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Original Research Article

Single Centered Prospective Observational Assessment of the Intravenous Fluids in Acute Pancreatitis

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Abstract

Aim: To compare the occurrence, persistence or worsening of systemic inflammatory response syndrome (SIRS) and occurrence organ failure in patients with acute pancreatitis receiving normal and high-volume fluid therapy in the first 24 hours.

Material & Methods: This was a single centered prospective observational study conducted in the Department of General Surgery, Jagannath Gupta Institute of Medical Sciences and Hospital, Budge Budge, Kolkata, West Bengal, India. 50 patients admitted with AP as per the definition of modified Atlanta criteria were included in the study.

Results: The study population consisted of 34 males (65%) and 16 females (45%). The etiology of acute pancreatitis was most commonly alcohol (n=34%) and gallstone (n=18%) related. Other 15 cases were due to drugs and post endoscopic retrograde cholangiopancreatography (ERCP). The organ system involved was renal system.

Conclusions: Our study did not show any statistically significant difference in outcomes in patients with acute pancreatitis receiving normal or high-volume fluids in the initial 24 hours. Further multi-centric randomized control trials are required to analyze the outcomes of high and normal volume fluid resuscitation in acute pancreatitis.

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

Introduction

Acute pancreatitis (AP) is acute inflammation of the pancreas and has high morbidity and mortality rates [1]. AP displays a wide spectrum of disease presentation, ranging from self-limiting mild illness to rapidly progressive severe illness ending in multi-organ failure with a high risk of mortality. Different stages of severity have been described in the Atlanta classification [2]. It has been estimated that about 10% to 20% of AP patients develop the severe form, which has a 15% to 40% mortality rate [3].

A major factor complicating the appropriate management of AP is the

failure to discriminate its mild and severe forms in the initial stages. This issue is critical, as about half of the patients with severe AP die within the first week due to the development of organ failure; the incidence of organ failure is maximal (17%) on the first day [4-5]. The causes for later mortality are development of infected necrosis and other complications. Thus, it is important to identify factors that can predict severity of the AP disease so as to guide early clinical management within the so-called interventional window [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 treatacute 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].

Thus, we aim to compare the occurrence, persistence or worsening of systemic inflammatory response syndrome (SIRS) and occurrence organ failure in patients with acute pancreatitis receiving normal and high-volume fluid therapy in the first 24 hours.

Material & Methods:

This was a single centered prospective observational study conducted in the Department of General Surgery, Jagannath Gupta Institute of Medical Sciences and Hospital, Budge Budge, Kolkata, West Bengal, India .Study period was one year. The sample size was calculated using nMaster software with a confidence interval of 80% and an alpha error of 5%. 50 patients admitted with AP as per the definition of modified Atlanta criteria were included in the study.

Exclusion criteria included: patients with congestive cardiac failure and chronic renal diseases; patients already received treatment from other hospitals; patients presenting after 48 hours of onset of symptoms and pregnant women. This study was approved by the St. John's Medical College and Hospital institutional ethics committee.

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

All analysis was performed using Statistical Package for the Social Sciences (SPSS) version 2.15.0.

Results:

The study population consisted of 34 males (65%) and 16 females (45%) (Table 1).

Table 1: Gender distribution of study population.

Sex	Number	Percentage
Male	34	68
Female	16	32

Persistence/worsening of SIRS at 48 hours were more in normal volume fluid group compared to the high-volume fluid group (p=0.083). Organ failure at 48 hours is more in normal volume fluid group compared to the high-volume fluid group (p=0.080). Incidence of local complications was equal in both groups (Table 2).

Table 2: 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	8	5	12	5
Organ failure	1	1	2	1
Local complications	0	1	0	1

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.

The etiology of acute pancreatitis was most commonly alcohol (n=34%) and gallstone (n=18%) related. Other 15 cases were due to drugs and post endoscopic retrograde cholangiopancreatography (ERCP) (Figure 1).

