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Case Report

Distal pancreatectomy with preserved spleen for benign serous cystadenoma of the pancreas

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ABSTRACT

Pancreatic serous cystadenoma is a benign tumor of the pancreas that can be effectively managed using the Kimura surgical technique. This method involves resecting the distal portion of the pancreas while preserving the spleen and its associated vessels. The aim of this study was to evaluate the application of the Kimura technique in two different surgical approaches—laparotomy and laparoscopy—for the treatment of pancreatic serous cystadenomas. Specifically, the study assessed the feasibility, surgical outcomes, and postoperative prognosis associated with each approach. A case review was conducted involving two patients who underwent surgery at the Department of Organ and Tissue Transplantation, Plastic, and Endocrine Surgery at Grodno Clinical Hospital. The study focused on distal pancreatectomy and its surgical variants, paying special attention to the patients' clinical presentations, symptoms, and imaging findings (CT and MRI). Both patients had uneventful postoperative recoveries without complications such as pancreatic fistula, gastric stasis, or splenic infarction. The findings suggest that the Kimura technique is a safe and effective method for managing benign serous cystadenomas of the pancreas. Favorable outcomes with both surgical approaches highlight the importance of a patient-specific strategy, taking into account factors such as lesion size, anatomical location, splenic vessel involvement, and the surgeon's expertise to optimize surgical results. Furthermore, spleen preservation using the Kimura technique helps maintain immune function and reduces the risk of postoperative complications, including severe infections and splenic infarction.

Keywords: Pancreatic serous cystadenoma, Kimura technique, Spleen preserving distal pancreatectomy, Laparoscopic, Laparotomy

INTRODUCTION

Pancreatic serous cystadenomas are benign, fluid-filled tumors arising from the epithelial cells of the pancreas and are considered to be the most common occurring tumors among polycystic neoplasms (PCNs).[1,2] They represent one-third of PCNs cases and are seen more commonly among women.[3-5] Furthermore, genetic predisposition plays a role in pancreatic serous cystadenomas.[2] Pancreatic serous cystadenomas are a relatively rare group of tumors that are more prevalent in elderly people, with a prevalence of about 2.5% in the general population and up to 10% in those over 70 years old people.[7] Pancreatic serous cystadenoma falls under category of cystic neoplasms of the pancreas (CNP) and are clinically significant due to their potential for malignancy. Despite most cases being benign, the condition presents challenges in surgical management due to its complexity.[8] Most patients with pancreatic serous cystadenomas are asymptomatic, and the condition

often goes unnoticed.[2,5] As a result, patients without specific signs and symptoms are often detected incidentally through abdomen ultrasonography, cross-sectional imaging studies such as CT, MRI, or endoscopic ultrasound (EUS) performed for another condition.[2]

Therefore, it is crucial to identify and manage growing pancreatic serous cystadenomas as early as possible to avoid complications such as pancreatitis and obstructive jaundice, which can lead to cholangitis. Additionally, pancreatic duct obstruction may result in pancreatic exocrine and endocrine insufficiencies or gastric outlet obstruction. Even though it is rare, malignant transformation is a potential concern.[2]

Advancements in imaging techniques, such as enhanced CT and MRI, have improved detection rates of pancreatic serous cystadenomas (PSCs), ranging from 1.2% to nearly 20% in clinical settings. Based on size and structure, PSCs are classified into four types: microcystic, macrocytic, mixed, and solid.[2,9] Differentiating PCNs from others can be quite challenging, especially when they have fewer cysts or resemble mucinous neoplasms. Therefore, additional imaging studies such as MRI are often required for better diagnostic clarity.[2,9] MRI findings indicate that cysts appear dark on T1-weighted images, but may appear bright if there is bleeding whereas, on T2-weighted images, cysts appear bright compared to surrounding tissues. In fact, MRI is superior to CT in detecting small cysts. Endoscopic ultrasound (EUS) is the preferred diagnostic tool for detecting small pancreatic cysts, especially when a good tissue sample is obtained for accurate analysis.[2,9] Despite advances in imaging technology, a thorough understanding of PCNs and their pathophysiology remains essential for accurate diagnosis and effective treatment.[8]

