INTERNATIONAL SEVEN JOURNAL
OF HEALTH RESEARCH
ISSN: 2764-9415

Pancreatic fistula after splenectomy: Case report

DOI: 10.56238/isevjhv3n4-032
Receipt of originals: 06/11/2024
Acceptance for publication: 07/31/2024

Helen Brambila Jorge Pareja[1], Armando Carromeu Dias Pioch[2], Elisangela Maria Nicolete Rampazzio[3], Mateus Baptista Morais[4], Tânia Aparecida Alves Vilela[5], Marcelo De Jesus Garcia Júnior[6], Luiz Gustavo Anunciação Rico[7], Beatriz Mendes Nascimento Bueno[8], Julyana Santos Fraga[9], Arthur Oliveira de Alencar[10] and Danilo Martins Salati Sudki[11]

ABSTRACT

Splenectomy, a procedure for removing the spleen, is indicated primarily for trauma and hematologic conditions, with an overall incidence rate ranging from 6.4 to 7.1 per 100,000 people annually. Currently, splenectomy can be performed by open, laparoscopic, partial, or embolization techniques, and laparoscopic technique is preferred because it offers lower postoperative mortality and fewer complications. Complications can include bleeding, damage to adjacent organs, and high risks of infections and thromboembolism. After surgery, changes in blood cell count and quality increase susceptibility to infections. Anatomical knowledge of the spleen and pancreas is essential to avoid complications, such as pancreatic fistulas, which can occur due to pancreatic duct rupture, leading to enzyme leaks and a variety of symptoms, such as ascites. These fistulas, especially postoperative fistulas, are serious and can result in infections, hemorrhages, and increased hospital costs. There are few studies on splenectomy-related pancreatic fistulas, highlighting the importance of further investigation into this significant complication.

Keywords: Splenectomy, Pancreatic Fistula, Surgery.

[1] Advisor and Dr.
General Surgeon and Ap. Digestive
University of Western São Paulo
[2] Dr. and General Practitioner
University of Western São Paulo
[3] Medical Student
University of Western São Paulo
[4] Medical Student
University of Western São Paulo
[5] Medical Student
University of Western São Paulo
[6] Medical Student
University of Western São Paulo
[7] Medical Student
University of Western São Paulo
[8] Medical Student
University of Western São Paulo
[9] Medical Student
University of Western São Paulo
[10] Medical Student
University of Western São Paulo
[11] Medical Student
University of Western São Paulo

INTRODUCTION

Splenectomy is a surgery to remove the spleen, an organ on the upper left side of the abdomen, whose function is to filter blood cells, on average 150ml of blood per minute, by splenic macrophages that remove pathogens from the circulation. The incidence rate of splenectomies globally ranges from 6.4 to 7.1 per 100,000 people per year. The procedure is most often performed due to trauma and hematological diseases. Surgery is indicated for several conditions, including benign and malignant diseases, anatomical problems, and traumatic injuries[1,4].

The removal of the spleen was carried out for centuries even though there was no adequate understanding of its function and physiology. The first record of a splenectomy dates back to 1549, when it was performed to treat a symptomatic enlargement of the spleen. During the nineteenth century, it was noted that it could be used in cases of penetrating injuries in the upper left quadrant of the abdomen. In the mid-twentieth century, splenectomy became a therapy for idiopathic/immune thrombocytopenic purpura (ITP)[4].

The spleen plays an essential role in immune responses by identifying antigens in the blood, producing antibodies, and eliminating pathogens through antibody-mediated mechanisms. It houses cells responsible for innate and adaptive immunity. The organ is supplied by the splenic artery, which originates from the celiac trunk, and receives collaterals from adjacent organs. In addition, the spleen has the function of sequestering blood cells, such as platelets, retaining approximately one third of the total of these cells, in addition to erythrocytes and granulocytes3,4.

Currently, there are four main methods for performing splenectomy: total removal of the spleen by open surgery, laparoscopy, partial splenectomy, and reduction of splenic tissue by embolization. Among these, open and laparoscopic splenectomy are the most frequently used techniques for total removal of the spleen. The laparoscopic technique has shown notable benefits, including a significant reduction in mortality within 30 days postoperatively, shorter length of hospital stay, and lower incidence of pulmonary, infectious, and wound-related complications2. This technique also includes two modalities: hand-assisted laparoscopic and single-incision laparoscopic. Robotic-assisted splenectomies can be performed with or without opening the smaller sac1, in addition, percutaneous drainages may be an option for splenic abscesses3.

