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Case Report

Complete transection of third part of duodenum following blunt injury abdomen: a rare case report

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ABSTRACT

Blunt injury abdomen (BIA) is an ever-increasing problem. Isolated injury to duodenum following BIA is rare (1-4%). It can be a challenge to the surgeon and failure to manage it properly can lead on to devastating results. Blunt duodenal injury can occur in isolation or with pancreatic injury. We report a case of an isolated transection of third part of the duodenum following BIA. Initial clinical changes in isolated duodenal injury may be subtle before life-threatening peritonitis develops. High index of suspicion, knowledge of mechanism of injury, physical examination and proper imaging techniques are the key in early detection of duodenal injury.

Keywords: Blunt injury abdomen, Isolated duodenal injury, Duodenorrhaphy, Duodenostomy

INTRODUCTION

Blunt injury abdomen (BIA) is a leading cause of death. 11.2-26% of duodenal injuries are due to BIA.[1] Solid organ injury and gastrointestinal perforations are the main complications of BIA. After BIA, fourth most commonly injured organs are duodenum and pancreas (2-10%).[3] Blunt duodenal injuries (BDIs) pose a diagnostic and therapeutic challenge, because of nonspecific signs and symptoms, associated injuries, unreliable history and the duodenum's retroperitoneal location. Early diagnosis of BDI is vital and the interval between injury and surgical intervention can determine the morbidity and mortality.[4] Contrast enhanced CT scan is the diagnostic test of choice in haemodynamically stable patients.[5] Management should be tailored according to the type and nature of the injury.[2]

CASE REPORT

24 years lady with abdominal pain was admitted with alleged history of fall from motor cycle on the previous evening and suffered a blow to the upper abdomen. Immediately she was referred to medical facility and underwent physical examination, laboratory analysis, plain abdominal X-ray and abdominal ultrasound. The patient was discharged to home care.

When admitted to our hospital, the patient was pale with cold extremities and sweating profusely. On examination, patient had diffuse tenderness with rigidity, guarding and decreased bowel sounds. She was tachycardic and hypotensive. USG done on the day of admission at outside hospital showed free fluid with air pockets in the abdomen suggestive of hollow viscus perforation. After hemodynamically stabilizing the patient, CECT abdomen was taken which showed, duodenal tear involving third part of duodenum with fluid collection and air pockets in retro-peritoneum, moderate ascites with pneumoperitoneum (Figure 1).

Patient was posted for emergency laparotomy. At laparotomy there was about 100 ml of gastric fluid and bile. On further exploration, we found near complete

transection of the third part of duodenum with continuity only in its posterior wall. No additional injuries were found. Primary repair of the transected duodenum with interrupted non absorbable sutures in two layers was done. A nasogastric tube was placed for gastric decompression and a feeding jejunostomy also done for enteral nutrition. The retroperitoneal and sub-hepatic spaces were drained (Figure 2).

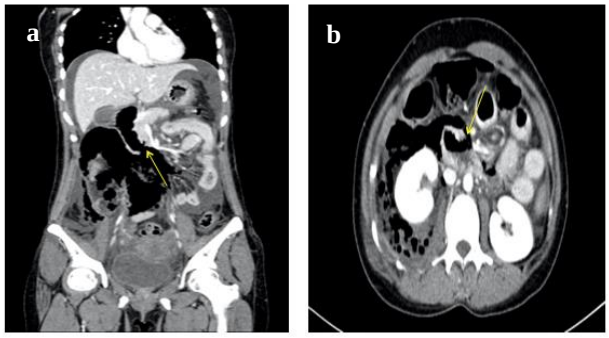

Figure 1 (a and b): Contrast enhanced CT abdomen and lower thorax showing tear in the third part of duodenum with fluid collection and air pockets in the retro-peritoneum.

