

CASE REPORT

Is pyloric exclusion the best surgery for lesions of the duodenum D3 and D4?

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ABSTRACT

Due to its retroperitoneal location, injuries to the duodenum are relatively rare. As a result, many general surgeons have limited experience of duodenal trauma, which is particularly the case in countries with a small population. The use of primary repair in the treatment of duodenal injuries is rising⁴ with the existing trend of a move away from surgical treatment towards less invasive procedures, and the role of pyloric exclusion has become controversial. We present two cases with lesions to D3 and D4 of the duodenum, treated by pyloric exclusion.

Keywords: Pyloric exclusion, duodenal injury

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Introduction

Due to its retroperitoneal location, injuries to the duodenum are relatively rare, accounting for 3 to 5% of all abdominal injuries¹. As a result, many general surgeons have limited experience of duodenal trauma, which is particularly the case in countries with a small population.

Therefore, there is a limited amount of high quality evidence related to treatment of such traumas, such as large cohort studies².

The World Society of Emergency Surgery (WSES) and the American Association for the Surgery for Trauma (AAST) have published recommendations for treatment of duodenal trauma, but the evidence related to surgical treatment of duodenal injuries is moderate to weak. The only strong recommendation is emergency surgery for unstable patients².

Even though most duodenal lesions can be treated by simple suture repair³, a small number of patients require a more complex procedure in order to protect the suture line in the duodenum.

The use of primary repair in the treatment of duodenal injuries is rising⁴ with the existing trend of a move away from surgical treatment towards less invasive procedures, and the role of pyloric exclusion has become controversial.

Injuries to D3 and D4 are very rare and represent a challenge to general surgeons.

We present two cases with lesions to D3 and D4 of the duodenum, treated by pyloric exclusion.

Case report 1.

A patient aged 20 years was admitted as an emergency, due to a gunshot wound to the abdomen. After preoperative preparation, emergency surgery was performed. A lesion of the right colon was found, and a tangential lesion to the duodenum, in two places (Figures 1 and 2). After right-side hemicolectomy, sutures were placed in two places in the injured duodenum and pyloric exclusion was performed using a stapler (Figures 3, 4 and 5). Four weeks after the surgery, reconstruction of the gastro-intestinal tract was performed.

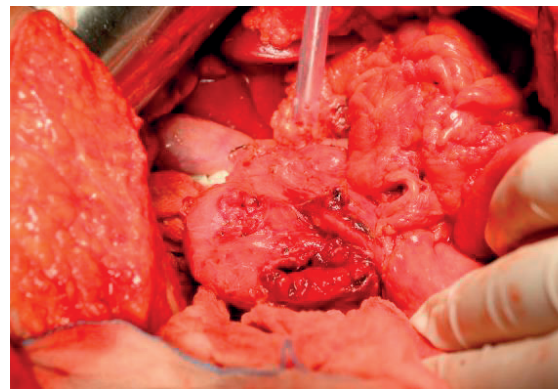


Figure 1. Tangential lesion of the duodenum D3 in two places.

