An Eventful Sleeve Gastrectomy: A Case Report and Literature Review

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AIM: Sleeve gastrectomy is the most common bariatric procedure in Poland. The procedure leads to reduction of stomach volume by 85%, allowing the intake of food of approximately 100–150 mL. The complication rate is usually low as it is one of the least invasive bariatric procedures with a short recovery pathway.
CASE PRESENTATION: A 34-year-old male with a history of bipolar disorder and Body Mass Index of 46 kg/m^2 underwent a sleeve gastrectomy in a regional center. Due to anastomosis leakage diagnosed in the postoperative period, the patient was transferred to a referral bariatric center. The patient underwent revision laparotomy, during which a self-expandable metal stent was placed. After the revision surgery, the patient complained of stomach pain and left shoulder pain and gastroduodenal fistula was diagnosed. Vacuum wound therapy was initiated and a pigtail drain was implanted into the fistula canal. Despite multiple sessions of therapy, the patient developed recurrent thoracic empyema, ultimately requiring the creation of an esophago-ileal anastomosis. No further complications occurred, and the patient was discharged home in good condition.
RESULTS: Following early postoperative anastomotic leakage, the patient developed a gastric fistula. The recurrent thoracic empyema persisted despite multiple surgical and endoscopic interventions, including vacuum wound therapy, drainage, and stenting. Further, the patient required surgery to create an esophago-ileal anastomosis. The case shows a rare but complex and severe complication due to patient's incompliance regarding the calorie intake, volume and temperature of the meals and alcohol consumption.
CONCLUSIONS: In case of suspected postoperative complications after bariatric surgery, including bleeding or staple line leaks, referral to specialist bariatric center may be recommended. Patients should be strongly advised to follow the postoperative dietary recommendations to reduce the risk of complications.

Keywords: laparoscopic sleeve gastrectomy; bariatric surgery; obesity; weight reduction; perioperative complications; case report

Introduction

Sleeve gastrectomy (SG) is the most common bariatric procedure in Poland. The procedure leads to reduction of stomach volume by 85%, significantly decreasing its volume to around 100–150 mL. The procedure is conducted along the greater curvature of the stomach, leading to restricted food intake. Additionally, weight loss after SG is contributed to the hormonal changes, including a decrease in ghrelin, leptin, and glucagon-like peptide-1 levels. This contributes to appetite suppression and metabolic improvements. As a result, SG does not only lead to weight loss, but also to the remission of common obesity-related comorbidities such as hypertension, diabetes mellitus type 2 or other features of metabolic syndrome [1].

The complication rate of SG is at the level of 4.6%, significantly lower than in other types of bariatric procedures. Anastomotic leakage is the most common complication, occurring in 1.5–2.4% of patients undergoing SG and can be repaired relatively easily in a revision surgery [2]. In comparison, the leakage rate for Roux-en-Y gastric bypass is 1–3%, while mini gastric bypass/one anastomosis gastric bypass has a lower rate of 0.1–0.3%. Other important complications include bleeding (0.7% after SG) and strictures of the gastrointestinal tract (0.5%). Body Mass Index (BMI) greater than 50 kg/m^2 is a major risk factor for postoperative leakage [3].

Laparoscopic sleeve gastrectomy (LSG) has a lower rate of post-operative complication (2.12%) than laparoscopic

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Roux-en-Y gastric bypass (LRYGB) (3.02%). According to the International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO) and IFSO Global Registry Report 2022, the rate of unplanned return to theatre ranged from 0.5% to 2.0% after primary LSG. Additionally, it was higher for revisional procedures including LRYGB. The overall postoperative mortality was reported across all procedures as 0–0.11% [4]. Some authors recommend considering LSG as a standalone bariatric procedure, particularly in group of patients with a BMI under 43 kg/m^2. Additionally, LSG leads to a lower risk of vitamin deficiencies, reduced probability of occurrence of dumping syndrome and does not impair the drug absorption, conversely to LRYGB. Bariatric treatment is proven to lead to remission of obesity co-morbidities, including hypertension, diabetes mellitus type 2, depression or obstructive sleep apnea.

The aim of this case report is to present a severe and rare complication following SG and discuss whether the poor compliance of the patient led to the reoccurrence of the complications, which required multiple surgical and endoscopic interventions, including the creation of an esophagoileal anastomosis. By presenting the patient's case, we aim to highlight the possible postoperative management, the importance of patient's compliance. Additionally, we aim to present the need for timely referral to specialized bariatric centers when complications arise.

Case Presentation

This case has been reported in line with the case report guidelines: Case Report (CARE) Guidelines to ensure the accuracy and completeness of the report (**Supplementary Material**).