Complications arising from the removal of the spleen surgically are limited to intraoperative, immediate and late postoperative periods, resulting from the surgery itself or from the absence of the organ and its functions. The most common intraoperative complications during splenectomy include bleeding, usually caused by lesions in the splenic capsule or short gastric vessels, and lesions in adjacent structures such as the stomach, colon, and pancreas. Pancreatic lesions can result in pancreatitis and fistula, and a drain is recommended in these cases. In the postoperative period, early complications include severe infections, hemorrhage, intraabdominal abscesses, venous thromboembolism, and respiratory complications, such as pneumonia. In the long term, patients without a spleen face a higher risk of infections, cancer, and abdominal hernias[1].

Splenectomy is clearly associated with a higher risk of infections and thromboembolism. After the spleen is removed, changes in cell counts, cell quality, and immune responses occur. Initially, reactive thrombocytosis and leukocytosis are common, with thrombocytosis usually resolving within 6 to 12 months, although it may persist. Although total B lymphocytes remain stable, there is a significant decrease in IgM memory B cells and in the proportion of B cells exchanged, which happens about 150 days after surgery. This increases vulnerability to infections by encapsulated bacteria and reduces the immune response to polysaccharide vaccines, predisposing the patient to infections, and may include sepsis as an outcome of such a procedure[1,4].

Understanding the anatomy of the spleen and distal pancreas is crucial to understanding the formation of fistulas and how both organs are related. The spleen is located in the upper left quadrant of the abdomen, being covered by the left diaphragm and protected by the 9th, 10th, and 11th ribs. It is supported by peritoneal ligaments, such as the splenophrenic, gastrosplenic, splenorenal and splenocolic. The tail of the pancreas is adjacent to the splenic hilum. The splenic artery, a branch of the celiac trunk, runs along the back of the pancreas and supplies branches to the organ. The splenic vein, which also originates from the splenic hilum, runs along the back of the pancreas, joining with the inferior mesenteric vein and the superior mesenteric vein to form the portal vein. Understanding the anatomical proximity between the spleen and the tail of the pancreas is important to avoid complications during and after surgery[5].

A fistula is an abnormal connection between epithelial surfaces, and in the case of pancreatic fistula, it involves communication between the pancreatic duct and another

epithelial surface, leading to the leakage of pancreatic enzymes. They can be classified anatomically, by the underlying disease or by predisposing cause. Pancreatic fistulas are divided into internal, when there is communication with the peritoneal or pleural cavities, and external, when pancreatic fluid drains through the skin, and is more common after surgery6.

The pathophysiology of pancreatic fistulas, whether internal or external, is caused by rupture of the pancreatic duct, resulting in the leakage of pancreatic fluid. Depending on the location and size of the fistula, symptoms can range from asymptomatic to signs such as ascites, with abdominal distension and pleural effusion in cases of thoracopancreatic fistulas. In external fistulas, pancreatic fluid is drained through the skin, which can cause dehydration, weight loss, and risk of infection at the fistula site[6]. Postoperative pancreatic fistula (POFE) can be commonly observed in surgeries such as pancreaticoduodenectomy, presenting a significant morbidity and mortality rate in these cases[7].

Very few reports and studies relating pancreatic fistulas to splenectomy have been found in the literature, raising the hypothesis of iatrogenic origin due to the anatomical proximity of both organs. Therefore, this report aims to elucidate and help the community to understand this very significant complication.

METHODOLOGY

This is a case report study, whose information was collected through a review of medical records. In parallel, to support the ideas discussed in this article, a literature review was carried out in scientific databases such as PubMed. The production of this scientific article followed the regulations proposed by the National Research Council (CONEP).

CASE REPORT

A 59-year-old female patient presented with splenomegaly on physical examination, and the hematology team indicated robotic splenectomy. 3 weeks after surgery, in postoperative follow-up, the patient presented a collection in a splenic pocket and underwent percutaneous drainage. It evolved uneventfully for 4 months, until it presented abdominal distension, stopped the elimination of gases and feces, again presenting collection in a splenic store. After guided drainage was submitted for the

second time and fluid was sent for analysis (Figure 1), elevated amylase was observed in this sample, concluding pancreatic fistula. The patient remained fasting, using octreotide for 3 days, with improvement of symptoms and return of fecal elimination. The diet was introduced slowly, without intercurrences, evolving with complete improvement and hospital discharge.

Image 1: Appearance of the punctured liquid.

Source: The authors.

