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Predictors of successful non-operative management of grade III & IV blunt pancreatic trauma

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HIGHLIGHTS

- Non-operative measures should be attempted in a select group of high grade (grade III/IV) pancreatic trauma.
- Controlled leak walled off as a pseudocyst, absent necrosis&organ injuries predict high success rate for NOM.
- Dedicated nutritional, gastrointestinal and interventional radiological support are the key components of care.

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ABSTRACT

Introduction: Although surgery is the preferred treatment for grade III&IV pancreatic trauma, there is a growing movement for non-operative management. in blunt pancreatic trauma. Very few studies compare operative versus non-operative management in adult patients.

Methods: Retrospective analysis of a prospectively maintained database was performed from 2004 to 2013 in the department of gastrointestinal surgery, NIMS, Hyderabad. Comparative analysis was performed between patients who failed versus those who were successfully managed with non-operative management.

Results: 34 patients had grade III/IV trauma out of which 8 were operated early with the remaining 26 initially under a NOM strategy, 10 of them could be successfully managed without any operation. Post-traumatic pancreatitis, Necrotizing pancreatitis, Ileus, contusion on CT, surrounding organ injuries are independently associated with failure of NOM on a univariate analysis. On multivariate logistic regression presence of necrosis& associated organ injury are factors that predict failure of NOM independently. Development of a pseudocyst is the only significant factor that is associated with a success of NOM.

Conclusions: Non-operative measures should be attempted in a select group of grade III&IV blunt pancreatic trauma. In hemodynamically stable patients with a controlled leak walled off as a pseudocyst without associated organ injuries and pancreatic necrosis, NOM has a higher success rate.

1. Introduction

Among the solid organ injuries in the abdomen, pancreatic injuries are rare as compared to liver and spleen [1,2]. Morbidity and mortality rates of pancreatic trauma are comparatively high and stems from associated vascular and surrounding organ injury, delays in diagnosis, ductal breach (Grade III and higher) [3–6]. Contemporary management of grade III and grade IV injuries is an operative intervention. Operative management of grade III and grade IV injuries however is associated with higher morbidity and mortality [7,8]. In a series of 42 patients who had pancreatic resection at the time of initial damage control surgery mortality rates for pancreatic resection were as high as 55% [8]. One third of patients who underwent pancreatic resection and 20% of those who did not undergo resection developed pancreatic related complications [8]. In a consecutive series of 107 patients who underwent

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distal pancreatectomy for grade III injuries the rates of overall complications is 75%, rates of pancreas specific complications are 50**%** [7]. There is a growing movement for non-operative management (NOM) of solid organ injury in blunt abdominal trauma [9]. Nationwide trends have shown that rates of NOM of pancreatic trauma has increased and that is associated with decreased mortality [9]. NOM has been embraced as an essential part of care in the management of blunt trauma of spleen and liver in hemodynamically stable patients [10,11]. In pediatric population non-operative management has become the standard of care in management of grade II and grade III pancreatic injuries [12]. However very few studies exist that compare operative to NOM of higher grade (Grade III/IV) pancreatic trauma in adults.

1.1. Aim of the study

To analyze patients who presented with blunt pancreatic trauma at the department of gastrointestinal surgery, Nizam's institute of medical sciences, Hyderabad from 2004 to 2013. To assess NOM in a select group of hemodynamically stable patients of grade III and grade IV pancreatic trauma. To determine the factors that predict success of non −operative management in such patients.

2. Material and methods

All patients with blunt pancreatic trauma who were treated between Januarys 2004–2013 at the department of gastrointestinal surgery, Nizam's institute of medical sciences, Hyderabad were included. Among 72 patients 34 patients were identified to have grade III/IV pancreatic trauma in whom non-operative management strategy was attempted. Patient's demographic data including age, sex, comorbid illness, mode of injury, time of presentation, imaging modalities used and interventions were entered into a prospective database.