A 34-year-old male patient with obesity and a BMI of 46 kg/m^2 was admitted to a regional hospital to undergo bariatric surgery. He had a history of bipolar disorder, treated with vortioxetine 10 mg/d and lamotrigine 200 mg/d. He admitted irregular medication use and also presented a history of alcohol addiction. While he denied other chronic conditions, he fulfilled the criteria of diagnosis of metabolic syndrome. The blood pressure threshold is $\geq$130/85 mmHg, and blood glucose is typically measured with fasting plasma glucose $\geq$5.6 mmol/L. The significant changes in the patient's lipid profile included changes in the cholesterol low-density fraction 162 mg/dL (optimal $<$100 mg/dL), total cholesterol 220 mg/dL (optimal $<$200 mg/dL), and triacylglycerols 234 mg/dL (optimal $<$150 mg/dL). Elevated alanine transaminase (ALT) 92 U/L (optimal $<$41 U/L), aspartate transaminase (AST) 30 U/L (optimal $<$40 U/L), alkaline phosphatase 143 U/L (optimal 30–120 U/L), and gamma-glutamyl transferase 247 U/L (optimal 8–61 U/L) with ALT to AST ratio of more than 2 indicated the presence of alcoholic fatty liver disease. The peripheral blood count demonstrated no significant abnormalities.

The patient was qualified for a laparoscopic sleeve gastrectomy, which was performed without intraoperative complications. Three days after the primary procedure, the patient developed symptoms that suggested a complication. The symptoms included tachycardia, fever, and abdominal pain. A contrast-enhanced abdominal computed tomography (CT) scan revealed extraluminal air and contrast leakage near the staple line, consistent with a staple line leak. Based on these findings, the patient was diagnosed with a postoperative leak and underwent a revision laparotomy with resuturing of the anastomosis. In the subsequent postoperative observation in the hospital, seven days after the revision surgery, a staple line leak reemerged and an endoscopic esophagogastric stent was placed (Fig. 1).

Fig. 1. Esophagogastric stent.

After three days, the patient was discharged home in good condition.

One week after being discharged from the primary hospital, the patient presented to the emergency department of a referral bariatric center with symptoms of gastroesophageal reflux and abdominal pain and was admitted to the hospital. The patient did not adhere to the postoperative dietary recommendations provided, regarding the caloric intake, types of recommended food products, volume of meals, and temperature of meals. Additionally, the patient admitted regular alcohol consumption. He was treated with nonsteroidal anti-inflammatory and analgesic drugs and the symptoms resolved, during one week hospital stay. The patient was discharged home in good condition.

One month after the stent placement, the stent was removed during a gastroscopy, and a gastric fistula in the pericardiac area was revealed together with a pressure ulcer in the subpyloric area, in the place of stent. CT showed presence of the gastric opening of the fistula in the subcardiac part of the gastric pouch Fig. 2.

An abscess with 35 mm of diameter was found in the subdiaphragmal area on the left side. Fig. 2 presents an axial CT

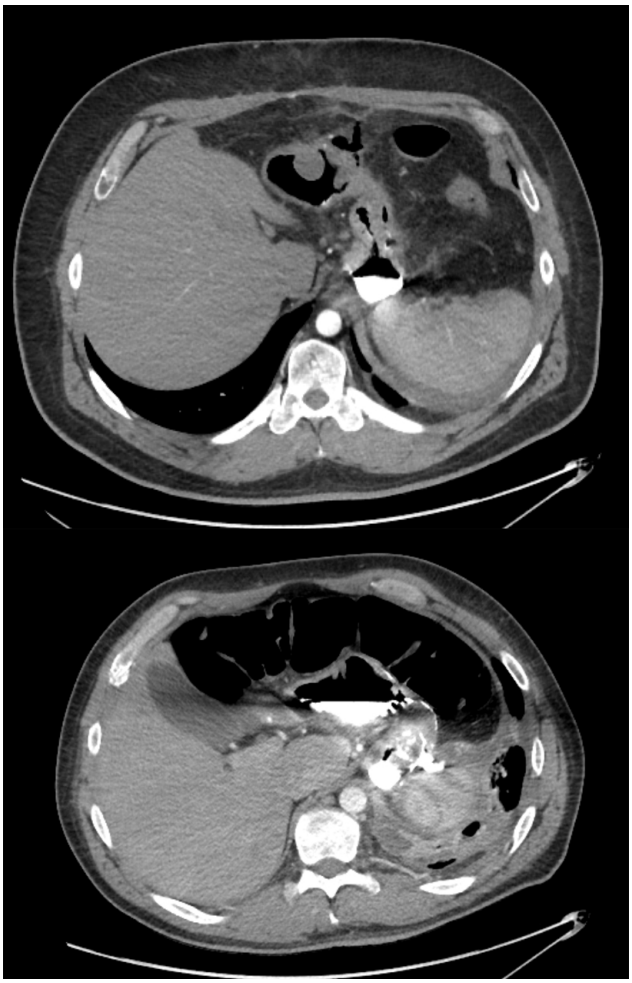

Fig. 2. Gastric fistula with an abscess.

image. A pig-tail catheter was placed in the fistula canal and the patient was discharged home in a good condition.

One month after the placement of the pigtail catheter, the patient presented to the emergency ward with severe abdominal pain and fever. Computed tomography and ultrasound revealed multiple intraperitoneal abscesses and the patient had a revision laparotomy with peritoneal cavity cleavage. Negative pressure wound therapy was introduced for the postoperative wound and continued for the following several days. The patient was discharged home in good condition.

