Original Article

Traumatic Duodenal Injuries, Surgical Management

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ABSTRACT

Objectives: The purpose of this study is to share our surgical experience of duodenal injuries management and to evaluate outcome of different surgical procedures. **Study Design:** case series. **Place and Duration of Study:** Surgical emergency Allied hospital Faisalabad from 01 June 2012 to 31 may 2014. **Methods:** All patients with traumatic duodenal injuries were included. Data included patient's profile, date of admission, mechanism of injury, grade of duodenal injury, type of procedure, and outcome. **Results:** Total number of cases in period under study was 29. There were 26 (89.7%) male and 3 (10.3%) female and mean age of 27.8 years. 62% cases were due to blunt abdominal trauma commonly road traffic accident and 38% penetrating injuries predominantly firearm injuries.Second part of duodenum was found to be the most commonly injured site in 55.17% case and grade II injuries accounted for 65.52% of total injuries. The most common operative procedure performed was Primary repair. Postoperatively 10.34% cases developed duodenal fistula, and the overall morbidity was found to be 34.48% and mortality 31%. **Conclusion:** It is concluded that blunt trauma abdomen is common cause of duodenal injury in our setup. Most injuries can be managed by primary repair. Early diagnosis and surgical intervention is most important factor for good results. **Keywords**: Duodenal injury, blunt abdominal trauma, penetrating injury.

INTRODUCTION

Injuries of the duodenum occur in about 3 to 5 percent of all traumatic abdominal injuries.[1] The duodenum is primarily a retroperitoneal organ that begins at the pylorus and ends at the ligament of Treitz. The duodenum measures approximately 20 cm and consists of four segments. The first portion is transversely-oriented, beginning at the pylorus and ending at the common bile duct superiorly and the gastroduodenal artery inferiorly. The second portion runs inferiorly to the ampulla of Vater, the third portion runs transversely to the superior mesenteric artery and vein, and the fourth portion extends to the point where the duodenum emerges from the retroperitoneum to join the jejunum at the left border of the second lumbar vertebra. Common causes of duodenal injury in our setup are blunt trauma like road traffic accidents, sport injury alongwith firearm and stabs. In blunt abdominal trauma duodenum is injured by crushing of duodenum against spine or shearing force of truma.[2] The diagnosis can be challenging, particularly in the setting of blunt trauma, because symptoms and signs resulting from these injuries may not be obvious due to the retroperitoneal location of duodenum and duodenal injuries may occur at more than one site.[3] There are many operative procedures to deal with duodenal injury, which range from simple primary repair (duodenorrhaphy) to more complex procedures like resection and anastomosis, jejunal serosal patch, tube duodenostomy, duodenal diverticulation, pancreaticoduodenectomy.[4] However, no single procedure completely eliminates the possibility of complications like a duodenal fistula.Most of the duodenal injuries are adequately managed with primary closure (duodenorrhaphy) in one or two layers or by resection and anastomosis.[5] Pyloric exclusion has been claimed to have minimal advantage over nasogastric drainage.[6] The management of severely injured patients with

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multiple and complex injuries still remains challenging with significant mortality and morbidity.[7] The purpose of this study is to share our surgical experience of duodenal injuries management and to evaluate different surgical approaches and to establish relationship between grades of injury and surgical treatment employed with outcome.

MATERIALS & METHODS

This study was conducted from 01june 2012 to 31 may 2014

Twenty nine consecutive patients with traumatic duodenal injuries admitted to surgical emergency Allied hospital Faisalabad during the above given period were analyzed. Patients with perforation due to other diseases were excluded. The data collected was demographic data, age, cause of injury, anatomic location of duodenal injury, grade of duodenal injury, surgical procedures performed, postoperative complications, morbidity and mortality.

After resuscitation and necessary investigations emergency exploratory laparotomy was performed. Peroperatively duodenal injuries were classified into grade I to V duodenal organ injury scale (DIS) according to AAST (American Association for the Surgery of Trauma. Primary repair, resection and anastomosis, tube duodenostomy and complex repair that included gastrojejunostomy with or without pyloric exclusion, were the surgical procedures performed. The data analysis was done using SPSS for windows version 11.

Grade		
I	Haematoma Laceration	Involving single portion of duodenum Partial thickness, no perforation
II	Haematoma Laceration	Involving more than one portion Disruption < 50% of circumference
III	Laceration	Disruption of 50–75% of circumference of D2 Disruption of 50–100% of circumference of D1, D3 and D4
IV	Laceration	Disruption of > 75% of circumference of D2 Involving ampulla or common bile duct
V	Massive Vascular	disruption of pancreatico-duodenal complex Devascularisation of the duodenum

RESULTS

In the study period 29 patients with duodenal injuries were included. There were 26 (89.7%) male and 3 (10.3%) female. Most of the patients were young with mean age of 27.8 years range from 22-45. All patients suspected of intra-abdominal organ injuries, after resusitation underwent midline exploratory laparatomy. Peroperativly second part of duodenum was found to be the most commonly injured site, i.e. in 16 (55.17%) cases, followed by third part in 6 patients, fourth in 5 patients, and first part in 2 patients.

19 patients had Grade II injuries, 09 Grade III, and only 01 of Grade IV.

The most common operative procedure performed was primary repair .All penetrating injuries to duodenum were treated by debridement of duodenal margins, and single layer interrupted primary closure done with vicryl 2/0. Primary repair alone was done in 19 patients, 17 of grade II, and 02 of Grade III injury, while 2 cases of grade II and 05 of grade III injury had primary repair with gastrojejunostomy without pyloric exclusion,2 patients with grade III injury had pyloric exclusion in addition to primary repair with gastrojejunostomy. One patient of grade IV injury required tube duodenostomy in addition to primary repair, gastrojejunostomy and pyloric exclusion. Postoperatively the complications encountered were wound infection 13.8%, respiratory tract infections 17.24%, duodenal fistula 10.34% i.e. o3 patients, o1 of grade IV and 2 of grade III injuries respectively. The average post-operative hospital stay was noticed to be 11.2 days. The mortality in this study was noted to 31%, 9 out of 29 patients expired postoperatively.

