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Pancreatolithiasis with Puestow Procedure in Rural Hospital: Case Report

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ABSTRACT

Background: Pancreatolithiasis represents a significant challenge in gastroenterological surgery, particularly when complicated by metabolic disorders and lifestyle factors. This rural setting often results in limited access to specialized medical care, leading to delayed diagnosis and treatment for conditions such as pancreatolithiasis. The coexistence of uncontrolled diabetes mellitus and chronic alcoholism creates a complex clinical scenario that can significantly impact surgical outcomes and post-operative recovery. Understanding these interactions is crucial for optimal patient management and risk stratification in surgical decision-making. ***Case presentation:*** A 22-year-old male presented with severe hyperglycemia (blood glucose 768 mg/dL) and generalized weakness, complicated by a two-year history of poorly controlled type 2 diabetes mellitus and chronic alcoholism. Diagnostic imaging revealed multiple pancreatic calculi, necessitating a modified Puestow procedure. The postoperative course was marked by severe complications, including metabolic derangements, coagulopathy with severe thrombocytopenia, and respiratory failure requiring tracheostomy. ***Discussion:*** This case highlights the complex interplay between pancreatolithiasis, diabetes mellitus, and chronic alcoholism in young adults. The rapid deterioration despite aggressive medical management underscores the importance of comprehensive pre-operative risk assessment and metabolic optimization. The case demonstrates the potential complications of major pancreatic surgery in patients with multiple comorbidities. ***Conclusion:*** Pancreatolithiasis is a challenge to diagnose, accurate diagnosis and open surgery is the definitive therapy. Early recognition of high-risk factors, careful patient selection, and aggressive pre-operative optimization are crucial in managing complex cases of pancreatolithiasis.

Keywords: pancreatolithiasis; modified puestow procedure; diabetes mellitus; surgical complications.

BACKGROUND

Pancreatolithiasis, characterized by calcification within the pancreatic ductal system, represents a significant challenge in gastroenterological surgery and continues to be a major source of morbidity worldwide. The global prevalence of pancreatic calculi varies significantly by region, with reported rates ranging from 50–90% in patients with chronic pancreatitis. Recent epidemiological studies suggest a rising incidence in young adults, particularly in South Asian populations, where rates have increased by 18% over the past decade [1]. Pancreatolithiasis, characterized by calcification within the pancreatic ductal system, represents a significant challenge in gastroenterological surgery, particularly when complicated by concurrent metabolic disorders and lifestyle factors. The formation of pancreatic calculi typically occurs as a consequence of chronic inflammatory processes within the pancreas, leading to altered calcium homeostasis and protein plug formation within the ductal system [2]. Additionally, environmental factors, including chronic alcohol consumption and smoking, have been shown to accelerate the calcification process through oxidative stress pathways [3]. The association between diabetes mellitus and pancreatolithiasis presents a particularly challenging clinical scenario. The relationship appears bidirectional, as pancreatic calculi can further impair endocrine function through progressive parenchymal damage and inflammation [4]. Current management strategies for pancreatolithiasis range from conservative medical therapy to various surgical interventions. While endoscopic approaches have gained popularity in recent years, particularly for solitary stones, the modified Puestow procedure remains a cornerstone of surgical management for diffuse disease [5].

In Indonesia, particularly in remote areas like Kaimana, and West Papua, geographical challenges significantly exacerbate the healthcare situation. Kaimana Hospital, situated in this rural setting, faces substantial limitations in healthcare resources and access to specialized medical services. This isolation often leads to delayed diagnosis and treatment for conditions such as pancreatolithiasis, where timely intervention is crucial. Additionally, the presence of uncontrolled diabetes mellitus and chronic alcohol consumption complicates the clinical scenario, as these factors not only contribute to the pathogenesis of pancreatolithiasis but also adversely affect surgical outcomes and post-operative recovery. Understanding these interactions is essential for optimal patient management and risk stratification in surgical decision-making.