After six months, the patient presented to the emergency ward with recurrent, non-resolving retrosternal pain, abdominal pain, cough, hemoptysis and fever. He had been diagnosed with coronavirus disease (COVID)-19 pneumonia two months earlier. The patient admitted noncompliance as he had not attended any of the previously planned control visits. The laboratory results showed elevated levels of C-reactive protein 26.3 mg/dL (norm 0.1 mg/dL), normocytic anemia, and raised alkaline phosphatase 187 U/L. Computed tomography showed fluid at the base of the left pleural cavity, which was diagnosed as lung abscess, successfully treated non-invasively with targeted antibiotics. Due to the persistent gastric fistula, endoscopic negative pressure wound therapy was initiated. However, the patient rejected the therapy and was qualified for a revision laparoscopy. The anastomosis line with the fistula canal was resected and a new anastomosis was created between the esophagus and ileum, bypassing the duodenum and the remaining part of the stomach. Pictures from operation are presented below Figs. 3,4,5,6,7. No further complications occurred and the patient was discharged home after ten days in good condition.

The patient underwent laparoscopic sleeve gastrectomy after preoperative evaluation. Psychologists confirmed the patient's readiness for the surgery. Psychiatrists controlled the patient's bipolar disorder. The mental illness was in remission. The bariatric dietitian provided a nutritional evaluation of the patient. The dietitian contributed to counselling the patient and advised them to pursue a preoperative hypocaloric and low-carbohydrate diet. He also educated the patient about postoperative demands, such as avoiding alcohol, controlling meal portions and regulating meal temperature. Postoperative follow-up included gastroscopies and CT scans to monitor the healing of the gastric leak and detect complications. Due to the patient undergoing endovac therapy, stent placement and pigtail catheter placement. Nutritional support combined with enteral and parenteral feeding. Targeted antibiotic therapy was applied. C-reactive protein (CRP) and vitamin levels were monitored at each hospital visit. The patient received recommendations concerning supplementation of medications and vitamins. The patient was monitored by multidisciplinary care, which included surgeons, dietitians and psychologists. Despite the episodes of disobedience in the early postoperative period, at the most recent follow-up in June 2024, the patient reported a stable condition. Physicians confirmed standard inflammatory markers and satisfactory quality of life.

Discussion

Early postoperative complications after LSG include bleeding (1.16–4.94%), mostly from the staple line, rarely from the parenchymatous organs such as the liver or spleen, staple line leak (1–3%), leading to the peritoneal inflammation and sepsis or acute pancreatitis (1.04%). Late complications are gastric stenosis, gastroesophageal reflux disease, and protein, vitamin, or micronutrient deficiencies [5].

Omentopexy has been proposed as a method to reduce complications after LSG. In a meta-analysis by Zarzycki *et al.* [6], the staple line leak rate was significantly lower in the group of patients who had undergone LSG with omentopexy than in patients after LSG without omentopexy (relative risk (RR) = 0.17; 95% CI [0.04–0.76]; p = 0.02). Omentopexy is also reported to decrease the incidence of nausea, vomiting, and hospital readmissions, although further research is needed to confirm these findings [7].

