

Surgical Care for Duodenal Injuries

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A study of 50 consecutive cases of duodenal injuries managed in the surgical unit of Mayo Hospital, Lahore in the year 1994-1997 is presented. Ninety percent of patients were received, resuscitated and operated within 24 hours of injury. Penetrating injuries 38(76%) outnumbered the patients with blunt abdominal trauma 12(24%). Forty three patients (86%) had grade I, II and III duodenal injuries according to organ injury scale. Primary duodenal repair (68%), primary repair with gastrojejunostomy(10%), primary repair with jejunal serosal patch (8%), pyloric exclusion (4%), resection and primary anastomosis (6%), duodenal dirverticulization (2%) and emergency whipple procedure. (2%) were the procedures carried out. The determinants of duodenal injury severity were mode of injury, duodenal site, injury repair interval and adjacent injuries. Morbidity in this series was 70% and mortality 14%

Key words: Duodenal injuries, organ injury scale, penetrating abdominal injuries.

Duodenal injuries can present a confusing picture for the surgeon and pose a diagnostic and therapeutic challenge. The mortality is high between 25%-55% and is due to delay in the diagnosis and other serious associated injuries^{1,2}. A uniform approach to the surgical exposure of all suspected pancreatic and duodenal injuries will decrease their morbidity and mortality by identifying all injuries. Proper intraoperative assessment and grading will help with procedure selection from the broad surgical armamentarium available to manage these injuries.

Material and Methods

During the study period all the patients with duodenal injuries admitted in surgical unit of Mayo Hospital Lahore were included. The patients were assessed clinically. The CT scan and contrast duodenography were not done because these facilities were not available. Complete blood examination, urinalysis, blood sugar, blood urea, serum creatinine, serum amylase, X-ray chest and X-ray abdomen were done in all cases.

The decision of laparotomy was based on the site of stab wound, wound of entry and exit in case of firearm injury, mechanism of blunt abdominal trauma and physical examination suggesting peritonitis. In patients with blunt abdominal trauma one should be more careful because clinical features are camouflaged due to retroperitoneal position of the duodenum.

Peri-operative antibiotic cover with third generation Cephalosporin and metronidazole was given to all the patients. The extent of the injury was graded according to the guidelines of American society of Trauma, as presented in surgical clinics of North America. Complete record of postoperative clinical course was kept. Postoperative complications identified and managed accordingly.

Results

We collected 50 cases in the last 4 years. Forty-two were males and eight females. Age of the patients range from 15-60 years. Ninety percent were received, resuscitated and operated within 24 hours of injury. Ten percent were referred to us from other cities and reached us from 24-72 hours.

Most of the patients had grade I, II or III duodenal injuries according to OIS as shown in Table No I.

Table I: Details of injury

Duodenal Injury (OIS)	n=	%age
I	8	16%
II	17	34%
III	18	36%
IV	5	10%
V	2	4%
TOTAL	50	100%

Seventy six percent of patients had penetrating trauma and 24% presented with blunt abdominal trauma as shown in fig 1. Three of them were due to "tonga" bamboo hitting the epigastrium and right hypochondrium. The various procedures performed for duodenal injuries are shown in Table No.II.



■ Blunt trauma ■ Penetrating trauma

Table No. II: Various Procedures For Duodenal Injuries

Procedure	n=	%age
Primary repair alone	34	68%
Primary repair with gastrojejunostomy	5	10%
Primary repair with jejunal serosal patch	4	8%
Duodenal resection and primary anastomosis	3	6%
Primary repair + Pyloric exclusion + gastrojejunostomy	2	4%
Diverticulization	1	2%
Pancreaticoduodenectomy, Roux en Y cholechojejunostomy, gastrojejunostomy, ligation of pancreatic duct	1	2%

In 22 (44%) patients with grade I, II and III injuries and who presented within 6 hours of injury the postoperative course was uneventful and mean hospital stay was seven

days. Remaining twenty eight (56%) patients had one or more complications listed in table III with mean hospital stay of 18 days. Twenty-one (42%) patients had second operation for the management of postoperative complications as shown in Table No. IV.

Table III: Post Operative Complications

Complications	n=	%age
Wound infection	15	30
Wound dehiscence	5	10
Duodenal fistulae	5	10
Pancreatic fistula	3	6
Interloop abscess	4	8
Subphrenic abscess	5	10
Malena	3	6
Mortality	7	14

Table IV: Second Operations to Treat postoperative Abdominal Complications

Drainage of subphrenic abscess	3
Drainage of interloop abscess	3
Closure of wound dehiscence	5
Secondary closure of wound	10

We had seven mortalities. One patient died on the table due to exsanguination from associated hepatic trauma. Rest six died of septicaemia due to a delayed referral from other hospitals or due to multiple organ failure associated with shock at presentation. The determinants of duodenal injury severity are given in Table No. V.

Table V: Determinants of Duodenal Injury Severity

Determinants of injury severity	Mild	Severe
Agent	Stab	Blunt / missile
Duodenal site	3,4	1,2
Injury repair interval	<24	>24
Adjacent injury	No CBD/Pancreatic	CBD/Pancreatic injury

Discussion

Duodenal injuries are relatively uncommon. Because the posterior aspect of the duodenum and the whole of the pancreas is retro peritoneal, the signs of closed injury may be few and delayed¹.

The important point to remember when there has clearly been a severe blow on the epigastrium is that the earlier pancreaticoduodenal injuries can be treated the better, because both cause leakage of active enzymes, and risks of traumatic pancreatitis as a cause of secondary haemorrhage and fistula are considerable. Suspicion, and readiness to explore the abdomen when in doubt are the basis of early diagnosis of closed injuries³.

