Pancreas is the fourth solid organ injured in blunt abdominal trauma. Isolated pancreatic injury is present in less than 1% of patients. As it is associated with high morbidity and mortality, management is controversial.

Isolated pancreatic trauma cases with pancreatic neck transection following blunt abdominal trauma were analyzed. All these patients were treated with immediate surgery involving lesser sac drainage and feeding jejunostomy only.

Authors conclude that lesser sac drainage can be used as an alternative to distal pancreatectomy or pancreaticojejunostomy or pancreaticogastrostomy.

Key words: pancreas, trauma, conservative surgery, transpapillary stenting

Pancreas is the fourth solid organ injured in blunt abdominal trauma (1). Reported incidence of blunt pancreatic injury is only 0.2% (2, 3) which is attributed to its retroperitoneal location. Complete transection at the neck of pancreas is even rarer and is usually missed initially if there is no other major intra-abdominal injury as initial abdominal signs are subtle. Therefore, it is associated with high morbidity (30-40%) and mortality (2-17%) (3, 4).

Management of pancreatic trauma which includes complete transection of parenchyma at the neck is controversial. It may vary from mere observation recommended by few to immediate exploration by others to prevent delay induced escalation in morbidity and mortality (5).

Aim of this study was to study the feasibility of pancreatic conservation surgery in pancreatic neck transection.

Patients of blunt abdominal trauma with pancreatic injury (complete pancreatic neck transection) who presented in the emergency department at PGIMER, Chandigarh from January 2013 to December 2013 were analysed. Demographic details, mechanism of trauma, serum and peritoneal fluid amylase, abdominal computed tomography (CT) scan, surgical record, hospital stay, postoperative outcome and follow up in outpatient clinic was analysed retrospectively.

Preoperative diagnosis was made by CT scan. These patients were treated with immediate surgery after initial stabilisation. Surgery involved midline laparotomy, peritoneal lavage, assessment of pancreatic injury, lesser sac drainage and feeding jejunostomy (FJ) only. Postoperative octreotide (Sandostatin 100 microgram subcutaneously, three times a day) was administered to all patients for 7 days. Feeding was stared from FJ once bowel movement started normally. Patients were allowed orally after 7th postoperative day.

Drain fluid amylase was monitored every other day. Drain tube was removed when the drain output was less than 50 ml with normal drain fluid amylase (less than 3 times of serum amylase) and no documented collection in the lesser sac on ultrasound (US) abdomen. If there was persistent output of amylase rich fluid from the drain for more than 2 weeks, patient was considered for endoscopic transpapillary pancreatic duct (PD) stenting.

Patients were followed up three monthly in outpatient clinic and they were assessed for
any existing pancreatic exocrine or endocrine insufficiency. Radiologically they were assessed by US abdomen every 3 months to look for any collection in the lesser sac and dilatation of PD in the body and tail. CT scan was done when there was any documented collection on US abdomen and at 6 months to look for the status of distal pancreas.

RESULTS

There were a total of four patients with CT documented pancreatic neck transection. All were male with age range of 18-28 years. Two of these sustained blunt abdominal trauma in a road traffic accident, third patient had fall from height of 12 ft. and fourth patient fell down on a wooden log while running. There was a delay in presentation of about 24-72 hours between sustaining injury and presentation to the index hospital. All these patients were hemodynamically stable with pulse rate of 100-120/mt and respiratory rate of 24-32/mt. On per abdominal examination, there was generalised distension, guarding and rigidity. One of these patients also had associated blunt chest trauma. Patient who sustained injury following fall from height also had fracture left temporal bone and D9 fracture with anterior wedge compression but without any neurological deficit. Serum amylase was within normal range in all these patients. Peritoneal fluid amylase was raised ranging from 833 to 2453 SU. CT scan of all four patients showed hemoperitoneum with hematoma at the neck region of pancreas, saponification in the peripancreatic region and also at the root of mesentery. In one patient superior mesenteric vein was also exposed with complete disruption at pancreatic neck.

Postoperatively drain output was about 200-400 ml amylase rich fluid initially for all these patients. In two patients it decreased subsequently over a period of 2 weeks and drain was removed thereafter. One of these patient developed lesser sac collection on follow up after 8 weeks (fig. 2). This was drained endoscopically into the stomach. Remaining two patients developed persistent pancreatic fistula (PF) and required PD stenting. Their lesser sac drain was removed after 10-12 days of PD stenting. PD stent could not be placed across the disruption (fig. 3, 4). Hospital stay was between 2-4 weeks.

At laparotomy, all these patients had hemoperitoneum, haemorrhagic fluid collection in lesser sac with hematoma at the neck region of pancreas, saponification in the peripancreatic region and also at the root of mesentery.