CASE REPORT

A 22-year-old male presented to our emergency department with generalized weakness and altered mental status. Initial assessment revealed stable hemodynamics with blood pressure of 120/80 mmHg, heart rate of 88 beats per minute, and respiratory rate of 20 breaths per minute, but severe hyperglycemia was noted with blood glucose of 768 mg/dL. The patient's medical history was significant for a two-year diagnosis of type 2 diabetes mellitus, characterized by poor medication adherence and irregular follow-up. Additionally, he reported chronic alcohol consumption averaging 80-100 grams daily for the past three years, though exact quantities were difficult to verify due to inconsistent patient reporting. The remoteness of the area makes it difficult to access adequate health services and timely referral to specialized care. Therefore, after careful consideration of the patient's condition and the limited resources available, it was decided to continue the best possible intervention in this case at Kaimana Hospital, West Papua, Indonesia.

Laboratory evaluation revealed elevated inflammatory markers (C-reactive protein 180 mg/L). The X-ray examination of the abdomen revealed the presence of multiple calculi located within the main pancreatic duct. The largest calculus measures 8 mm in diameter (Figure 1).

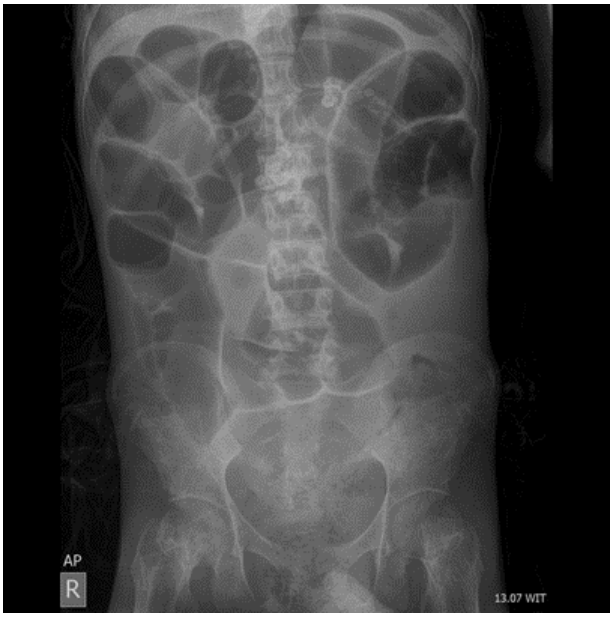

FIGURE 1: Abdominal X-ray showing multiple calculi located within the main pancreatic duct.

Following initial metabolic stabilization and thorough pre-operative evaluation, the patient underwent a modified Puestow procedure, which involved a longitudinal opening of the pancreatic duct. The surgical procedure involved several key steps: First, a careful exploration of the pancreas revealed multiple pancreatic duct stones of varying sizes distributed throughout the main pancreatic duct (Figure 2a). Additionally, there was significant dilatation of the pancreatic duct observed, measuring approximately 12 mm (Figure 2b).

The pancreatic duct was meticulously opened longitudinally, allowing for complete stone extraction. A side-to-side pancreaticojejunal anastomosis was then created using interrupted 4-0 PDS sutures to ensure precise mucosal approximation (Figure 3a). This was followed by an end-to-side jejunojejunostomy to complete the bypass configuration (Figure 3b). The total operative time was 4 hours and 15 minutes, with an estimated blood loss of 450mL.

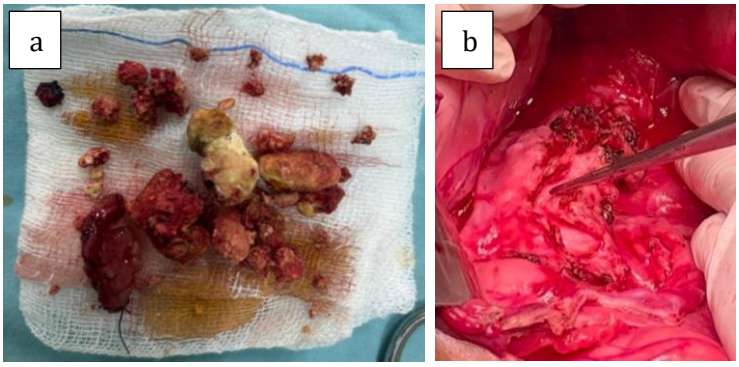

FIGURE 2: Multiple pancreatic duct stones of varying sizes (a), Dilatation of the pancreatic duct (b).

