



Case report

Surgical management of complex duodenal trauma using laterolateral duodenum enteroanastomosis: A case report

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ABSTRACT

Introduction and importance: Duodenal trauma is rare, however, it has high morbidity and mortality rates. Surgical treatment modalities are employed depending on severity, ranging from simple sutures to complex pancreaticoduodenectomy cases.

Case presentation: A male patient had a circular saw accident, leading to evisceration in an extensive wound from the thoracoabdominal transition to the inguinal region, with 75% laceration of the second duodenal portion circumference, laceration in hepatic segments, section from right mesocolon to transverse colon, and multiple perforations in small bowel loops between 70 and 90 cm from the angle of Treitz. Laterolateral duodenum enteroanastomosis was performed with proximal jejunum and gastroenteroanastomosis with the distal loop of the small intestine at 90 cm from the Treitz angle, and a termino lateral enteroanastomosis between food and the biliary loop at 20 cm from the gastroenteroanastomosis.

Clinical discussion: This report presents a new surgical technique for patients with penetrating duodenal trauma associated with liver and intestinal injuries, to avoid the need for more complex procedures. In addition, it demonstrates postoperative management of complications, including confection of the enteroatmospheric fistula for feeding.

Conclusion: The technique described in this article proved to be a good option for treating these lesions, as evidenced by optimal postoperative results.

1. Introduction

Duodenal trauma, despite being rare and making up less than 2% of abdominal trauma cases, is associated with high morbimortality rates. Approximately 75% of cases are caused by penetrating injuries. The retroperitoneal position of the duodenum prevents early diagnosis and surgical treatment, as they may be associated with injuries to other organs [1].

Duodenal lesions are challenging to repair due to presentation heterogeneity, making surgical treatment difficult to standardize. In most severe cases, several treatment modalities are primary repair, pyloric exclusion, diverticulization, and pancreaticoduodenectomy [1]. This report presents a surgical technique used for a patient with complex penetrating duodenal trauma associated with hepatic and intestinal injuries. Moreover, we report the clinical and surgical management of

postoperative complications presented in this case. This article was reported in line with the SCARE criteria [2].

2. Presentation of case

A 47-year-old male, mild malnutrition, without comorbidities, drug history, family history or psychosocial history, had an accident with a circular saw after a fall from a height of 1 m, leading to evisceration in an extensive cutting wound on the right, from the thoracoabdominal transition to the inguinal region (Fig. 1). Initial care was performed according to ATLS by the surgeon on call in the emergency room. Right thoracic drainage was done, and the patient was referred to the operation room. Laparotomy using traumatic incision for access, with 75% laceration of the anterolateral wall circumference of the second duodenal portion; laceration in hepatic segments V, VII, and VIII; active

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Fig. 1. Image showing the extensive cutting wound on the right hemiabdomen, from the thoracoabdominal transition to the inguinal region.

bleeding and outflow of biliary contents; section from right mesocolon to transverse colon; and multiple perforations in the small bowel loops between 70 and 90 cm from the Treitz angle were observed (Fig. 2). There were no lesions in the pancreas, ampulla of Vater or gastroduodenal arteries. Due to the severity of the trauma and the patient's condition, was chosen to perform damage control surgery. Pringle's maneuver with control of hepatic bleeding, suture of the laceration, and

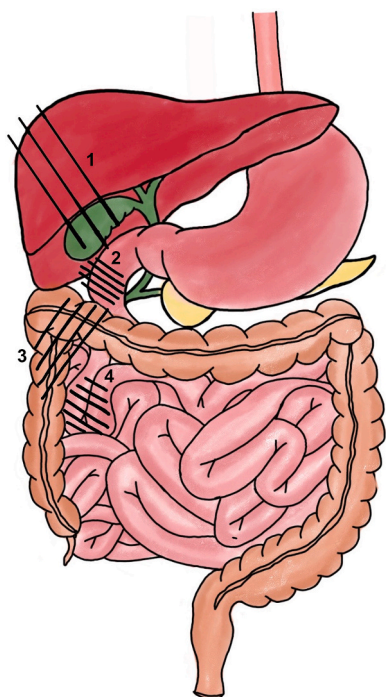


Fig. 2. Illustrative drawing of the patient's injuries. 1-Laceration in hepatic segments V, VII, and VIII. 2-75% laceration of the anterolateral wall circumference of the second duodenal portion. 3-Section from right mesocolon to transverse colon. 4-Multiple perforations in the small bowel loops between 70 and 90 cm from the Treitz angle.

a right hemicolectomy extending from 10 cm of the distal ileum up to the medial portion of the transverse colon associated with enterectomy of the 20 cm affected were performed. Two Foley probes were inserted with balloon insufflation in the proximal and distal stump of the torn second duodenal portion (Fig. 3). Damage control was performed with vacuum dressing. The procedure lasted for 35 min, then the patient was transferred to the ICU.