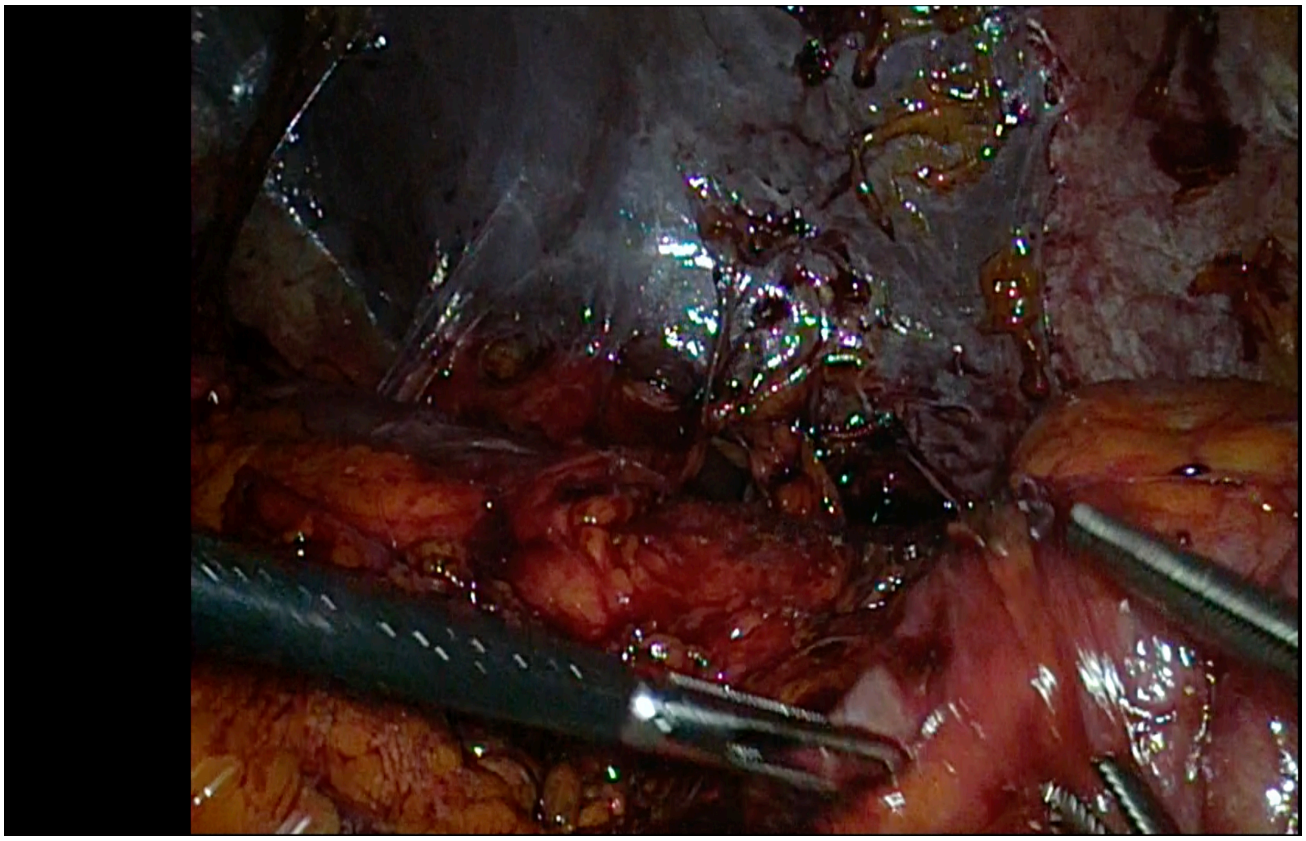

Fig. 3. Adhesion resection in perigastric area—intraoperative view showing extensive adhesions near the staple line.

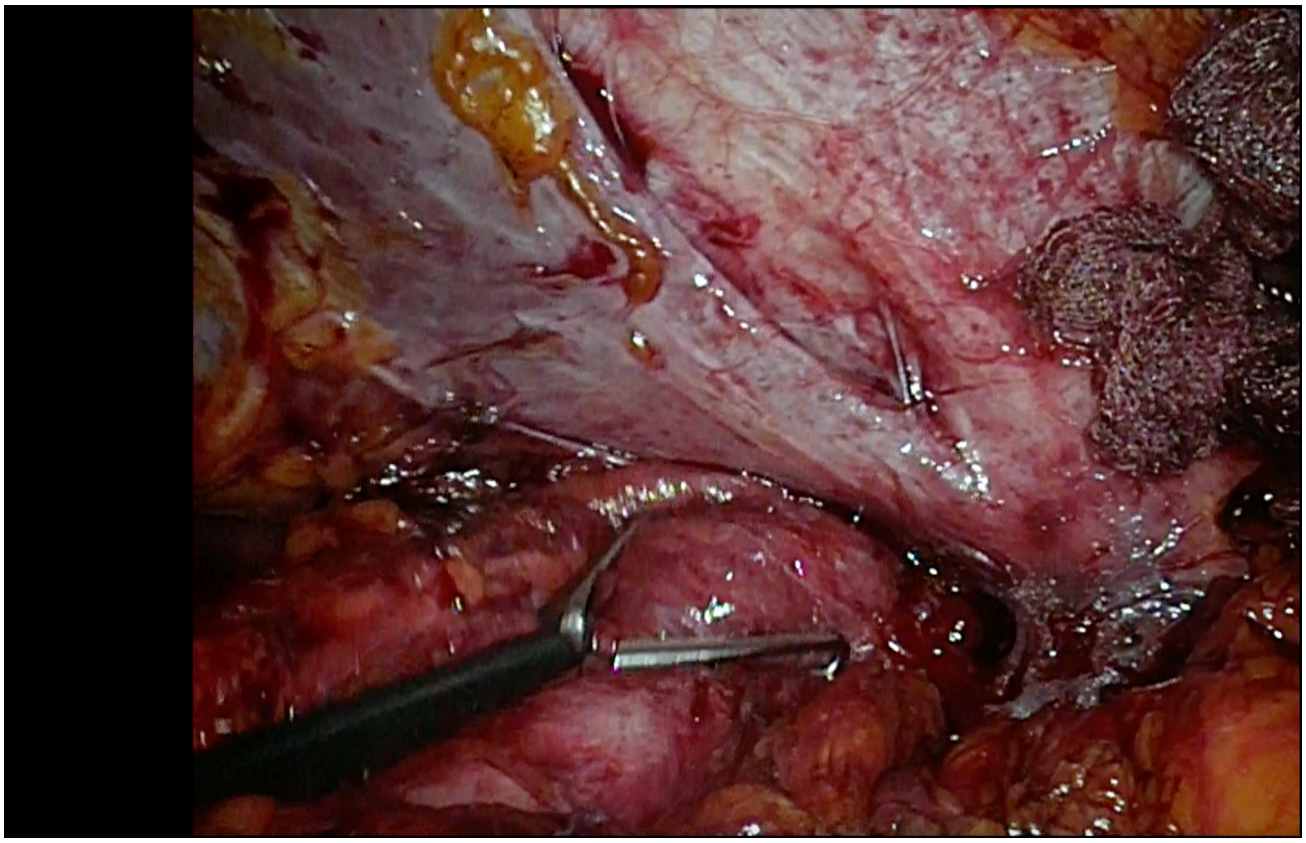

Fig. 4. Identification of the gastric fistula—visualization of the fistula tract during laparotomy.