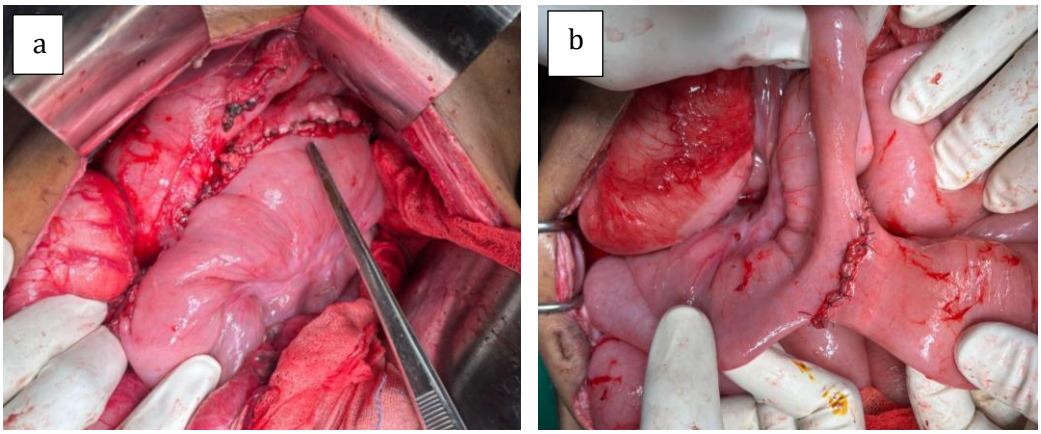

FIGURE 3: Side-to-side pancreaticojejunal anastomosis (a), End-to-side jejunojejunostomy (b).

The postoperative course in the intensive care unit was marked by multiple severe complications. The patient demonstrated fluctuating consciousness levels, responding only intermittently to verbal stimuli, with a Glasgow Coma Scale score ranging between 8 and 11. Ventilator weaning attempts were unsuccessful due to poor respiratory effort and compromised gas exchange. The patient had two episodes of defecation during their stay in the ICU but did not experience any faecal leakage from the abdominal drain. Metabolic control proved extremely challenging, with blood glucose levels showing dramatic swings between severe hyperglycemia and hypoglycemia (2-6 mg/dL) despite careful insulin titration.

On postoperative day 7, the patient developed severe thrombocytopenia with a platelet count of 6,000/μL, necessitating a massive transfusion of 10 units of platelet concentrates. Despite this intervention, the platelet count remained critically low at 4,000/μL. A tracheostomy was performed on the same day due to anticipated prolonged ventilator dependency. The patient's condition continued to deteriorate, and death occurred on postoperative day 8 due to multiple organ dysfunction syndrome.

DISCUSSION

This case exemplifies the complex presentation of pancreatolithiasis in young adults with multiple comorbidities. The patient's initial presentation with severe hyperglycemia (768 mg/dL) and generalized weakness aligns with findings from recent large-scale studies.

According to [6], among 1117 patients with pancreatolithiasis, 40.9 % initially presented with metabolic derangements rather than classical pancreatic pain. The combination of uncontrolled diabetes and chronic alcoholism in our patient represents a particularly high-risk scenario. A recent by [7], involving 587 patients found that the presence of uncontrolled diabetes (HbA1c >6.5%) increased the risk of pancreatic ductal calcification and was independently associated with earlier onset of diabetes mellitus in patients with chronic pancreatitis. The relationship appears bidirectional, as pancreatic calculi can further impair endocrine function through progressive parenchymal damage and inflammation [8]. The absence of typical pancreatic pain in our patient, despite significant calculi burden, merits discussion. A study by [9], suggests that chronic hyperglycemia may modify pain perception through peripheral neuropathy, potentially masking the characteristic pain patterns of chronic pancreatitis.

The physical examination findings in our case, particularly the presence of stable hemodynamics despite severe metabolic derangement, demonstrate the compensatory capacity of young adults with chronic disease. However, as noted by [2], in their analysis of 2 similar cases, this stability can be deceptive. Their study found that apparently stable patients with concurrent hyperglycemia and pancreatic disease had a 2.7-fold higher risk of rapid decompensation compared to matched controls.

The laboratory profile of our patient, particularly the elevated inflammatory markers and metabolic acidosis. According to [10], reported that the combination of elevated CRP (>150 mg/L) and metabolic acidosis carried an odds ratio of 4.2 for post-operative complications.

