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ORIGINAL RESEARCH

Assessment of Cardiovascular Status and Hemodynamics in Patients of Severe Acute Pancreatitis on Liberal Vs Restrictive Fluid Therapy

[1]Dr. Nadia Bashir, [2]Dr. Shamsudeen MP, [3]Dr. Abid Ahmad Kuchay

[1]Medical Officer, Health and Medical Education Department, J&K India
[2]Assistant Professor, Department of Nephrology, GMC Ernakulam, Kerala India
[3]Assistant Professor, Department of Medicine Government Medical College Udhampur, J&K India

Corresponding Author:
Dr. Abid Ahmad Kuchay
Assistant Professor, Department of Medicine Government Medical College Udhampur, J&K India
Email: Abidkuchay2000@gmail.com

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Abstract:
Introduction: Acute pancreatitis (AP) is one of the most common diseases of the gastrointestinal tract,leading to tremendous emotional,physical,and financialhuman burden [1,2]. Acute Pancreatitis is an acute inflammatory process of the pancreas with variable involvement of other regional tissues or remote organ systems.**Material and Methods:** The present study is a prospective hospital based study. All patients of severe acute pancreatitis were included in the study.A total of 130 cases of severe acute pancreatitis were included and randomised into two study groups based on quantity of fluid therapy administered [liberal vs restrictive fluid]. The Patients were assessed for fluid overload on daily basis by observing clinical parameters, baseline Hematocrit (HCT) and Blood Urea Nitrogen (BUN).Cardiovascular dynamics and mortality were also studied using Troponin T and Echocardiography and compared between group A and group B.**Results:** There was significant difference in the percentage drop in haematocrit and BUN from Day1 to Day3 in both study groups and there was also significant mortality seen between two groups.

Keywords: Pancreatitis,Hematocrit, Blood Urea Nitrogen

Introduction:

Acute Pancreatitis is an acute inflammatory process of the pancreas with variable involvement of other regional tissues or remote organ systems. The most common cause of AP is gallstones (40 – 70 %) and alcohol (25 – 35 %).[5-14]. **Mild AP** is defined by the absence of organ failureand / or pancreatic necrosis [15-16]. **Severe AP** is defined by the presence of persistent (fails to resolve within 48 h) organ failure and / or death [16]. **The Revised Atlanta Criteria** now define organ failure as a score of 2 or more for one of these organ systems using the **modified Marshall scoring system** [16,19]

Initial management - as per American College of Gastroenterology:

Early Aggressive Intravenous Hydration: The rationale for early aggressive hydration in AP arises from observation of the frequent hypovolemia that occurs from multiple factors affecting patients with AP, including vomiting, reduced oral intake, third spacing of fluids, increased respiratory losses, and diaphoresis. In addition, researchers hypothesize that a combination of microangiopathic effects and edema of the inflamed pancreas decreases blood flow, leading to increased cellular death, necrosis, and ongoingrelease of pancreatic enzymes activating numerous cascades. Inflammation also increases vascular permeability, leading to increased third space fluid losses and worsening of pancreatic hypoperfusion that leads to

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increased pancreatic parenchymal necrosis and cell death.

Aims and Objectives: To study the quantity of fluid used in the management and the cardiovascular status and haemodynamics in patients of severe acute pancreatitis.

Materials and Methods: This is a prospective hospital based study was conducted in the department of Gastroenterology in collaboration with department of Cardiology SKIMS, Soura Srinagar for a duration of 2 years. All patients of severe acute pancreatitis presenting to SKIMS emergency were included getting a total of 130 cases and randomized into two study groups based on quantity of fluid therapy administered liberal (>4.1L/24hr)vs restrictive fluid(<3.1L/24hr) given for 48 hours following that patients were switched to conventional fluid replacement. The Patients were assessed for fluid overload on daily basis by assessing clinical parameters (dependent edema,rales on chest exam,JVP) , CVP and accordingly fluid overload. Baseline Hematocrit (HCT) and Blood Urea Nitrogen (BUN) was assessed and compared with values on Day3,and percentage drop in HCT and BUN was calculated and compared between group A and group B.CRP levels were measured .Cardiovascular dynamics were studied using Troponin T level and Echocardiography and compared between group A and group B.Mortality between two groups were compared. All cases of severe acute pancreatitis aged <65yrs were included andfollowing patients were excluded: Age>65yrs,pregnant female, patients with underlying cardiac comorbidity, CKD, pacemaker installed, acute on chronic pancreatitis.