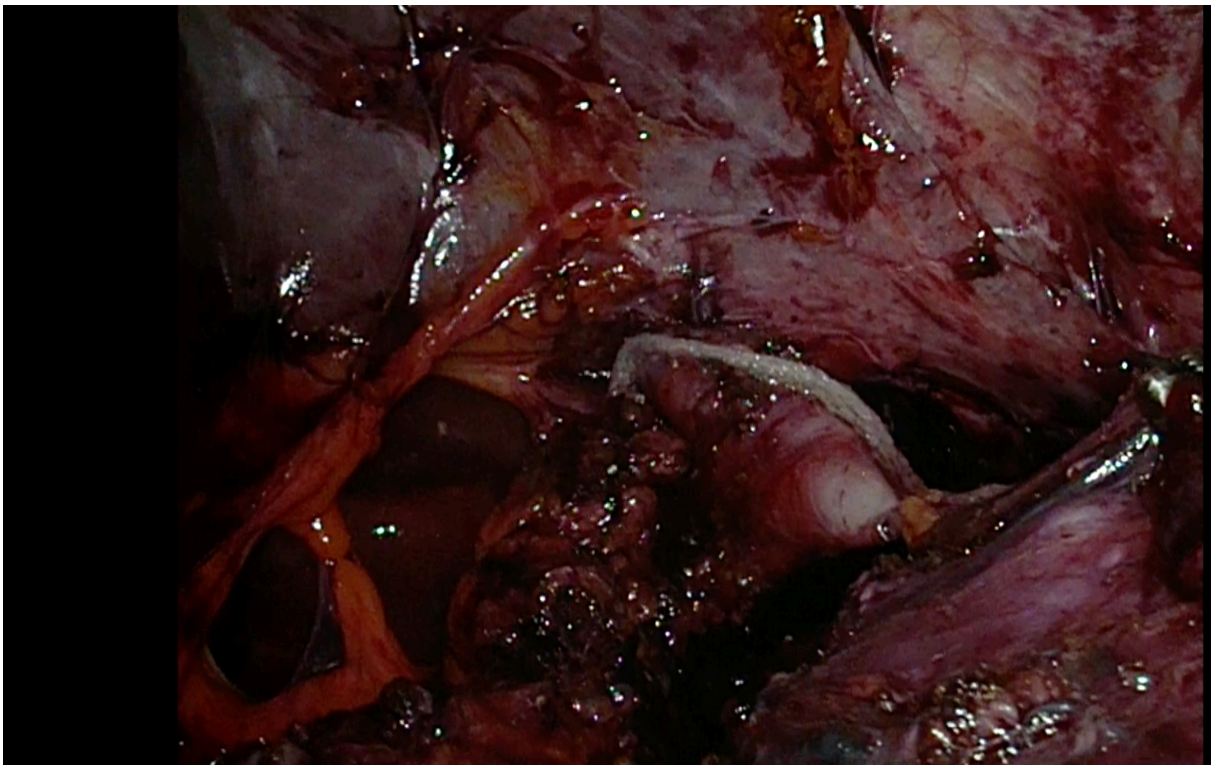

Fig. 5. Resected gastric part with fistula.