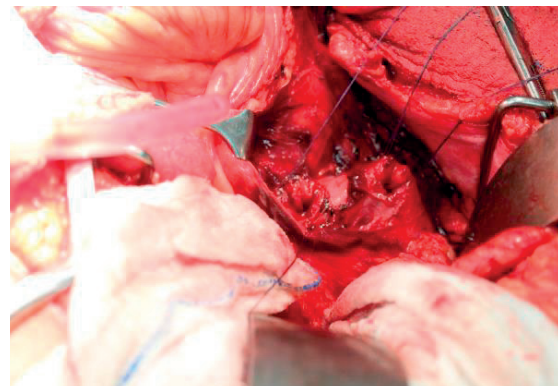
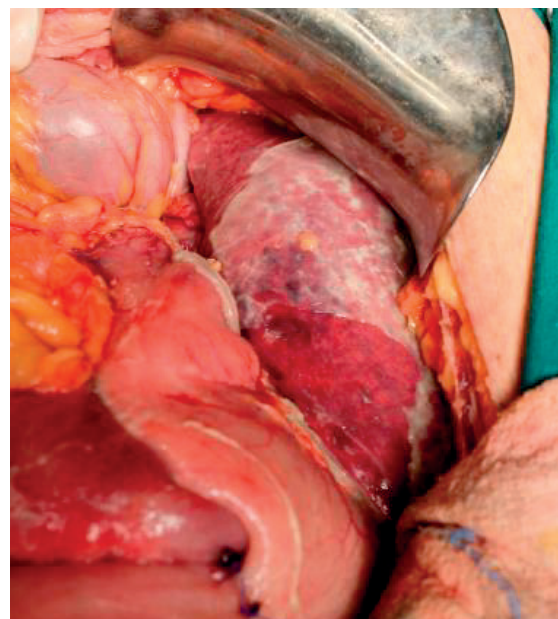
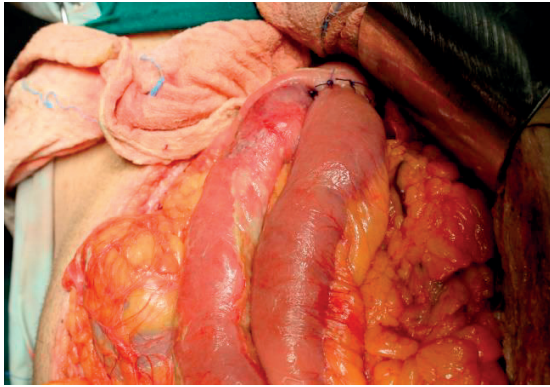


Figure 2. Perforation of the duodenum on supporting sutures.





Figures 3 and 4. Stapler pyloric exclusion with gastro-intestinal anastomosis.

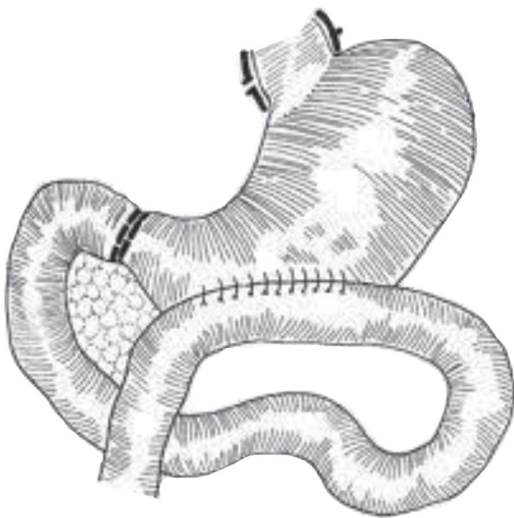


Figure 5. Schematic image of the procedure.

Case 2

A 77 year-old patient had undergone emergency surgery three days previously for rupture of an aneurysm in the abdominal aorta, with placement of a vascular graft. In the post-operative period the patient became septic, with a distended and painfully sensitive abdomen. Abdominal CT showed progression of pneumoperitoneum, and small perihepatic, perisplenic and interintestinal accumulations of free fluid, and an accumulation up to 35 mm in diameter above the vascular graft.

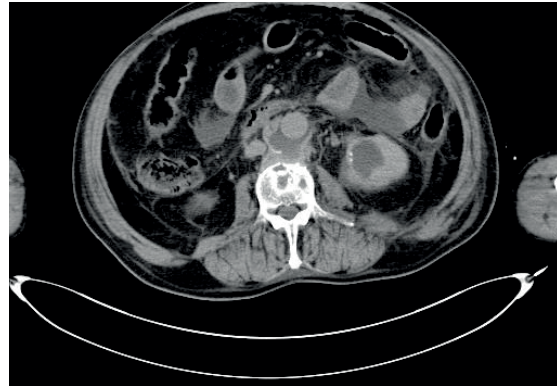


Figure 6. Abdomen CT showing the accumulation of fluid above the vascular graft.

Exploration of the abdomen found it full of serous fluid, and an accumulation of bile in D4 above the vascular graft. Injection of methylene blue through a nasogastric tube and other manoeuvres failed to find the location of the perforation. Pyloric exclusion was performed with stapler (Figure 6). However, despite the emergency surgery, due to the delayed diagnosis and septic shock, the patient died.