Table 1: Site of Injury

Site of injury	Number of patients	Percentage
1st part of duodenum	2	(6.8%)
2nd part of duodenum	16	(55.2%)
3rd part of duodenum	6	(20.7%)
4th part of duodenum	5	(17.2%)

Table 2: Operative Procedure Performed

Procedure	Grade II	Grade III	Grade IV	Grade V	Total
Primary repair	17 (58.62%)	2 (6.89%)	-	-	19
Primary repair with gastrojejunostomy	2 (6.89%)	5 (17.24%)	-	-	7
Primary repair with gastrojejunostomy & pyloric exclusion	-	2 (6.89%)	-	-	2
Primary repair with gastrojejunostomy & tube duodenostomy	-	-	1 (3.45%)	-	1

Table 3: Postoperative Complications

Sr. No	Complications	% of Patients
1	Wound Infection	13.8%
2	Respiratory tract infection	17.24%
3	Duodenal Fistula	10.34%
4	Death	31.0%

Table 4: Delay in Surgical intervention and mortality

Sr. No	No. of Patients	Presentation Delay	Patients Expired	Percentage
1	2	> 7 Day	2	100%
2	7	1-7 Days	4	57%
3	20	< 24 Hrs	3	15%

DISCUSSION

The increase in road traffic accidents and use of firearms has increased the incidence of duodenal injuries. Management of duodenal injuries is quite challenging even in expert hands and failure to manage it properly can have devastating results. In contrast to penetrating injuries the duodenal injuries following blunt abdominal trauma are usually difficult to diagnose in the early post traumatic period, as large portion of duodenum is retroperitoneal, so sign and symptoms are often subtle and manifested only when severe pathophysiological derangements take place. This often leads to delay in surgical intervention, thus increasing morbidity and mortality.[8]The timing between injury and surgery is important as mortality rate increases from 11 to 40 % if time interval between injury and surgery is more than twenty four hours.[9] Thus early diagnosis, early surgical intervention and shorter operative time have better outcome.[10] keeping in mind the mechanism and site of injury physicians must have a high index of clinical suspicion of duodenal injuries.[11] Use of conventional and modern imaging like contrast enhanced CT scan, MRI are very helpful tools in diagnosis of duodenal injuries. Presence of retroperitoneal air outlining the right kidney, a partially obscured upper portion of the right psoas muscle, and lumbar spinal scoliosis to the left on plain x-ray abdomen are highly suggestive of duodenal injury.[12] CT scanning with intravenous contrast remains a valuable tool in the diagnosis of blunt duodenal injuries. Retroperitoneal extra luminal air seen on CT scan is an important sign for the duodenal perforation.[13,14] Historically, duodenal injuries were often treated aggressively with such technically complex procedures as duodenal diverticulization, which was first described by Donovan and Hagen in 1966 for higher-grade lesions. The surgical treatment of traumatic duodenal injuries remained controversial from decades and surgical options varied from simple primary repair to complex duodenal procedures including extensive resections. However recently laparoscopic primary repair has been claimed to have good result in stable patients.**[15].**Most of patients in our study were young male with mean age of 27.8 years, as in other studies on trauma.[16,17] The common cause of duodenal injury in our study was blunt abdominal trauma

predominantly due to road traffic accidents. This is in contrast with other studies carried out previously in which penetrating injuries are common cause.[18].It may be due to the fact that penetrating trauma being clear indication of exploration are operated in periphery, while in blunt trauma approach is mainly conservative. In addition due to lack of modern diagnostic facilities like C T scan, MRI diagnosis is delayed and when condition of patient deteriorates is referred to tertiary care hospital. In this study, the most common segment of duodenum injured was second part, and most injuries were grade II injuries. This is in accordance to other studies [19].
Primary repair was the most common surgical procedure performed. It has been reported to be successful in 75-85% cases. In our study primary repair was performed in 19 patients out of which 17 were having grade II and 02 grade III injuries. Primary repair with gastrojejunostomy was done in 07 patients, 02 of grade IIand 05 of grade III injuries. Primary repair with gastrojejunostomy and pyloric exclusion in 02 patients of grade III injuries and tube duodenostomy in addition to all this was done in 01patient of grade IV injury. Primary repair was the commonest procedure performed and only 3patients 02 of grade III and 01 of grade IV (10.34%) out of 29 patients developed duodenal fistula , giving a success rate of 89.66%.This is comparable to a multi central trial study of Cogbill et al which claims tube duodenostomy to be unnecessary and ineffective in preventing postoperative procedure related complications [20]. In our study the overall morbidity was found to be 41.38%, consistent reported by cogbill et al. and Park OH et al. ranging between 12-50% of which duodenal-procedure related morbidity was10.34% only.[7,20]. This is within the range of duodenal fistulas rates reported in literature ranging between 0-16.2%.The mortality rate in our study was 31%. This is in upper limit of the range reported in literature by cogbill et al. 20, ranging from 10-30% and can be attributed to delayed hospitalization, perioperative sepsis and organ failure, and not particularly procedure related.

CONCLUSION

Early surgical intervention, primary repair, and primary repair with or without gastric diversion has better outcome with low rate of morbidity and mortality. For early diagnosis high index of suspicion, use of conventional and contrast enhanced CT (CECT) is the diagnostic test of choice in stable patients with blunt abdominal trauma.

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