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Original Research Article

Early complications and prognosis with multiple organ system failure score

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ABSTRACT

Background: Acute pancreatitis is a common surgical entity with a wide clinical spectrum ranging from mild pancreatitis to severe acute pancreatitis with lethal complications. A number of scoring systems have been devised to predict and manage complications associated with severe acute pancreatitis. The objective of this study was to study the demographics, early complications of acute pancreatitis with their outcome, and to assess the efficacy of multi organ system failure score.
Methods: This was a descriptive study including 120 patients of acute pancreatitis done over a period of 2 years. The management of complications and their outcome were recorded in detail. A multi organ system failure score was used to predict and assess the severity of acute pancreatitis.
Results: Total 120 patients were evaluated with mean age of 40 years and male preponderance. Alcohol consumption was the most common etiological factor. Acute fluid collection was the most common local complication while shock was the most common systemic complication. MOSF scoring system had a sensitivity, specificity and positive predictive value of 96%, 92.8% and 90.5% respectively. Mortality was 5.8% seen in patients with MOSF score above 5.
Conclusions: The management of early complications of acute pancreatitis is mainly conservative, with surgical management limited to only a few selected patients. MOSF score is a valuable tool to predict and assess the severity of acute pancreatitis and should be used for monitoring of high risk patients.

Keywords: Acute pancreatitis, Complications, Multi organ system failure score, Outcome

INTRODUCTION

Acute pancreatitis includes a wide spectrum of disease, from mild self-limiting symptoms, to fulminant processes with multi-organ failure and high mortality. Most patients experience relatively minor episodes of disease characterized by mild parenchymal edema without distant organ dysfunction and an uneventful recovery. Severe episodes, however, may involve a progression to extensive pancreatic necrosis, development of the systemic inflammatory response syndrome (SIRS), multi-organ failure, rapid clinical deterioration.[1] Although the overall mortality rate for acute pancreatitis is 2–10%, this is related primarily to the 10–30% of patients with severe disease characterized by pancreatic and peri-pancreatic necrosis.[2]

Multiple factor scoring systems like Ranson, Glasgow, and acute physiology and chronic health evaluation II are used by surgeons to assess and predict the severity of acute pancreatitis and anticipate complications to enable timely management. Of all the scoring systems, the multiple organ system failure (MOSF) scale has few advantages over the other systems including better clinical utility for evaluating patients, and can be performed within a few hours of admission and be

repeated daily to monitor disease progression.[3] Despite presence of extensive literature on the complications of the condition, there have been very few advances in the prevention and management of specific early complications. With this perspective this clinical study of early complications of acute pancreatitis and their outcome is carried out to analyse the sequelae of acute pancreatitis as well as the management and outcomes of patients with acute pancreatitis.

METHODS

This was a prospective study of patients of all age groups presenting to the Department of General Surgery at a Tertiary care centre with a diagnosis of acute pancreatitis from December 2016 to December 2018. Institutional ethical committee approval was obtained (approval no. Pharma/IEC-GMCA/398/2016).

Inclusion criteria

Inclusion criteria were 1) all cases newly diagnosed with acute pancreatitis as per above mentioned criteria 2) patients willing for investigations 3) patients willing for follow up

Exclusion criteria

Exclusion criteria were 1) chronic pancreatitis 2) pancreatic malignancy 3) acute on chronic pancreatitis 4) patients not willing for investigations 5) patients not willing to take part in the clinical trial 6) patients not willing for follow up

All patients were detailed about the purpose of the study and consent was taken. Parameters taken into account of every case included detailed history, repeated thorough clinical examination, relevant laboratory and radiological investigations, management in the hospital and detailed record of complications, their management and outcomes. For determining the severity and predicting the course of acute pancreatitis, a MOSF scoring system was utilized. MOSF scoring system is the sum of the failing organ system during a day, where score varied from 0 to 7. All patients were put on conservative treatment on admission which included adequate and prompt fluid resuscitation, early oxygen supplementation, nil per oral if nausea, vomiting or ileus and prompt resumption of enteral feeding on their resolution, and symptomatic treatment including analgesics. Patients with evidence of organ failure were referred to the intensive care unit. Surgery was done in patients who deteriorated in spite of intensive medical management. The patients were followed up for the period of 14 days. The patients on follow up were re-examined for complications.

