

## CASE REPORT

## ISOLATED DUODENAL INJURIES AFTER BLUNT ABDOMINAL TRAUMA

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Isolated duodenal injury after blunt abdominal trauma is a very rare entity. In contrast to penetrating injuries, duodenal injuries after blunt trauma are difficult to diagnose. Early diagnosis and management is required to prevent high morbidity and mortality associated with these injuries. We present three young patients of blunt abdominal trauma with an isolated injury to duodenum in which primary repair of perforations were done with good outcomes.

**Keywords:** Duodenal injuries, blunt trauma, primary repair

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## INTRODUCTION

Isolated duodenal injury is a rare<sup>1</sup> operative finding seen in 0.2–3.7% of laparotomies performed for abdominal trauma. Blunt trauma accounts for 11.2–26% of this injury.<sup>2,3</sup> Forty percent cases have an associated visceral injury. Common are hepatic (38%), or pancreatic (28%) injuries.<sup>4,5</sup> Due to its anatomical location, isolated duodenal injury is hard to diagnose, without any concurrent solid organ injury. Clinical findings depend upon the extent of injury. Prompt recognition of an injury to duodenum is a diagnostic dilemma, and delay in its diagnosis or misdiagnosis leads to a higher incidence of extensive septic and inflammatory complications.<sup>6</sup> Mortality and morbidity ranges from 6-25% and 30-60% respectively in blunt duodenal injuries.<sup>7</sup>

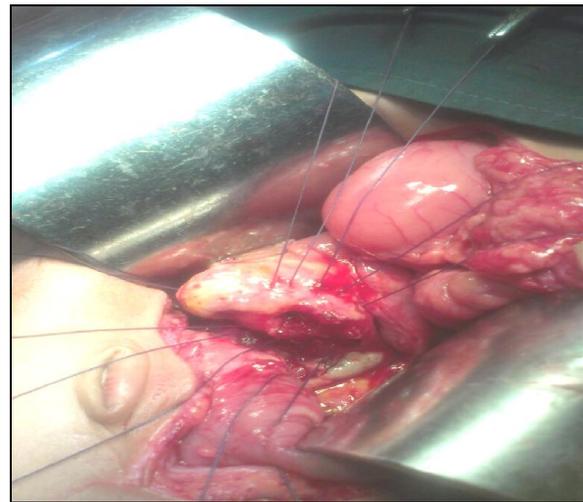
Here we present three patients of blunt abdominal trauma with an isolated injury to duodenum.

## CASE-1

A 17 year old boy presented in surgical ER with history of road traffic accident (RTA). He was hit by a van while riding a motorbike and received a blow to epigastrium from bike handle. On examination, he had a pulse rate of 78/min, B.P 110/70 mm Hg, respiratory rate 18/min, Temperature 98 F and Glasgow Coma Score of 15/15. Abdomen was tender in epigastrium and right hypochondrium. Initial laboratory investigations were within normal limits. Abdominal and chest radiographs were normal. Initial FAST scan was unremarkable but repeated scan after 2 hours showed streak of fluid in hepatorenal pouch. Contrast enhanced computed tomography scan of abdomen showed duodenal perforation with contrast extravasation into hepatorenal pouch. Laparotomy was performed and complete Kocherization (mobilization) of the duodenum showed 5×4 cm laceration in anterolateral wall of 2<sup>nd</sup> part of duodenum (Figure-1) with 500 ml

of bilious fluid in the peritoneal cavity. After thorough peritoneal lavage, primary repair of perforation was done in two layers.

No associated pancreatic injury was seen on opening the lesser sac. A tube drain was placed in Morrison's pouch and abdomen closed. Postoperative course of patient was unremarkable. Patient was allowed oral fluids on 4<sup>th</sup> postoperative day and subsequently discharged two days later. Patient was followed for three months with no active complaints.



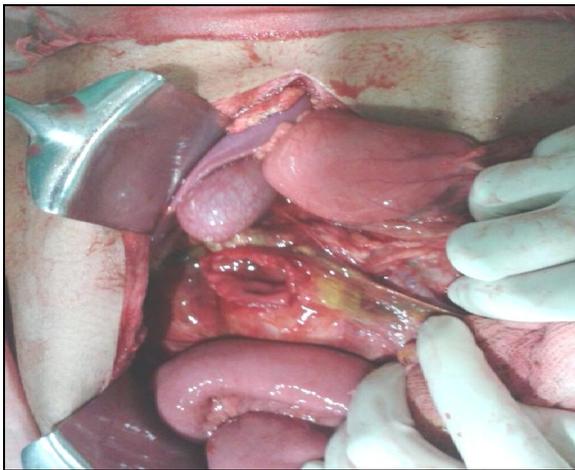
**Figure-1: Duodenal perforation in anterolateral aspect of 2<sup>nd</sup> part of duodenum**

