Management Outcome of Duodenal Trauma

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This study was carried out on 42 patients of duodenal trauma managed in North Surgical Unit of Mayo Hospital, Lahore from June 1998 to May 2004. It was done to determine the cause of duodenal trauma and the management. Duodenal injury along with injury to other abdominal viscera is more common than isolated duodenal injury. Penetrating injuries are more frequent than blunt trauma. Primary duodenal repair (19%), repair with tube duodenostomy (30%), repair with pyloric exclusion and gastrojejunostomy (12%), pancreaticoduodenectomy (7%), resection of third & fourth part followed by duodenojejunal anastomosis (21%), tube duodenostomy (5%) were the procedures performed. Wound infection, intra-abdominal abscess, duodenal fistula and wound dehiscence were common postoperative complications. Early diagnosis, prompt resuscitation and operation and a tailor made approach in expert hands leads to better outcome.
Key words: Duodenal trauma, repair, complication

Duodenal injuries are more common due to penetrating trauma than blunt injuries[1]. In penetrating abdominal trauma, firearm injuries are increasing and more lethal than the stabs[2,3]. Isolated injury to the duodenum is relatively rare. Commonly duodenal injuries present in combination with trauma to other organs[3]. In blunt trauma cause of injury is crushing against the vertebral column and blow out of the closed loop. The duodenal rupture may be intra or retroperitoneal. The intraperitoneal rupture produces symptoms and signs of peritonitis, but retroperitoneal rupture is more difficult to detect in early hours[4,5]

The diagnosis is made usually on clinical assessment. Most of the patients are explored for injury to other viscera and duodenal injury is found during surgery. A high index of suspicion in patients with abdominal trauma, elevated level of serum amylase repeated after 6 hours and diagnostic peritoneal lavage are helpful in diagnosis of pancreaticoduodenal injury. Apart from routine investigations abdominal ultrasound, CT scan and radiographs are helpful. Plain abdominal x-ray may show perinephric gas shadow, obliteration of right upper psoas muscle border and gas under right side of diaphragm. Surgical options for treatment of duodenal injury are:

Repair of injury primarily[6].
Repair with tube duodenostomy
Roux-en-Y duodenojejunostomy.
Repair and pyloric exclusion with gastrojejunostomy.
Pancreaticoduodenectomy[6,7,8].

The postoperative complications increases in patients with associated injury of other organs[9]. The time lag between injury and operation, severity of injury to the duodenum and associated injuries to other organs are important factors affecting the outcome[2].

Patients and methods:

This study includes 42 patients of duodenal trauma managed in the North Surgical Ward, Mayo Hospital, Lahore from July 1998 to May 2004 over a period of six years. All these patients were admitted through emergency. Patients below the age of 12 years were not included because they present to department of paediatric surgery.

All patients were assessed clinically blood samples were sent for routine hematological studies and grouping and cross matching. Worsening shock despite resuscitative measures lead to operating room resuscitation and operation carried out simultaneously. A nasogastric (NG) tube and Foely's catheter were passed. Plain radiographs of chest and abdomen were performed except in patients who were unstable. Abdominal ultrasound and CT scan and duodenogram was performed where required. Penetrating injuries did not pose any diagnostic problem as all penetrating injuries with peritoneal breach are explored as a rule. Blunt injuries however, required a high index of suspicion. These were explored for other abdominal injuries on clinical assessment and duodenal injury was found at exploration. In suspicious cases serum amylase and diagnostic peritoneal lavage (DPL) was done.

All patients were operated by senior registrar or consultants on the provisional diagnosis of peritonitis or haemoperitonium and explored through midline incision after resuscitation. Associated injuries were treated on merits. Duodenum was explored if there was visual evidence of duodenal injury, paraduodenal haemorrhage/ haematoma, elevation of posterior peritoneum with edema, haematoma over head of pancreas, biliary leakage etc.

In all patients, the duodenum was mobilized using Kocher's manoeuvre and by mobilization of right colon, detaching transverse mesocolon from gastrocolic omentum and division of ligament of Treitz. Repairs was done in 2 layers using vicryl 2/0 or 3/0 round body needle. For gastric decompression, nasogastric tube or gastrostomy was done in all patients. Some cases required a gastrojejunostomy or tube duodenostomy as a decompression procedure. Among the diversion procedures, pyloric exclusion with gastrojejunostomy was also used. External drainage was employed through use of tube drains placed near the suture line.

Postoperatively, patients were managed regarding fluid and electrolyte, analgesia, antibiotics, H_2 receptor blocker, intake and output etc. Steam inhalation, chest physiotherapy and nebulization were employed for prevention and treatment of pulmonary complications.

Results:

During this period of six years, a total number of 42 patients with duodenal trauma were admitted through accident and emergency department. Relative incidence of mode of injury in Table 1 showing that most of the patients presented with penetrating trauma. Firearm caused duodenal injury in 30(72.5%), stab in 4(9.5%) and blunt trauma in 8(19%) patients. The second part of the duodenum was the most commonly injured part (Table 2).

Incidence of associated organ injury i.e., 37(88.10%) was high as shown in Table 3. As shown in Table 4 the associated injury to other abdominal organ was liver in 13 patients, gallbladder in 4, pancreas in 6, small bowel injury in 5, stomach in 3, colonic injury in 12, right kidney in 5, and inferior vena cava in 3 patients.