Statistical analysis

Data was entered in windows excel format. Frequency tables and measures of central tendency (mean) and measures of dispersion (standard deviation) were obtained by using the statistical package SPSS ver2.0

RESULTS

During a 2-year study period, 120 patients of acute pancreatitis were admitted and included in the study group. The majority of patients were seen to be in 31 to 40 years of age (Table 1), with the youngest patient 14 years of age, while the oldest patient was 70 years of age. Acute pancreatitis was five times more common in males than females. Alcohol (71%) was the most common etiological factor for acute pancreatitis in our study followed by biliary calculi (24%) (Table 2).

Table 1: Age distribution (n=120).

Age in year	Number	Percentage (%)
<20	05	04
21-30	24	20
31-40	40	33
41-50	33	28
51-60	07	06
>60	11	09
Total	120	100

Table 2: Etiology of acute pancreatitis (n=120).

Predisposing Factors	No. of Patients	Percentage (%)	Mortality
Alcohol	85	71	5 (6%)
Biliary calculi	24	20	2 (8%)
Trauma	04	03	0
Drugs	03	03	0
Idiopathic	04	03	0
Total	120	100	0

The commonest presentation in our study was pain in abdomen, which was present in 116 (97%) patients followed by vomiting in 81 (68%) patients, fever in 28 (23%) patients and distension of abdomen in 20 (17%) patients. On careful examination, tachycardia was the most common finding in 87 (73%) patients followed by epigastric tenderness in 85 (71%) patients; 66 (55%) patients were found to have tachypnea and an equal number had absent bowel sounds secondary to paralytic ileus.

Diagnosis of acute pancreatitis was based on clinical features, serum amylase and lipase estimation and ultrasonography examination. Following parameters were studied which were then used to calculate a multiple organ system failure (MOSF) score. Serum amylase was found to be raised in 93 (78%) patients with acute pancreatitis while serum lipase was elevated in 95(79%) patients.

Ultrasonography showed a bulky pancreas in 112 (93%) patients while cholelithiasis was diagnosed in 24 (20%)

patients with acute pancreatitis. A contrast enhanced CT scan was done in 72 patients after 48-72 hours of admission. CT scan was done mostly in patients not responding to conservative management and was helpful in demonstrating the condition of the pancreas and associated local complications.

Table 3: Local complications of acute pancreatitis (n=120).

Complications	No. of patients	Percentage (%)	Mortality(n=7)
Acute peripancreatic fluid collection	53	46	0
Ascites	11	9	5
Pancreatic Necrosis	13	11	2
Infected pancreatic abscess	02	2	2

*More than one complication was present in several patients

The most common local complication in our study was acute fluid collection in the abdomen in 53 (46%) patients followed by pancreatic necrosis in 13 (11%) patients. (Table 3) Out of 7 patients who died, 5 patients were found to have ascites, while 2 out of 13 patients with pancreatic necrosis died.

Table 4: Systemic complications of early pancreatitis (n=120).

Complications	No. of Patients	Percentage (%)	Mortality (n=7)
Pleural effusion	20	17	3
ARDS	11	9	3
Renal Failure	12	10	4
Confusion state/Delirium	3	2	1
Hyperglycemia	15	13	1
Septicemia	14	12	7
Shock	30	25	7
Death	7	6	

The most common systemic complication was found to be shock in 30 (25%) patients, followed by pleural effusion in 20 (17%) patients (Table 4). Pleural effusion was unilateral in 12 patients and bilateral in 8 patients. Hyperglycemia was seen in 15 (13%) patients, septicaemia in 14 (12%) while renal failure was seen in 12 (10%) patients.

Out of 120 patients, 12 patients underwent unilateral pleural tapping for pleural effusion while 8 patients needed bilateral pleural tapping. The maximum amount of pleural fluid tapped was 1.5 litre while the minimum amount was 200 ml. 9 patients underwent exploratory laparotomy, out of which 3 patients were managed by necrosectomy. The other 6 were managed by thorough peritoneal lavage and drainage, 2 of which were found to have infected pancreatic abscess intra-operatively. 4 patients with ascites were managed by abdominal paracentesis to relieve abdominal distension causing respiratory discomfort.

The MOSF scoring system was assessed to predict the severity of acute pancreatitis. The sum of the failing organ system during a day, score varied from 0 to 7. The MOSF scoring system predicted the attack of severe acute pancreatitis in 53 patients (score≥1). However, out of 53 patients, only 48 patients actually had severe disease, while remaining 5 had mild disease. While MOSF predicted mild attack in 67 patients, only 2 of them actually had severe disease. Thus, the sensitivity and specificity of MOSF in for severe attack of acute pancreatitis was 96% and 92.8% (Table 5) in our study with a positive predictive value of 90.5%.

Table 5: Sensitivity and specificity of MOSF score.

