Original research article

Assessment of the outcome in patients with acute pancreatitis receiving normal volume fluid therapy and high volume fluid therapy in the initial 24 hours

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Abstract
Aim: This study aims at analyzing the persistence or occurrence of SIRS and organ failure in patients with acute pancreatitis receiving normal volume fluid therapy and high volume fluid therapy in the initial 24 hours.
Material and methods: The study was a prospective observational study conducted in the Department of General Surgery, Vardhman Mahavir Medical College and safdarjung Hospital, New Delhi, India for 18 months. 120 Patients with AP were included in this study. Systemic inflammatory response syndrome (SIRS) score and modified Marshalls score were accessed at admission. Patients are assessed at 24 and 48 hours for the persistence or worsening of SIRS, organ failure and local complications.
Results: The study population consisted of 75 males (62.5%) and 45 females (37.5%). The etiology of acute pancreatitis was most commonly alcohol (n=61; 50.83%) and gallstone (n=45; 37.5%) related. Other 14 cases were due to drugs and post endoscopic retrograde cholangiopancreatography (ERCP). Most of the patients 63(52.5%) presented after 24 hours from the onset of symptoms. In the normal volume group the mean amount of fluid given in initial 24 hours was 2512 ± 269.88 ml and the mean rate of fluid administration was 106.845 ± 11.04 ml/hour. In the high volume group the mean amount of fluid given in initial 24 hours was 5832 ± 895.87 ml and the mean rate of fluid administration was 262.22 ± 40.11 ml/hour. Persistence/worsening of SIRS at 48 hours were more in normal volume fluid group compared to the high volume fluid group (p=0.081). Organ failure at 48 hours is more in normal volume fluid group compared to the high volume fluid group (p=0.079). Incidence of local complications was equal in both groups. In normal volume group with organ failure the system involved was renal system in one and respiratory system in the other. In high volume group the organ system involved was renal system. At the time of presentation, in the normal volume group 12 patients had SIRS and 2 patient had organ failure. At the end of 48 hours 7 patients had SIRS, 3 patients had organ failure and 2 patient developed local complication in the form of acute fluid collection. In organ failure the system involved was renal system in one and respiratory system in the other. In the high volume group 24 patients had SIRS and 5 patients had organ failure at the time of admission. After 48 hours 6 patients had SIRS, 2 had organ failure and 2 developed pancreatic ascites.
Conclusion: we concluded that there was not found any statistically significant difference in the clinical outcomes of AP patients receiving normal or high volume fluid resuscitation in the initial 24 hours.

Keywords: Acute pancreatitis, Fluid resuscitation, Systemic inflammatory response syndrome.

Introduction

Acute pancreatitis has a high annual incidence of 13 – 85/100,000 persons worldwide with mortality up to 20% in case of infected pancreatic necrosis.[1-5] Persistent (multi) organ failure further increases mortality to 35%.[5] Adequate fluid resuscitation and pain management are the cornerstones in early treatment of acute pancreatitis. Based on retrospective studies, early fluid resuscitation seems to be associated with a reduced incidence of systemic inflammatory response syndrome (SIRS), organ failure and mortality.[6,7] Current international guidelines for the management of acute pancreatitis recommend vigorous infusion of a balanced salt solution (Ringer's lactate 5-10 ml/kg/h) to maintain a urinary output of >0.5 – 1.0 ml/kg/h.[8] However, the recommendation for Ringer's lactate is mainly based on one relatively small and early-terminated randomized trial in patients suffering from mild acute pancreatitis.[9] The latter might explain the fact that many physicians still treat acute pancreatitis patients with normal saline infusion. The composition of the infusion fluid used has received increasing attention in recent years.[10] Balanced salt solutions better match the composition of blood plasma than the widely used normal saline.[11] In clinical trials in patients with pathologies other than pancreatitis (i.e. renal transplantation, dehydration, abdominal aortic aneurysm surgery), balanced salt solutions have been shown to prevent the development of hyperchloremic acidosis and to reduce the need for blood transfusion compared to resuscitation with normal saline.[12,13] In acute pancreatitis, balanced salt solutions have been suggested to reduce inflammation.[9,14] Although metabolic and clinical advantages of balanced salt infusion are promising, convincing evidence for a clinical benefit is lacking. Most clinical outcome studies have used heterogeneous patient populations, various types and volumes of infusion fluids as well as different endpoints, which might have obscured the clinical benefit of balanced salt solutions. Moreover, the effects of large infusion volumes on urinary output, laboratory parameters (i.e. plasma sodium and potassium level, acid-base status) and morbidity (i.e. organ failure) in patients with acute pancreatitis are unknown. This study aims at analyzing the persistence or occurrence of SIRS and organ failure in patients with acute pancreatitis receiving normal volume fluid therapy and high volume fluid therapy in the initial 24 hours.