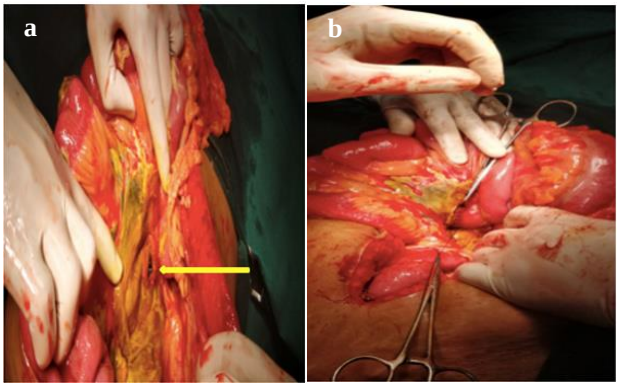

Figure 2: (a) Transection of third part of duodenum and (b) primary repair of the duodenum with non-absorbable sutures in two layers.

Patient developed pancreatitis on post-operative day (POD)-3 which was treated conservatively and patient was started on enteral feeding via jejunostomy tube on POD-7. She had breathlessness on 9th POD. X-ray showed right sided effusion. Pleural fluid analysis showed evidence of empyema. Patient went into sepsis with shock and acidosis hence she was intubated and ventilated on 10th day. Image guided drainage of the empyema was performed on the same day itself. Patient became symptomatically better and pig tail catheter removed on 18th POD.

While on ICU, she was kept nil enteral and total parenteral nutritional support was given. Rest of the hospital stay was uneventful. Ryles tube was removed on 21st day and was started on oral sips of water along with jejunostomy feeds. Oral intake gradually increased to soft diet over a period of 5 days and jejunostomy feeds stopped. Patient was further observed for anastomotic leak/fistula formation. Drain and sutures removed on 29th day. The patient was discharged on POD-36. Prior to discharge, USG of the abdomen showed no collection. Six months later the patient was complication free.

DISCUSSION

In duodenal injuries, there will be massive peritoneal contamination in no time leading to sepsis and multi organ failure, so early detection and treatment becomes the key in reducing the morbidity and mortality.

BIA accounts for approximately 25%, with isolated duodenal injuries occurring in 1-4%.[6] The mechanisms of BDI are crush, shear and burst.[7-10] Incidence of duodenal injuries are 14.4% in D1, 33.0% in D2, 19.4% in D3, 19.0% in D4 and 14.2% at multiple sites with respect to anatomical location.[11] Injuries associated with BDI are liver 16.9%, pancreas 11.6%, small bowel 11.6%, colon 11.5%, venous injuries 9.8%, stomach 9.1%, biliary tree and gall bladder 6.8% and arterial injuries 6.6%.[11] Mortality due to duodenal injury is 2-5% in BIA and 6-25% in penetrating injuries. This variability in outcome depends upon the mechanism of injury, associated injuries and time to initial diagnosis (40% mortality in patients who are diagnosed over 24 hours).[4]

Important steps in management of duodenal injuries are early diagnosis, control of hemorrhage and control of bacterial contamination. No diagnostic test found to be accurate and it must not be used as an indicator for exploratory laparotomy.[12] The tests helpful in diagnosis includes abdominal X-ray; findings suggestive of duodenal perforation are presence of air collections outlining the right kidney and right psoas muscle.[17] Upper GI series with gastrografin or thin barium to demonstrate a leak in fluoroscopy.

Endoscopy may visualize an intra-luminal blood, a perforation or a hematoma directly, not usually used in acute setting due to the possibility of worsening of injury. CT with oral and IV contrast, the best method for visualizing all the structures in stable patients. But CT is always not very sensitive.[14] Diagnostic peritoneal lavage (DPL); unreliable in BDI, can be positive if associated with other injuries.[10] Exploratory laparotomy; helpful in immediate control of life-threatening hemorrhage and GI contamination. The intra operative finding that necessitates duodenal exposure are crepitus along the duodenal sweep, bile staining of para-duodenal or adjacent tissues and right sided retroperitoneal or peri-duodenal hematoma.

