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The impact of optimization fluid resuscitation in Acute Pancreatitis: A Retrospective study

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Abstract:

Background: Acute pancreatitis remains a clinical challenge, despite an exponential increase in our knowledge of its complex pathophysiological changes. Early fluid therapy is the cornerstone of treatment and is universally recommended; however, there is a lack of consensus regarding the type, rate, amount and end points of fluid replacement. **Material and Methods**: Records of patients who were admitted with Acute Pancreatitis in Mandya Institute of Medical Sciences, Mandya between June 2018 and May 2019 (1-year period) were studied and analysed. 76 acute pancreatitis cases were admitted during this period. Those diagnosed with acute pancreatitis on the basis of epigastric pain, serum amylase and serum lipase levels more than 3 times normal were subjected to the investigations and fluid management was analysed at the time of admission and after 48hours. **Results**: In our study, out of 76 cases admitted with the diagnosis of Acute Pancreatitis 22% had Severe acute pancreatitis, 72% affected were males,60% of the total were in 4th decade, alcohol was the most common aetiology 55%, followed by biliary pancreatitis 35% and idiopathic 10%. Patients managed with optimal fluid recovery rate was 87% in Mild Acute Pancreatitis, 67% in moderately severe Acute Pancreatitis and 54% in Severe Acute Pancreatitis. **Conclusion**: Acute pancreatitis is an inflammatory disease associated with a high mortality rate.[25] Adequate fluid resuscitation has been identified as a key intervention in prevention of systemic complications, however, the debate over the type, rate or amount of intravenous fluids to be administered is ongoing

Keywords: Acute Pancreatitis, fluid Optimization, Crystalloids, Colloids.

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Introduction

Acute pancreatitis (AP) is one of the commonest cause for admission in emergency surgical ward, which is nothing but acute inflammation of the pancreatic organ which has got very high morbidity and mortality rates. [1] The clinical presentation of AP varies from a self-limiting mild disease to rapidly progressive severe disease leading to multi-organ failure which has got a high risk of mortality, as well as morbidity. Stages of severity is described based on the revised Atlanta classification, as mild AP, moderately severe AP and severe AP. [2] Mild AP is not associated with any local or systemic complications, whereas moderately severe AP is associated with organ failure which subsides with in 48 hours, persistent organ failure is severe AP. The estimated risk is about 10% to 20% of AP patients develop the severe form, in which 15% to 40% is the 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] The causes for later mortality are development of infected necrosis and other complications. Therefore, it is important to identify factors that predicts the severity of the AP so that disease can be managed early within the so-called interventional window. Management of the disease is basically fluid resusctitation and optimal fluid management plays crucial role along with identification of the patients based on the severity reduces the morbidity and mortality. [5]

Management of AP is basically supportive care which includes nutritional oral or parenteral along with optimal fluid replacement. Hydration is basically correction of the fluid lossess which occurs because of the vomiting, decreased oral intake, third space extravasation, respiratory losses and diaphoresis. Therefore early replacement of the fluids provides both macrocirculatory and microcirculatory support which further prevents the complications that can lead to pancreatic necrosis. [6]

The earlier the resuscitation is started the outcome will be better. Type of fluid - Colloids and/or crystalloids, in crystalloids, Ringer lactate (RL) is better than normal saline(NS). [7] Colloids are better useful when albumin <
2.0 g/dL or haematocrit < 35%. Total fluid desirable in first 24 hrs is between 3 and 4 L, should not exceed 4 L. Rate of infusion, initially start with bolus of 1000 mL over one hour and to be followed by 3 mL/kg per hour (200 mL/h) for next 24-48 hrs. The things to be monitored are Urine output > 0.5 mL/kg/h, haematocrit
= 25% to 35%, and decrease in BUN (Blood Urea Nitrogen). The duration of resuscitation is 24-48 hrs or till signs of volume depletion disappear. If the haematocrit is ≥ 44% at the time of admission along with failure of decrease in the haematocrit at 24 h is the appropriate risk factor for development of necrosis. [8]

Hypovolemia is the main risk factor of poor outcome in patients with AP. In Severe AP because of uncontrolled inflammation which cause endothelial damage further resulting in vasodilation, capillary leakage and also oedema. Associated with vomiting, ascites and ileus, adds further vascular dysfunction leading to hypovolemia and acute circulatory failure. Because of the circulatory dysfunction, hypoperfusion of the tissues occurs leading to ischemia ending up in persistent pancreatic, extra-pancreatic tissue damage as well as multiple organ failure.

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Compared to the earlier period where fluid replacement was the only management, even after understanding the pathophysiology of AP treatment remains mostly supportive. Rapid fluid perfusions, also called fluid loading or volume expansion plays the major role in the management of AP. Correction of the depleted fluid with proper and efficient fluid loading prevents circulatory dysfunction. Also, judicious use of the fluid not to overload or underload prevents worsening of pancreatic injury and development of organ failure.