MOSF score	Disease truly severe	Disease truly mild	Number of Patients
Severe	48	5	53
Mild	2	65	67
Total	50	70	120

Regarding mortality, out of 120 patients with acute pancreatitis 7 patients died. Thus, mortality was 5.8%. All of the deaths were of patients with severe acute pancreatitis with MOSF score more than 5.

DISCUSSION

In the present study, we observed 120 patients diagnosed with acute pancreatitis at tertiary care center, for early complications of acute pancreatitis.

Most of the patients who presented with acute pancreatitis were middle aged with patients in third to fifth decades. Mean age of presentation was 40yrs. Previous studies like Barreto et al and Baig et al also show that most of the patients of acute pancreatitis were from middle age groups.[4,5]

Our study showed a very high incidence of acute pancreatitis in males [84%] as seen in other Indian studies like Baig et al as compared to European studies like by Kaya et al and Papaehristou et al.[5-7] The trend of acute pancreatitis in the Indian subcontinent is attributed to alcohol abuse while in the European countries and the middle- east, is most likely attributed to a higher intake of dietary fat and increased predilection to formation of gallstones.

Alcohol was found to be the most common etiological factor in our study as we receive a large set of patients exposed to alcohol abuse. Biliary pancreatitis was seen in all females and 5 males. Post traumatic pancreatitis was seen in 4 study subjects, the history of trauma being minimum 1 month back. Drug induced pancreatitis was seen in patients on anti-retroviral therapy. All 3 subjects were on zidovudine leading to acute pancreatitis. However, in 4 patients the cause of acute pancreatitis could not be attributed and were hence, termed idiopathic. Alcohol was found to be the most common risk factor in the study by Sharman et al and Jaidev Vig et al, while biliary pancreatitis was the most common in studies by Hussain et al and Cho et al.[3,8-10]

Pain in abdomen was seen in majority of 116 (97%) patients followed by vomiting (68%) and fever (23%). Similar observations were seen in study by Hussain et al, Negi et al.[3,11] Tachycardia was most common sign (73%) followed by epigastric tenderness 71%, tachypnea 55%, absent bowel sounds 55%. A salient feature of our study is an elaborate clinical examination including various parameters which have not been considered in other reference studies yet, prove to be of remarkable significance.[3,11]

The sensitivity of serum lipase and amylase in our study was 79% and 78 %. The previously compared studies have not evaluated the sensitivity of serum amylase and serum lipase in the diagnosis of acute pancreatitis. Treacy et al stated serum lipase has been reported to rise more than amylase and to remain elevated for longer periods than serum amylase levels, following an acute attack.[12] Amylase has always been known to have poor specificity for diagnosis of acute pancreatitis. It also has the problem that low values are observed when the patient has hypertriglyceridemia, therefore both lipase and amylase were preferred to complement one another.

CECT was done in 72 patients, mostly in patients who did not respond to conservative treatment, pancreatic necrosis was found in 18%, cholelithiasis in 33%, abdominal collection in 74% and hemorrhagic pancreatitis in 17%. Kaya et al CT showed varying degrees of necrosis in 56.3% of the patients with severe acute pancreatitis.6 CT findings were unremarkable (non-diagnostic) in 16% of the mild pancreatitis cases and 6% of the severe cases. It is not current practice to perform an early CT scan in view of potential for extension of necrosis and exacerbation of renal impairment following the use of intra-venous contrast media. Unless a management decision is required based on the extent of necrosis (e.g., use of prophylactic antibiotics), a CT scan for staging is unlikely to materially affect the management of patients with acute pancreatitis during the first week of illness.[3]

Pancreatic necrosis usually develops 2–4 days after the onset of an acute attack and rarely progresses. Therefore, CT performed after 3 days would be able to delineate pancreatic necrosis accurately.

Regarding early complications, abdominal fluid collection was seen in maximum i.e. 46% patients, followed by pleural effusion (17%), hyperglycemia (13%), pancreatic necrosis (11%).

Acute fluid collection was seen in 53 (44%) patients that resolved in all patients. Similar findings were observed by Nandu et al.[13] Acute fluid collection was seen in 14 (13.46%) patients in the study by Hussain et al.[3]

Shock was the second most common complication in our study (25%). Out of 30 patients, 7 patients died. Thus the mortality rate associated with shock was found to be 23%. The remaining patients were managed by inotropic support and improved eventually. Hussain et al observed that 10.58% patients went into shock.[3]

Pleural effusion was the third most common complication in our study (17%). 12 patients had unilateral effusion while 8 had bilateral pleural effusion. All patients were managed initially conservatively but pleural tapping was done to relieve tachypnea and respiratory distress. Hussain et al observed that pleural effusion was the most common systemic complication, seen in 35 patients (33.65%).[3] Twenty-two patients (21.15%) showed unilateral pleural effusion and 13 patients (12.5%) showed bilateral pleural effusion. In the study by Nandu et al, pleural effusion was noticed in 11 patients (7.75% of total patients).[13]

Renal failure was seen in 12 patients (10%) in our study. 4 patients died, thus a mortality of 33%. Similar finding was seen in study by Hussain et al.[3] Acute renal failures may be reversible if treated promptly and appropriately.

