

A Clinical Study of Pancreatic Injuries

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ABSTRACT. We evaluated 48 patients with pancreatic injuries. The trauma was blunt in 46 of the patients. Forty-five patients had associated injuries, especially to the gastrointestinal tract, liver, or major vessels. The mean Injury Severity Score was 20.1. Ten patients died from hemorrhage or sepsis, which was unrelated to the type of the pancreatic injury. There was no significant relation between the patients' serum amylase level on admission and the type of pancreatic injury. A CT scan can detect complete transection injuries. An emergent operation was carried out for thirty-nine patients. Drainage was mainly performed for type I injuries, suture for type II injuries. Nine patients had pancreatic ductal injury (type III), three of them were underwent distal pancreatectomy with splenectomy and one without splenectomy. Pancreaticojejunostomy was carried out for one patient. A pancreatic pseudocyst developed in four patients, but only one case needed percutaneous drainage.

In spite of the recent development of image examinations, exact diagnosis and treatment for pancreatic injury still remains difficult. Careful management is important for each case of pancreatic injury.

Key words: pancreatic injury — pancreatic trauma — serum amylase — computed tomography

Pancreatic injuries are relatively uncommon, and their diagnosis and treatment is still controversial. We have evaluated our experience with pancreatic injuries.

PATIENTS AND METHODS

From 1981 to 1997, 48 patients with pancreatic injuries were admitted to our emergency medical center. All patients were evaluated and treated by single group of trauma surgeons. The clinical data were taken from the charts, and evaluated retrospectively for age, sex, vital signs, mechanisms of injury, associated injuries, computed tomography (CT) findings, serum amylase levels, Injury Severity Score,¹⁾ indication for operation, performed operations, complications, and outcome. Pancreatic injuries were confirmed by subsequent laparotomy or CT findings. The severity of the pancreatic injuries were evaluated according to the classification of the Japanese Association for the Surgery of Trauma²⁾ (Table 1).

RESULTS

Forty-eight patients, 36 men and 12 women, mean age of 38.4 years old,

TABLE 1. The Classification of Pancreatic Injury by The Japanese Association for the Surgery of Trauma

Type I	Contusion
Type II	Laceration
Type III	Ductal injury
	a distal part of pancreas
	b proximal part of pancreas

were treated for pancreatic injuries. The trauma was blunt in 46 patients, and penetrating (a stab wound) in the other two (Table 2). Twenty-nine patients had type I injuries, 10 had type II, and 9 had type III. Five patients had complete transection of the pancreas. Ten patients died from hemorrhage or sepsis, but none died from pancreatic injuries, and unrelated to the type of the pancreatic injury (Table 3).

TABLE 2. Mechanisms of Injury

Stab Trauma	2
Blunt Trauma	46
Moter Vehicle	24
Motorcycle	7
Fall	5
Bicycle	3
Pedestrian	3
Others	4

TABLE 3. Type of Pancreatic Injury and Mortality

Type of Injury	NO. of Patient	NO. of Death
I	29	5
II	10	3
III	9	2

Forty-five patients had associated injuries (Table 4). Forty-three had intraperitoneal injuries, including ones of the gastrointestinal tract (especially duodenum), liver, and major vessels. The mean Injury Severity Score was 20.1.

The serum amylase levels of the patients on admission and the type of pancreatic injury shows in Fig 1. No significant relation was found between these two factors. No elevation of serum amylase was seen in 16 patients.

Enhanced CT scans were performed on 29 patients with stable vital signs. The CT revealed peripancreatic hematoma or pancreatic edema in type I and II injury, but failed to show parenchymal injuries clearly. CT scans detected a complete transection of the pancreas in three patients³⁾ (Fig 2).

An emergent laparotomy was performed for thirty-seven blunt traumas and two stab wounds, with indications of intraperitoneal hemorrhage (27 cases), free air on abdominal x-ray (2), both (2), diaphragmatic rupture (2), and peritoneal irritation on physical examination (4).