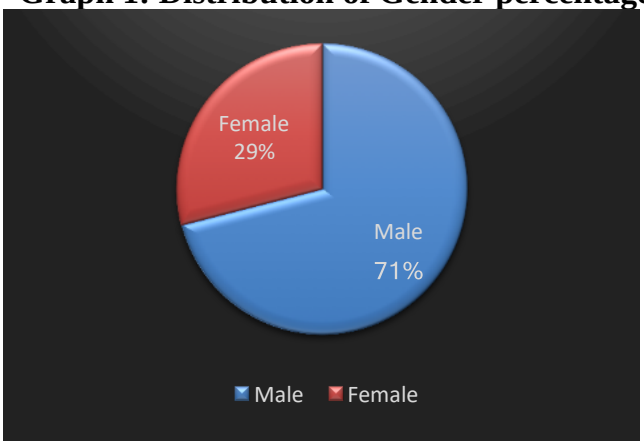
Material And Method

This study is a single centre, non-interventional, retrospective study conducted at Department of General Surgery, Mandya Institute of Medical Sciences, Mandya, Karnataka, India, between June 2018 and May 2019 (1-year period) were studied and analysed. 76 acute pancreatitis cases were admitted during this period. Those diagnosed with Acute pancreatitis on the basis of epigastric pain, serum amylase and serum lipase levels more than 3 times normal were subjected to Ultrasound Abdomen initially followed by Contrast enhanced CT Abdomen confirmed to have AP. Suspected AP were ruled with investigations. Optimal fluid management was analysed at the time of admission and after 48hours. Patients aged less than 14 years and elder patients more than 70 years are excluded. Statistical Analysis The data collected were tabulated. The tabulated data were analysed using descriptive statistics, i.e by using percentages.

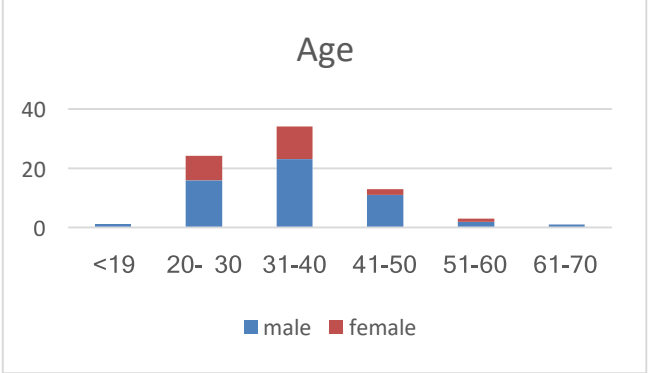
Result

In this study 76 patients were analysed, 54 (71.0%) were male, 22 (29%) were female patients in Graph 1.

Graph 1: Distribution of Gender percentage



Graph 2: Distribution of Age Group of the patients



In our study, youngest was 19 years of age and oldest was 69 years with a median age group of 43 years in Graph 2

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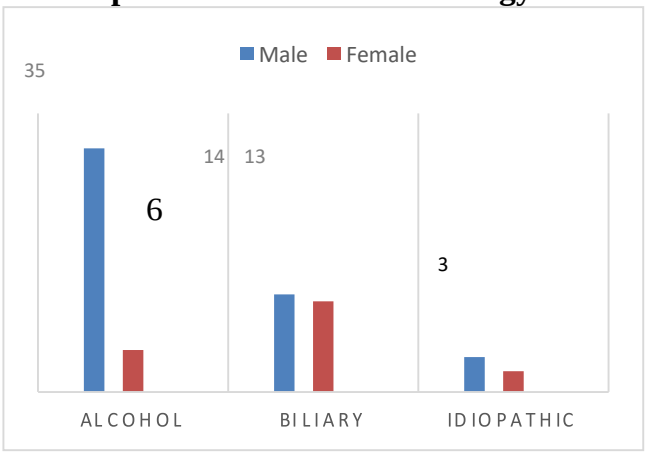
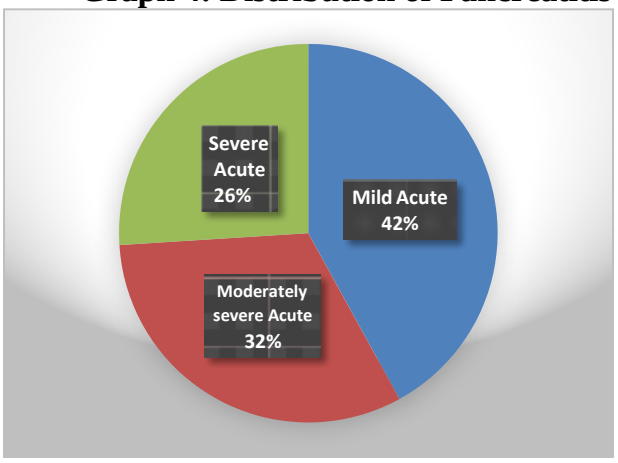
Graph 3: Distribution of Etiology



In Graph 3, 60% of the total were in 4th decade, alcohol was the most common aetiology 53.9%, followed by biliary pancreatitis 35.5% and idiopathic 9.2%.