Results:

Gall stone and alcohol abuse account for the bulk of the cases of Acute Pancreatitis consistent with previous studies[5,14].Of the 130 patients included in our study, gall stones account for 79 (60.76%) patients and idiopathic cases account for 37 (28.46%).In Group A, gall stone induced pancreatitis 38(58.5%)patients, idiopathic 16(24.6%) patients, worm induced pancreatitis 4(6.2%)cases, hypercalcemia 6(9.20%) patients. In Group B, gall stone induced pancreatitis 41(63.1%),idiopathic cases 21(32.3%),worm induced cases 3(4.6%).

Table 1: Etiology of studied patients in two groups

Etiology	Group A		Group B	
	No.	%age	No.	%age
Gallstone	38	58.5	41	63.1
Idiopathic	16	24.6	21	32.3
Worm	4	6.2	3	4.6
Hypercalcemia	6	9.2	0	0
Alcohol	1	1.5	0	0

Table 2: Showing fluid overload among two groups

Fluid Overload	Group A		Group B		P-value
	No.	%age	No.	%age	
Yes	5	7.7	3	4.6	0.718
No	60	92.3	62	95.4	
Total	65	100	65	100	

Table 3: Showing mortality among two groups

Mortality	Group A		Group B		P-value
	No.	%age	No.	%age	
Yes	12	18.5	5	7.7	**0.042***
No	53	81.5	60	92.3	
Total	65	100	65	100	

Statistically Significant Difference (P-value<0.05)

There was no significant difference in the percentile distribution of fluid overload in both study groups [(Group A;7.7%) vs(Group B;4.6%)].

There was significant difference in the percentage drop in haematocrit from Day1 to Day3 in both study groups [(Group A;15.4%) vs (Group B;9.2%)]

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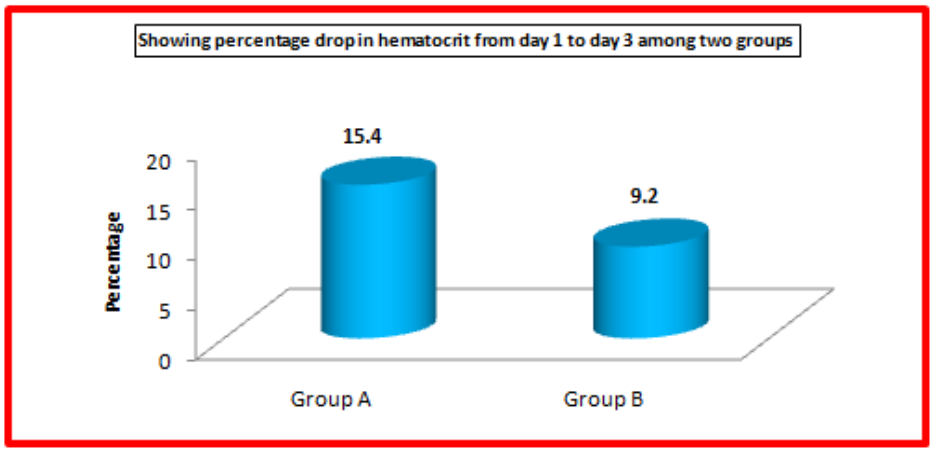

Fig 1: There was significant difference in the mean percentage drop in BUN from Day1 to Day3 in both study groups [(Group A;37.8%) vs (Group B;24.5%)].