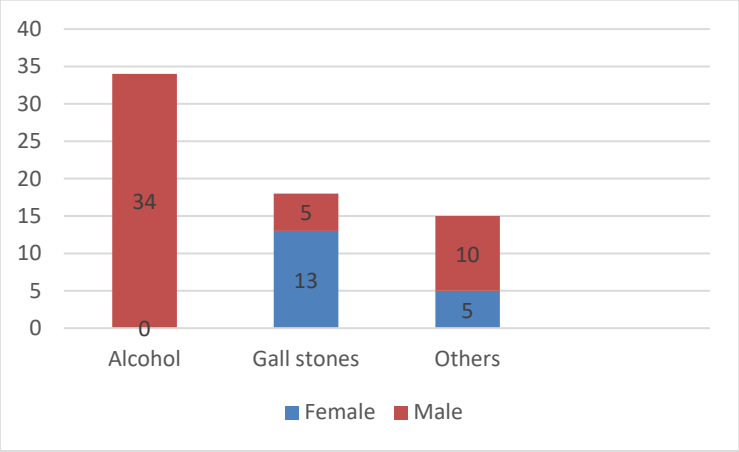

Figure 1: Etiological causes of acute pancreatitis

Most of the patients (n=38) presented after 24 hours from the onset of symptoms (Figure 2).

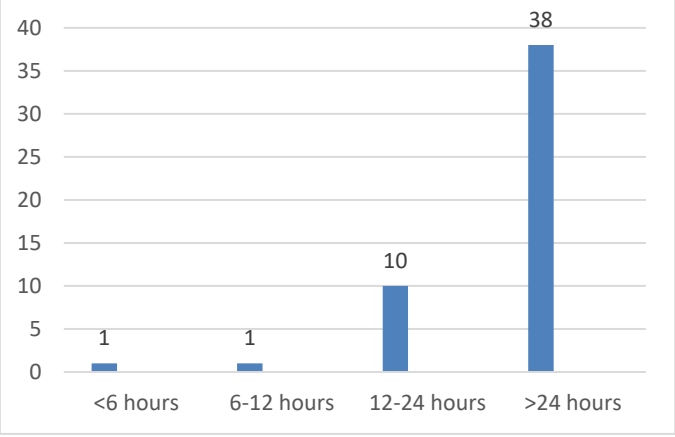

Figure 2: Time of presentation.

At the time of presentation, in the normal volume group 6 patients had SIRS and 1 patient had organ failure. At the end of 48 hours 5 patients had SIRS, 1 patients had organ failure and 1 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 (Figure 3).

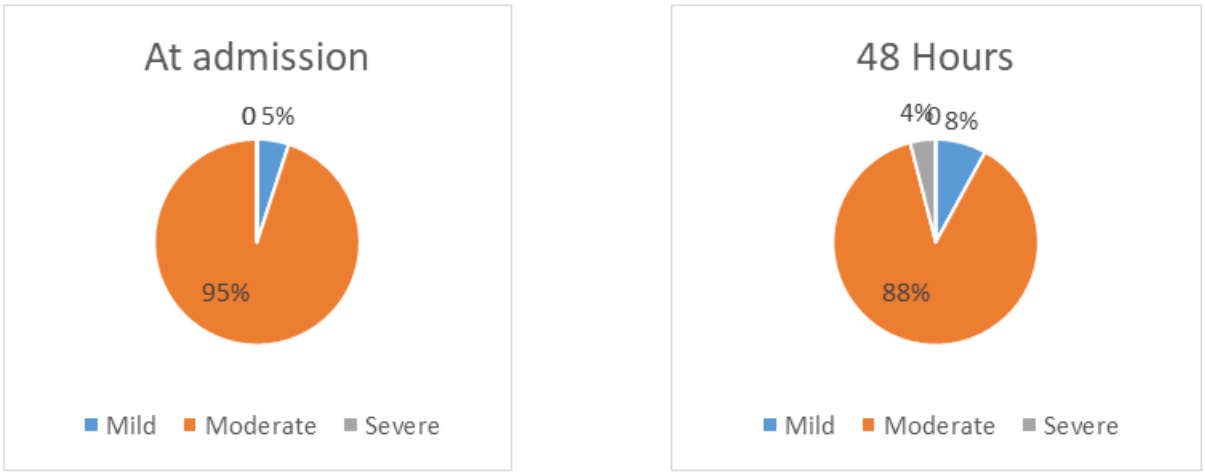

Figure 3: Severity of acute pancreatitis at admission and after 48 hours in the normal volume group.