## CASE-2

A 14 year old boy presented in surgical emergency, after 12 hours, with history of blunt injury to epigastrium by a bicycle handlebar. He initially went to a local doctor who gave him oral analgesics and then discharged him. He presented with complaints of epigastric pain and multiple episodes of bilious vomiting. On examination, his pulse rate was 100/min, B.P 110/70 mm Hg, respiratory rate 20/min, Temperature 98 F and GCS 15/15. Abdominal

examination revealed 3×3 cm bruise and mildly tender epigastric and right hypochondrial region. Baseline investigations including serum amylase were within normal ranges. Abdominal and chest radiographs were unremarkable. Abdominal sonography revealed minimal amount of free fluid in the peritoneal cavity. Laparotomy was done and complete Kocherization of the duodenum showed laceration in posterolateral wall of duodenum at junction of 2<sup>nd</sup> and 3<sup>rd</sup> part involving more than 75% of duodenal circumference (Figure 2). Primary repair of laceration was done in two layers with Vicryl 3/0 suture (Figure 3) and T-tube placed across the repair for duodenal decompression.

A tube drain was positioned in subhepatic recess and abdomen closed. Oral fluids were started on 4<sup>th</sup> postoperative day and patient was sent home on 6<sup>th</sup> postoperative day. Cholangiogram was performed on 14<sup>th</sup> postoperative day and T-tube removed. Patient was followed for three months with no active surgical issue.



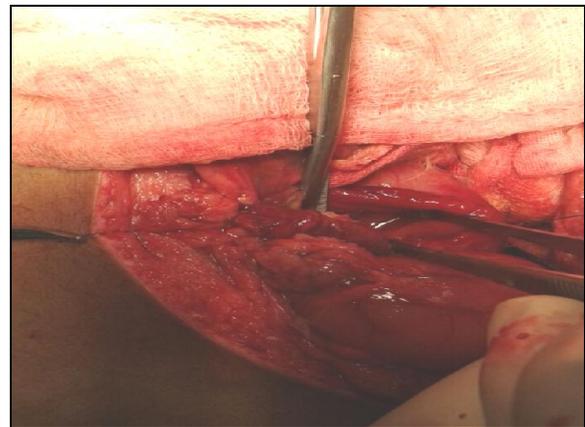
**Figure-2: Perforation at the junction of 2<sup>nd</sup> and 3<sup>rd</sup> part of duodenum**



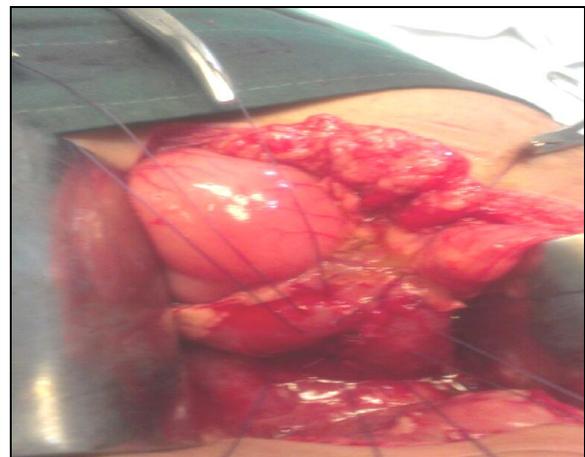
**Figure-3: Repaired perforation with absorbable suture**

### CASE-3

A 13 year old boy presented in surgical emergency with the history of assault. He received a punch in upper abdomen. He complained of mild epigastric pain and a single episode of hematemesis. His vital signs were within normal ranges. Abdomen was tender in epigastrium on deep palpation. Laboratory investigations including serum amylase were normal. Chest and abdominal radiographs were normal. Initial abdominal scan was unremarkable. Due to deterioration of vital signs, laparotomy was planned. Complete mobilization of duodenum showed 3×3 cm laceration in the posterior wall of 2<sup>nd</sup> part of duodenum (Figure 4 & 5). Primary repair of laceration was done in two layers with Vicryl 3/0 and T-tube placed across the repair for duodenal decompression. Abdomen closed with a tube drain in Morrison's pouch. Postoperative course of patient was satisfactory. On 3<sup>rd</sup> postoperative day, patient was allowed oral fluids. He was discharged from hospital after 2 days of commencement of oral diet. On 14<sup>th</sup> postoperative day, T-tube cholangiogram was performed and T-tube removed. No active surgical issue was noted in the follow up period of 3 months.