Fig. 1. CECT abdomen (axial image) showing complete transection at the neck of pancreas (arrow)

Fig. 2. CECT abdomen (axial image) showing lesser sac collection (arrow) after 8 weeks of trauma

Fig. 3. Endoscopic retrograde pancreatography reveals leakage of contrast at the level of transection (arrow)
None of the patients’ required a second surgery. There was no mortality and all patients were doing well on follow up (8-26 months) without exocrine and endocrine pancreatic insufficiency. In two patients where PD stenting was done, follow up CT scan showed dilated PD in the body and tail region with atrophy of pancreas. Patient who developed lesser sac collection did not develop atrophy of distal pancreas. Fourth patient who did not require PD stenting also developed silent atrophy of body and tail of pancreas (fig. 5). Three patients where there was distal atrophy of pancreas, there was no loss of body weight but there was gain in body weight of 6-10 kg over 10 months after surgery indicating that there was no pancreatic exocrine insufficiency.

DISCUSSION

Pancreatic neck transection secondary to blunt trauma is infrequent. It is a potentially morbid injury as it is invariably associated with pancreatic duct disruption. If pancreatic duct disruption is not dealt with immediately it may lead to necrotising pancreatitis, or pseudocyst / fistula formation (6). It also increases the risk of secondary infections, massive bleeding and increase in the duration of hospital stay (6). Therefore timely detection and appropriate management is a key for good outcome.

Management of this type of pancreatic injury is a challenge. As both non-surgical minimally invasive treatment and surgical intervention can result in grave postoperative complications, therefore choice between these two must be unbiased and objective. Aim of treatment should be to preserve the normal pancreas along with its exocrine and endocrine functions and also to decrease the morbidity and mortality associated with pancreatic surgery. There is a range of surgical procedures which are described to deal with such type of pancreatic trauma. Choice of surgical procedure depends upon the general condition of the patient, hemodynamic stability, technical expertise and in-house availability of perioperative management services. Pancreatecoduodenectomy is recommended only if there is severe disruption of pancreatic head as this is a very major surgery with inherent high morbidity and mortality especially if performed in trauma setting (7). Few have also described primary repair of pancreas and PD (8). This is technically challenging and may not be appropriate and possible in all patients.

There are other surgical procedures which are more viable treatment options for pancreatic neck transection like parenchymal preserving surgeries which includes pancreaticojejunostomy (PJ) (9) or pancreaticogastrostomy (PG) (10). These procedures are not always feasible in trauma settings because of both patient and surgeon factors. These procedures are also associated with postoperative PF or intra-abdominal collections secondary to anastomotic leak and other complications associated with leak. Traditional approach for pancreatic neck transection is distal pancreatectomy with or without splenectomy (11, 12). This leads to sacrifice of normal pancreas which in long-term may be associated with exocrine insufficiency. If it is combined with splenectomy, it can be performed quickly but it is associated
with post-splenectomy infectious complications. If distal pancreatectomy is performed without splenectomy, it is technically demanding, more time consuming in emergency sitting and also associated with more blood loss, but it is associated with lower postoperative complication rate (22.2%) (13, 14).

Non-operative management has been suggested by Keller et al. (14) in 80% of grade I and grade II pancreatic injuries but it was successful only in 48% of grade III pancreatic injuries. They suggested that any deterioration of clinical state of the patient warrants an exploratory laparotomy. Non-surgical conservative treatment for grade III pancreatic injury includes US / CT guided drainage of intra-abdominal collection(s) and endoscopic transpapillary PD stenting (15, 16, 17). There is also case report where initial conservative management was followed by surgical intervention after stabilisation of other solid organ injuries (5).

In this study we have performed combined surgical and non-surgical approach. Peritoneal lavage has prevented development of any intra-abdominal collection / abscess which may occur in purely non-surgical approach due to undrained hemoperitoneum. Drainage of lesser sac has allowed the fistula to be lateralised and persistence of fistula was managed with PD stenting. FJ provided an early establishment of nutrition. Even though three patients developed sterile atrophy of distal pancreas but none of these patients developed exocrine insufficiency. Distal pancreatectomy is the easiest and most commonly performed procedure but it does require surgical expertise and hemodynamically stability of patient. If splenectomy is combined with distal pancreatectomy, it is also associated with post-splenectomy infectious complications. Procedure in this study is equivalent to distal pancreatectomy but without its associated morbidity. This approach is also easy to perform as it does not require technical expertise for pancreatic surgery. It can also be performed quickly, it also avoids the duration of anaesthesia and transfusion of blood products in a patient. Feeding line provides early achievement of enteral nutrition. Therefore, we recommend combined approach for pancreatic neck transection in selected patients.

CONCLUSION

Combined surgical and non-surgical approach can be used as an alternative to distal pancreatectomy or pancreatic preservative surgery in selected patients. Endoscopic transpapillary stenting is an effective and safe procedure for proximal duct injuries in patients with persistent PF. Choice of treatment must be unbiased and objective keeping in view the morbidity and mortality associated with available surgical procedures.

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