In the high-volume group 15 patients had SIRS and 2 patients had organ failure at the time of admission. After 48 hours 5 patients had SIRS, 1 had organ failure and 1 developed pancreatic ascites (Figure 4). The organ system involved was renal system.

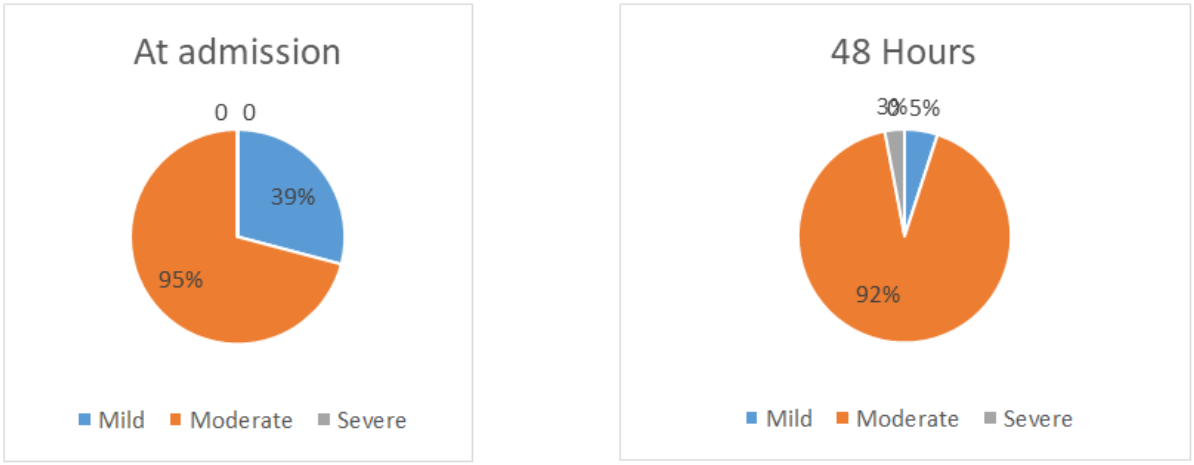

Figure 4: Severity of acute pancreatitis at admission and after 48 hours in the high-volume group.

Discussion:

The main goal of infusion therapy is to ensure adequate tissue perfusion. However, one might question whether urine output truly reflects tissue perfusion, which possibly explains the low level of recommendation (weak) in the current international guidelines [8]. Interestingly, the amount of chloride a specific infusion fluid contains, plays an important role in the effect of infusion fluid on diuresis. Infusion fluids containing supra-physiological concentrations of chloride, as is the case with normal saline, will induce intrarenal vasoconstriction, suppress renin and subsequently decrease glomerular filtration rate [12-14]. The ensuing decrease in diuresis increases the risk of intravascular volume overload. One

might speculate that with the use of the recommended balanced salt solutions, with a more physiological chloride content, diuresis will better reflect intravascular volume, and therefore prevent the need for diuretic therapy [12].

Pancreatic insult due to any etiology leads to release of pro-inflammatory mediators, such as zymogens, cytokines and vasoactive factors. These mediators cause endothelial cell activation leading to arteriolar vasoconstriction, increased permeability and circulatory stasis, thereby inducing ischemia [15]. Organ dysfunction usually occurs quite early in the course of severe AP, usually the first four days [16-17], and unless aggressive management is performed, it causes mortality in about 50% of cases within the first week of its manifestation [18].

Gallstone pancreatitis is more common in female subjects, and alcoholic pancreatitis was more common in middle-agedmale subjects. 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. [19-20]

Many recent prospective studies suggest that early aggressive fluid therapy is not associated with improved outcomes in patients with AP. [21-22] 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. [23-25]

Conclusion:

Our study did not show any statistically significant difference in outcomes in patients with acute pancreatitis receiving normal or high-volume fluids in the initial 24 hours. Further multi-centric randomized control trials are required to analyze the outcomes of high and normal volume fluid resuscitation in acute pancreatitis.

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