Cyst fluid analysis is performed using fine-needle aspiration (FNA) under ultrasound guidance, which plays a crucial role in diagnosis.[10] This analysis includes chemical analysis as well as tumor markers evaluation. In chemical analysis, amylase levels are measured, as high levels indicate a pathological condition; however, in serous cystadenomas, amylase levels are usually low.[2,11] If a definitive diagnosis is made in an asymptomatic patient with a small lesion, follow up series of imaging can be used to monitor its progress. However, if a definitive diagnosis cannot be made, or if the patient is symptomatic, pancreatectomy is warranted.[10]

Timely surgical intervention is essential to prevent disease progression and improve patient outcomes.[12] Pancreatectomy is indicated for conditions such as pancreatic cancer, cysts, or chronic pancreatitis, regardless of whether the lesion is malignant or benign.[13] The specific surgical approach, such as the Whipple procedure, total, central or, distal pancreatectomy depends on the location and extent of the disease, as well as the patient's anatomy.[13,14]

Distal pancreatectomy with, or without splenectomy offers a potential curative option for patients with pancreatic serous cysts.[15,16] This procedure has been used more frequently over recent years, particularly for pancreatic diseases affecting the body and the tail of the pancreas.[16] Distal pancreatectomy with splenectomy involves central ligation of the splenic artery and vein, en-bloc splenectomy, and extensive regional lymph node dissection, which is especially indicated for malignant tumors.[16] A long-term risk associated with this procedure is the potential development of diabetes due to the removal of pancreas.[16]

Spleen-preserving distal pancreatectomy is an alternative surgical option for the pancreatic tumors and can be performed using either Kimura technique (KT) or the Warshaw technique (WT). The Warshaw technique does not preserve splenic vessels, and is typically employed when splenic vessel preservation fails during surgery.[17] It involves ligation of the splenic vessels, with blood supply maintained through short gastric and gastroepiploic vessels.[17] Although, the Warshaw technique has shown promising outcomes, it is associated with increased risk of complications, such as splenic infarction, gastric varices, and unplanned splenectomy.[17] The Kimura technique (KT), preserves splenic vessels, and significantly lowers the complications mentioned above. However, KT is associated with greater intraoperative blood loss and longer operative time.

The Kimura technique is traditionally performed by laparotomy approach, which is then well adapted to accommodate the laparoscopic approach later on. The laparotomy approach allows direct access and visualization, while the laparoscopic approach is well suitable for a wide range of patients, including obese, elderly, or the frail.[18] Even though, the costs of both approaches are similar, the laparoscopic approach offers promising post-surgical outcomes, such as reduced post-operative complications, less pain and a shorter hospital stay. Understanding the outcomes of these two surgical approaches are crucial for optimizing patient care, enhancing surgical practice, thereby potentially reducing the overall burden on the healthcare system.[18]

CASE REPORT

This study highlights the importance of proper surgical decision-making in managing pancreatic cystadenomas and evaluates the postoperative outcomes of patients who underwent laparoscopic and laparotomy Kimura technique at the department of organ and tissue transplantation, plastic and endocrine surgery, grodno clinic hospital. Furthermore, this study aims to contribute valuable insights to refine surgical practices and enhance patient care.

Two patients with similar pancreatic tumor characteristics and demographic features underwent the Kimura technique using different surgical approaches.

Patient A

A 67-year-old female with a cystadenoma in the body and tail of the pancreas underwent Kimura technique through laparotomy. The initial MRI revealed a fluid-filled formation in the body of the pancreas, measuring 38×40×47 mm, with multiple thin-walled septa, and then a follow up MRI was performed which showed an increase in size to 57×51×48 mm, as shown in Figure 1.

