

## Original Article

# Management and Outcome of Patients with Pancreatic Trauma

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### ABSTRACT

**Introduction:** Pancreatic trauma is a rare entity occurring in 0.2% of patients with blunt trauma abdomen. Once the diagnosis is made, the management of patients is dependent on multiple variables. Conservative management, suture repair, drainage, and resection have been utilized with varying degree of success. This study is aimed to evaluate the management of patients with pancreatic trauma.

**Materials and Methods:** This was a prospective study done in the Department of Surgery in Dayanand Medical College and Hospital where forty hemodynamically stable patients diagnosed to have pancreatic trauma on contrast-enhanced computed tomography abdomen were included in the study. **Results:** Out of forty patients taken in this study, 38 were male and two were female with age ranging from 3 to 50 years. Road traffic accident was the most common cause of pancreatic injury. Pancreatic injuries were graded according to the American Association for Surgery in Trauma scale. Twelve patients had Grade I and II injuries. Grade III was the most common injury occurring in 14 patients. Twenty-four patients underwent surgical management. Mortality rate was 45% and it was in direct correlation with the severity of injury. **Conclusion:** Grade I and II pancreatic injury can be managed conservatively depending upon the hemodynamic status of the patient. Grade III and IV injuries have a better prognosis if managed surgically.

**KEYWORDS:** American Association for Surgery in Trauma pancreatic injury, blunt trauma abdomen, pancreatic trauma

## INTRODUCTION

Pancreatic injury in trauma abdomen is rare due to its retroperitoneal location. Pancreatic injury occurs in 0.2% of patients with blunt trauma abdomen.<sup>[1]</sup> The incidence is higher in penetrating injuries, ranging from 1% to 12% in published series.<sup>[1,2]</sup>

The mortality directly attributed to pancreatic injury ranges from 2% to 17%.<sup>[3]</sup> Morbidity rates due to pancreatic trauma approach up to 45%.<sup>[2-6]</sup> In cases of delayed treatment, this may increase to 60%.<sup>[4-6]</sup>

Delay of 6–12 h in the diagnosis and treatment of pancreatic trauma is found to increase morbidity and mortality. Main pancreatic duct injury leads to a poor outcome.<sup>[4]</sup> Recognition of major ductal injury early in the course is paramount to decrease morbidity of these patients.

Pancreatic injuries are diagnosed mostly on exploratory laparotomy which is done for hemodynamic instability as

a result of other intra-abdominal injuries. A stable patient without clinical findings after abdominal trauma but with potential for pancreatic injury affords the greatest diagnostic challenge.<sup>[7]</sup>

The timely diagnosis of pancreatic injury has been challenging. Being a retroperitoneal organ, physical examination findings of abdominal pain and peritonitis are not reliable. This can be particularly challenging in multisystem trauma patients with altered levels of consciousness or distracting injuries.

Ultrasound may show localized traumatic enlargement of the pancreas or diffuse edema simulating inflammatory pancreatitis.

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Early computed tomography (CT) findings in traumatic pancreatitis are unremarkable from pancreatitis of other causes. Easy availability and increased sensitivity of contrast-enhanced CT (CECT) have made the diagnostic modality of choice in diagnosing pancreatic trauma.

Pancreatic ductal laceration may be difficult to detect on either CT or ultrasound, endoscopic retrograde cholangiopancreatography or magnetic resonance cholangiopancreatography may be required to precisely demonstrate the status of the pancreatic duct. Grading of pancreatic injury is done according to the American Association for Surgery in Trauma (AAST).<sup>[8]</sup>

Once the diagnosis has been made, the optimal management of pancreatic injury is also not well established. Nonoperative management, suture and repair, nondrainage or drainage of injury with or without sumps have all been utilized with varying degrees of success.

Distinct laceration of the pancreatic parenchyma may require resection of that part and anastomosis of the pancreatic resection line to a Roux-en-y loop. A pancreatoduodenectomy may sometimes be required if the injury is proximal in the head of the pancreas.

Thus, early diagnosis and adequate treatment of pancreatic trauma are of utmost importance in determining the morbidity and mortality of the patients with traumatic pancreatic injury.