Within 48 h, due to an increased risk of morbimortality and without devascularization or injury to the pancreas, the Whipple was not considered, and another technique was performed. Pyloric exclusion was performed through pyloric closure with catgut, a laterolateral duodenum enteroanastomosis, using the entire opening of the duodenal laceration, with proximal jejunum (30 cm from the Treitz angle) and a gastroenteroanastomosis with the distal loop of the tear (90 cm from the Treitz angle) was performed resulting in a alimentary loop. In addition a termino lateral enteroanastomosis between the alimentary and biliary loops at 20 cm from the gastroenteroanastomosis with confection of a terminal ileostomy to the right was performed (Fig. 4). All anastomoses were performed in two planes with vicryl thread on the first, and prolene on the second. A nasoenteral tube (NET) was inserted after anastomosis. A new vacuum dressing was made, and the patient was referred to the ICU. Opted for a second follow-up within 48 h, abdominal wall reconstruction and liver revision were performed due to biliary secretion between sutures, and a Jackson-Pratt intrahepatic drain was attached.

Despite progressive improvement, the patient developed fever, tachycardia, and release of bile secretion from the surgical wound on the 12th postoperative (PO) day. During the follow-up, thick bile in the abdominal cavity was found due to a perforated gallbladder with necrotic edges (Fig. 5). Cholecystectomy was performed, progressing to extubation due to clinical improvement. The patient remained hemodynamically stable; however, after an episode of psychomotor agitation, the NET was dislodged and reintroduced by a nursing team without surgical team guidance.

On the 23rd PO day, biliary content outflow was identified in the distal hepatic portion, which was induced by dehiscence of the previous suture, requiring new liver sutures. In addition, evidence of a 0.5 cm

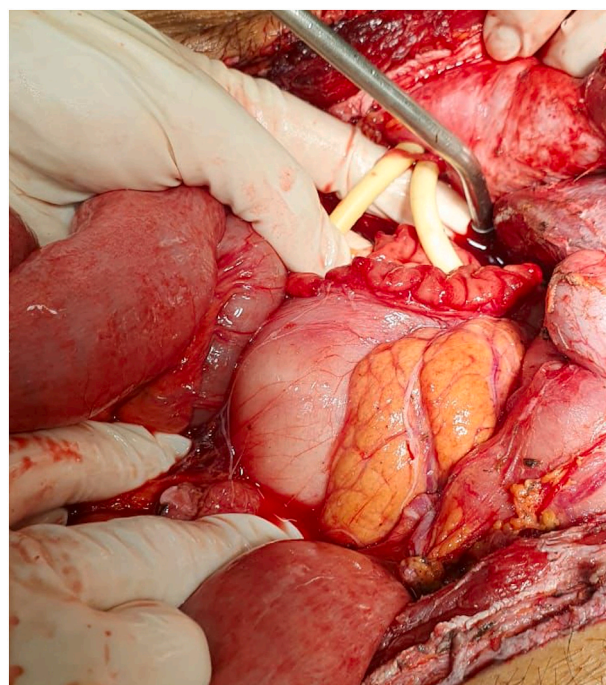


Fig. 3. 75% laceration of the anterolateral wall circumference of the second duodenal portion, with two Foley probes that were inserted with balloon insufflation in the proximal and distal stump.