Material and methods

The study was a prospective observational study conducted in the Department of General Surgery, Vardhman Mahavir Medical College and safdarjung Hospital, New Delhi, India for 18 months. after taking the approval of the protocol review committee and institutional ethics committee.

Inclusion criteria

- Patients with AP

Exclusion criteria

- Patients with congestive cardiac failure and chronic renal diseases;
- Patients presenting after 48 hours of onset of symptoms
- Pregnant women.

Methodology

At admission, haematocrit, haemoglobin, blood counts, arterial blood gas analysis, liver function test, serum amylase and serum lipase values are obtained. Patients who receives

intravenous fluids at a rate of 100-150 cc/hour in the first 24 hours was included in the normal volume group and those receives intravenous fluid at a rate of 150-250 cc/hour was included in the high volume group. Systemic inflammatory response syndrome (SIRS) score and modified Marshalls score were accessed at admission. Patients are assessed at 24 and 48 hours for the persistence or worsening of SIRS, organ failure and local complications.

Results

The study population consisted of 75 males (62.5%) and 45 females (37.5%) (Table1). The etiology of acute pancreatitis was most commonly alcohol (n=61; 50.83%) and gallstone (n=45; 37.5%) related. (Table 2) Other 14 cases were due to drugs and post endoscopic retrograde cholangiopancreatography (ERCP). 85 patients (70.83%) presented with classical symptoms of AP. Most of the patients 63(52.5%) presented after 24 hours from the onset of symptoms (table 3). In the normal volume group the mean amount of fluid given in initial 24 hours was 2512±269.88 ml and the mean rate of fluid administration was 106.845±11.04 ml/hour. In the high volume group the mean amount of fluid given in initial 24 hours was 5832±895.87 ml and the mean rate of fluid administration was 262.22±40.11 ml/hour. The fluids used were normal saline and ringer lactate. Persistence/worsening of SIRS at 48 hours were more in normal volume fluid group compared to the high volume fluid group (p=0.081). Organ failure at 48 hours is more in normal volume fluid group compared to the high volume fluid group (p=0.079). Incidence of local complications was equal in both groups (Table 4). In normal volume group with organ failure the system involved was renal system in one and respiratory system in the other. In high volume group the organ system involved was renal system.

Table 1: Gender and age distribution of patients

Gender	No. of patients	Percentage
Male	75	62.5
Female	45	37.5
Age		
Below 30	32	26.67
30-40	38	31.67
40-50	28	23.33
50-60	15	12.5
Above 60	7	5.83

Table 2. Etiological causes of acute pancreatitis

Parameter	Total	Percentage
Alcohol	61	50.83
Gall stone	45	37.5
Other	14	11.67

Table 3: Time of presentation.