## MATERIALS AND METHODS

This was a prospective study conducted in Dayanand Medical College and Hospital, Ludhiana, which is a tertiary care institute of North India after obtaining the Institutional Review Board approval. Forty patients with pancreatic trauma diagnosed on CT who came to the Department of Surgical Emergency were included in this study.

The patients who were hemodynamically unstable were excluded from the study. Grading of pancreatic trauma was done according to the AAST system of grading. Management modalities and outcome of patients were recorded.

## RESULTS

This study was done on forty consecutive patients of pancreatic trauma diagnosed on CECT abdomen who were admitted through emergency department of Dayanand Medical College and Hospital, Ludhiana.

Following observations were made:

- Etiology - The most common cause of pancreatic trauma was road traffic accident followed by fall from height and assault

- Age and sex - Majority of the patients were males in the age group of 20–50 years
- Serum amylase level - Raised serum amylase levels were seen in 36 patients on admission
- Serum lipase levels - Serum lipase levels were raised in 38 patients on admission
- Eight patients were admitted within 6 h of injury - none of the patients in this category had raised serum amylase levels while only two patients in this group had raised serum lipase levels. Thirty-two patients were admitted after 6 h of trauma. All of these patients had increased serum amylase and lipase levels
- Intra-abdominal organ injured - In this study, most common organ injured along with pancreas was liver, seen in 16 (40%) patients. This was followed by spleen seen in 14 (35%) patients. Gut was injured along with pancreas in 6 (15%) patients while kidneys and diaphragm were injured in 4 (10%) patients each. Three organs were injured in eight patients, most common being liver, pancreas, and spleen (four patients). Ninety percent of the patients had some associated organ injury along with pancreas. Pancreatic injury as an isolated injury occurred in only 4 (10%) patients
- Grading of pancreatic injury - Six patients (15%) had Grade I injury. Another six patients (15%) had Grade II injury. Fourteen patients (35%) had Grade III injury while 12 patients (30%) had

**Table 1: Distribution of patients according to pancreatic injury grade**

Grade	Number of patients	Percentage
Grade I	6	15.0
Grade II	6	15.0
Grade III	14	35.0
Grade IV	12	30.0
Grade V	2	5.0
Total	40	100.0

**Table 2: Distribution of patients according to modality of treatment**

Treatment modality	Number of patients	Percentage
Conservative management	16	40.0
Surgical management	24	60.0
Peritoneal drainage	10	25.0
Suturing of bleeding vessel	2	5.0
Distal pancreatectomy and splenectomy	8	20.0
Whipples procedure	2	5.0
Sphincterotomy and stenting	2	5.0

**Table 3: Distribution of patients according to grade of pancreatic injury and treatment modality**

Grade of injury	Total number of patients	Number of patients expired (%)	Patients undergoing surgical management	Percentage of patients undergoing surgery	Percentage mortality in operated patients
Grade I	6	0	2	33.33	0
Grade II	6	2 (33.33)	4	66.66	50
Grade III	14	8 (57.10)	10	71.42	80
Grade IV	12	6 (50.00)	6	50.00	100
Grade V	2	2 (100)	2	100.00	100
Total	40	18 (45.00)	24	60.00	

Grade IV injury. Two patients (5%) had Grade V injury [Table 1]

- Type of management - Out of forty patients in this study, 16 patients (40%) were managed conservatively. Twenty-four (60%) patients underwent surgical management. Eight patients (20%) underwent distal pancreatectomy and splenectomy. Peritoneal drainage was done in ten patients (25%). Suturing of the bleeding vessel, pancreaticoduodenectomy, and sphincterotomy with stenting were done in two patient (5%) each [Table 2]
- Treatment modality and grading of pancreatic injuries - Out of three Grade I injury patients, two were operated. Four out of six Grade II injury patients were managed surgically. 71.42% of the Grade III patients were managed surgically while 6 out of 12 Grade IV patients were operated. All Grade V patients were operated [Table 3]
- Mortality of patients - Out of forty patients, 18 patients (45%) expired. Out of six Grade I injury patients, no patient expired. Two out of 6 (33.33%) Grade II injury patients expired. Mortality rate in Grade III injury was 57.10%. Six out of 12 patients with Grade IV injury (50%) expired. One-hundred percent patients in Grade V injury expired [Table 3]
- Mortality of the patients according to modality of treatment and grading of injury - Out of surgically managed patients, none of the patients expired in Grade I injury. Mortality rate was 50% in Grade II, 60% in Grade III injuries. 33.33% of surgically managed patients in Grade IV injuries expired while mortality rate was 100% in Grade V injuries.