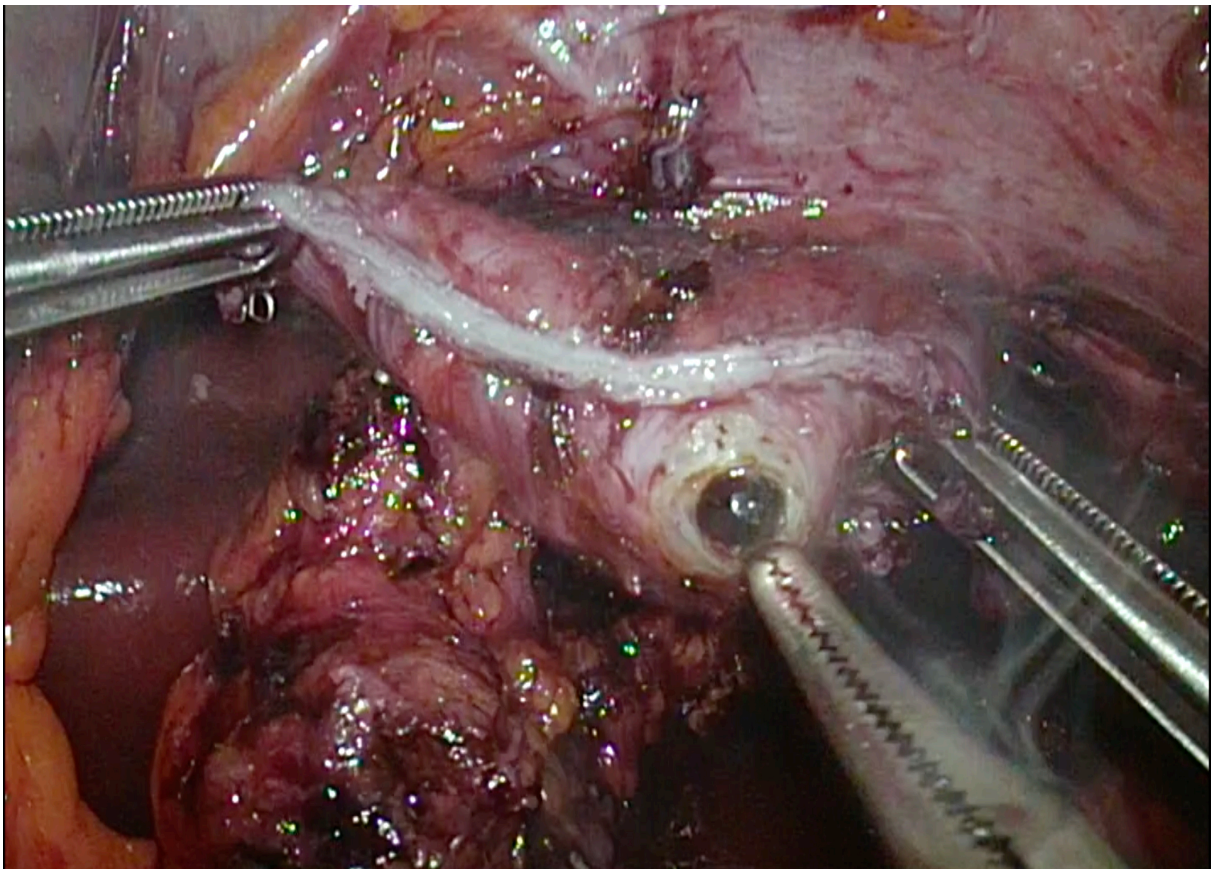

Fig. 6. Esophagus with orvil tube during preparation for anastomosis.

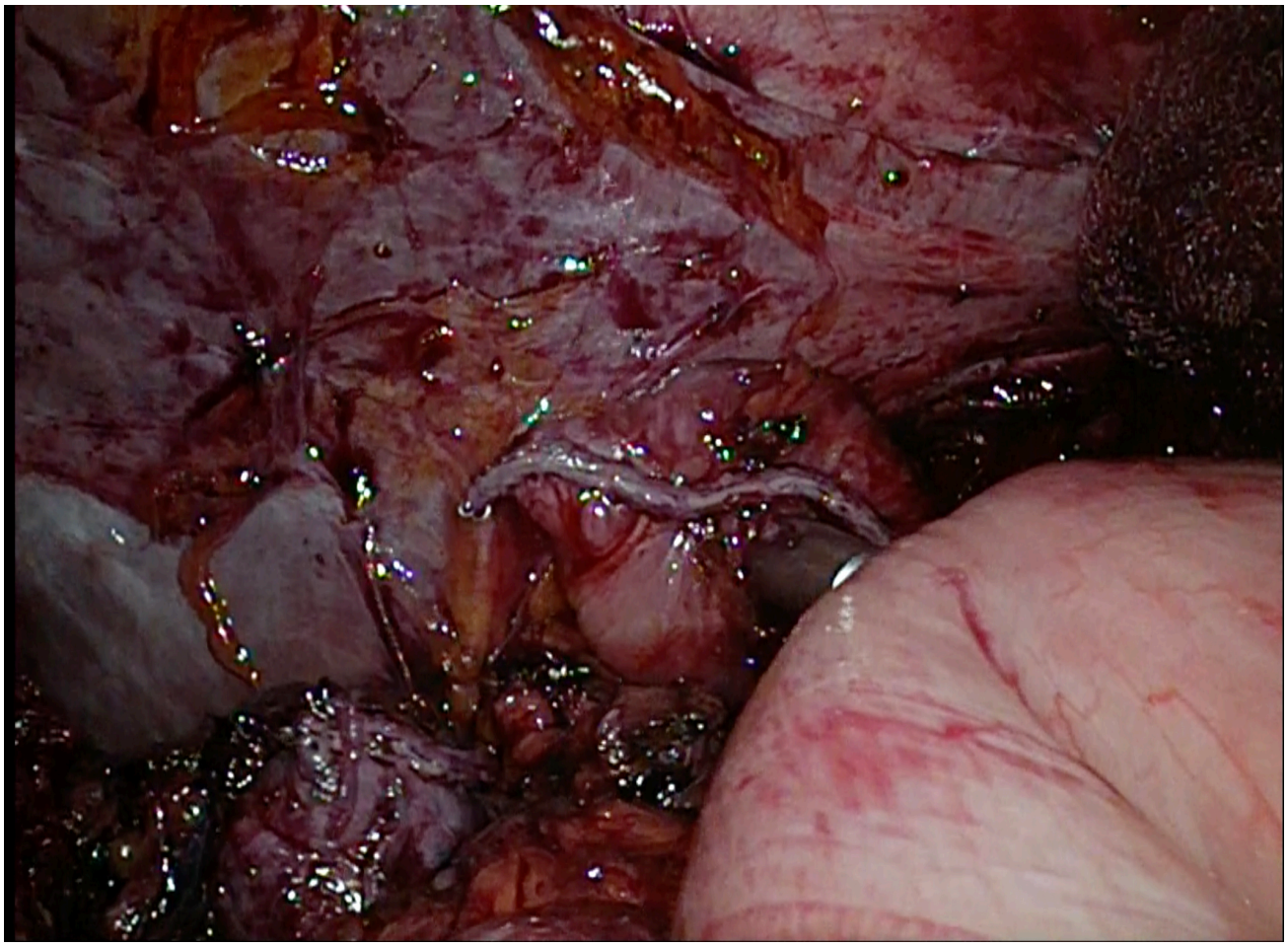

Fig. 7. Making of esophago-jejunostomy-intraoperative step showing completed reconstruction.

