Pancreatico-Duodenal Trauma in Children: Two-Year Experience at a Regional Referral Center and Tertiary Care Teaching Hospital

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INTRODUCTION

Pancreaticoduodenal injuries, though rare, pose a mighty challenge to the surgeon in both the diagnosis and management, more so in children, where the pathophysiological threshold is low. Mostly occurring in road traffic injuries sustained through motorcycle handlebars or penetrating abdominal traumas, they have high mortality due to complications such as systemic inflammatory response syndrome, sepsis, and multiple organ dysfunction syndrome and morbidity from complications such as pancreatic abscesses, pseudocysts, and pancreatic or enteric fistulae.[1,2] Added to this is the absence of any strong guidelines to guide and ensure standardized care in these children for the best outcome.[3] Unlike other solid organ injuries, the utility of nonoperative management has given mixed result in pancreatic trauma.[4-7] On the contrary, surgery in pancreaticoduodenal trauma could be challenging with respect to skill, timing, and organ preservation. We, here at a regional referral tertiary care teaching hospital, studied the incidence and management of pancreaticoduodenal injuries in abdominal trauma cases over 2 years with respect to diagnosis, treatment, and outcome.

Background: Pancreatico-Duodenal injuries, though rare, pose a mighty challenge to the surgeon in both diagnosis and treatment. More so in children, where the patho-physiologic threshold is low. Added to this is the absence of any strong guidelines to guide and ensure standardised care in these children for best outcome.

Materials and Methods: The trauma patients’ records in the emergency department, operation theatre, inpatient department, outpatient department (OPD) for the period of December 2016 to December 2018 in the institution were retrospectively reviewed, to find out the cases of pancreaticoduodenal trauma proven radiologically, biochemically and/or on laparotomy. Those cases then studied with respect to diagnosis, treatment and short term outcome.

Results: Of the 256 cases of abdominal trauma, suspected pancreatico duodenal (PD) trauma were in nine but on laparotomy actually eight of them had PD trauma. All were blunt abdominal traumas sustained in road traffic accidents. Of these one was combined pancreatico duodenal while three were pure pancreatic and four were pure duodenal. One had associated superior mesenteric vein trauma. All were managed operatively. There were no mortality, one fourth had major complications. Mean hospital stay was 22.25 days. Follow up period varied from six to 32 months.

Conclusion: Though PD traumas are rare but are potentially very morbid and may prove fatal. Proactive individualized management, multidisciplinary approach and good perioperative support can yield good results.

Keywords: Children, mesenteric vein injury, pancreaticoduodenal trauma

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Materials and Methods

The trauma patients’ records in the emergency department, operation theater, inpatient department, and outpatient department (OPD) for the period of December 2016–December 2018 in the institution were retrospectively reviewed. The cases that had abdominal trauma causing pancreaticoduodenal injury proven radiologically, biochemically, and/or on laparotomy during this period were included in this study. Hemodynamically stable and responders of blunt trauma cases underwent radiological evaluation in the form of ultrasonography abdomen/focused abdominal sonography for trauma primarily and contrast-enhanced computed tomography of the abdomen depending on time and availability and were managed on their grade of specific trauma. All patients of penetrating trauma and hemodynamically unstable or nonresponders underwent emergency laparotomy and damage control or definitive operation depending on the quantum of their injuries. A multidisciplinary approach was observed, and the specific specialists addressed the other associated traumas simultaneously (viz., orthopedic and neurosurgical). Postoperative early nutrition was initiated in the form of a jejunostomy feed or total parenteral nutrition. All patients were kept on regular follow-up at our OPD.

Results

Of the 256 cases of abdominal trauma, 242 were blunt and 14 were penetrating. Suspected pancreaticoduodenal (PD) trauma was in nine, but on laparotomy actually eight of them had PD trauma. All cases of PD trauma in our series were blunt abdominal traumas sustained in road traffic accidents. Of these cases, one was PD while three were pure pancreatic, and four were pure duodenal. Associated trauma was jejunal in four cases, colonic in one case, and superior mesenteric vein (SMV) in one case. Associated orthopedic, head and chest trauma was in two of these cases. An extradural hematoma in one case, and a fractured shaft humerus with fractured left 7th, 8th, and 9th rib with hemopneumothorax in the other. Major complications were considered to be the one that delayed the discharge of the patient. Superficial surgical site infection was not considered as a major complication in our series. Of the eight patients, one had a third part of duodenum (D3) transection, proximal jejunal transection, transverse colon devascularization along with SMV tear, and uncinate laceration. The patient had the SMV repaired, triple-tube decompression technique and primary duodenal repair, resection anastomosis for the colon, and primary repair of jejunal injury. The lacerated uncinate was left behind after hemostasis as it looked salvageable. Two patients had transection of the pancreatic body [Figure 1] and had the distal pancreatic segment drainage through a Roux loop of the jejunum [Figure 2] and proximal segmental closure with omental packing. Three patients had the second part of duodenum laceration. Two of them underwent a Billroth 2 gastrojejunostomy (GJ) with a primary duodenal repair, whereas one had pyloric