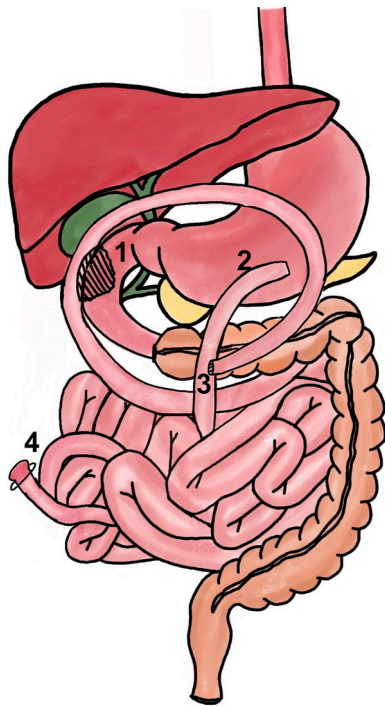


Fig. 4. Illustrative drawing of the surgical technique. 1- Laterolateral duodenum enteroanastomosis, with proximal jejunum (proximal loop of the tear). 2- Gastroenteroanastomosis with the distal loop of the tear. 3- Termino lateral enteroanastomosis between the alimentary and biliary loops at 20 cm from the gastroenteroanastomosis. 4- Terminal ileostomy.

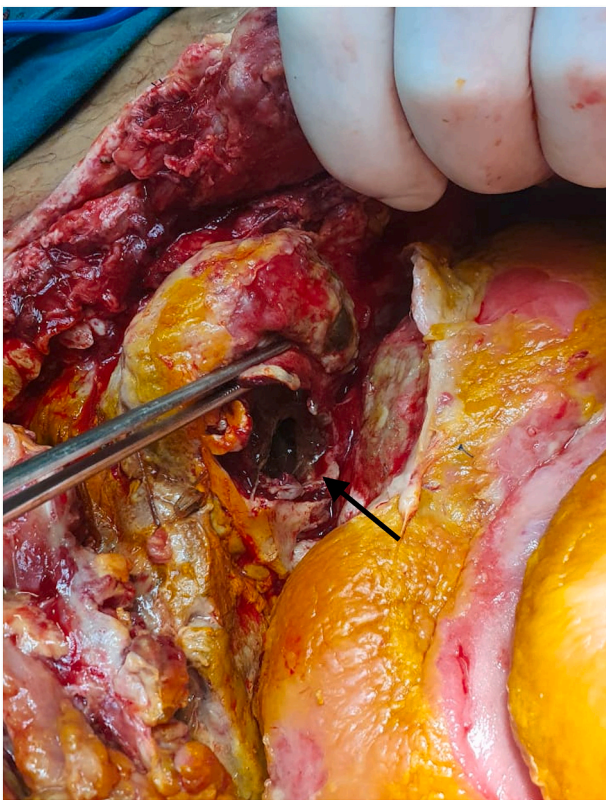


Fig. 5. Image showing the perforated gallbladder with necrotic edges (black arrow).

fistula in the gastroenteroanastomosis also required suturing. Vacuum dressing was maintained with a suction probe only in the upper abdomen to isolate the region and reduce contamination of the lower abdomen.

Postoperatively, the patient remained in the ICU, and dressing was changed every 48 h. Due to the persistence of enteric secretions in the vacuum dressing, on the 46th PO day, an enterocutaneous fistula was made in the region of the gastroenteroanastomosis dehiscence associated with a vacuum dressing, specifically in the fistula site of the right hypochondrium, leading to optimal results. After 13 days, endoscopy and abdominal manipulation with insertion of gastrostomy tube in the fistulous path of the gastroenteroanastomosis were performed for nutrition. The patient was discharged five days later and continued to visit the outpatient clinic weekly, with good recovery and diet acceptance via gastrostomy.

The patient remained hospitalized for 64 days, of which, 50 were spent in the ICU. Dressing changes between surgical approaches were performed at intervals of 2 to 3 days. Nutritional interventions were decided based on the patient's compliance after each surgical approach. The patient received antibiotic therapy according to the guidelines of the Hospital Infection Control Committee. Five months after discharge, reconstruction of the intestinal transit, enterocutaneous fistula closure, and abdominal wall closure were performed without complications (Fig. 6).

3. Discussion

Surgery for damage control aims to control potentially fatal injuries and reduce surgical time for restoration of physiological parameters for further definitive treatment of injuries. Inadequate control of injuries can lead to the deadly triad of hypothermia, coagulopathy, and acidosis [3,4]. In our patient, due to multiple potentially fatal injuries and hemodynamic instability during the initial surgical procedure, the strategy



Fig. 6. Image showing the final result of the patient's last surgery with reconstruction of the intestinal transit, enterocutaneous fistula closure and abdominal wall closure.

was essential for a good postoperative evolution.

