

## Isolated Traumatic Duodenal Perforation

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### Abstract

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### Introduction

Isolated duodenal injury is not a common phenomenon encountered often. Overall incidence of duodenal injury is 11.2–26% due to blunt abdominal trauma<sup>1-4</sup>. Combined multi-organ duodenal injury is 4 times common than isolated injury<sup>4,5</sup>. The diagnosis of isolated duodenal injury is missed due to its peculiar retroperitoneal anatomical placement, producing nonspecific symptoms leading to delayed diagnosis and subsequent morbidity and mortality.

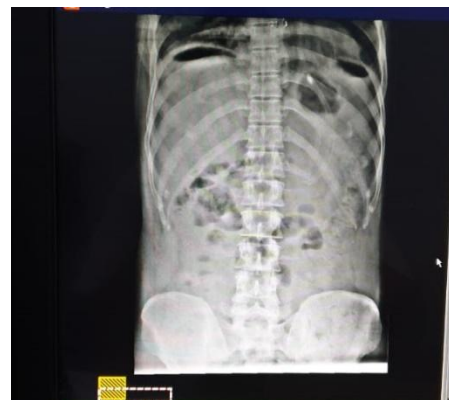
I present a case report of isolated duodenal injury of grade 3 severity due to steering wheel trauma with delayed presentation managed successfully without any complication.

### Case Report

A 25 Year old male patient referred to us 48 hrs after a steering wheel injury presented with complaints of abdominal pain, nausea and vomiting. On Examination, he was conscious, oriented with a pulse of 96 beats, BP 130/90mmHg and Spo<sub>2</sub> of 98% on Room Air.

On Local Examination, the abdomen was tender all over with guarding and rigidity with absent intestinal sounds. Radiological investigations revealed moderate free fluid in the abdomen. Standing X-ray abdomen revealed gas under both domes of diaphragm, gas under the Morrison's pouch and gas around duodenum. CT scan with

contrast was suggestive of Moderate haemoperitoneum with pneumoperitoneum.



**Figure 1: Abdominal X-ray revealing gas under the diaphragm**

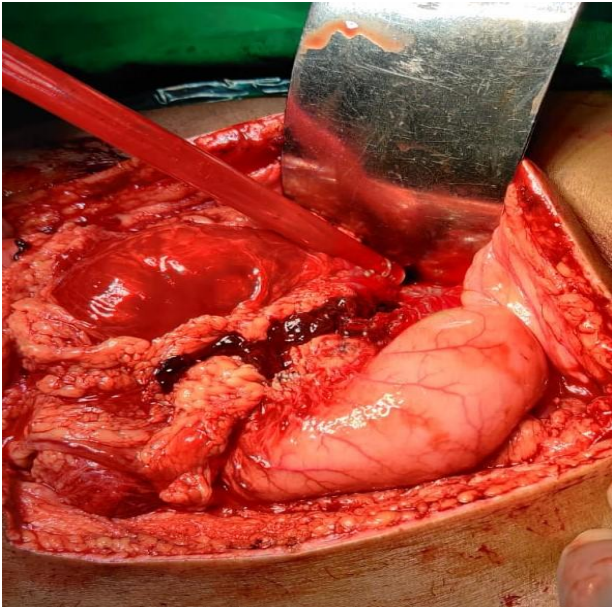
Blood investigations revealed Hb: 7.4, WBC:6040

Patient was taken up for emergency laparotomy within 2 hours of arrival and abdomen was opened by a midline incision.

Findings – Yellowish brown soilage present with thin watery consistency. Collection seen in infra-colic compartment more than supra-colic compartment.

Yellowish-brown staining of gastrocolic omentum noticed with near total (80% circumferential) full thickness duodenal trauma at D1-D2 junction. Everted mucosal margins and blood clots in the

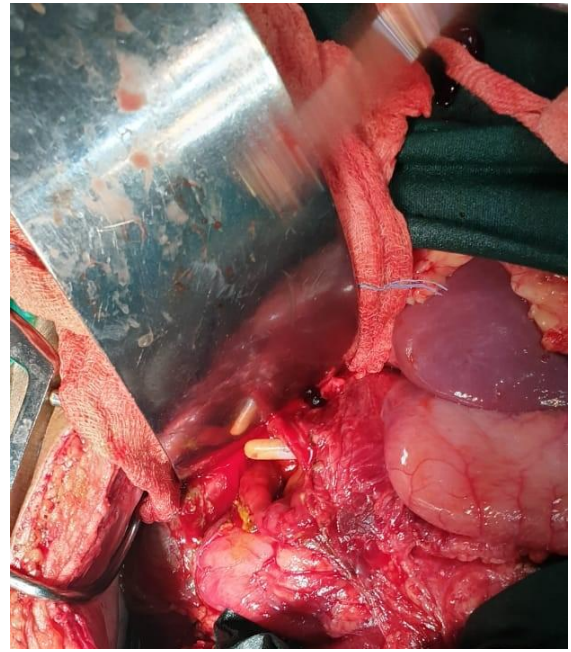
immediate vicinity were noticed. Other surrounding organs were intact making this a grade 3 isolated duodenal injury. Kocher's manoeuvre was done to mobilise the entire duodenum.