TABLE 4. Associated Injury of Pancreatic Injury

Intraperitoneal Injury				
Gastrointestinal tract	17	—	Duodenum	8
Liver	16		Small Intestine	5
Major vessels	11		Stomach	3
Spleen	10		Large intestine	1
Kidney	8			
Diaphragm	3			
Choledochus	2			
Extraperitoneal Injury				
Head	7			
Chest	10			
Spine	1			
Pelvis	5			
Extrimities	15			

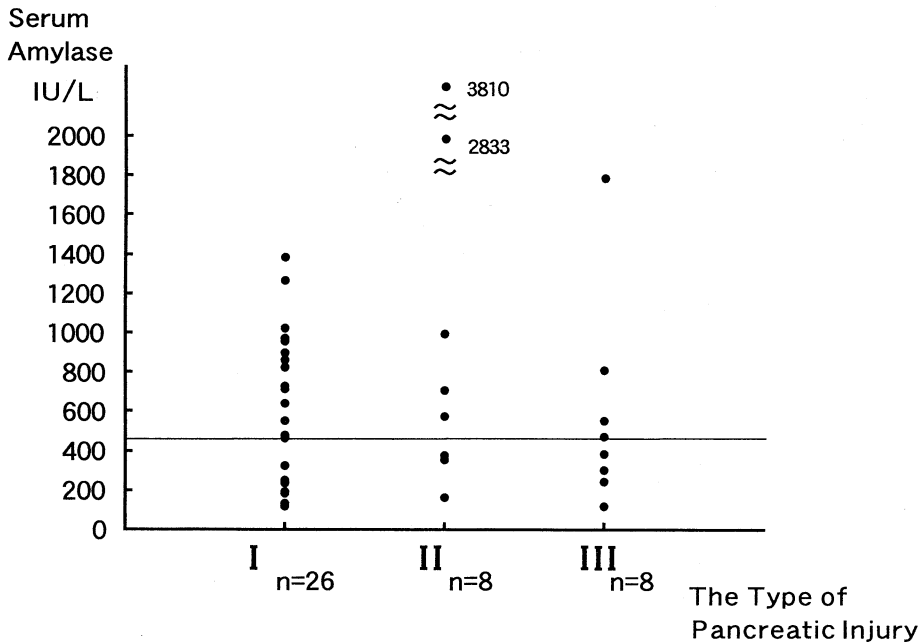


Fig 1. The Serum Amylase Level on admission and The Type of Pancreatic Injury

The types of pancreatic injuries and the operations performed are outlined in Table 5. Twenty-one patients with type I injuries underwent a laparotomy for other associated injuries, and needed no direct procedure to the pancreas besides drainage. Seven patients with type II injuries underwent suture of the pancreas, and one resection of the pancreas tail. Two patients with type III injuries underwent suture of the pancreas. In five patients with complete transection, three patients underwent a distal pancreatectomy with a splenectomy, one had a distal pancreatectomy without a splenectomy, and one underwent a pancreaticojejunostomy (Letton and Wilson⁴). Intraoperative pancreaticography was performed on two patients with type II injuries, and indicated no injury to the pancreatic duct.