Intraperitoneal or intrapleural abscesses are rare complications after LSG, with low incidence rate. A recent study about spleen abscesses as a complication after LSG in a group of 18 patients showed that the most common clinical presentation included fever (94.4%) and abdominal pain (55.6%). In two cases the occurrence of spleen abscess was associated with a pleural effusion. Microbiological analysis showed growth of Staphylococcus aureus and Escherichia coli. All patients were treated with antibiotic therapy (100%), with added percutaneous draining in 61.1% of cases and splenectomy in 61.1% of cases, parenteral nutrition was needed in 22.2% of cases [8]. Buksh *et al.* [9] published a review of 20 publications with 27 cases of splenic abscess post-bariatric surgery. They found associations between occurrence of spleen abscesses and splenic ischemia, portal vein thrombosis and congenital or acquired immuno-deficiencies. Bacterial growth from abscess exudate in most cases showed the domination of Streptococcus spp. The authors suggested anticoagulation prophylaxis (both mechanical and pharmacological) for at least two weeks after bariatric surgery [9].

Shoar *et al.* [10] analyzed 25 studies with a total of 76 patients (mean age of 38.7 ± 12.7 years) with intrathoracic gastric fistula (ITGF) as a late complication of bariatric surgery. The most common types of ITGFs were gastro-bronchial (72.4%), gastro-pulmonary (17.1%), gastro-pleural (6.6%), and gastro-pericardial (3.9%). The mean time from surgery to diagnosis was 28.1 months, with full recovery achieved in 71.25% of patients and treatment failure in 6.25%. The mortality rate was 2.5% [10].

Surgical treatment may lead to a higher rate of full recovery than conservative treatment in late complications after laparoscopic bariatric surgery (LBS) [11]. Gastropleural fistula (GPF) is an extremely rare but serious complication following sleeve gastrectomy, characterized by the formation of a fistula between the stomach and the pleural cavity. The symptoms of GPF are nonspecific, which complicates diagnosis. The complication led to the recurrence of a subphrenic abscess in the left upper quadrant. Early diagnosis and treatment are crucial for improving treatment outcomes and reducing morbidity [12].

Ortega *et al.* [13] suggested an alternative method for the abscess and gastric fistula management—an endoscopic septotomy of the abscess, in which endoscope was inserted through the fistula canal and the septum of abscess was incised to create a connection between the abscess cavity and the gastric lumen. Ortega *et al.* [13] indicated that his method led to complete recovery, confirmed both radiolog-

Table 1. Summary of selected case reports describing surgical management.

Authors, year	Age, sex, BMI [kg/m^2]	Surgical method	Type of complications	Management
Chouillard E *et al*., 2020 [19]	29, male, 46.2	Sleeve gastrectomy	Gastric leak and peritonitis	Endoscopy with placement of pigtail catheters. After failure of treatment, Roux-en-Y Gastro-jejunostomy.
Ruiz-Úcar E *et al*., 2022 [20]	36, female, 44	Sleeve gastrectomy	Gastric leak	Esophageal stenting, which was removed, with a mucosal avulsion, 2 months afterwards. Esophageal stenosis treated with endoscopic dilatations. Esophagotomy with ileocoloplasty reconstruction.
Dugan N and Nimeri A, 2020 [21]	37, male, 33	Sleeve gastrectomy	Gastrocolic fistula	Failed nonoperative management. Gastrectomy and Roux-en-Y reconstruction.

BMI, Body Mass Index.

ically and clinically. A more classical method of treatment of gastric fistulas included endoscopic placement of double pigtail stent (DPS) in the fistula canal. A recent study assessed the effectiveness of DPS treatment in a group of 385 patients after LSG, which was found to be 83.41%, with 84.71% as a first-line therapy, and 78.05% as emergency treatment. The complication rate for this procedure was 13.73% and the most common complication was stent migration [14]. Drainage should be the first-line treatment for gastric fistula, followed by thoracic surgery in case of failure.

Al Hajj and Chemaly [15] proposed a classification and treatment algorithm for optimal management of post-LSG fistulas. The authors classified fistulas as:

- Type I—a small leak with no fluid collection.
- Type II—a leak with an intra-abdominal abscess.
- Type III—a complex fistula—an internal/external fistula with multiple fluid collections.

Authors suggested that type I responded well to conservative therapy, while type II might have required endoscopic or surgical intervention. Type III in most cases should be managed by surgical treatment [15]. Ramos *et al*. [16] suggested laparoscopic total gastrectomy (LTG) as an ultimate treatment option for patients with chronic post-LSG fistula, who had not responded well to prior conservative, endoscopic, and surgical treatment. 12 patients underwent LTG after unsuccessful treatment with other methods. LTG with Roux-en-Y esophago-jejunal anastomosis was performed in all cases by an experienced surgeon. The results showed that LTG was a safe and effective procedure, however it should only be performed in reference bariatric centers with experience in revisional bariatric surgery [16].