**Figure 2: Duodenal injury causing haematoma**

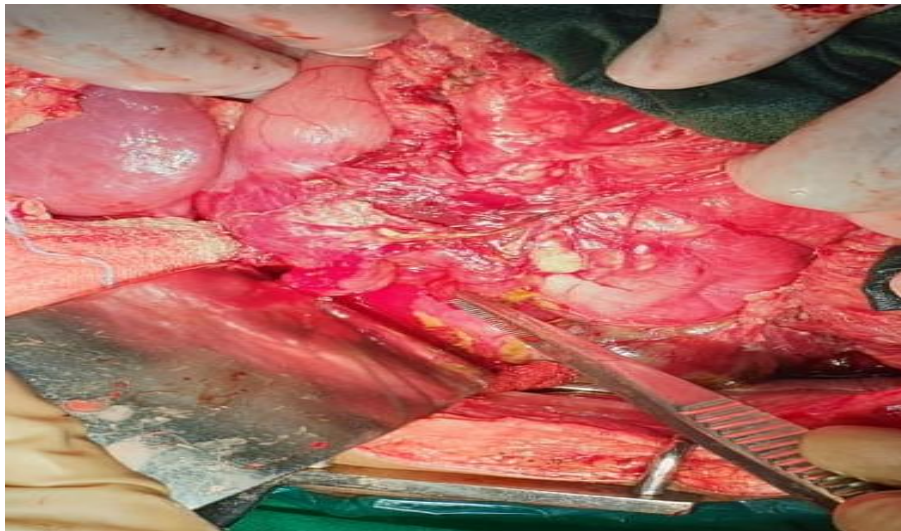
Debridement of traumatic edges of the duodenum was done followed by duodenorrhapy. Duodenal decompression was achieved with a double-tube jejunostomy tube – retrograde and anterograde. Stomach was decompressed by placing a nasogastric tube. Abdomen was lavaged thoroughly and closed en-mass by placing abdominal drains - one each in subhepatic and pelvic cavity.

Post-operatively, IV Antibiotics given for 7 days followed by necessary fluid supplementation. Gastrograffin contrast injected through nasogastric



**Figure 3: Duodenal perforation with Nasogastric tube passing through the perforation site**

tube, and serial imaging obtained which confirmed duodenal continuity without any leakage. Nasogastric tube was removed on 8th post-op day and oral feeds started. Patient was ambulated with necessary chest physiotherapy. Drains removed on day 9 and sutures removed on day 10. Patient was discharged the following day in a stable condition. Patient came for follow-up twice - at 15 days interval and did not have any active complaints.



**Figure 4: Duodenal repair –duodenorrhaphy**

**DISCUSSION**

Deep in the retroperitoneum, the duodenum is protected from superficial injuries. Duodenal Injuries accounts for approximately 3%-5% of all injuries to the abdominal organs. Isolated Duodenal Injuries are even rarely reported due to their anatomical position in relation to other organs, which can be a diagnostic challenge to physicians. Delay in the diagnosis and treatment beyond 24 hours raise mortality from 11%

to 40%. Duodenal Injuries are classified as Blunt or Penetrating. Both blunt trauma and penetrating duodenal trauma are uncommon. Motor vehicle collisions are responsible for 77% of blunt duodenal injuries, whereas assaults and falls each account for 10%.[6] The remaining 3% of blunt injuries are caused by a complex series of forces that may crush, burst, or shear the duodenum.