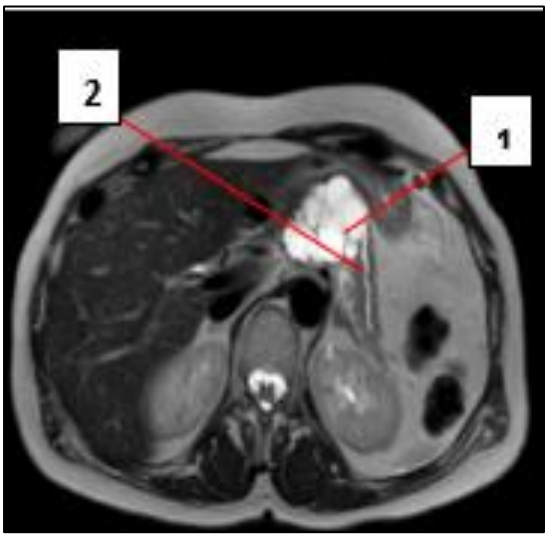

Figure 1: (1) Cystadenoma in the body and tail of the pancreas and (2) Wirsung duct.

Patient B

A 57-year-old female with a cystadenoma in the tail of the pancreas underwent the Kimura technique via laparoscopic surgery. The initial MRI revealed a fluid-filled formation in the tail of the pancreas, measuring 40×42×40 mm, with multiple thin-walled septa. The follow up MRI showed an increase in size to 5751×48 mm, and a final MRI scan revealed further growth to approximately to 60×49×58 mm, as shown in Figure 2.

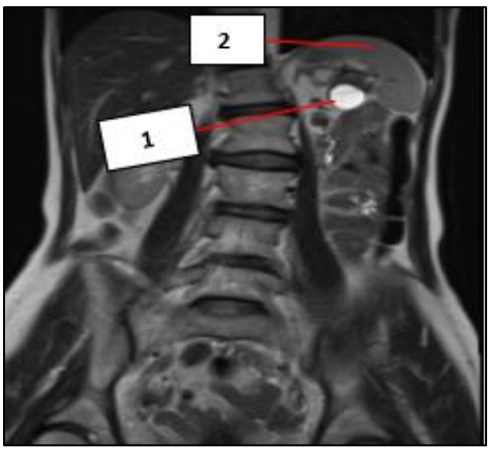

Figure 2: (1) Cystadenoma of the tail of the pancreas and (2) spleen.

Laparotomy kimura technique

The surgical procedure began with administration of inhalation anesthesia. After preparing and sterilizing the surgical field, an upper midline laparotomy was performed. Upon entering the abdominal cavity, no effusion was observed. During the exploration, a cyst approximately 6 cm in length was palpated within the body of the pancreas. To access the omental bursa, the gastrocolic ligament was dissected, revealing a multiloculated cyst with clear fluid contents within body of the pancreas. Both the pancreas and the cyst were found to be mobile. The pancreatic neck was then carefully isolated and mobilized from the portal vein before being transacted using a suture device. The hepatic flexure of the large intestine, along with the body and tail of the pancreas containing the cystic tumor were carefully mobilized and separated from the spleen and its splenic vessels.

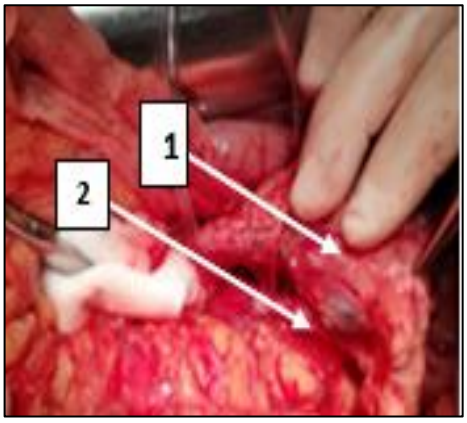

Figure 3: (1) Cystadenoma and (2) splenic vein.