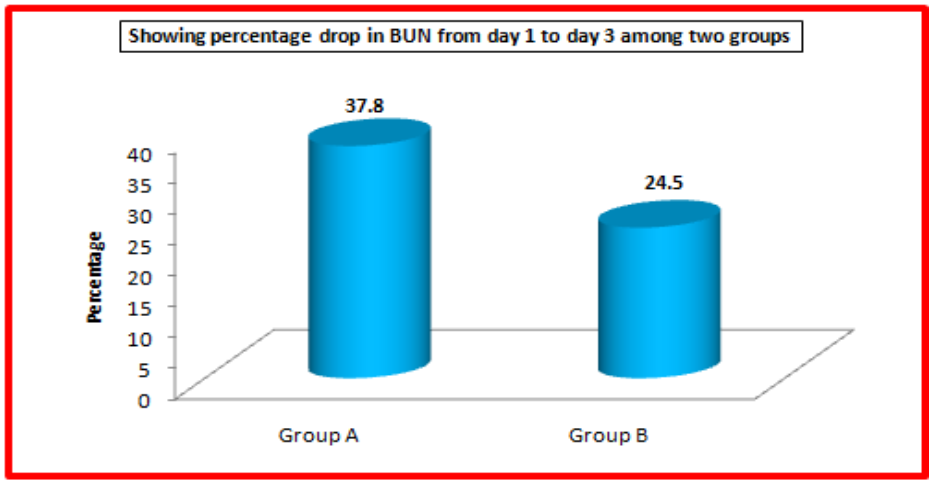

Fig 2: No significant diiference in CRP level was found in Group A and Group B.

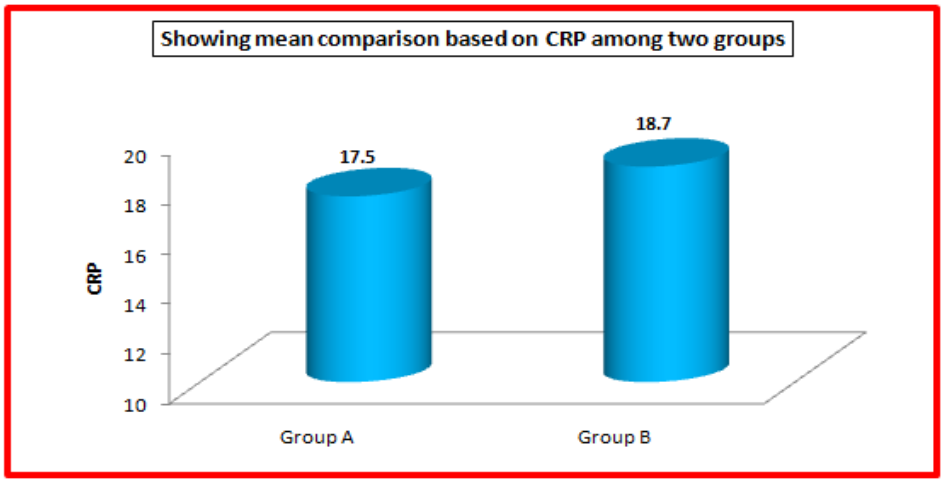

Fig3: There was no significant difference in the percentile distribution of elevation of Troponin-T levels in both study groups [(Group A;7.7%) vs(Group B;3.1%)]. No significant difference in Ejection Fraction and in the systemic and local complication profile in both study groups was seen as well.However there was significant difference in the

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mortality during hospital stay in both study groups [(Group A;18.5%) vs (Group B;7.7%)].

Discussion:

