



## A RARE CASE OF DUODENAL INJURY FOLLOWING BLUNT TRAUMA ABDOMEN SAMPATH KUMAR B

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### Abstract :

Duodenal injury can pose a formidable challenge to the surgeon. The total amount of fluid passing through the duodenum can exceed 61 litres per day and failure to properly manage the duodenal injury can result in fistula causing serious fluid and electrolyte imbalance. The retroperitoneal location of the duodenum and its close proximity to other viscera like CBD, Pancreas, major vascular structures means that the isolated duodenal injury(1,8) itself is rare following blunt trauma abdomen. It represents nearly 3 to 5 of patients with blunt injury abdomen and often occurs after blows to upper abdomen. Blunt injury(1,8) of the duodenum is most commonly caused by the transmittal of significant force to the anterior abdomen, as often experienced by an unrestrained driver in a motor vehicle accident who comes into contact with the steering wheel. A considerable number of blunt duodenal injuries(1,8) can, however be caused by far less violent mechanisms such as falls, assaults, and handlebar contact. We had a case of blunt injury abdomen with duodenal rupture following hit with steering wheel which was managed by emergency laparotomy, tube duodenostomy, diversion posterior gastrojejunostomy and feeding jejunostomy.

### Keyword :

Blunt trauma, duodenal injury, tube duodenostomy, gastrojejunostomy.

### CASE REPORT

A 35 years old male was admitted in our emergency ward with complaints of upper abdomen pain following injury to abdomen while driving a car, hit with steering wheel six hours back. On examination patient was conscious, well oriented, no pallor, BP-130/80 mm of hg, PR-110/min, CVS/RS-NAD, Abdomen was not distended, soft with tenderness over epigastric region. Basic blood investigations were within normal limits. A plain X ray abdomen erect was taken which showed free air under right side diaphragm (Fig 1). Ultrasound abdomen showed minimal free fluid with no solid organ injury.



**Fig 1 Xray abdomen erect showing free air under right diaphragm**

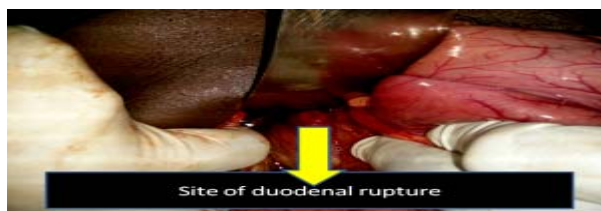
A diagnosis of hollow viscus perforation was made and planned for emergency laparotomy and proceed, with high risk informed written consent. Under ETGA abdomen was opened by midline incision. Toxic fluid around 200ml was drained out and bile leak was found at the junction of 1st and 2nd part of duodenum (Fig 2). Solid organs were normal and there was no pancreatic or CBD injury (Fig 3).



**Fig 2 showing bile leak from duodenal rupture**



**Fig 3 showing normal CBD**



**Fig 4 showing duodenal rupture site**



**Fig 5 showing tube duodenostomy site**

Kocherization of duodenum done and a tear of about 2x1 cm was found at posterolateral part at the junction of 1st and 2nd part of duodenum (Fig 4). After placing an 18F foley's catheter in the middle of the duodenal tear (Fig 5), the edges are approximated on either side with 2.0 silk, then diversion gastrojejunostomy and feeding jejunostomy was done. Drainage tube was kept, haemostasis secured and abdomen closed in layers. Post operative period was uneventful. Duodenostomy started functioning by 2nd post operative day, FJ feeding started on 4th post operative day and oral feeding started on 6th post operative day. There was no leak, left sided drainage tube removed on 6th post operative day, right sided drainage tube removed on 9th post operative day. Sutures removed on 10th post operative day and patient discharged(fig 6).



**Fig 6 showing patient at 10th post Operative day before discharge**

Patient was followed up and readmitted after six weeks. The duodenostomy tube was removed and dressing applied. Patient was kept under observation for three days. Feeding jejunostomy tube was removed and there were no any adverse sequelae. Hence patient discharged.

#### DISCUSSION

The duodenum is a 'C' shaped organ primarily situated in the retroperitoneum and is anatomically divided in to four sections namely D1, D2, D3 and D4. It is vulnerable to damage by shearing or compression forces, as D1 and D2 are relatively mobile compared to D2 and D3 which are fixed. Numerous collected series of duodenal injuries have reported a varying mortality of 5 to 25%. Most of deaths are caused by associated injuries. Duodenal injury itself is the cause of death in 6 to 12%. Abdominal pain is the only consistent symptom of blunt small bowel trauma, while in cases of blunt duodenal trauma, this lack of specific symptomatology is compounded by the anatomy of the duodenum itself, whose predominantly retroperitoneal location(11) may hide an injury that would be obvious otherwise. Patient may promptly exhibit right

upper quadrant pain, progressive tachycardia, and vomiting, but peritoneal signs(4) are often delayed several hours as duodenal contents slowly seep into the peritoneal cavity. The protected anatomic location of the duodenum implies that significant blunt force is needed to produce a small bowel injury, thus raising the likelihood that other abdominal structures, including solid organs, will be injured in the process. It is therefore important to consider both mechanism of injury and other clinical signs such as tachycardia, raised white cell count as delay in diagnosis and subsequent management have been shown to adversely affect morbidity and mortality. However in this case there was no peritonitis and the only evidence of hollow viscus injury was free air under right diaphragm. Duodenal injuries(1,8) secondary to blunt trauma can range from an intraluminal haematoma to severe disruption of duodenopancreatic complex(2,5) and duodenal devascularisation and are graded 1-5 by American Association for surgery of trauma.