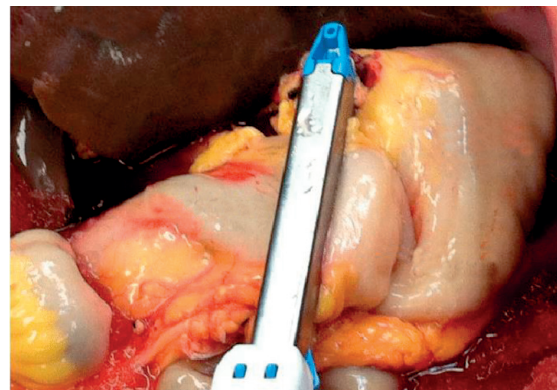


Figure 7. Staple resection of the pylorus.

Discussion

Penetrating wounds are the main cause of duodenal injury, where gunshot (63.6%) and stab wounds (25%) account for the majority of penetrating trauma to the duodenum⁵. Iatrogenic injuries are very rare, but involve high mortality, of up to 25%.⁶

Diagnosis of penetrating injuries is clear, but iatrogenic injuries are much harder to diagnose. Alongside CT, and even during exploratory laparotomy, small injuries are difficult to identify. The mean size of defects in the duodenum mentioned in studies is 9 mm⁷. In our case of iatrogenic injury, it was not possible to establish the precise location of the opening, although an accumulation of bile in front of the aortic prosthesis indicated the localization of the perforation. Recommendations for treatment of duodenal injuries are also based on the classification of the injury (Table 1)⁸.

Methods for dealing with duodenal injuries include primary closure, with broad drainage of the site of anastomosis. In complex wounds, more complex surgical procedures are required, Roux-en-Y reconstruction, tube duodenostomy decompression, or even pyloric exclusion (Figure 7).

Pyloric exclusion is rarely indicated, but the aim of the method is to reduce the volume of saliva and gastric juices passing through the duodenum, reduce the active flow of bile and pancreatic juices, and divert the gastric juices away from the duodenum. It is necessary to adhere to the indications for this procedure.

The recommended indications for pyloric exclusion are:

1. Delay of surgery of more than 24 hours
2. Injuries which involve more than 75% of the duodenal wall, D1 and D2, or perforation by a high energy missile.
3. Associated injuries of the head region of the pancreas or distal common bile duct⁹.

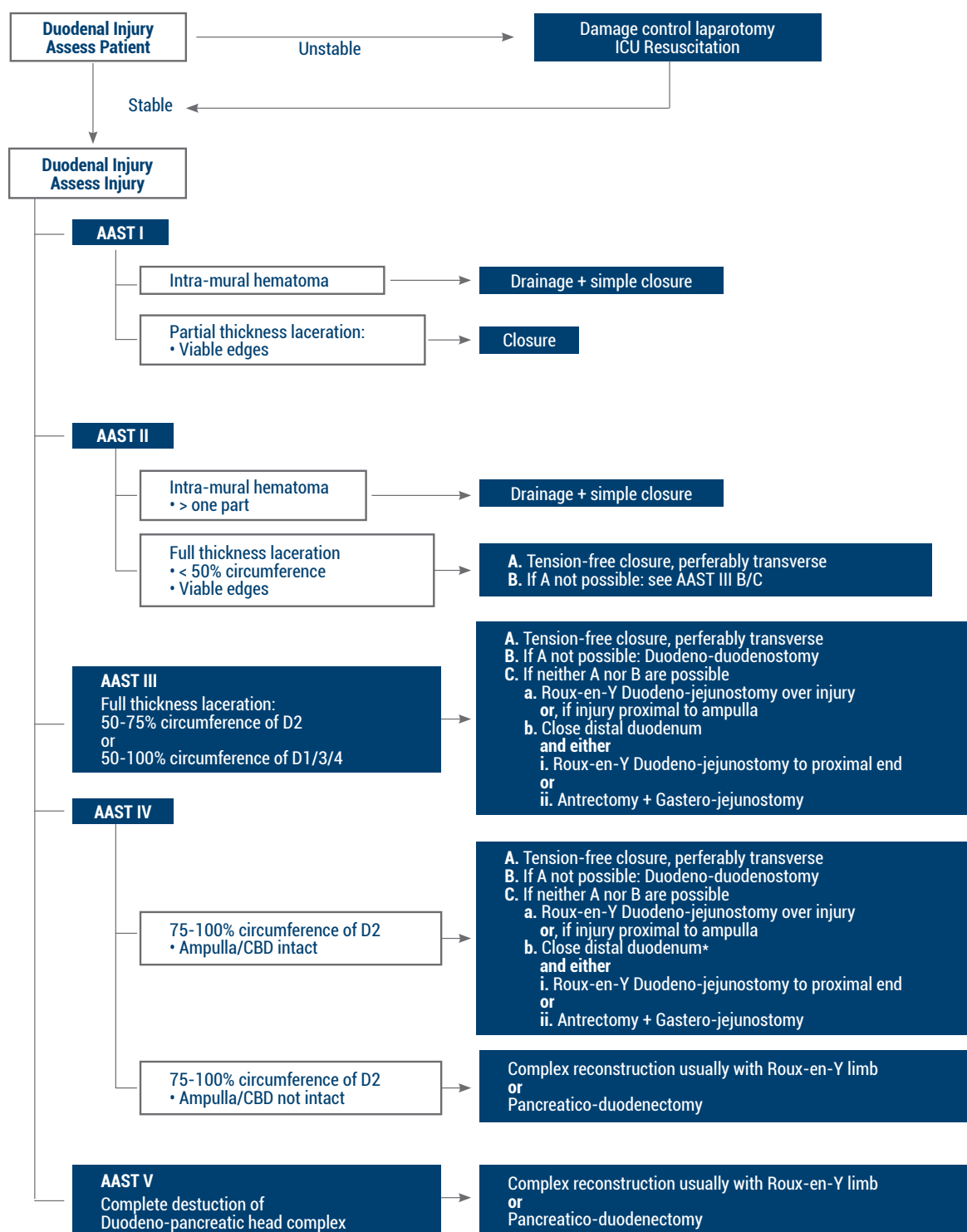
The surgical procedure itself includes repair of the duodenum, opening the gastric antrum and suturing the pyloric sphincter away from the stomach, and the procedure is completed by performing a gastrojejunal anastomosis¹⁰. The pylorus opens spontaneously in three weeks in 90% of patients, when it is closed using an absorbable suture¹¹.