## DISCUSSION

Pancreatic injuries being impossible to diagnose clinically, the role of history and diagnostic imaging cannot be overemphasized. Early diagnosis and treatment has always been a good prognostic indicator in pancreatic trauma.

### Mode of injury

In this study, road traffic accident was the most common mode of injury seen in 32 of the patients followed by

penetrating trauma due to firearm injury seen in four patients. Three studies by Isenhour and Marx,<sup>[9]</sup> in their study in 2007 also reported motor vehicle collisions to be the most common cause (75% cases) of blunt trauma abdomen.

### Age and sex distribution

In our study, 70% patients were in the age group of 20–50 years with 95% male patients. Baradaran *et al.* have also reported young males, most of all those aged 20–50 years, to be the most frequent victims.<sup>[10]</sup>

### Serum amylase/lipase levels

The diagnostic investigations that help in the management of pancreatic trauma include ultrasound abdomen, focused abdominal sonography for trauma, diagnostic peritoneal lavage, and CT scan.<sup>[11]</sup> Takishima *et al.*<sup>[12]</sup> and Mayer *et al.*<sup>[13]</sup> have advocated the significance of serum amylase in pancreatic injury. Simon *et al.*<sup>[14]</sup> and Holmes *et al.*<sup>[15]</sup> have laid specific emphasis on lab analysis in pediatric population. In this study, serum amylase was raised in 90% of the patients. Serum lipase was raised in 95% of patients.

Takishima *et al.*<sup>[12]</sup> in their study concluded that a normal serum amylase level determined on admission within 3 h after blunt abdominal trauma did not directly allow elimination of the possibility of injury to the pancreas. Adamson *et al.* in their study found that serum amylase and lipase determinations may support clinical suspicion in the diagnosis of pediatric pancreatic trauma but were not reliable or cost effective as screening tools.<sup>[16]</sup>

### Intra-abdominal organs injured

In our study, isolated pancreatic injury was uncommon (10%). Isenhour and Marx<sup>[9]</sup> and Davis *et al.*<sup>[17]</sup> also found spleen and liver to be the most commonly injured organs with isolated pancreatic injuries in <10% patients.

### Grading of pancreatic trauma

In this study, the most common grades of pancreatic injury were Grade III and IV (according to the AAST grading system on CECT abdomen) comprising 65% of the patients. Lin *et al.* in their study of 48 patients

found forty patients (83%) to have Grade III and IV injuries.<sup>[5]</sup>

### Treatment modality

In this study, 60% of the patients were managed surgically.

Degiannis *et al.* in their study recommended distal pancreatectomy for severe Grade II and all Grade III, IV, and V injuries.<sup>[18]</sup> Stone *et al.* looked at 283 pancreatic trauma patients and their management over 30 years.<sup>[19]</sup> Eighty-seven percent of the patients were managed by drainage alone, and 11% with resection including splenectomy and some form of drainage.

Patton *et al.*<sup>[2]</sup> in their study of 124 patients reported an overall mortality rate of 13%. Stone *et al.*<sup>[19]</sup> looked at 283 pancreatic trauma patients over 30 years and reported a mortality of 38%. Mortality increased with grade of pancreatic injury with Grade III and IV showing maximum mortality. In this study too, mortality was in direct correlation with the AAST grade of pancreatic injury.

### CONCLUSION

These findings suggest that early diagnosis of pancreatic injury is paramount in determining the morbidity and mortality due to pancreatic injury. Serum amylase and serum lipase levels may be normal during the initial period after trauma. CECT abdomen is the most sensitive imaging modality in diagnosing pancreatic trauma. Increasing the AAST grade of pancreatic injury is directly proportional to the severity as well as mortality of the patients. Surgical management is needed mostly in Grade III and higher injuries while Grade I and II injuries can be managed conservatively.

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### Conflicts of interest

There are no conflicts of interest.

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