**Figure-4: Perforation in 2<sup>nd</sup> part of duodenum**



**Figure-5: Primary repair with interrupted sutures**

## DISCUSSION

In the present case series, we have discussed three patients with isolated duodenal injury following blunt abdominal trauma. One fourth of all duodenal injuries occur due to blunt trauma; rest are due to penetrating trauma.<sup>1,3</sup> It primarily results from crushing of the duodenum between the spine and steering wheel, handlebar, or any other impact to the anterior aspect of the abdomen.<sup>8</sup> In our patients, crushing force was due to motorbike handle in first case, bicycle handlebar in second case and a punch in the third case. In contrast to large duodenal injuries, which present with signs of peritonitis and shock, early diagnosis of duodenal injuries based on history and clinical examination is hard to make.

Laboratory findings are usually non diagnostic in these injuries. Plain abdominal radiographs showing air bubbles in retro-peritoneum and free intra-peritoneal air can give a clue to duodenal injury.<sup>8</sup> Abdominal ultrasonography can essentially rule out free intra-peritoneal fluid and other visceral injury but it is not a sensitive modality for visualizing retroperitoneal structures especially lesions in pancreato-duodenal area.<sup>9</sup> Computed tomography scan is an effective modality in the diagnosis of duodenal injury, retroperitoneal air and fluid collection and degree of trauma to adjacent organs. Thus, contrast enhanced CT scan is of prime significance in the case of a duodenal laceration by demonstrating the extravasation of oral or intravenous contrast media.<sup>10</sup>

American Association for the Surgery of Trauma (AAST) has devised a system for grading duodenal injuries, which is shown in table-1.

Various factors are important in the surgical management of duodenal injuries: (i) anatomical relation of duodenal laceration to ampulla of Vater; (ii) the severity of injury; (iii) the duodenal circumference involved; (iv) associated biliary, pancreatic or major vascular injury.

Primary repair of duodenal lacerations can be successfully performed in approximately 80% of cases, whereas more intricate procedures are generally required in the remainder. These include pyloric exclusion, duodenoduodenostomy, and duodenojejunosomy. Patients with severe damage to pancreaticoduodenal complex may require pancreaticoduodenectomy.<sup>3</sup>

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.<sup>11</sup> Adequate debridement, mobilization and end to end anastomosis of duodenal ends is a favored approach in patients with completely transected 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 transected D1 requires antrectomy, duodenal stump closure and Bilroth II gastro-jejunostomy.<sup>12</sup> In a similar injury distal to ampulla, distal duodenal closure and Roux-en-Y duodeno-jejunostomy is the procedure of choice.<sup>13</sup> Presence of a closed drainage system closer to the duodenal repair is helpful in the diagnosis of leak and its subsequent control.<sup>4,14</sup>

Different methods have been employed to reduce the risk of duodenal repair leak. The main aim is to divert the flow of gastric contents. These procedures include antrectomy, vagotomy, duodenal diverticulization and end-to-side gastrojejunostomy.<sup>4</sup> One surrogate technique is triple tube decompression. This includes decompression using either simple nasogastric tube, surgically constructed gastrostomy or feeding jejunostomy.<sup>15</sup> We used T-tube for duodenal decompression in two cases without feeding jejunostomy with good outcomes.

**Table-1: Grading of duodenal injuries**

Grade	Injury Description	
I	Hematoma	Involving single portion of duodenum
	Laceration	Partial thickness, no perforation
II	Hematoma	Involving more than one portion of duodenum
	Laceration	Disruption <50% of circumference
III	Laceration	Disruption 50–75 % of circumference of 2 <sup>nd</sup> part of duodenum
		Disruption 50–100% of circumference of 1 <sup>st</sup> , 2 <sup>nd</sup> and 4 <sup>th</sup> part of duodenum
IV	Laceration	Disruption >75% of circumference of 2 <sup>nd</sup> portion of duodenum. Involving ampulla or distal common bile duct
V	Laceration	Massive disruption of duodenopancreatic complex
	Vascular	Devascularization of duodenum

## CONCLUSION

Isolated duodenal trauma is unusual following blunt trauma. Delay in diagnosis is attributable to complex duodenal anatomy, its location and subtle clinical signs. CECT scan needs to be done in suspected cases of blunt epigastric trauma to rule out significant pancreaticoduodenal injury. Primary repair of duodenal wounds is enough; provided the expertise is available. Prompt diagnosis and management is the key to prevent morbidity and mortality.

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