Operative Strategies in Pancreatic Trauma

N AHMAD K J ABID A Z KHAN *S T A SHAH.*
Department of surgery, Mayo Hospital, Lahore.
Correspondence to: Dr Nazir Ahmad Senior Registrar, Surgery.

A prospective study consisting of 16 patients was carried out in West Surgical Ward Mayo Hospital, Lahore from January 2001 to December 2002. All the patients having pancreatic injury alone or associated with other organ injuries detected on exploratory laparotomy were included in the study. There were 15(93.75%) males and only one (6.25%) female patient in the study. Cause of injury in 11(68.75%) patients was firearm, in three (18.75%) patients it was blunt trauma and stab in 2(12.50) patients. Four (25%) patients had grade III injury and five (31.25%) patients had grade V pancreatic injury. Distal pancreatectomy with splenectomy was done in seven (43.75%) and Whipple's operation in six (37.50%) patients. Post-operative complications observed in the series were pancreatic fistula in two (12.50%), intra-abdominal abscess in two (12.50%), peri-pancreatic abscess in one (6.25%) and acute pancreatitis in one (6.25%) patient. There were four deaths in the series.
Key words: pancreatic trauma, distal pancreatectomy, Whipple's operation, pancreatic fistula.

Improvement in transport of the trauma patient, the in-transit resuscitation efforts, the knowledge regarding the physiologic alterations subsequent to trauma and the means of returning such abnormalities toward normal by appropriate fluids and drugs have prolonged the survival of such individuals so they now represent a significant challenge to any trauma surgeon.

Pancreatic injuries are uncommon accounting for 1-12% of the abdominal trauma[1,2]. Two third of these injuries are penetrating in nature and associated with retroperitoneal vascular damage in 50% of the cases[3]. The incidence of associated organ injuries is very high with the figures of 50-98% and these injuries play a significant role in the mortality that ranges from 10-25%[4].

Basic principles for the management of pancreatic trauma are:

- Control of haemorrhage and associated organ injuries.
- Proper identification of degree and location of pancreatic injury.
- Judicious resection and debridement.
- Control of pancreatic secretions by drainage

The aims and objectives of the study were to apply the appropriate surgical procedures according to the injury severity and early detection of post-operative complications along with their management.

Patients and methods

The prospective study was conducted over a period of two years from January 2001 to December 2002 in West Surgical Ward, Mayo Hospital, Lahore. All the patients above 12 year of age were included in the study who were admitted through Accident and Emergency Department (caters patients above 12 year of age) with abdominal trauma in whom pancreatic injury was found per-operatively either alone or in association with other organ injuries. Antibiotics, Tetanus toxoid and analgesics were given to all patients and kept nil by mouth for 4-6 days post-operatively. Post-operative complications were noted and treated accordingly. Hospital stay ranged from 1-27 days with the mean of 9.44 days.

Results

Sixteen patients were included in the study over a period of two years. Pancreatic injury alone or in combination with other organ injuries was detected in all patients on exploration. In the series males were 15(93.75%) and only one (6.25%) patient was female. Age ranged from 13-50 years with the mean of 27.69. Cause of injury in 11(68.75%) patients was firearm and in 3(18.75%) was blunt trauma (Table 1).

Table 1: Cause/Mechanism of injury.

Cause	n=	%age
Firearm	11	68.75
Blunt trauma	3	18.75
Stab	2	12.50

Injury severity was graded according to the Moore EE et al[5] and the grading of the American Association for the Surgery of Trauma (Table 2).

In current series 15(93.75%) patients were found to have associated organ injuries which included diaphragm, stomach, duodenum, small intestine, colon, spleen, liver, inferior vena cava, portal vein, kidney and fracture of radius and ulna and only one (6.25%) patient had pancreatic injury alone.

Table 2: Grades of Pancreatic injury (According to the Moore EE organ injury scale).

Grade of injury	n=	%age
I	2	12.50
II	3	18.75
III	4	25
IV	2	12.50
V	5	31.25

After grading the pancreatic injury according to the severity, various operative procedures were performed. External drainage in 3(18.75%) and Whipple's operation was performed in 6(37.50%) patients (Table 3).

Table 3: Operative procedures performed.

Procedure	N=	%age
External drainage only	3	18.75
Distal pancreatectomy with splenectomy + (duodenorraphy in one patient)	7	43.75
Whipple's operation	6	37.50

Mortality recorded in the series was 25%. High mortality was due to exsanguination because of associated major abdominal vascular injuries, irreversible shock and multiple organ failure.

Discussion

Successful surgical management depends on precise delineation of the extent of injury. Minor pancreatic injuries grade I-II involves only parenchyma of the pancreas without ductal violation and can be definitely managed by the use of external drainage. Complex pancreatic injuries grade III-V or pancreatico-duodenal injuries are especially challenging even to the experienced trauma surgeon.