Graph 4: Distribution of Pancreatitis



Patients managed with optimal fluid recovery rate was 42% in Mild Acute Pancreatitis, 32% in moderately severe Acute Pancreatitis and 26% in Severe Acute Pancreatitis in graph 4.

The common presentation in these patients was upper Abdominal pain radiating to back increased on oral feeds followed by distension of abdomen, nausea and vomiting. Optimal fluid management patients had high recovery rate. Duration of the stay in the hospital ranged between 2 to 17 days with mean duration being
10 days. Patients with multi-organ dysfunction syndrome along with shock were 4 in number and 12 patients had multi-organ dysfunction without shock.

Discussion

The diagnosis of AP requires at least presence of two out of the three criteria: (i) abdominal pain in epigastric region radiating to the back, (ii) biochemical evidence of pancreatitis (serum amylase and/or lipase greater than three times the upper limit of normal), and (iii) characteristic findings in imaging either the ultrasound of the abdomen or in contrast enhanced computer tomogram (CECT). Early identification of the disease is crucial and optimal fluid management is necessary to reduce the morbidity and mortality in acute pancreatitis When taking care of patients suffering from AP, it is strongly recommended to

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immediately assess hemodynamic status and begin resuscitative measures.

Early and aggressive fluid resuscitation was earlier usually recommended and seemed to reduce morbidity and mortality. Early resuscitation refers mostly to fluid loading within the first 24 h of management. Aggressive resuscitation is a liberal strategy of fluid administration to reach predetermined endpoints. In the latest guidelines, aggressive fluid therapy is defined as the administration of 250-500 mL per hour to all patients, except for those suffering from cardiovascular, renal and other comorbid conditions. [9]

Also in case of suspected severe volume depletion, additional fluids are recommended. Proposed endpoints for guiding fluid therapy are mostly based on clinical parameters Arterial blood pressure, heart rate (HR) and urinary output (UO), blood urea nitrogen (BUN), haematocrit changes at 12-24 h after admission, and optionally central venous pressure (CVP). Finally, based on these endpoints, reassessment of fluid requirement is advised every 6 hours within the first 24 to 48 hours.

However fluid administration as recommended can lead to an amount of about 6-12 L of fluids during the first
24 h. However, aggressive fluid therapy which is practised routinely corresponds to around of 4.5 L of fluid over the first 24 hours, compared to 3.5 L for non- aggressive therapy. Also, fluid loading must be based on the Urine Output, Heart rate, blood pressure, haematocrit and BUN. That's why it is important to know what is optimal fluid management along with fluid volume also about the time period and endpoints. Aggressive fluid loading is essential, not just for patients suffering from AP but also generally in other diseases as well where significant fluid therapy is required.

There is no clear response over the superiority of one fluid strategy over another because of the great variability of individual response to volume expansion and also due to the specific hemodynamic status of each patient at a given time. Therefore, aggressive therapy may be good for some patients and at the same time it can be deleterious for others. Newer methods which allows better hemodynamic and fluid management have been developed over the last 12 to 15 years. The aims of this strategy is to restore specific hemodynamic parameters with an individualized management named "early goal-directed therapy" (EGDT), in which fluid expansion plays the major part. [10] The various steps in this is first to determine the specific population, followed by to assess tissue perfusion and oxygenation goals to be achieved and lastly to choose the appropriate therapy in order to reach these predetermined goals. Optimal fluid management has proved to be very important in high-risk surgical patients as well as in severe sepsis.

Though early aggressive fluid therapy in acute diseases like acute myocardial infarction, stroke and trauma improved mortality and had good outcomes. EGDT was conceived for optimizing treatment when tissue oxygenation is impaired by hemodynamic failure, which is nothing but a multifaceted strategy aimed to adjust oxygen delivery to oxygen consumption. The concept of a global hemodynamic strategy guided by oxygen transport variables was first proposed in 1983 for high-risk surgical patients. [11] EGDT as a time-sensitive method has been initially applied to patients suffering from severe sepsis and septic shock, then in all patients with elevated lactate level, regardless of etiology. EGDT can also be applied to the perioperative management of patients undergoing major surgery, like cardiovascular or gastro-intestinal surgeries. EGDT has now reduced morbidity, mortality and also healthcare resource consumption. [12]

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Conclusion

Optimal fluid resuscitation is the best way of management in Acute pancreatitis, early identification of the suspected AP, confirming the diagnosis and by classifying them according to the Atlanta Classification as Mild, moderately severe and severe AP helps in reducing the morbidity and mortality. Acute pancreatitis is an inflammatory disease associated with a high mortality rate. Adequate and optimal fluid resuscitation has been identified as a key intervention in prevention of systemic complications, however, the debate over the type, rate or amount of intravenous fluids to be administered is ongoing

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