SAS Journal of Surgery
Abbreviated Key Title: SAS J Surg
ISSN 2454-5104
Journal homepage: https://www.saspublishers.com

OPEN ACCESS

Visceral Surgical Emergencies

Post-traumatic Duodenal Perforation: A Case Report and Literature Review

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DOI: https://doi.org/10.36347/sasjs.2024.v10i11.011 | **Received:** 12.09.2024 | **Accepted:** 19.10.2024 | **Published:** 12.11.2024

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Abstract **Case Report**

Duodenal trauma is rare, but it is increasingly observed due to the rise in car accidents and violent events. It is associated with significant mortality and morbidity rates. Given its complex anatomy, the diagnosis of duodenal injuries remains difficult. These injuries are often associated with multiple major intra-abdominal vascular and solid organ injuries. The surgical management of duodenal trauma remains challenging.

Keywords: Duodenum, Injuries, Diagnosis, Management, Surgery, Mortality.

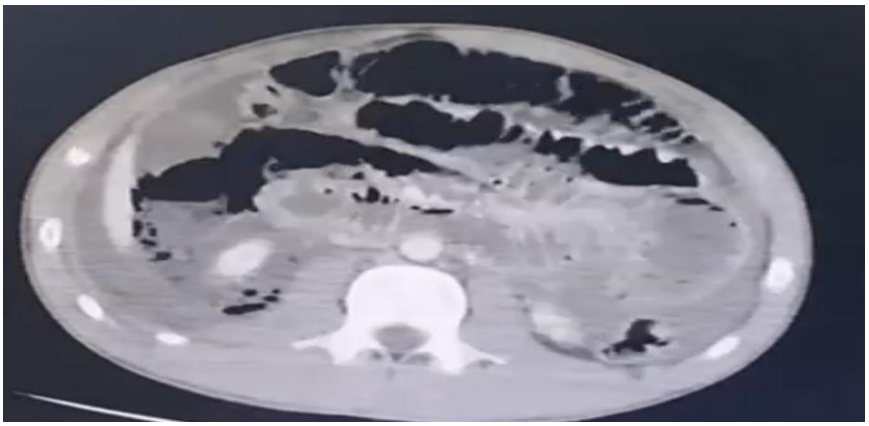
INTRODUCTION

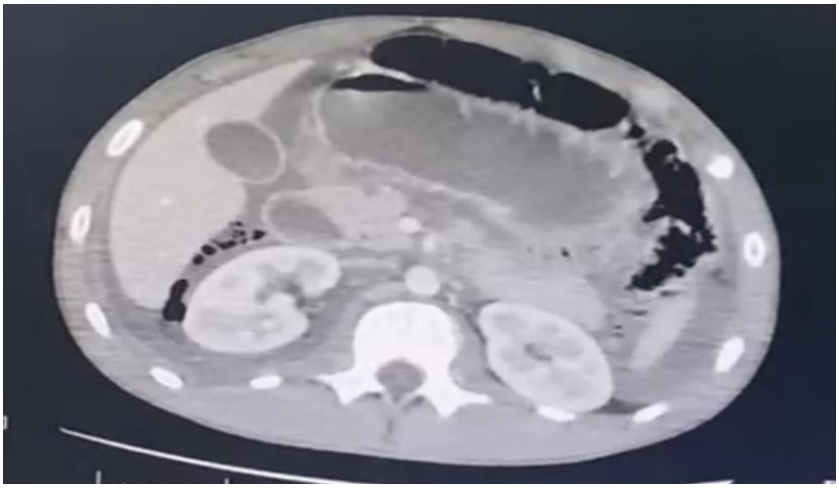
Duodenal injuries are quite rare. They represent about 3% to 5% of abdominal trauma cases [1]. These injuries are associated with a high reported morbidity and mortality rate [2]. Traumatic duodenal injuries pose significant diagnostic and surgical challenges [3]. Different surgical approaches can be considered depending on the severity of the injury, timing of presentation and associated injuries [4].

We report a case of duodenal trauma in a young adult who suffered a closed abdominal injury. The diagnostic methods and therapeutic approaches of duodenal trauma are discussed in this paper.