Time of presentation	No. of patients	Percentage
Below 6 hrs	2	1.67
6-12hrs	3	2.5
12-24 hrs	52	43.33
Above 24 hrs	63	52.5

Table 4: Complications of AP in normal and high volume group at admission and 48 hours

Complications	Normal volume		High volume	
	Admission	48 hours	Admission	48 hours
SIRS	12	7	24	6
Organ failure	2	3	5	2
Local complications	0	2	0	2

Discussion

In our study 62.5% of the patients with AP were males. Few other studies too have found a male predominance in AP, also suggesting a significant association between the gender and etiology of AP. Alcohol is the primary cause for both acute and chronic pancreatitis in most of the countries; both being common in men.[15] 50.83% of AP in our study was secondary to alcohol abuse and seen only in male patients. 37.5% of AP was secondary to gallstone disease with a female predominance; this gender-etiologic pattern seen in other studies too. In our study 58.33% of patients were between the ages of below 40 years . Gallstone pancreatitis is more common in female subjects, and alcoholic pancreatitis was more common in middle-aged male subjects.[16,17] Other etiological factors for AP observed in the study included post ERCP, drugs and idiopathic. Two patients developed post ERCP acute pancreatitis. The drugs which caused AP were steroid and valproate. This observation gains importance in the view that most of the patients who develop AP are in the younger productive age group. Morbidity, mortality, diagnostic and treatment costs associated with AP will have an adverse health and socioeconomic outcome on these patients at an individual level and at the societal level.

In the study 39.17% had a normal body mass index (BMI), but 60.83% had a BMI more than 23. Various studies have shown that obesity is associated with an amplified systemic inflammatory response in acute pancreatitis and is a prognostic factor for mortality, local, systemic complications and severity in AP.[18] Most of the patients in our study group (52.5%) presented after 24 hours from the onset of symptoms. This observation is important as the pathological changes in AP develop much earlier before the serum tests are positive. This delay in presentation of the patients to hospital and initiation of fluid therapy may have an influence on the outcomes of the disease.

In the normal volume group patients received intravenous fluids at an average rate of 106.845 ± 11.04. The type of fluid used was normal saline and ringer lactate solution. In normal volume group at admission 97.5% of patients had mild pancreatitis and 2.5% had moderate severe pancreatitis according to revised Atlanta criteria. After 24 hours of normal volume intravenous fluid therapy 88.33% had mild pancreatitis, 7.5% had moderate severe pancreatitis and 4.17% had severe pancreatitis. In the high volume group patients received intravenous fluids at an average rate of 262.22 ± 40.11. At admission 86.67% of patients in the high volume group had mild pancreatitis and 13.33% had moderate severe pancreatitis according to revised Atlanta criteria. After 24 hours of high volume intravenous fluid therapy 92.5% had mild pancreatitis, 4.17% had moderate severe pancreatitis and 3.33% had severe pancreatitis.

At the time of presentation, in the normal volume group 12 patients had SIRS and 2 patient had organ failure. At the end of 48 hours 7 patients had SIRS, 3 patients had organ failure and 2 patient developed local complication in the form of acute fluid collection. In organ failure the system involved was renal system in one and respiratory system in the other. In the high volume group 24 patients had SIRS and 5 patients had organ failure at the time of admission. After 48 hours 6 patients had SIRS, 2 had organ failure and 2 developed pancreatic ascites .The organ system involved was renal system.

Persistence/worsening of SIRS at 48 hours are more in normal volume fluid group compared to the high volume fluid group (p=0.081). Organ failure at 48 hours is more in normal volume fluid group compared to the high volume fluid group (p=0.079). Incidence of local complications equal in both group. However the above observations did not have any significance. Many recent prospective studies suggest that early aggressive fluid therapy is not associated with improved outcomes in patients with AP.[19,20] These studies also have shown an association between aggressive fluid resuscitation and increased organ failure, acute pancreatic fluid collection, renal and respiratory insufficiency, intensive care unit admissions, sepsis and mortality. There are few observational studies which support aggressive fluid management in AP.[21,22] However most of the randomized trials provide evidence in favour of non-aggressive fluid therapy.

At present aggressive fluid therapy is the recommended for initial management of AP. However our study did not show any significant difference in outcomes in patients with AP receiving normal or high volume fluids in the initial 24 hours. One main limitation of our study was that most of the patients in our study group presented after 24 hours from the onset of symptoms. This delay in presentation of the patients to hospital and initiation of fluid therapy may have an influence on the outcomes.

Conclusion

We concluded that there was not found any statistically significant difference in the clinical outcomes of AP patients receiving normal or high volume fluid resuscitation in the initial 24 hours.

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