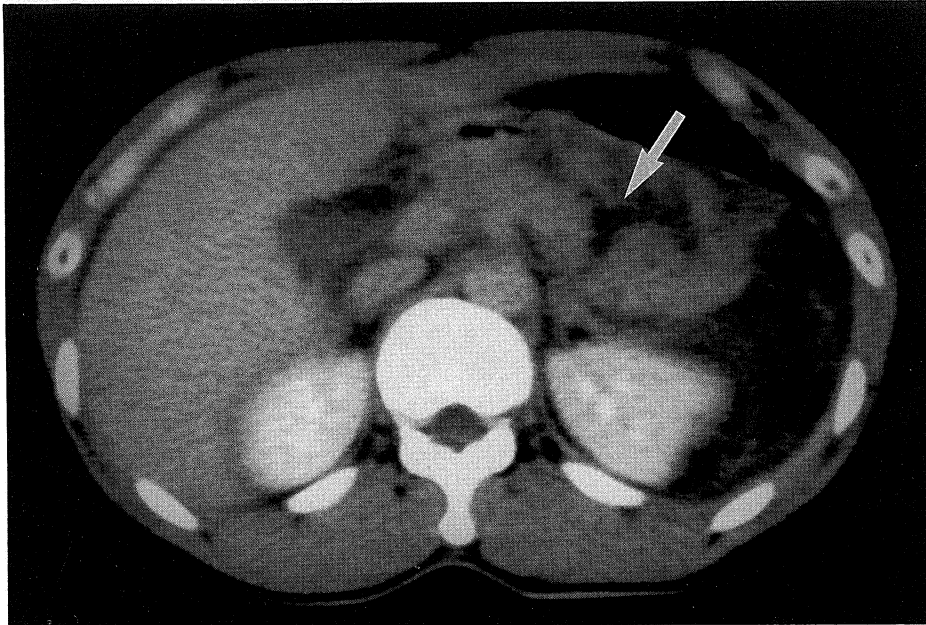


Fig 2. A CT scan of a complete transection of pancreas (white arrow)

TABLE 5. Type of Injury and Therapy

Type of Injury	I	II	III
No. of Case	29	10	9
Laparotomy	21	10	8
Procedure to Pancreas			
drainage	21	2	1
suture		7	2
resection		1	4
pancreatico- jejunostomy			1

Gabexate Mesilate and/or Ulinastatin were administered to all patients according to their serum or urine amylase levels. Four patients with type I or II injuries developed a pancreatic pseudocyst. In three patients, the cysts were diminished conservatively, and in the remaining case needed percutaneous drainage. In seven other cases, serum and/or urine amylase levels were elevated after trauma, but none of the patient showed signs of pancreatitis. In all of these cases, the amylase level decreased within 30 days.

The patient underwent pancreaticojejunostomy had developed in septic shock from duodenal perforation, and she recovered conservatively.

DISCUSSION

Pancreatic injuries are relatively uncommon, and the diagnosis and treatment is still difficult.⁵⁻⁸⁾

Serum amylase has been claimed to neither sensitive nor specific in the diagnosis of pancreatic injuries.^{8,9)} Takishima *et al* observed that hyperamylasemia due to blunt pancreatic injuries is time dependent.¹⁰⁾ In this series, we observed no significant relation between hyperamylasemia and the type of pancreatic injury, and the amylase was not elevated even in severe cases.

Because the morbidity and mortality for isolated pancreatic trauma correlated significantly with the presence of pancreatic duct injuries, the detection of a duct injury should be considered important.⁵⁾ Endoscopic retrograde pancreatography (ERP) has been advocated this purpose.¹¹⁾ In our cases, pancreatic duct injuries were detected by CT scans, intraoperative findings and pancreatography. ERP was not performed. We must consider the risk of pancreatitis related to ERP or associated duodenal injury. There are limited indication for ERP.⁵⁾ Magnetic resonance pancreatography may be helpful in imaging studies in future.

Pancreatic injuries usually associated with life threatening injuries such as ones to the liver, spleen or major vessels. Most deaths involving pancreatic injuries are attribute to the associated injuries.^{7,12)} The mortality rate of 21.7 per cent for this series is similar to that reported by others.^{7,8,13)}

The selection of operative procedures is still controversial.^{4,5)} The patient with major destruction of the pancreas head should be undergo a pancreaticoduodenectomy.¹⁴⁾ In this series, we had not encountered on such cases. Distal injuries can be easily managed by distal resection with a splenectomy.¹³⁾ Distal resection without a splenectomy is time consuming procedure, but it will prevent postsplenectomy sepsis.¹⁵⁾ Distal resection has also involves the risk of diabetes with over 80 percent resection.¹⁶⁾ In this series, diabetes did not occur. Pancreaticojejunostomy involves a risk of leakage, because it requires at least two anastomoses. Repair of the pancreatic duct may be useful,¹⁷⁾ but we have no experience with this method.

In spite of the recent development of image examinations, exact diagnosis and treatment for pancreatic injury still remains difficult. Careful management is important for each case of pancreatic injury.

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