According to American association for the surgery of trauma, duodenal injuries are graded and the management will depend upon the grade of duodenal injury (Table 1).[15]

Table 1: Duodenal injury scale according to American association for the surgery of trauma.[15]

Grade	Injury	Description
I	Hematoma	Involving single portion of duodenum
	Laceration	Partial thickness, no perforation
II	Hematoma	Involving more than one portion
	Laceration	Disruption <50% of circumference
III	Laceration	Disruption 50-75% circumference od D2
		Disruption 50-100% circumference of D1, D3 and D4
IV	Laceration	Disruption >75% circumference of D2 involving ampulla or distal common bile duct
V	Laceration	Massive disruption of the duodeno-pancreatic complex
	Vascular	Devascularization of duodenum

Management

Grade I and II hematoma non-operative, hemoglobin monitoring and NG tube or surgical evacuation followed by sero-muscular repair. Grade I and II laceration duodenorrhaphy with omental patch.[23] Grade III and IV lacerations, the treatment options are primary repair with protection of the repair by tube duodenostomy. According to Synder duodenal severity scale, protection of the duodenal repair is not necessary in the mild group (Table 2).[16] Resection anastomosis and Roux-en-Y duodenojejunostomy. Duodenal diverticulisation (Figure 3).[17] Pyloric exclusion (Figure 4).[18] Jejunal serosal patch: serosa of a loop of jejunum is sutured to the edge of the duodenal defect. The serosa exposed to the duodenal lumen rapidly undergoes complete mucosal resurfacing.[19] Grade V duodenal injury Whipples pancreatic duodenectomy as a staged procedure.[20]

Table 2: Synder duodenal severity scale.[16]

Variables	Mild	Severe
Agent	Stab	Blunt or missile
Size	<75% of wall	>75% of wall
Duodenal site	3, 4	1, 2
Injury repair interval	<24 hours	>24 hours
Adjacent injury	No CBD/pancreatic injury	CBD/pancreatic injury

Figure 3: Duodenal diverticulisation.

Table 3: Surgical techniques and procedures to repair duodenal and duodenopancreatic injuries.

Surgical techniques	Procedures
Duodenorrhaphy with external drainage	
Duodenorrhaphy with duodenostomy tube	Primary (through the duodenum)
	Anterograde (through the pylorus)
	Retrograde (through the jejunum)
Triple ostomy technique	
Jejunal serosal patch	Gastrostomy, duodenostomy and jejunostomy
Jejunal mucosal patch	
Vascular pedicles	Ileum, jejunum, stomach (gastric island)
Duodenal resection	Duodenal duodenostomy and duodenal jejunostomy
Duodenal diverticulisation	Antrectomy and gastrojejunostomy, truncal vagotomy, wound excision and duodenorrhaphy, duodenostomy, Kehr's tube and feeding jejunostomy
Pyloric exclusion	Temporary pyloric closure and transit reconstruction by gastrojejunostomy) with suture (absorbable and non-absorbable)
Duodeno pancreatectomy	Whipple's procedure

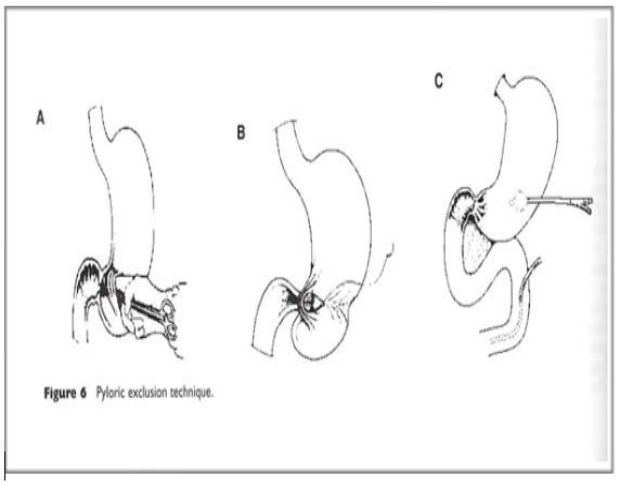

Figure 4 (A-C): Pyloric exclusion technique.

CONCLUSION

The purpose of this article is to make the surgical community aware about the rare consequence of an ever-increasing problem, the isolated transection of duodenum following blunt injury abdomen and to discuss about the various management options available. Crucial factors for the successful management of these patients are high index of suspicion, early operative intervention and accurate assessment of the nature of the duodenal injury and associated injuries. Primary closure with a feeding jejunostomy is a safe procedure.

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