Grade	Injury
1	Hematoma involving single portion of wall Laceration: partial thickness, no perforation
2	Hematoma involving more than 1 portion Laceration: <50% circumference distribution
3	Laceration: disruption 50%–75% circumference of 2nd portion Disruption 50%–100% circumference of 1st, 3rd, or 4th portions
4	Laceration: disruption of >75% circumference of 2nd portion, involvement of ampulla or distal common bile duct
5	Laceration: massive disruption of duodenopancreatic complex Duodenal devascularization

Several imaging modalities(4) have been demonstrated to be helpful in diagnosing blunt duodenal injury, including abdominal plain films, ultrasound, and computed tomography (CT) imaging with oral and intravenous contrast. Classic signs of duodenal injury on plain film include retroperitoneal air outlining the lateral duodenum and right kidney, a partially obscured upper portion of the right psoas muscle, and lumbar spinal scoliosis to the left. Focused abdominal sonography in trauma [FAST] is of no value in the diagnosis of duodenal and pancreatic trauma. FAST is very sensitive to detect free abdominal fluid, when performed by an experienced operator, but cannot identify the source or type of fluid. However, CT(14,15) with contrast has more recently become a widely used modality in diagnosing and assessing the severity of blunt duodenal injuries. Luminal contrast materials such as meglumine diatrizoate (Gastrografin, Bristol-Myers Squibb) or barium sulfate may prove helpful as adjuncts in locating a duodenal perforation precisely. The finding of fluid in the right anterior pararenal space on CT scan may be seen in the presence of a duodenal haematoma whereas if air is seen in this area duodenal rupture is suspected. There are multiple ways to repair(3,10) a duodenal injury and it depends upon the severity of injury. Nearly all cases of duodenal haematoma(16,17) can be managed without surgery by nil per oral, nasogastric aspiration and parenteral nutrition. An increase in symptomatology, leukocytosis, or hyperamylasemia should prompt reimaging or, in severe cases, laparotomy. Most simple duodenal lacerations can be closed primarily. Lacerations along the axis of the duodenum may be closed longitudinally or transversely. The transverse closure is preferred, if significant narrowing would result from longitudinal closure. Transection of the duodenum may be treated by debridement and end-to-end repair. Limited mobilization is possible in the descending portion of the duodenum due to the dependence of the duodenum on vessels from the pancreas. Extensive disruptions of the

duodenum may be treated by resection with end-to-end Roux-en-Y duodenojejunostomy(7). Duodenal injuries(3,10) that cannot be repaired primarily without severe narrowing of the lumen may be repaired by the use of a serosal patch technique. This may be accomplished using the technique popularized by Kobbold and Thal in which the serosal aspect of a loop of jejunum is brought anterior or posterior to the transverse colon and directly sutured to the duodenum. If the duodenal defect is large, a Roux-en-Y limb of jejunum can be brought behind the colon, split longitudinally, and sutured to the duodenal defect and sutured in place with a two-layer technique. Vascularized island flaps of jejunum or stomach have also been described. An alternative to the use of a serosal patch in severe duodenal injuries is the use of a pedicled graft(13). Such grafts may be taken from the body of the stomach or from the jejunum. The segment of jejunum from which the graft has been taken is repaired by end-to-end anastomosis. Aside from these procedures expanded polytetrafluoroethylene (ePTFE) graft may be an acceptable membrane for repair of duodenal defects. It provides mild tissue reaction with cellular and tissue infiltration into porous structure of the graft. Combined pancreaticoduodenal(2,5) injuries carry a mortality rate of about 30 to 35%. Pancreaticoduodenectomy (9) has been performed for a widely varying spectrum of pancreaticoduodenal injuries. Whipple operation(9) has been proposed in cases of massively destructive injuries of the pancreas and duodenum.

#### Adjuncts for Repair

Intraluminal duodenal decompression has been advocated as a useful adjunct in the repair of duodenal injuries. The simplest of these is a tube duodenostomy. Severe duodenal and combined pancreaticoduodenal injuries(2,5) often require the diversion of the gastric contents away from the duodenal repair by duodenal diverticularization(6). This consists of antrectomy with gastrojejunostomy, truncal vagotomy, tube duodenostomy, and external drainage of the duodenal repair. Tube choledochostomy may be added if the duodenal injury is in the region of the ampulla. A useful adjunctive procedure in severe duodenal injuries and pancreaticoduodenal injuries is pyloric exclusion. Through a gastrostomy in the dependent portion of the distal stomach, the pylorus is sewn closed with nonabsorbable suture material. A gastrojejunostomy is then performed.