The timing of surgical intervention remains controversial, particularly in young patients with multiple comorbidities. Recent guidelines from the International Association of Pancreatology [11], suggest early surgical intervention in patients with ductal dilatation >6mm and multiple calculi, provided adequate metabolic control can be achieved. However, the optimal timing must be balanced against the increased surgical risks in patients with poorly controlled diabetes and other metabolic derangements.

The modified Puestow procedure performed in our case represents the current standard of care for diffuse pancreatolithiasis with ductal dilatation. Recent technical analyses by [12], in cases of dilated pancreatic duct (>6 mm) without inflammatory mass in the head of the pancreas. Identification of the main pancreatic duct is critical to a successful modified Puestow procedure, and the use of ultrasound facilitates finding the duct. Successful symptom relief has been reported in up to 80% of patients who underwent the Puestow procedure. The decision to proceed with surgery despite suboptimal metabolic control remains controversial. While [13], advocates for strict glycemic control (HbA1c <7.5%) before major pancreatic surgery, emerging data from the European Pancreatic Surgery Consortium suggests that prolonged delay for metabolic optimization may lead to worse outcomes in patients with progressive disease.

The postoperative course in our patient was marked by several severe complications that align with known risk factors in the literature. A study by [14], found that severe thrombocytopenia (platelet count <10,000-20,000/μL) was associated with a significantly increased mortality rate. Thrombocytopenia occurring within four days of surgery is commonly caused by haemodilution and increased perioperative platelet consumption, prior to the recovery of platelet counts induced by thrombopoietin and a transient overshoot in platelet counts. The poor response to platelet transfusion in our case suggests possible immune-mediated destruction or consumption coagulopathy, although definitive evaluation was limited by the rapid clinical deterioration.

In cases where ventilator weaning attempts are unsuccessful due to recurrent hypoglycemia, which can lead to cerebral edema, it is crucial to understand the underlying physiological mechanisms. According to [15], about 20% of weaning attempts fail, primarily because the respiratory muscles cannot meet metabolic demands, resulting in increased respiratory distress.

Additionally, fluctuations in blood glucose levels, particularly severe hypoglycemia, can complicate recovery and contribute to neurological issues. The Society of Critical Care Medicine highlights the importance of maintaining glycemic control to improve patient outcomes, recommending insulin infusions, and frequent monitoring to prevent hypoglycemia. Thus, a comprehensive approach addressing both respiratory and metabolic challenges is essential for optimizing recovery in the intensive care setting [16].

The absence of fecal content in the surgical drain, while not definitively ruling out anastomotic failure, raises important considerations regarding the technical aspects of the Puestow procedure. Anastomotic leaks are a significant concern in surgical practices, with studies indicating that they occur in approximately 5% of anastomosis surgeries, particularly in procedures involving the gastrointestinal tract [17].

The ultimate outcome in our case highlights the critical importance of appropriate risk stratification in complex pancreatic surgery. In a retrospective study of 64 patients [18], reported a mortality of 0% and a postoperative morbidity of 33%. The pain was relieved in 91% of patients after surgery, and further acute exacerbation was prevented in 95%. Subsequent surgery for pancreatitis-related complications was necessary in 7%. In a large series of 524 patients with chronic pancreatitis reported by [7], the 30-day mortality was found to be 1.2%. At least one major complication occurred in 19.1% of patients, including death (1.2%), major organ dysfunction (8.2%), pulmonary embolism (1.3%), and surgical-site infection (13.0%). The risk factors for complications were diabetes, chronic obstructive pulmonary disease (COPD), and multiple transfusions. Limiting transfusions and optimizing preoperative pulmonary status were recommended to improve 30-day outcomes. Their data suggest that alternative management strategies, including staged procedures or hybrid approaches, might be more appropriate for such high-risk patients.

CONCLUSIONS

Pancreatolithiasis is a challenge to diagnose, accurate diagnosis and open surgery is the definitive therapy. Early recognition of high-risk factors, careful patient selection, and aggressive pre-operative optimization are crucial in managing complex cases of pancreatolithiasis. This case contributes to the growing evidence supporting the development of specialized pre-operative optimization pathways for high-risk pancreatic surgery candidates, particularly in the setting of multiple metabolic and lifestyle-related comorbidities.

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