The liver is one of the most affected organs in abdominal trauma, and is usually associated with lesions in other organs. Complex lesions, such as those seen in our case, present a therapeutic challenge, and are associated with high morbimortality rates [5,6]. In cases of active hepatic bleeding, Pringle's maneuver should be performed with subsequent ligation of vessels and bile ducts at the site of laceration [3]. In the postoperative period, complications such as biliary fistulas may develop, which may cause peritonitis secondary to extravasation of bile, thus increasing morbimortality rates and the need for surgical approaches [7].

Moreover, in terms of biliary complications, the incidence of severe post-trauma cholecystitis can range from 0.5–18%. In patients with multiple severe injuries, this can increase up to 22%. Cholecystitis occurs due to ischemia, decreased mobility of the abdominal wall, and release of proinflammatory mediators, which can lead to perforation of the organ, peritonitis, and even death [8]. In our case, acute cholecystitis was associated with perforation, with extravasation of biliary contents into the peritoneal cavity. However, even in complex hepatic lesions, there is no indication for performing prophylactic cholecystectomy established in the literature. Since there is no consensus, the procedure was initially not considered.

Complex duodenal lesions require elaborate surgical procedures for their treatment and should be individualized according to the variables present, such as associated lesions in other organs [1]. Several procedures are described for the treatment of these lesions, such as pyloric exclusion and gastrojejunostomy, Roux-en-Y duodenojejunostomy, segmental resection with end-to-end or latero-lateral anastomosis, and pancreaticoduodenectomy in more severe cases [1]. Due to the complexity associated with the lesions in our patient, we decided to anastomose the second portion of the duodenum with the proximal loop of the small intestine for the confection of the bile duct after pyloric cerclage. Moreover, a gastroenteroanastomosis was performed using the distal portion of the loop of the small intestine for the alimentary canal. For biliary secretion excretion, an enteroanastomosis was performed 20 cm from the gastroenteroanastomosis. Regarding the management of duodenal trauma, the anastomosis of the second portion of the duodenum with the jejunal loop proved to be safe. However, complications resulting from a fistula in the gastroenteroanastomosis on the 21st PO day may be related to the patient's nutritional deficit or inadvertent manipulation of the nasogastric tube. The use of this technique proved to be a safe alternative, thus avoiding the need to perform more complex procedures with higher morbimortality rates [9].

Therapy with vacuum dressing showed several advantages in managing trauma patients or those with severe intra abdominal infections, thus reducing postoperative morbimortality rates. It effectively prevents fluid loss and bacterial contamination [10,11]. In our patient, the use of vacuum therapy was crucial during the entire hospital stay, in reducing both surgical and recovery time. Despite the presence of an abdominal fistula, the vacuum dressing on the upper abdomen was effective in reducing contamination of the rest of the abdominal cavity, thus reducing the risk of further complications.

Postoperative fistulas may raise concerns regarding complications in surgical patients, including sepsis, malnutrition, and hydroelectrolytic imbalance. Among the therapeutic measures, adequate nutrition, fistula drainage maintenance, and associated infection monitoring are essential [12,13]. In this patient, upon the observation of the gastroenteroanastomosis fistula, with extravasation of enteric content in the dressing and multiple needs for dressing changes, causing dermatitis, pain, and discomfort to the patient, we opted for confection of an enteroatmospheric fistula to reduce contamination of the abdominal cavity. Moreover, gastrostomy tube insertion provided an optimal route for nutrition. The surgical technique showed good postoperative results and patient satisfaction, thus allowing hospital discharge with outpatient follow-up.

4. Conclusion

For severe duodenal lesions requiring surgical treatment, it is advisable to employ techniques with lower morbidity and mortality rates. Hence, the technique described in this report, which revealed good postoperative results, is an optimal alternative treatment for such lesions.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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CRediT authorship contribution statement

Carolina da Silveira Welter: conceptualization, methodology, investigation, writing original draft, supervision.

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Dayana Talita Galdino: conceptualization, methodology, investigation, writing-review and editing, supervision, project administration.

Djulia Adriani Frainer: conceptualization, methodology, investigation, writing original draft, visualization.

Heloiza Fiamoncini: conceptualization, methodology, writing original draft, visualization.

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Declaration of competing interest

None to declare.

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