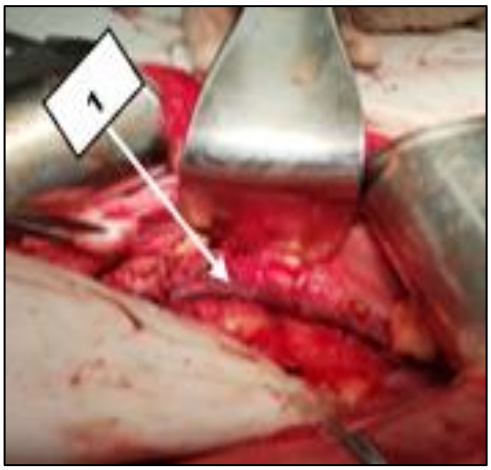

Figure 4: (1) Splenic vein after resection of cystadenoma of the pancreas.

The pancreatic body and tail, along with the associated tumor, were surgically removed from the abdominal cavity. Lymphatic dissection was performed along the splenic artery, splenic vein, and common hepatic artery.

Subsequently, a drainage tube was inserted via the omental bursa to the pancreatic stump.

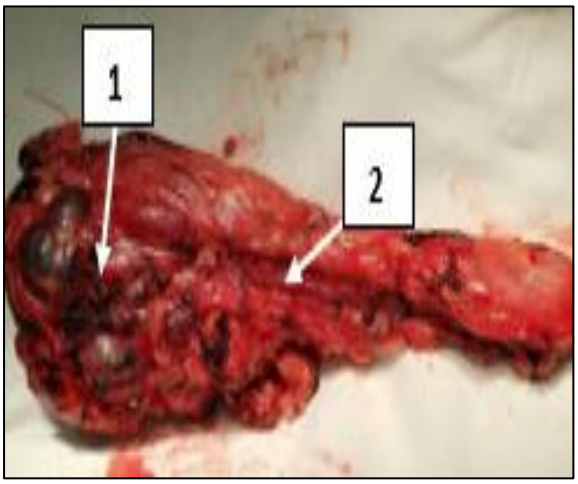

Figure 5: (1) Cystadenoma & (2) bed of the splenic vein.

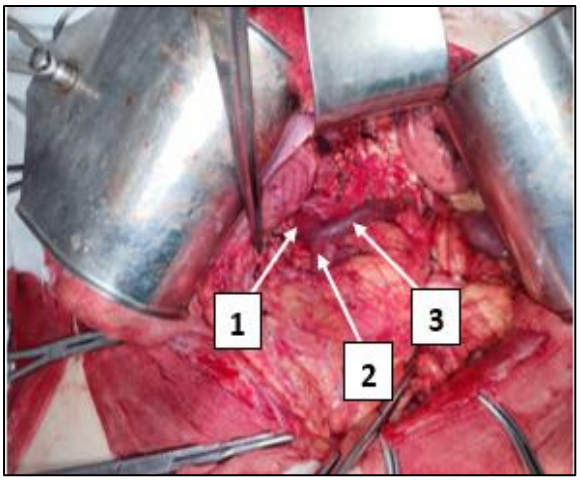

Figure 6: (1) Portal vein; (2) superior mesenteric vein; (3) splenic vein.