DISCUSSION

Splenectomy surgery is defined as a surgery to remove the spleen, whose purposes range from control and treatment of autoimmune diseases to traumatic injuries. Splenectomy is an old surgery, dating back to times when there was no knowledge about the function of the spleen and its anatomy. Currently, the incidence of surgeries for the removal of this organ varies up to 7.1 people per 100,000 inhabitants, a global rate and now the functions of the spleen related to immunity and blood filtration are understood. In Brazil, a total of 1,519 splenectomy-related procedures were performed in the Unified Health System, from January to July 2024, excluding oncological causes, resulting in an important fact of hospital logistical impact, generating a cost of 3.83 million reais to the SUS in these 7 months alone1,4,14

According to this report, we observed a female patient who underwent this procedure. No studies were found that correlate gender with the procedure itself, but it is known that hematological autoimmune diseases are more frequent in women and are among the main precipitating factors for surgical removal of the spleen1.

Little is found in the literature regarding pancreatic fistula associated with this procedure of removal of the spleen, but it is cited as a possible complication due to the anatomical proximity between both organs, being more commonly observed after pancreaticoduodenectomy surgery or even resection of gastric tumors[5,6]. Some studies have defined techniques for pancreatic surgeries and analyzed the impact on fistula formation, since it presents an important morbidity and mortality factor10,11. The pathophysiology of pancreatic fistulas, whether internal or external, is caused by the rupture of the pancreatic duct, resulting in the leakage of pancreatic fluid and such occurrence in this case can be attributed to an iatrogenic committed at the time of surgery. Depending on the location and size of the fistula, symptoms can range from asymptomatic to signs such as ascites, with abdominal distension, and pleural effusion in cases of thoracopancreatic fistulas. In external fistulas, pancreatic fluid is drained through the skin, which can cause dehydration, weight loss, and risk of infection at the fistula site[6]. As described here, the patient evolved with abdominal distension and impaired gas and feces, presenting an acute abdomen due to an internal fistula.

Postoperative pancreatic fistula (POPE) is defined as "an abnormal communication between the pancreatic ductal epithelium and another epithelial surface containing enzyme-rich fluid derived from the pancreas." Although the definition has remained the same since 2005, in 2016, the diagnostic criteria were changed by the International Study Group of Pancreatic Fistula (ISGPF), whose criteria related to the presence of amylase in the fluid forming the collection remain, but now it must be associated with a causal factor of pancreatic leakage, where grade A ceased to exist and started to be called asymptomatic and/or biochemical fistula and grades B and C now have more significant clinical categorizations, where the former refers to patients who had to undergo a procedure to drain the collection, the latter to patients who present organ failure[6,8,10]. Therefore, this patient is classified according to the International Study Group of Pancreatic Fistula as a grade B pancreatic fistula.

Regarding the classification of fistula grade B/C, the study by Xiang, Chengzhi et al (2022)[12] showed that infections do not have a predictive factor to classify fistula as

grade C, but showed that its presence can be a triggering factor for fistulas in general, with these mechanisms being uncertain in the literature. Infection was not a factor present in this case, in which the patient presented systemic symptoms related only to the collection in the hepatic pocket itself, without changes in the blood count and/or infectious signs.

Although easily classified, fistulas must first undergo an analysis of the fluid in the collection to determine their pancreatic origin. In this regard, the criteria for analyzing the liquid for the presence of amylase quantitatively remain, and the value should be 3x higher than the amount of normal serum amylase8. Using this criterion, the presence of the diagnosis is made only after percutaneous drainage, and this was the case reported here, in which the amylase value of the fluid in the hepatic pocket was several times higher than the serum reference value. In addition, other studies have shown that postoperative amylase values can be predictive of the occurrence of pancreatic fistulas13.

Still analyzing the need for intervention for diagnosis and classification, it can be concluded, then, that all diagnosed patients are at least grade B, reinforcing the impertinence of classification A for patients who are admitted to health services, as stated in the study by ISGPF8. In the hook of the procedures performed, the health team of this patient followed the literature that allows percutaneous drainage of abscesses or splenic collections, even if this was performed after the removal of the organ3.

Several studies correlate risk factors with the occurrence of postoperative pancreatic fistula, in our references we used Nahm, Christopher B et al. (2018)[11] who cite excessive administration of intraoperative fluids, increased remaining volume of the pancreatic parenchyma, poor preoperative nutrition, and male gender. The mechanisms by which these preoperative factors lead to POLL have not been studied in detail, considering that advanced age is associated with increased perioperative mortality, but there does not seem to be an increased risk of fistula. It is worth mentioning that this study evaluates the risk factors after pancreaticoduodenectomy, but we excluded those that were the risk score for such occurrence and took into account those that are nonspecific to surgery, thus corroborating that the patient in this case presented relatively advanced age, inadequate diet and contrasted with the risk factor that

includes male gender. As for the excessive administration of fluids, this data remains uncertain.