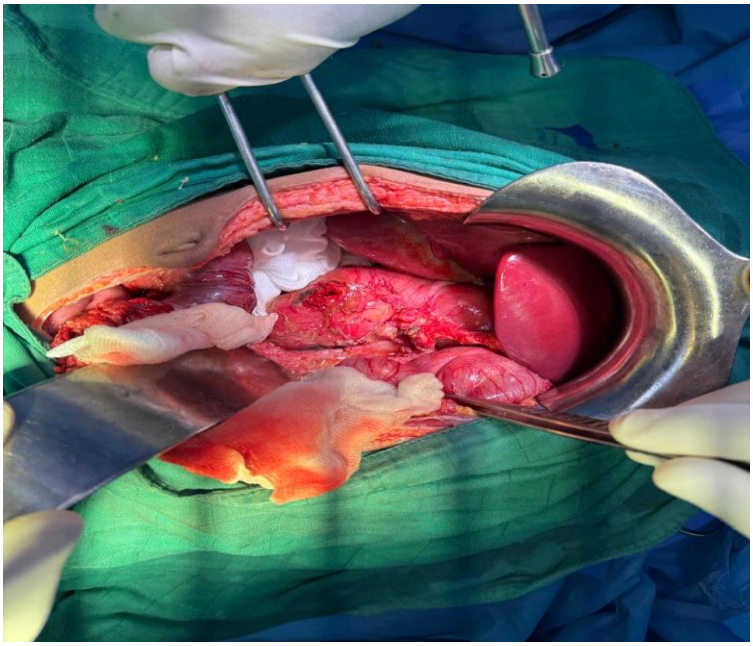
PATIENT AND OBSERVATION

A young 16-year-old patient, with no significant medical history, was admitted to the emergency department 20 hours after an accidental fall onto the bicycle hand. The examination revealed a conscious patient, tachycardic at 120b/min, with stable blood pressure at 130/80 mmHg. The abdominal examination revealed generalized abdominal rigidity. An abdominopelvic computed tomography (CT) scan was performed. It revealed a moderate amount of peritoneal effusion with significant retroperitoneal involvement, particularly marked in the right para-renal, and paraduodenal spaces, likely due to duodenal perforation.





The decision for surgical exploration was made. The operative findings revealed a large biliary peritoneal effusion, along with the presence of multiple false membranes throughout the abdomen. A Kocher maneuver revealed a perforation on the anterior wall of the second (descending) portion of the duodenum (D2).



A simple suture with separate stitches was performed, along with the creation of a feeding jejunostomy. The patient remained in the postoperative recovery unit for a week before being transferred to the surgical ward for continued care.

The postoperative course was marked by the development of a biliary fistula (drainage of bile fluid) after the initiation of feeding through the jejunostomy tube.

DISCUSSION

Duodenal traumas vary in frequency and mechanisms. The ratio of duodenal injuries among male to female patients is 5 to 0, with the most affected age group being between 16 and 30 years [1].

The mechanism of penetrating injury is the leading cause of duodenal trauma [5]. It often involves a direct lesion of the duodenal wall by the penetrating object. In cases of blunt injuries, primarily resulting from road traffic accidents and sports trauma, the mechanism is more complex; duodenal injuries result from crushing or compression [6]. The second portion of the duodenum is the most commonly injured, accounting for 35% of cases [1]. Blunt injuries are often associated with other intra-abdominal injuries. The liver was the most frequently injured organ [1, 7].

The diagnosis of duodenal injuries remains challenging [8]. The retroperitoneal location of the duodenum usually leads to subtle clinical signs, which can result in misdiagnosis or delays in detecting injuries [1]. The key to diagnosis lies in maintaining a high level

of suspicion, taking into account the mechanism of injury [6].

Radiological studies can be useful for diagnosis. Abdominal ultrasound can be a valuable non-invasive investigation. It can reveal free peritoneal fluid in cases of gastrointestinal perforations, and can be used to exclude injuries to intra-abdominal organs and vessels; however, it is not a sufficient test for assessing the pancreatico-duodenal region [5].

Abdominal X-rays can assist in diagnosis by showing air in the retroperitoneum or free air in the peritoneal cavity [6].

At this time, CT scan of the abdomen is the diagnostic test of choice in stable patients [9]. It has been shown to effectively reveal retroperitoneal injuries. It is also sensitive for small amounts of retroperitoneal air, blood, or extravasation from an injured duodenum [1] [5].

The management of duodenal traumas has remained controversial among trauma surgeons [3, 10]. Their management is made challenging by the duodenum's location adjacent to critical vascular and biliary structures as well as the pancreas, along with its physiological functions [8, 11].

In hemodynamically unstable patients, the optimal treatment involves an abbreviated laparotomy with control of hemorrhage, rapid closure of gastrointestinal lacerations, temporary abdominal closure and early patient resuscitation in the intensive care unit -known as the damage control approach [12].

The majority of duodenal injuries can be repaired by simple techniques such as primary repair or resection and anastomosis [3, 11]. For complex duodenal injuries, there is a significant risk of duodenal fistulization and increased morbidity. This had lead surgeons, through the years, to incorporate various procedures to protect the duodenal suture line in order to prevent the complication [2, 3]. Stone and Fabian [1] described a method of triple-tube diversion (gastrostomy, duodenostomy and jejunostomy). In their series of 237 patients, only one patient experienced a suture line leak when this technique was employed, compared to 8 patients when it was not used [13]. In a multicenter study, Cogbill and associates [14] concluded that tube duodenostomy is neither routinely necessary nor effective in preventing duodenal related complications.

Duodenal exclusion techniques, such as duodenal diverticulization [15] or pyloric exclusion, should be reserved for severe duodenal injuries or in cases of delayed management with significant tissue edema. Pancreatico-duodenectomy, rarely performed for abdominal trauma, should be reserved for patients with massive peripancreatic hemorrhage, proximal pancreatic duct or ampullary injuries, and combined devascularizing injuries of the duodenum and head of the pancreas [16].

Morbidity following duodenal trauma is related to the extent of associated abdominal injuries while mortality is primarily caused by associated major abdominal vascular and hepatic trauma [1]. The overall mortality rate reported in recent studies ranges from 5,3% to 30% [17].

CONCLUSION

Duodenal trauma can be effectively managed using simple surgical techniques, such as wound excision and duodenorrhaphy, when diagnosed early and treated promptly. Severe duodenal injuries require more advanced surgical techniques and are associated with a high incidence of postoperative complications especially the duodenal fistula and high mortality.

Acknowledgement: None

Conflicts of Interest: The authors declare that they do not have any conflicts of interest.

Funding: The author(s) received no financial support for the research, authorship, and/or publication of this article.

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