Laparoscopic kimura technique

Firstly, general inhalation anesthesia was administered to the patient, and a veres needle was used to establish pneumoperitoneum. Subsequently, trocars and a laparoscope were inserted to access the abdominal cavity. Upon surgical intervention, no effusion was observed in the abdominal cavity. This was followed by mobilization of the splenic angle of the colon and opening of the omental bursa by mobilizing the stomach along the great curvature. This was achieved by transecting the gastrocolic ligament using an ultrasonic dissector. A cyst-like formation, approximately to 3.0 cm in diameter, was identified in the area of the pancreatic tail, as shown in Figure 7. Secondly, mobilization was carried out along the lower and upper edges of the retroperitoneal ligament of the pancreas using an ultrasound dissector and a bipolar coagulation device (LIGASURE). Resection of the body and tail of the pancreas, including the cyst, was performed using a linear stapler, which was applied at the level of mobilization (body of the gland), as shown in Figure 8. Individual vascular structures were clipped to preserve the splenic vein and artery, as shown in Figure 9.

Figure 7: Cyst like formation in the tail of pancreas.

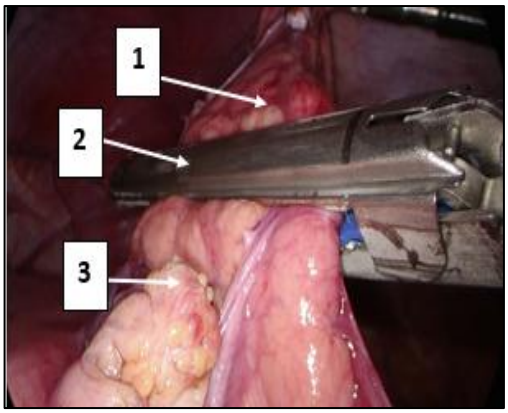

Figure 8: (1) Distal part of the pancreas; (2) linear stapler; (3) proximal part of the pancreas.

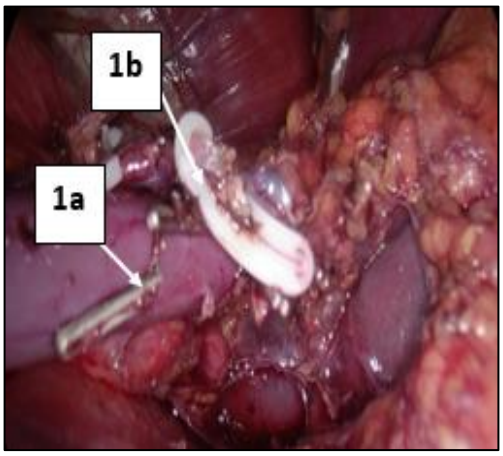

Figure 9 (1a, 1b): Clipped individual vessels.

A linear stapler was achieved, and haemostasis was achieved. The resected part of the pancreas was removed, and a PVC drainage tube was placed at the pancreatic stump. The abdominal cavity was then drained, and all instruments and trocars were removed. Finally, skin sutures and bandages were applied.

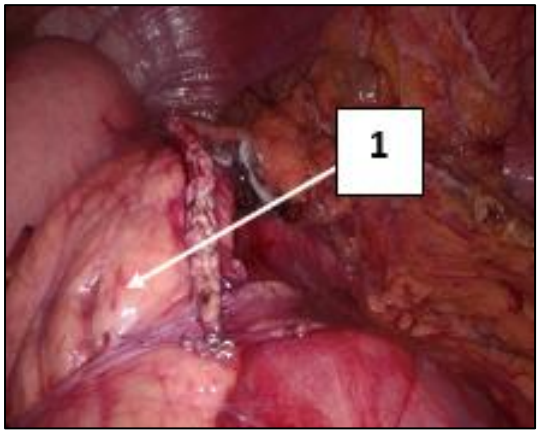

Figure 10: (1) Proximal part of the pancreas after resection of the pancreatic cystadenoma.