Acute pancreatitis (AP) is one of the most common diseases of the gastrointestinal tract, leading to tremendous emotional,physical, and financial human burden [1,2].Most episodes of AP are mild and self-limiting, needing only brief hospitalization.During this 2- year study,130 patients fulfilling inclusion criteria were included. Of these 63 were males and 67 were females.These 130 patients were randomly distributed into two study groups based on quantity of fluid administered in 24hrs.These two groups were; Group A,who received liberal fluid therapy (>4.1L/24h) and Group B, who received restrictive fluid therapy(<3.1L/24h).Of the 130 patients included in the study, the age of cases ranged from 21 years to 65 years. The median age in group A was 50.1-+10.59 and the median age in group B was 50.6+-12.07.The majority of the patients in Group A were in the age group of >60yr constituting 20 patients(30.8%) and 50-59yrs constituting 19 patients(29.2%).In the Group B,the majority of patients fall in 50-59yr constituting 26 patients(40%). Of the 65 patients in Group A, male patients were 34 (52.3%) whereas females were 31 (47.7%).In Group B,male patients were 29(44.6%) and female patients were 36(54.4%).Gallstone and alcohol abuse account for the bulk of the cases of Acute Pancreatitis consistent with previous studies[5,14].Of 65 patients enrolled in Group A,fluid overload was seen in 5(7.7%)patients, and among 65 patients in Group B ,fluid overload was seen in 3(4.6%)patients.There was no significant difference in the percentile distribution of fluid overload in both study groups. Hematocrit was done in all patients in both study groups on Day1 and repeated on Day3.Percentage drop in haematocrit was calculated and compared between two groups (Group A& Group B). Of 65 subjects enrolled in Group A, mean haematocrit on Day1 was 41.9+/-4.37SD and on Day3 was 35.3+/-4.35SD with percentage drop in haematocrit 15.4%.Of 65 subjects enrolled in Group B,mean haematocrit on Day1 was 43.2% +- 4.01SD and on Day3 was 39.3% +/-9.2SD with mean percentage drop in haematocrit 9.2% +/-4.09.There was significant difference in the percentage drop in haematocrit from Day1 to Day3 in both study groups [(Group A;15.4%) vs (Group B;9.2%)];7.7%) vs(Group B;4.6%)] consistent with results shown by **Mao etal[23],MAO En-qiang[21].**

Similarly,like haematocrit,Blood Urea Nitrogen (BUN) was done in all patients in both study groups on Day1 and repeated on Day3.Percentage drop in BUN was calculated and compared between two groups (Group A& Group B).

There was significant difference in the mean percentage drop in BUN from Day1 to Day3 in both study groups [(Group A;37.8%) vs (Group B;24.5%)] consistent with results shown by **Mao etal[23],MAO En-qiang[21].** C reactive protein,a marker of inflammation was measured in all patients of Severe Acute Pancreatitis included in the study. No significant difference in CRP level was found in Group A and Group B consistent with **Wu BU et al[24].** However,RL compared to NS as resuscitation fluid has been shown to reduce systemic inflammation and disease severity & less systemic complications[107]

There was no cardiovascular compromise in either study groups of our study. In Group A,cardiac marker Troponin-T was found positive in 5 patients(7.7%) and negative in 60 patients (92.3%).In Group B,Troponin-T was found positive in 2 patients (3.1%) and negative in 63patients(96.9%).There was no significant difference in the percentile distribution of elevation of Troponin- T levels in both study groups [(Group A;7.7%) vs Group B;3.1%)].

In Group A, mean EF was 62.9% and in Group B,mean EF was 62.1%.No significant difference in EF in both groups. Of 65 patients in Group A,RWMA was seen in 3 patients(4.6%),and;of 65 patients in Group B,RWMA was seen in 1 patient(1.5%).No significant difference in two study groups.In Group A,Local complication was seen in 55 (84.6%)patients whereas, In group B, local complications were seen in 44 (67.7%)patients.Not significant between two groups consistent with **Brown et al[20].**In Group A, respiratory,renal and CVS complications were seen in 54 patients(83.1%), 41patients(63.1%), 24patients(36.9%) respectively.

In Group B,among 65 patients included, respiratory, renal and CVS complications were seen in 49 patients(75.4%),38patients(58.5%),20patients(30.8%) respectively.

There was no significant difference in the systemic complication profile in both study groups.

Brown et al [20] showed that early aggressive fluid therapy has better outcome in terms of less systemic complications and mortality**, however, Gardner et al[22], Enrique de-Madaria et al[25]**, **Mao etal[23], Chang YS et al** showed that controlled fluid therapy is better and is associated with less complications and mortality.

Mortality during hospital stay was compared in two study groups as a marker of outcome.In group A,out of 65 patients,12 (18.5%) died;whereas,in group B,5 patients(7.7%) expired. There was significant difference in the mortality during hospital stay in both study groups [(Group A;18.5%) vs (Group B;7.7%)] consistent with previous studies[22,25,23].

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Conclusion:

In our study,aggressive fluid therapy led to significant percentage drop in hematocrit and BUN,however,restrictive fluid therapy was shown to be superior in terms of less organ failure and mortality during hospital stay.

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