Additionally, another point for the discussion is the importance of postoperative patient's compliance. The analyzed case pictured the impact of poor compliance on the progression and recurrence of complications after SG. Although, patient was given dietary guidelines on the energy, volume and temperature of meals, he did not adhere to them. Patient also presented continued alcohol use, and failure regarding attending follow-up appointments. It is likely that those are important factors resulting in persistence of gastric fistula and further complications, including pleural empyema. Long-term success is not only dependent on the surgical technique and doctor's experience but also on patients sustained lifestyle and engagement in the treatment. Poor patients' compliance depends on factors such as low self-discipline, lack of motivation, and healthy food availability, which may lead to higher risk for postoperative leakages [17]. Therefore, the crucial components of bariatric care after surgery should be rigorous preoperative education, psychological assessment, and consistent follow-up appointments. Dietary, psychological and physiotherapeutic support may help with the improvement of patients' outcomes and reduction of occurrence of severe complications [18]. Furthermore, assessment of patients' compliance through regular monitoring and identifying early signs of non-compliance can allow fast interventions and modifications of treatment plans. This may prevent the escalation of the complication, leading to severe life-threatening conditions [2].

The long-term impact of the complications after laparoscopic sleeve gastrectomy was compelling. Continuous gastric leak and the occurrence of gastrobronchial fistula resulted in prolonged hospitalization, recurrent infections and various endoscopic and surgical interventions. These interventions affected patient's healing, nutritional status and quality of life. Even though laparoscopic sleeve gastrectomy is a feasible and efficient treatment for obesity, significant complications may occur. According to Sakran *et al*. [2], the mean time to closure of gastric leaks may extend up to 40 days. In some circumstances, it can last over 9 months [1]. In our patient, the fissure endured beyond this timeframe and turned into a chronic fistula. The patient's quality of life was compromised for several months. The patient demanded assisted nutrition. He reported lethargy and

malaise. These observations are in agreement with long-term study, which suggest that bariatric surgery may lead to decreased quality of life, despite positive metabolic outcomes [3].

From a surgical perspective, the deployment of esophagoileal anastomosis was a life-saving solution. It is a successful approach in restoring gastrointestinal cohesion, but it may cause altered digestion, difficulties in absorption and the need for long-term monitoring. The literature upholds that occasional, but arduous and strongly depend on multidisciplinary ward and patient compliance [5].

In follow-up visits, the patient's condition has deteriorated. He maintains an appropriate nutritional status. The patient no longer reports pain or dysphagia, yet due to the severity of the complications, this case highlights the importance of scrupulous postoperative surveillance and the patient's compliance when facing such a long-term healing course.

Example of case and management are presented in Table 1 (Ref. [19–21]).

Analysis of selected cases:

Table 1 aims to summarize cases demonstrating similar severe complications following sleeve gastrectomy. The selection of these cases based on the similarity of complication type (gastric leak or fistula) and surgical intervention required. In all the presented cases, the failure of standard conservative or endoscopic management, resulted in required surgical intervention such as LRYGB gastrojejunostomy or esophagectomy with reconstruction. Notably, presented patients required individualized and complex surgical management—depending on the location, fistula extension, and overall patient condition. These reports highlight the importance of timely decision-making in cases where conservative measures seem insufficient.

Conclusions

In case of presence of postoperative complications after bariatric surgery, such as bleeding or anastomosis leakage it is advisable to send the patient to a bariatric referral center. Gastric fistula is a rare complication of bariatric surgery that can be treated with catheterization of the fistula canal. If the conservative treatment fails, resection of the gastric part with the fistula canal is the optimum treatment. Late postoperative complications mostly occur in patients without compliance with the postoperative dietary recommendations. It is of utmost importance to properly educate bariatric patients about the necessity of lifestyle changes, highlighting the significance of adequate postoperative diet.

Abbreviations

SG, sleeve gastrectomy; BMI, Body Mass Index; IFSO, International Federation for the Surgery of Obesity and Metabolic Disorders; LSG, laparoscopic sleeve gastrectomy; LRYGB, laparoscopic Roux-en-Y gastric bypass; ALT, alanine transaminase; AST, aspartate transaminase; LBS, laparoscopic bariatric surgery; ITGF, intrathoracic gastric fistula; DPS, double pigtail stent; LTG, laparoscopic total gastrectomy.

Availability of Data and Materials

The data analyzed are available from the corresponding author upon reasonable request.

Author Contributions

MW, ARW—designing and conceptualization of the study. ZS, MB, SS—analyzing data, formal analysis, methodology, visualization. ZS, MB, SS—writing the manuscript. MW—collecting data. ARW—preparing the draft and revision of the manuscript. All authors have been involved in revising it critically for important intellectual content. All authors gave final approval of the version to be published. All authors have participated sufficiently in the work to take public responsibility for appropriate portions of the content and agreed to be accountable for all aspects of the work in ensuring that questions related to its accuracy or integrity.

Ethics Approval and Consent to Participate

This case report was prepared in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from the patient. Institutional ethics committee exemption of ethics approval.

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Conflict of Interest

Maciej Walędziak is serving as one of the Editorial Board members of this journal. We declare that Maciej Walędziak had no involvement in the peer review of this article and has no access to information regarding its peer review. Other authors declare no conflict of interest.

Supplementary Material

Supplementary material associated with this article can be found, in the online version, at https://doi.org/10.62713/aic.4082.

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