Figure 1: Pancreatic body transection

Figure 2: Distal segment drainage with a jejunal Roux loop

Figure 3: Third part of duodenum transection
exclusion done. One of the patients of GJ and duodenal repair developed a lateral duodenal fistula which was treated conservatively with parenteral nutrition, antibiotics, antiseretory drugs, and controlled drainage. One patient with an isolated D3 laceration [Figure 3] was treated by pyloric exclusion. One patient of generalized pancreatic edema and pancreatic ascites was intervened by multiple peritoneal and lesser sac drains. This patient had high output from her abdominal drains for a long time and slowly subsided with nutrition antiseretory drugs and antibiotics.

As we lack the facility of pediatric endoscopic retrograde cholangio pancreatography (ERCP) and pancreatic duct stenting at our facility, nothing else could be done for this patient. She recovered with time though her convalescence was interrupted by the Braden 2 pressure sore that was managed appropriately. In this series, 3.1% (8 of 256) of total abdominal traumas involved the pancreaticoduodenal complex. Among the PD traumas, six (75%) involved other associated intra-abdominal viscus injury. One (12.5%) had time-constrained life/bowel-threatening injury. Mean hospital stay was 22.25 days, with a minimum of 16 days and maximum of 48 days. Major complications occurred in 2 (25%) cases in the form of duodenal fistula and pancreatic fistula and both responded to conservative treatment. Follow-up period ranged from 6 to 32 months. In this series of PD trauma, we had no mortality.

**Discussion**

Overall pancreaticoduodenal injuries are rare traumas, occurring mostly in penetrating injuries. However, in children, most of these are blunt and occur due to upper abdominal injury during outdoor games or playtime accidents including handlebar injuries. Unless high degree of suspicion is there, these are difficult to diagnose when occur as isolated injuries. Ballard et al. report a 0.2% of pediatric duodenal injury among all blunt traumas. In our series, it was 1.9%. While the frequency of pediatric pancreatic trauma is around 3%–12% worldwide, it is about 1.5% in our series. Extravasation from the ductal system can cause acute fluid collection and sequelae. ERCP and pancreatic duct stenting can be done safely with good results in experienced hands. We have observed multidisciplinary trauma approach in all our cases. The preservation of distal segment as done in our cases is not practiced in the published studies from Dallas and Seattle. They performed distal pancreatectomies in transactions left of the spine, though long-term exocrine and endocrine status was not assessed in their studies. We prefer preserving the distal fragment by draining it through a roux loop of the jejunum if the fragment is found salvageable and the patient allowed a longer procedure as it contains higher percentage if islet cells. In our case of SMV injury, we could do a repair as we had the equipment and expertise. In a study by Asensio et al., it was concluded that patients with primary SMV repair had higher survival than those in whom SMV was ligated. The major complication of duodenal trauma repair is the breakdown of the anastomosis/repair.

A number of strategies have been thought of and applied; all of them aimed at diverting the physiological secretion away from the repair. This includes triple-tube ostomy, duodenal diverticulization, and pylor exclusion. In a study by Fraga et al., it was concluded that pyloric exclusion was more time-consuming, and hence as in trauma “less is better” a smaller procedure like primary repair may be considered. The current literature supports this view. We have performed both pyloric exclusion and primary duodenal repair and found minimal differences in short-term results. We have not faced any gall bladder and extrahepatic biliary radical injury although it has been shown to be as high as 54% in some studies. Provision of early postoperative nutrition in the form of jejunal tube feeding or else TPN is a well-established protocol, and we have done that in all our cases. In our series, 25% had major complications, whereas worldwide this approaches nearly 50%.

**Conclusion**

Although PD is a rare trauma, it is potentially very morbid and may prove fatal. Proactive, highly individualized management, multidisciplinary approach, and good perioperative support yield good results as seen in this series.

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**Conflicts of interest**

There are no conflicts of interest.

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