Grade <sup>a</sup>	Type of injury	Description of injury
I	Hematoma	Involving a single portion of the duodenum
	Laceration	Partial thickness without perforation
II	Hematoma	Involving more than one portion of the duodenum
	Laceration	Disruption of <50% of the circumference
III	Laceration	Disruption of 50–75% of the circumference of D2
IV	Laceration	Disruption of 50–100% of the circumference of D1, D3, or D4
		Disruption of >75% of the circumference of D2
V	Laceration	Involving the ampulla or distal common bile duct
	Vascular	Massive disruption of the duodenopancreatic complex Devascularization of the duodenum

<sup>a</sup> Advance one grade for multiple injuries up to grade III. D1, D2, D3, and D4 indicate the first, second, third, and fourth portions of the duodenum, respectively

**Table 1: American Association for the Surgery of Trauma grading duodenal injuries**

Injuries may be further classified by anatomic location. Whereas penetrating injuries may be distributed more equally among the four duodenal

segments, blunt mechanisms predominantly injure the second and third portions of the duodenum. When both blunt and penetrating mechanisms are



considered, the second portion of the duodenum is the most commonly injured (33%), followed by third and fourth portions (19% each), first portion (15%), and multiple sites (14%). Associated injuries are commonplace. Asensio et al., in a review of 11 series, analysed 1153 patients with duodenal injuries and found 86.9% to have associated injuries[6]. The liver was the most common organ to sustain associated injury, but injury to the pancreas, small bowel, major vascular structures, and colon was also common. Given its retroperitoneal location, physical examination is often unimpressive despite frank duodenal perforation. The injured patient may have only vague or mild complaints. Peritonitis becomes evident later, only after retroperitoneal contents leak into the peritoneal cavity.

A duodenal injury is often missed even on radiographic imaging. In less than a third of patients, evidence of duodenal injury on plain film includes air around the right kidney, right psoas, or cecum; obliteration of the right psoas shadow; and scoliosis of the spine to the left. Free air is seen in less than 10% of patients with duodenal rupture. Both DPL and FAST are equally unreliable adjuncts for the diagnosis of duodenal injuries.

CT scanning with intravenous and intraluminal contrast is presently the diagnostic study of choice for hemodynamically stable patients with suspected retroperitoneal injury. If duodenal perforation is highly suspected; an oral contrast CT abdomen should be considered to rule out leak.

The treatment of duodenal injuries is conditioned on the level of damage and possibility of post-operative complications. Approximately around 72% to 80% of duodenal injuries can be repaired with primary suture and 20–28% need complex procedure like pyloric exclusion, duodenoduodenostomy and duodenojejunostomy,(8). Primary repair of the duodenum is a viable option for the management of limited to moderately severe duodenal injuries. Although more complex and invasive procedures are warranted for management of severe delayed or duodenal disruption.

In cases of a large duodenal defect, pedicled jejunal mucosal graft, jejunal serosal patch or a gastric island flap is considered as an appropriate procedure. Adequate debridement, mobilization and end to end anastomosis of duodenal ends is a favoured approach

in patients with completely transacted duodenum. It is relatively easier to repair the first, third and fourth part of duodenum after its Kocherization and debridement of the divided ends. More sophisticated procedures are required in reconstruction of second part of duodenum, where a considerable extent of duodenal tissue is lost. Completely transacted D1 requires antrectomy, duodenal stump closure and Bilioth II gastro-jejunostomy. In a similar injury distal to ampulla, distal duodenal closure and Roux-en-Y duodenojejunostomy is the procedure of choice.[3] Presence of a closed drainage system closer to the duodenal repair is helpful in the diagnosis of leak and its subsequent control.

Complications of Duodenal Injuries are associated with a high rate of morbidity. They are mainly represented by duodenal fistulas and obstruction, which results from failure of surgical repair. Other complications such as intra-abdominal abscess, and recurrent pancreatitis were reported as well. DI mortality rate is determined according to the delay in injury recognition and repair time. Snyder et al. reported a 50% mortality rate in patients who underwent delayed surgery, and a 50% incidence of fistula. In the present case, the diagnosis was made early and the course was uneventful.

## Conclusion

Isolated Duodenal Injury is a rare condition of blunt abdominal trauma due to its retro-peritoneal location. It is normally associated with a lesion of other organs, such as the liver, pancreas or bile duct. The clinical signs of duodenal injuries are often discrete. Diagnosis is often delayed which causes high morbidity and mortality rates, especially when the damage is related to other associated injuries. If the perforation site cannot be found, the surgeon should always enter the retro-peritoneum to check for duodenal perforation. Once the need for a surgical procedure is established, duodenal injury extent and relation to other structures should be assessed – saving the more complicated techniques like diverticulization and pyloric exclusion for more complex injuries, while most injuries can be treated with simple techniques like wound excision with primary repair or duodenorrhaphy.

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