangerous and therefore preferable in cases of suspected gastrobronchial fistula are low-osmolar iodinated contrast media (eg, Omnipaque 350), which are easily absorbed and safe even in cases of suspected aspiration [9]. Finally, in our case, the diagnosis was confirmed by simultaneous gastroscopy and bronchoscopy with injection of toluidine blue solution within the orifice of the fistula.

The management of gastrobronchial fistulas ranges from conservative approaches, including antibiotics, percutaneous CT-guided drainage of abscess formation, and endoscopy to operative procedures. Endoscopic options, such as over-the-scope clip closure of the gastric defect, suturing, stent implantation, or vacuum therapy have been described [10]. Endoluminal vacuum therapy can also be used as a bridging procedure to surgery in instable patients [11]. In the series of Guillaud et al, who reported the management of 13 patients with gastrobronchial fistulas following sleeve gastrectomy, all patients underwent radical surgery with Roux-en-Y gastrojejunal anastomosis or gastrojejunal patch [1]. Depending on the location and size of the fistula, additional surgical management can include local debridement of the lung parenchyma or lobectomy. Sophisticated management is required in gastrobronchial fistulas after esophagectomy. They are mostly the result of an anastomotic leakage or an insufficiency of the gastric staple line. This complication usually requires a complex surgical repair [12].

Although endoscopic options are increasingly used, we decided for the surgical approach owing to the concomitant diaphragmatic defect. Generally, hiatal hernias are approached in a minimally invasive method from the abdominal route. However, we chose the transthoracic route for the simultaneous repair of the lung and the diaphragmatic defect.

Conclusions

We described the management of a traumatic gastrobronchial fistula. Gastrobronchial fistulas have many causes, and the clinical manifestation is heterogeneous. Owing to the scarcity of the disease, diagnosis can be challenging. The management of the disease should be tailored to the individual patient and always requires a multidisciplinary approach.

Declaration of Figures’ Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

References:

1. Guillaud A, Moszkowicz D, Nedelcu M, et al. Gastrobronchial fistula: A serious complication of sleeve gastrectomy. Results of a French multicentric study. Obes Surg. 2015;25:2352-59
2. Al-Quah. A gastrobronchial fistula developed in a 6-year-old boy 2 years after a bullet wound to the left thorax. J Pediatr Surg. 1997;32:1798-800
3. Moeller DD, Carpenter PR. Gastrobronchial fistula: Case report and review of the English literature. Am J Gastroenterol. 1985;80:538-41
4. Shoja MM, Ansarin K. Conservative management of a delayed benign gastrobronchial fistula: A 20-year follow-up. Cureus. 2019;11:e5444
5. Sakran N, Zakeri R, Madhok B, et al. Global Bariatric Research Collaborative. Gastric fistula in the chest after sleeve gastrectomy: A systematic review of diagnostic and treatment options. Obes Surg. 2021;31:357-69
6. Saliba C, Nicolas G, Diab S, et al. Gastrobronchial fistula following a laparoscopic sleeve gastrectomy. Am J Case Rep. 2019;20:31-35
7. Tung JT, Lucero LM, Davis JW, Sue LP. Gastrobronchial fistula after robotic repair of traumatic diaphragmatic hernia. Case Rep Surg. 2020;2020:8085425
8. Faraj W, Khalifeh M, Soweid A, et al. Gastro-bronchial fistula after laparoscopic nissen fundoplication. Surg Laparosc Endosc Percutan Tech. 2007;17:430-3
9. ACR Manual On Contrast Media, 2022. Available from: https://www.acr.org/-/media/ACR/Files/Clinical-Resources/Contrast_Media.pdf
10. Fischer A, Höppner J, Uzutolu S, Richter-Schrag HJ. Over-the-scope clip (OTSC) closure of a gastrobronchial fistula after esophagectomy. Endoscopy. 2014;46(Suppl. 1 UCTN):E638-39
11. Durbin S, Aranez JL, Shobassy M, Sealock RJ. Endoluminal vacuum therapy in the management of a large gastrobronchial fistula. VideoGIE. 2020;5:552-54
12. Nishimura T, Fuse C, Akita M, et al. A case report of a gastrobronchial fistula and lung abscess caused by leakage from the staple line of a gastric tube after esophagectomy for esophageal cancer. Surg Case Rep. 2021;7:95

This work is licensed under Creative Common Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0)