2.1. Diagnosis

Pancreatic injuries were diagnosed using a combination of dedicated 64 slice CT scanner, MRI with MRCP in majority of the patients. Injuries identified during intra-operative exploration were graded according to the extent of injury determined intra-operatively. ERCP solely as a diagnostic modality is not used in any of these patients. Serum amylase and lipase was obtained in all patients and in all grades of trauma.

2.2. Definitions

Pancreatic fistula, hemorrhage and other pancreatic specific complications are defined according to the standard ISGPF criteria [13,14].

2.3. Management of pancreatic trauma

Grading of pancreatic injuries was done according to the AAST grading system. CT scan was obtained on all patients who are hemodynamically stable and had intra-abdominal fluid on FAST exam as per the ATLS protocol of blunt abdominal trauma. Patients who are hemodynamically unstable had an early operation. Early operation is defined as surgery within first 24 h of presentation. In these patients no attempt at NOM was made. Non-operative strategy was considered in hemodynamically stable patients with grade III and IV trauma. Such strategy included excellent analgesia, Incentive spirometry, IV fluids, and enteral nutritional support if needed with help of a naso-jejunal tube no later than 48 h of injury. Patients who had progressive abdominal pain, hemodynamic instability, abdominal distension with inability to tolerate enteral feeds, need for blood transfusions, persistent leukocytosis (>11), sepsis or organ failure were considered failure of NOM. Organ failure that responded to initial resuscitation was not considered a failure of NOM. All patients with pancreatic trauma with duct disruption received octreotide 50 mcg TID. For patients who were operated octreotide was continued through the post-operative period for one week. Radiological or endoscopic guided drainage of fluid collections, necrosis or abscess externally or internally is not considered a failure of non-operative management.

2.4. Statistical analysis

Comparative analysis was performed between patients who failed versus those who were successfully managed with non-operative management in grade III and grade IV injuries. Descriptive statistics were used to identify differences in the clinical variables between the two groups. Continuous variables were described using mean. Categorical variables were compared between the two groups using non-parametric tests (X2/fisher's exact, Man Whitney *U* test). A p-value of <0.05 is considered significant. Univariable (unadjusted) logistic regressions were used to test the significance of individual variables (Presence of pseudocyst, Blood transfusions, pancreatic necrosis etc.) in predicting success of NOM. Multivariate logistic regression was used to determine predictors of success of NOM while controlling for other significant covariates identified on univariable analyses. All tests used a type I error set at α 0.05. Statistical analyses were carried out using SPSS (Version 18).

3. Results

During the study period 92 patients had pancreatic trauma overall. Of the 92 patients 20 patients with penetrating trauma were excluded from analysis. Among the 72 patients with blunt pancreatic trauma 34 patients were identified to have grade III or grade IV injury and were included for analysis. (Ref Table 1). There were five mortalities overall (6.9%). Two patients had grade V injuries both of them died with multiorgan failure from sepsis (Average of 12 days post trauma). One patient with grade IV died from necrotizing pancreatitis. One patient of grade III injury died on day 18 with respiratory failure from hospital acquired pneumonia. Both deaths in grade III and grade IV injuries are in patients in whom NOM was not attempted.

3.1. Operative versus non-operative management

Overall 34 patients (34/72, 47.2%) had grade III/IV trauma (Ref Table 1). Of these 24 patients eventually had surgery (8 early and 16 failed NOM). Five patients of grade 1 & 2 injuries (5/33) underwent operative exploration for other abdominal injuries. All patients (5/5) with grade 5 injuries underwent operative exploration. Among grade III and grade IV injuries 10 out of 34 were managed without any operation.

Table 1
Summary of all blunt pancreatic trauma patients according to different grades.

	Total	Operated
Grade 1	16	2/16
Grade2	17	3/17
Grade 3	20	14/20
Grade 4	14	10/14
Grade 5	5	5/5