The literature mentions that pyloric exclusion leads to longer hospital stays, has no benefits in terms of mortality¹² and is deemed to be an ulcerogenic technique¹³. A higher degree of complications is mentioned, along with surgical factors, such as extended procedure time, extra intestinal anastomosis, and suture line ulcers, that have reduce the use of this procedure¹⁴.

Table 1. Duodenum injury scale

Grade*	Type of injury	Description of injury
I	Hematoma	Involving single portion of duodenum
II	Hematoma	Involving more than one portion
	Laceration	Disruption <50% of circumference
III	Laceration	Disruption 50-75% of circumference of D2
	Disruption	75-100% of circumference of D1, D3, D4
IV	Laceration	Disruption >75% of circumference of D2
		Involving ampulla or distal common bile duct
V	Laceration	Massive disruption of duodenopancreatic complex
	Vascular	Devascularization of duodenum

*Advance one grade for multiple injuries up to grade III. D1-first position of duodenum; D2-second portion of duodenum; D3-third portion of duodenum; D4-fourth portion of duodenum



* if detected by CT and there is no other indication to operate observe with gastric decompression. If does not resolve during observation then operate and manage as AAST I above

Figure 8. Proposed algorithm for the management of duodenal injuries⁸.

However, the wide use of staplers in abdominal surgery today has resulted in this procedure being also performed using staplers, which reduces the surgical time. This is particularly important in emergencies such as penetrating wounds, and patients with haemorrhagic shock, or neglected biliary peritonitis.

Even though the use of primary repair to treat duodenal injuries is increasing⁴, and there is an increasing number of reports of endoscopic treatment of duodenal injuries¹⁵, we believe that pyloric exclusion has a place in the treatment of duodenal trauma, with strict adherence to the indications for this procedure.

The decision must involve multiple factors. The procedure provides the best combination of limited surgery in cases of seriously injured patients, or neglected peritonitis, with effective exclusion of the duodenum.

Conflict of interests

The authors have no relevant financial or non-financial interests to disclose.

Patient Consent Form: All participants were informed about subject of the study.

Author's Contributions: Samir Delibegović: Conceptualization, Investigation, Data curation, Visualization, Writing. Haris Kuralić: Data curation, Investigation.

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