Of 13 patients with pancreatic necrosis, 3 were managed by necrosectomy and 10 patients were managed conservatively. Sterile pancreatic necrosis, even when accompanied by organ failure, is not an absolute indication for surgery as most of the patients with sterile pancreatic necrosis respond to conservative management. Only if the necrosis is extensive and not responding to a conservative line or if the infection of the necrosis occurs can surgical management be considered.

Pancreatic abscess was seen in two patients (2%) in our study. Both of the patients with pancreatic abscess expired. Thus, 100% mortality was associated with pancreatic abscess in our study. Surgical drainage of the abscess is the only definitive method of improving the outcome.

Ascites was seen in 11 patients thus 9% of patients in our study. 5 patients who died had ascites at presentation. Thus the mortality associated with ascites was 45%. 4 of these were managed by abdominal paracentesis to relieve the respiratory distress, and the rest managed

conservatively. The most common local complication in the study by Hussain et al was ascites.[3] Ascites is best managed conservatively with constant follow-up.

ARDS was seen in 11 patients (9%) of whom 3 patients died. Similarly, acute respiratory distress syndrome was seen in 11 (10.57%) patients by Hussain et al in their study.[3] Acute respiratory distress syndrome should be treated in the ICU with mechanical ventilation, especially positive end expiratory pressure ventilation after intubation with administration of appropriate antibiotic therapy to prevent nosocomial pulmonary infection.

Out of 3 patients who underwent necrosectomy, all three died in the first week after surgery. 6 patients underwent exploratory laparotomy. 2 were found to have infected pancreatic abscess which was drained. However, they developed septicaemia, one of which died in the first week after admission and the other in the fourth week. One patient was managed by thorough peritoneal lavage and drainage; however, he died of multi organ system failure in the post-operative period. One patient who was managed by peritoneal lavage and drainage developed burst abdomen on post-operative day 8, managed by re-exploration and suturing. She was then discharged on post-operative day 24. One patient with bilateral pleural effusion was managed by pleural tapping and developed ARDS leading to death in the second week after admission.

The sensitivity and specificity of MOSF scoring system for severe attack of acute pancreatitis was in our study was 96% and 92.8% similar to results obtained by Hussain et al.3 MOSF score is an easy and valuable tool for prediction of severity of acute pancreatitis, and for timely identification and management of early complications.

Regarding mortality, death of 7 patients occurred due to multi organ system failure (5.8%). Out of the 7 patients that died, 4 died in the first week after admission, 1 died in the second week, 1 in the third week and 1 patient died in the fourth week after admission. 6 were males while only one was female.

Vengadakrishnan et al observed that death of 8 out of 20 patients occurred due to MODS in acute pancreatitis.[14] Wig et al stated that organ failure occurred in 52.17% of patients with severe acute pancreatitis.[9] Hussain et al in their research observed that the overall mortality rate was 13.46%, with a mortality rate of 37.83% in severe acute pancreatitis, mainly associated with multiple organ dysfunction syndrome.[3]

Limitations

Being a tertiary care centre catering to a majority of rural population with difficult access to healthcare, a vast number of the patients come with delayed presentation leading to higher rate of complications and mortality rates in our study. In our centre, CT scan is not routinely done but only in indicated patients not improving or responding to conservative treatment.

CONCLUSION

Acute pancreatitis is a surgical emergency predominantly seen in 3rd or 4th decade of life. There is male preponderance with alcohol being the most common etiological factor. The distinct clinical profile includes pain in abdomen, tachycardia and epigastric tenderness seen in most patients. Laboratory investigations like serum amylase and lipase, ultrasonography and contrast enhanced computerized tomography should be used to supplement the diagnosis and prognosticate complications. The management of early complications of acute pancreatitis is mainly conservative, with surgical management limited to only a few selected patients. Potentially lethal complications occur at any time following an acute attack and mortality is high in severe acute pancreatitis with pancreatic abscess and multi organ system failure. MOSF score is a valuable scoring system for predicting the severity of acute pancreatitis, facilitating early detection of complications and close monitoring of high risk patients.

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