DISCUSSION

This case report presents the successful management of a benign serous cystadenoma of the pancreas using the Kimura technique (spleen-preserving distal pancreatectomy). Serous cystadenomas are usually benign in nature with low malignant potential, and are often asymptomatic hence, frequently identified incidentally during imaging for other conditions.[1] However, it is highly recommended to use surgical intervention in cases where the lesion is symptomatic, increasing in size, or when there is uncertainty about the nature of the lesion, as seen in this case.[10]

The decision to pursue the Kimura technique was based on several factors; the benign nature of the lesion suggested by the histopathological results, its anatomical relationship to the surrounding structures, and the aim of minimizing the post-operative complications associated with splenectomy. Preserving the spleen in a distal pancreatectomy surgery is crucial, as it plays a vital role in immune function, particularly in filtering the blood and eliminating potential infectious agents.[19] Moreover, splenectomy can lead to life-threating post-splenectomy infections. Thereby emphasizing the importance of spleen conservation whenever feasible.[19]

In this case, the surgical team used the Kimura technique, preserving the splenic vessels, which is crucial to maintaining the spleen's function and viability thereby, reducing the risk of complications such as splenic infarction.[17,19,20] The Warshaw technique, which involves ligating splenic vessels while preserving the gastroepiploic and short gastric vessels, was not considered in this case due to favorable anatomy observed intraoperatively.[21] Both the patients had an uneventful post-operative course, with no evidence of post-operative complications such as pancreatic fistula, delayed gastric emptying, or splenic infarction.

These outcomes align with existing literature, which increasingly favors the Kimura surgical approach for benign and low-grade malignant pancreatic tumors. Studies have shown that this surgical approach reduces the post-operative morbidity, while preserving long-term immune function, providing yielding oncological outcomes comparable to those of splenectomy in benign cases.[17,22] Furthermore, preserved spleen aids in protection against potential life-threatening infections, maintaining the patient's overall health and reducing the risk of the overwhelming post-splenectomy infection.[23-25]

However, not all patients are eligible candidates for splenic preservation, as the eligibility depends on detailed pre-operative imaging and careful intraoperative assessment. Factors such as the size and location of the lesion, its involvement with splenic vessels, and the surgeon's expertise play a crucial role in determining the feasibility of the Kimura technique.[23,26] Nevertheless, the postoperative periods of both patients were uneventful, and they were discharged in a satisfactory condition for further observation and treatment by a surgeon at the place of residence.

This case report underscores several limitations. Firstly, the small sample size restricts the generalizability of the findings, as individual anatomical variations, tumor characteristics, and surgical expertise significantly impact spleen preservation success and overall surgical outcomes. Additionally, there is no direct comparison between the open and laparoscopic approaches, making it difficult to determine the advantages and disadvantages of each method.

Further research could aid compare the outcomes of the kimura technique with traditional distal pancreatectomy with splenectomy in a large cohort of patients, particularly in those with borderline resectable lesions or more complex lesions with invasion of the splenic vessels. Finally, while the report highlights the role of pre-operative imaging, it does not indicate potential variability in making interpretation, which could influence decision-making and surgical outcomes. These limitations highlight the need for larger studies or clinical trials comparing open and laparoscopic Kimura technique, as they would help establish a better efficacy, safety, and patient selection criteria.

CONCLUSION

This case study represents the Kimura surgical technique is a safe and effective surgical approach for managing serous cystadenomas of the pancreas. Preoperative investigations, including abdominal CT, MRI, and tumor marker analysis, were done for both patients to determine

the appropriate surgical approach. The Kimura surgical technique was used in both laparotomy and laparoscopic procedures, ensuring careful mobilization and separation of the cystadenoma and distal part of the pancreas from the spleen and its splenic vessels, followed by the surgical resection of the cystadenoma and the distal part of the stomach.

The resected specimen was confirmed to be a benign serous cystadenoma histopathologically. This case contributes to the growing body of evidence supporting the Kimura surgical technique in appropriately selected patients. It emphasizes the importance of patient selection based on the characteristics of the lesion, anatomical considerations, and surgical expertise to achieve optimal post-operative outcomes. Moreover, the successful outcomes of both patients highlight the potential advantage of spleen preservation, including a reduced risk of postoperative complications such as overwhelming post-splenectomy infections and splenic infarction.

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