As described in the literature, robotic splenectomy surgery is performed and demands several advantages over other techniques, including shorter hospital stays, less estimated blood loss, and less postoperative pain, in addition to aesthetic benefits. Despite these advantages, the lower risk of infections outweighs the clinical benefits, since they present a predictive factor for the occurrence of fistulas1,12,15. Complications of POLL can be classified into two main categories: hemorrhage and sepsis. Both can result in systemic consequences, such as prolonged hospital stay, delayed gastric emptying (DGE), intestinal fistulas, multiple organ failure, and even death. In addition to the consequences of splenectomy in terms of decreased immunity, the risk of sepsis potentially becomes higher1,4,11. As previously mentioned, the presence of infection was not observed in this patient, corroborating the robotic advantage over this procedure.

Other complications related to intervention in the colic/splenic anatomy and removal of the spleen may include portal vein thrombosis, whose solid indication allows the use of low molecular weight heparin (LMWH) and prophylactic warfarin9. This conduct was not observed in this patient.

CONFLICTS OF INTEREST

The authors state that there is no potential conflict of interest that could compromise the impartiality of the information presented in this scientific article.

REFERENCES

1. Yi, S. L., & Lopez, J. L. B. (2024). Splenectomy. *StatPearls*. StatPearls Publishing.

2. Daar, S., & Eleftheriou, P. (Eds.). (2021). *Splenomegaly and splenectomy*.

3. Cappellini, M. D., et al. (Eds.). (2023). *Guidelines: For the management of transfusion dependent thalassaemia (TDT)* (4th ed.). Thalassaemia International Federation.

4. Gutama, B., et al. (2022). Splenectomy versus imaging-guided percutaneous drainage for splenic abscess: A systematic review and meta-analysis. *Surgical infections, 23*(5), 417-429. https://doi.org/10.1089/sur.2022.072

5. Luu, S., et al. (2019). Post-splenectomy sepsis: Preventative strategies, challenges, and solutions. *Infection and drug resistance, 12*, 2839-2851. https://doi.org/10.2147/IDR.S179902

6. Lee, E. J., et al. (2021). Splenectomy and distal pancreatectomy in advanced ovarian cancer. *Gland surgery, 10*(3), 1218-1229. https://doi.org/10.21037/gs-2019-ursoc-09

7. Unegbu, F. C., & Anjum, F. (2023). Pancreatic fistula. *StatPearls*. StatPearls Publishing.

8. Kawaida, H., et al. (2019). Surgical techniques and postoperative management to prevent postoperative pancreatic fistula after pancreatic surgery. *World journal of gastroenterology, 25*(28), 3722-3737. https://doi.org/10.3748/wjg.v25.i28.3722

9. Pulvirenti, A., et al. (2017). Modifications in the International Study Group for Pancreatic Surgery (ISGPS) definition of postoperative pancreatic fistula. *Translational gastroenterology and hepatology, 2*, 107. https://doi.org/10.21037/tgh.2017.11.14

10. Liao, Z., et al. (2023). Long term prophylactic anticoagulation for portal vein thrombosis after splenectomy: A systematic review and meta-analysis. *PloS one, 18*(8), e0290164. https://doi.org/10.1371/journal.pone.0290164

11. Nahm, C. B., et al. (2018). Postoperative pancreatic fistula: A review of traditional and emerging concepts. *Clinical and experimental gastroenterology, 11*, 105-118. https://doi.org/10.2147/CEG.S120217

12. Xiang, C., et al. (2022). Prevention and treatment of Grade C postoperative pancreatic fistula. *Journal of clinical medicine, 11*(24), 7516. https://doi.org/10.3390/jcm11247516

13. Yang, J., et al. (2015). Postoperative drain amylase predicts pancreatic fistula in pancreatic surgery: A systematic review and meta-analysis. *International journal of surgery (London, England), 22*, 38-45. https://doi.org/10.1016/j.ijsu.2015.07.007

14. Ministério da Saúde. (2024). DATASUS. Tabnet. Brasília, DF: Ministério da Saúde.

15. Galvez, D., et al. (2016). Staple-free robotic distal pancreatectomy and splenectomy. *Journal of visualized surgery, 2*, 137. https://doi.org/10.21037/jovs.2016.07.01