Once the decision to perform laparotomy has been taken, it is still necessary to take specific steps to visualize the duodenum particularly the 3rd and 4th part.

Approximately three fourth of duodenal injuries resulted from penetrating trauma and one fourth from blunt injuries in our study. This finding is in accordance with the observation of some authors^{4,5,6} but is different from others⁷. This probably is due to increased incidence of civilian violence as compared to accidents in our society. An interesting finding noted in our study was

that out of 12 cases of blunt abdominal trauma, 3 cases were due to "Tonga bamboo" hitting directly into the right upper quadrant.

We found that duodenal injury grades as described in surgical clinics of North America⁸ correlate fairly well with the management and outcome of the duodenal injuries.

Most of the patients had Grade I (16%), Grade II (34%) and Grade III (36%) injuries according to organ injury scale described in surgical clinics of North America⁸. According to this classification system, approximately 75% to 80% duodenal wounds can be primarily repaired safely⁹. Approximately 20% to 25% are severe injuries of Grade IV or V, that require more complex procedures. Debridement or segmental resection and primary anastomosis may be attempted in all but the second portion of the duodenum for wounds that involve the near total circumference. In present study in four cases we performed resection and anastomosis. An alternative is Roux-en-Y jejunal limb anastomosis to the duodenal injury. Pancreatico-duodenoectomy is rarely required for duodenal injuries unless uncontrollable pancreatic haemorrhage or combined duodenal, ampullary or intrapancreatic bile duct injuries are present. In our series there was a single pancreaticoduodenectomy for shot gun injuries to duodenum and head of pancreas.

Protection of a tenuous duodenal repair may be aided by the diversion of gastric contents and it can be performed by accomplishing pyloric exclusion or duodenal diverticulization. We performed pyloric exclusion and gastrojejunostomy in two cases and the results were excellent. This was accomplished by a Vaughn pyloric exclusion¹⁰ and gastrojejunostomy. The more complete and anatomically disruptive duodenal diverticulization advocated by Berne¹¹ was performed in one case and it resulted in duodenal fistula.

An alternative to gastric diversion is either lateral tube duodenostomy or duodenal drainage via a retrograde jejunostomy. We did not perform this procedure. Complications are frequent following repair of duodenal injuries. Complications to be anticipated are retroperitoneal cellulites or abscess, peritonitis, intra abdominal abscess, external duodenal fistula^{9,10,11}, duodenal obstruction, pancreatitis, pseudopancreatic cyst, prolonged paralytic ileus and wound dehiscence. In our series the wound infection was the main complication 30%, followed by wound dehiscence 10%, duodenal fistula 10%, subphrenic abscess 10%, interloop abscess 8%, pancreatic fistula and malena 6%.

In our series most patients had associated injuries to head, chest and other abdominal organs that contributed a lot towards morbidity and mortality of the patients. In our study the mortality rate was 14%. Exsanguination and multiple organ failure were the major factors for this high percentage of mortality.

Nutritional support whether by total parental hyperalimentation or through feeding jejunostomy has reduced the morbidity and mortality during the last two and half decades¹² of the patients with severe duodenal and combined duodenopancreatic injuries. Nutritional support where indicated in our study was provided in the form of parenteral hyperalimentation.

Conclusion

We found in our series in accordance with other published reports on duodenal trauma that both morbidity and mortality have a linear correlation with mechanism of injury, grade of the injury, duodenal site, associated injuries, time of presentation and expertise available. Both morbidity and mortality can be reduced by having early diagnosis, swift means of transportation of such patients to centres of excellence and ban on firearms.

References

1. G. Tom Shires, Erwin R Thal, Ronald C Jones, G Town Shires III: Trauma, Principles of Surgery, sixth edition, New York 1994. 1999.
2. Davir K Jr. The injured duodenum, J-Natl Med Assoc 1992; 84(2): 177-79
3. Mckenney MG, Nir I, Levi DM, Mactin L: Evaluation of minor penetrating duodenal injuries. Am Surg Nov 1996; 62: 952-5.
4. Cogbill TH, Moore EE, Feliciano DV et al: Conservative management of duodenal trauma: A multicentre perspective: J-Trauma 1990 1990; 30(12): 1469-75.
5. Lokhvitskii SV, Sadna Kasov AZH- Duodenal injuries Khirurgia Mosk: 1993;(11):45-50.
6. Degiannis E, Kyawcizy, Kowski D, Velmahos GC: Pyloric exclusion in severe penetrating injuries of the duodenum. Worl J Surg: 1993; 17(6): 751-4.
7. Verma GR, Wig JD: Khanna SLC; Bose SM: Management of duodenal trauma. Trop Gastroenterol: 1994::60(7):500-4.
8. Erneast E Moore, Thomas H Cogbill, Mark A Malanyene et al: Organ injuryyu sealing, surgicalclinics of North America 1995; Vol.75, No.2,: 293-303.
9. Guddington G, Rusnak CH, Lameron RD, Carter J: Management of duodenal injuries: Can J Surg 1990 33(1):41-4.
10. Fang JF, Chen RF, Lin BC: Controlled reopen suture technique for pyloric exclusion. J Trauma, 45: 593-6. 1998 Sept.
11. Tedoli M, Veraldi D, Interlanda G, Sfeorza F, Barbagiovari L, Veralid GF: Retroperitoneal rupture of duodenum. Our experience Niverva-Chor 1990; 45(21,22): 1393-7.
12. Kline G, Lucas CE, Ledgerwood AM, Sales JM: Duodenal organ injury severity and outcome. Am Surg 1994 60(7): 500-4.