Table 1: Mode of injury in duodenal trauma (n=42)

Mode	n=	%age
Firearm	30	72.50
Stab	04	09.50
Blunt	08	19.0

Table 2: Incidence of injury of different duodenal parts

Injured part of the duodenum	n=	%age
First part	10	23.8
Second part	19	45.24
Third part	08	19.04
Fourth part	05	11.9

Table 3: Isolated duodenal and associated injuries

Groups	n=	%age
Patients with duodenal trauma only	05	11.90
Patients with associated organ injury	37	88.10

Table 4: Associated organ injury in patient with duodenal trauma

Organ	n=	%age
Liver injury	13	30.09
Gallbladder injury	04	09.50
Pancreatic injury	06	14.40
Small bowel injury	05	11.9
Stomach injury	03	07.14
Colon injury	12	28.5
Right Kidney	05	11.9
Inferior vena cava	03	07.14

Table 5 is showing different procedures performed to deal duodenal trauma in these patients. Primary repair with tube duodenostomy in 13(30.9%), primary repair in 8(19.05%), repair with pyloric exclusion and gastrojejunostomy in 5(11.9%), repair with jejunal serosal patch 2(4.8%), pancreaticoduodenectomy 3(7.11%), resection and duodenojejunal anastomosis 9(21.4%) for injury to the 3rd and 4th part and tube duodenostomy in 2(4.8%) patients. Two patients who had only tube duodenostomy performed, presented late and had bad peritonitis. Two patients who had only tube duodenostomy performed, presented late and had bad peritonitis. The results of various operative procedures (Table 5) were good and there was leakage and fistula formation in 3(7.14%) patients only.

Table 5: Procedure performed in duodenal trauma

Procedure	n=	%age
Primary repair	08	19.05
Repair with tube duodenostomy	13	30.9
Repair with pyloric exclusion and gastrojejunostomy	05	11.9
Repair with jejunal serosal patch	02	4.8
Pancreaticoduodenectomy	03	7.14
Resection and duodenojejunal anastomosis	09	21.4
Tube duodenostomy	02	4.8

Table 6: Post operative complications

Complications	n=	%age
Wound infections	08	19.1
Intra-abdominal abscess	03	7.14
Duodenal fistula	03	7.14
Pancreatic fistula	01	2.38
Abdominal wound Dehiscence	01	2.38
Death	01	2.38

Postoperative complications (Table 6), include wound infection in 8(19.1%), intra-abdominal abscess in 3(7.14%), duodenal fistula in 3(7.14%), pancreatic fistula, wound dehiscence and death in 1(2.38%) each patient These complications were managed on their own merit. The patient who died, had severe pancreaticoduodenal and colonic injury.

Discussion:

Duodenal trauma is a relatively uncommon but serious condition faced in routine surgical emergency. Most of the duodenum and whole of the pancreas is retroperitoneal, signs of closed injury may be few and delayed[7].

Duodenal trauma is more common in young and the middle aged. The diagnosis of the duodenal injury is difficult despite the development of different investigative techniques[10,11]. Penetrating trauma does not pose any difficulty in the diagnosis of duodenal injury. However, in blunt trauma a high index of suspicion is necessary. In this study x-ray chest and abdomen was the commonly performed investigation in blunt trauma. Diagnosis is difficult in blunt abdominal trauma.

In this study the most common mode of duodenal injury was penetrating injury effecting 34 patients and only 8 patients were having duodenal injury due to blunt trauma. This is very similar to the observations made by many authors[8,11,12]. This probably is due to increased

incidence of civilian violence in our society. Any part of the duodenum may be injured by penetrating trauma, but blunt trauma usually effects the second part of the duodenum because of closed loop barotrauma. As the duodenum has very close relation to other abdominal viscera, so isolated duodenal injury is uncommon and usually associated with injuries to other abdominal organs[3,6]. Colon, pancreas and liver were the common organs injured in association with duodenum. These associated injuries lead to more operative time, delayed recovery resulting in increased morbidity and mortality[5,6].

As shown in other studies, surgical treatment of the duodenal injury varies according to different situations. It is the decision of the surgeon per operatively to do the procedure which is best for the patient, i.e., repair, repair with duodenostomy, pyloric exclusion, pancreaticoduodenectomy etc[4,7,13,14]. Protection of the primary duodenal repair may be added by diversion of gastric contents by doing pyloric exclusion. The patients with postoperative complications are treated accordingly.

Nutritional support whether by total parenteral nutrition or through feeding jejunostomy has reduced the morbidity and mortality during the last two and half decades[15] of the patients with severe duodenal and combined duodenopancreatic injuries. In our study we provided prophylactic feeding jejunostomy in all cases with severe duodenal and duodenopancreatic injuries. This decreased the morbidity and mortality in our series.

Conclusion:

Duodenal injury is more prevalent in young males because they are exposed to accidents and violence more commonly. Penetrating trauma is more common mode in patients with duodenal injuries. Isolated duodenal injury is rare, because of close anatomical relation of abdominal organs to the duodenum. Primary repair with pyloric exclusion and repair with tube duodenostomy are safe and effective options in the treatment of duodenal injury. Wound infection, intra-abdominal abscesses duodenal fistulas are most common postoperative complications. A few patients require procedures to treat the postoperative complications. Having early diagnosis timely presentation and expertise available can reduce morbidity and mortality both.

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