There is marked preponderance of young men among those with pancreatic injury. In the study 93.75% patients were male and 6.25% patients were female. Regarding age 87.50% patients were below the age of 40.This is in comparison with the study conducted by Levison MA et al[6] in which 83% of injuries involved male and 78% patients were in the age group less than 40 years.

Damage to the pancreas is caused by either penetrating or blunt trauma. In the present series cause of injury in 68.75% patients was firearm, in 18.75% patients blunt trauma and in 12.50% patients was stab which is comparable to the study carried out by Farrell RJ et al[7] where they observed firearm in 33.33%, stab in 41.18% and blunt trauma in 25.49% patients.

Grade I injuries: We treated 2 patients having grade I injury by external drainage with no post-operative complications that resembles with the study conducted by Wynn M et al[8] where they treated their 14 patients with grade I injury by external drainage with no morbidity and mortality.

Grade II injuries: In current series 3 patients had grade II injuries. One of them was a referral case that developed pancreatic fistula after grade II penetrating injury. Distal pancreatectomy with splenectomy was done in 2 patients and external drainage in 1 patient with one on-table death. One patient developed acute pancreatitis that was managed conservatively. In contrast, Sorensen VJ et al[9] used resection in 17 patients for grade II injuries, 10 of whom suffered a total of 24 complications. One patient managed by external drainage with no complication.

Grade III injuries: In present study 4 patients had grade III injuries on exploration. Distal pancreatectomy with splenectomy was done in all patients with no mortality. One patient developed intra-abdominal collection, which was drained under Ultrasound guidance. He later on developed peri-pancreatic abscess that was drained externally by re-exploration.. This is in comparison with the study conducted by Smego DR et al[10] who reported 14 patients with grade III injuries. Resection was performed in all patients and 4 patients developed pancreatic fistula with one intra-abdominal abscess and one mortality.

Grade IV injuries: In current series 2 patients who had grade IV injuries, Whipple's operation was performed in one patient and other patient underwent duodenorraphy and distal pancreatectomy with splenectomy with no mortality. This is in comparison with the series reported by Cogbill TH et al[11], who used pyloric exclusion with gastro-jejunostomy for pancreatico-duodenal grade IV injuries in their 8 patients with pancreatic fistula in 2 patients and one mortality.

Grade V injuries: In the study 5 patients had grade V injuries on exploration. Whipple's operation was carried out in all patients. Two patients exsanguinated in the operation theatre and third one died on 4th post-operative day due to multiple organ failure. Other two patients who developed pancreatic fistula were managed conservatively. One patient developed wound infection and respiratory tract infection. He was managed conservatively and the other patient had intra-abdominal collection aspirated under Ultrasound guidance. This is in

contrast to the study conducted by Gentilello M et al[12]. In 13 patients pancreatico- duodenectomy was done and pancreatic duct was ligated instead of pancreatico-jejunostomy. Mortality was 54%, pancreatic fistula and malabsorption were observed in 50% of the cases.

Pancreatic fistula and peri-pancreatic abscess are the major post-operative complications in pancreatic injuries. In present series pancreatic fistula was observed in 12.50% patients who were managed conservatively which resembles with the study conducted by Vaughan CD et al[13] where they observed pancreatic fistula in 12% of cases in a series of 75 cases. In current series, 6.25% patients developed peri-pancreatic abscess which was drained externally by re-exploration and 12.50% patients who had intra-abdominal abscess were drained under Ultrasound guidance. This is in comparison with the study conducted by Feliciano DV et al[14], who observed intra-abdominal abscess in 17% of their patients and all required per-cutaneous drainage or re-exploration. Acute pancreatitis was observed in 6.25% patients in the study and managed conservatively. This is comparable to the study conducted by Moore JB et al[15], who observed acute pancreatitis in 18.75% patients. In all these patients it resolved on conservative management..

Mortality in present study was 25%. Two were on table deaths due to exsanguination and other two deaths were due to multiple organ failure and associated organ injuries especially major abdominal vascular injuries. Current series is in comparison with the study conducted by Jones RC[3], where he recorded 19-22% deaths in penetrating and blunt pancreatic injuries.

Although the pancreatic trauma is rare but due to retroperitoneal location of the organ pre-operative diagnosis of the injury is very difficult and is a confronting challenge. Exploration is the mainstay for diagnosis of pancreatic injuries. The pancreas is best approached through the lesser sac and kocherization of duodenum will allow the examination of pancreatic head and retroperitoneal areas of the duodenum along with major abdominal vessels. Pancreatic injuries can be managed by simple external drainage or pancreatic resection with good results and while dealing with complex pancreatic injuries strict adherence to the basic principles of dealing with pancreatic trauma can help to reduce the complications for these complex injuries. All the associated organ injuries should be managed according to their own priority and protocol. Earlier presentation, per-operative detection of injury, simple and accurate procedure according to severity, easy availability of blood, intensive care, early detection of post-operative complications with their accurate management may reduce both the morbidity and mortality.

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