#### Complications

Complications after the repair of duodenal injuries are influenced by numerous factors, including anatomic severity of the duodenal wound, severity of associated injuries, physiologic condition of the patient at surgery, and the interval between injury and surgery. The most serious complication specific to the repair of injury to the pancreaticoduodenal complex involves breakdown of the duodenal repair with fistula formation and abdominal sepsis. The incidence of duodenal fistula formation has been reduced significantly by improvements in the techniques of duodenal repair, decompressive enterostomy and pyloric exclusion. Fistulas that occur after duodenal diverticularization or pyloric exclusion are usually end fistulas, which in most cases heal without the need for surgery. The addition of the somatostatin analogue octreotide may convert a fistula from high to low output and thus facilitates spontaneous closure. Fistulas that fail to resolve after a reasonable attempt at nonoperative management may require surgery. Excision of the fistulous tract, closure of the duodenal defect, exclusion of the duodenum, tube duodenostomy, and feeding jejunostomy constitute an operative goal at reoperation.

#### CONCLUSION

\* Isolated duodenal injury without any associated pancreatic or common bile duct injury following blunt trauma is very rare

\* Due to retroperitoneal location of duodenum, occurrence of frank peritonitis is very rare initially which delays diagnosis. Because of potentially devastating delayed complications, early diagnosis of duodenal injuries should be an important goal for better care of patients who have experienced trauma.

\* Even though minor duodenal injuries can be managed with simple primary sutures with decompression, complicated injuries needs limited complex procedures like resection and anastomosis of involved segment, intraluminal duodenal decompression, diversion procedures and pyloric exclusion. Associated common bile duct or pancreatic injury should be diagnosed effectively and treated accordingly.

#### REFERENCES

1. Adkins Jr. R.B., Keyser III J.E.: Recent experiences with duodenal trauma. *Am. Surg.* 1984; 5:121.
2. Anderson C.B., Weisz D., Rodger M.R., Tucker G.L.: Combined pancreaticoduodenal trauma. *Am. J. Surg.* 1973; 125:530.
3. Asensio J.A., Feliciano D.V., Britt L.D., Kerstein M.K.: Management of duodenal injuries. *Curr. Probl. Surg.* 1993; 30:1021.
4. Bach R.D., Frey C.F.: Diagnosis and treatment of pancreatic trauma. *Am. J. Surg.* 1971; 121:20.
5. Berne C.J., Donovan A.J., Hagen W.E.: Combined duodenal pancreatic trauma: The role of end-to-side gastrojejunostomy. *Arch. Surg.* 1968; 96:712.
6. Berne C.J., Donovan A.J., White E.J., Yellin A.E.: Duodenal diverticularization for duodenal and pancreatic injury. *Am. J. Surg.* 1974; 127:507.
7. Brawley R.K., Cameron J.L., Zuidema G.D.: Severe upper abdominal injuries treated by pancreaticoduodenectomy. *Surg. Gynecol. Obstet.* 1968; 126:156
8. Cave W.H.: Duodenal injuries. *Am. J. Surg.* 1946; 72:26.
9. Chambers R.T., Norton L., Hinchey E.J.: Massive right upper quadrant intra-abdominal injury requiring pancreaticoduodenectomy and partial hepatectomy. *J. Trauma* 1975; 15:714.
10. Cogbill T.H., Moore E.E., Feliciano P.V., et al: Conservative management of duodenal trauma. *J. Trauma* 1990; 130:1469.
11. Cohn I., Hawthorne H.R., Frosbese A.S.: Retroperitoneal rupture of the duodenum in non-penetrating abdominal trauma. *Am. J. Surg.* 1952; 84:293.
12. Cone J.B., Eidt J.F.: Delayed diagnosis of duodenal rupture. *Am. J. Surg.* 1994; 168:676.
13. DeShazo C.V., Snyder III W.H., Daugherty C.G., Crenshaw C.A.: Mucosal pedicle graft of jejunum for large gastrointestinal defects. *Am. J. Surg.* 1972; 124:641.
14. Federle M.P.: Computed tomography of blunt abdominal trauma. *Radiol. Clin. North Am.* 1963; 3:461.
15. Federle M.P., Goldberg H.I., Kaiser J.R., et al: Evaluation of abdominal trauma by computed tomography. *Radiology* 1981; 138:637.
16. Felson B, Levin E.J.: Intramural duodenal hematoma of the duodenum: Diagnostic roentgen sign. *Radiology* 1954; 63:823.
17. Ferguson I.A., Goode W.J.: Intramural hematoma of the duodenum. *N. Engl. J. Med.* 1959; 260:1176.

