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Original Research

Comparison of two fluid-management strategies in acute lung injury following traumatic injuries to chest

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ABSTRACT

Background: Acute lung injury (ALI) and the acute respiratory distress syndrome (ARDS) are common complications in patients with traumatic injuries. The present study was conducted to compare two fluid-management strategies in acute lung injury following traumatic injuries to chest. **Materials & methods:** The present study was conducted on 86 patients of lung injuries following traumatic chest injuries of both genders. Patients were divided into 2 groups of 43 each. Group I patients received conservative fluid management Pulmonary-Artery Catheter (PAC) and group II patients received liberal fluid management using Central Venous Catheter (CVC). **Results:** Out of 86 patients, males were 48 and females were 38. APACHE score in group I was 93.1 and in group II was 95.1, primary lung injury in group I was pneumonia seen 3 in group I, 4 in group II, sepsis in 5 in group I and 7 in group II, trauma 31 in group I and 28 in group II, aspiration 4 in group I and 3 in group II. Mean arterial pressure was 77.5 mm Hg in group I and 72.3 mm Hg in group II CVP was 11.4 and 12.6 in both groups, cardiac index was 4.5 in group I and 4.6 in group II. The difference was non- significant (P> 0.05). **Conclusion:** Authors found that lung injury is commonly encountered in chest trauma. Primary lung injury was pneumonia, sepsis, trauma and aspiration.

Key words: Chest injury, Pneumonia, sepsis

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INTRODUCTION

Acute lung injury (ALI) and the acute respiratory distress syndrome (ARDS) are common complications in patients with traumatic injuries.[1] Trauma-associated ALI/ARDS has a lower mortality than ALI/ARDS associated with sepsis or other clinical risk factors such as pneumonia, pancreatitis or aspiration, possibly implying a different mechanism or pathological basis for the disease.[2] Despite the evidence that the pathophysiology of ALI/ARDS may differ depending on the underlying clinical disorder, the current clinical standard for diagnosis of ALI/ARDS is the 1994 American-European Consensus Criteria, which does not take into account the underlying cause of ALI/ARDS. The Consensus definition includes: 1) the acute onset of bilateral infiltrates on chest radiograph, 2) a low ratio of partial pressure of arterial oxygen to the fraction of inhaled oxygen, and 3) the absence of clinical evidence of left atrial hypertension. Because these are all clinical criteria, the definition does not account for the underlying biological and pathological mechanisms. Furthermore, despite the simplicity of the Consensus Criteria, ALI and ARDS are underdiagnosed and undertreated.[3]

Pulmonary edema resulting from increased capillary permeability, a hallmark of acute lung injury, worsens as intravascular hydrostatic pressure rises and oncotic pressure falls. Although lung failure alone can be lethal,

death in patients with acute lung injury is usually due to the failure of nonpulmonary organs.[4] The present study was conducted to compare two fluid-management strategies in acute lung injury following traumatic injuries to chest.

MATERIALS & METHODS

The present study was conducted in the department of Orthopaedics & Chest TB. It comprised of 86 patients of lung injuries following traumatic chest injuries of both genders. All patients were informed regarding the study and written consent was obtained. The study was approved from institutional ethical committee.

Data such as name, age, gender etc. was recorded. A thorough examination was done. Patients were divided into 2 groups of 43 each. Group I patients received conservative fluid management Pulmonary-Artery Catheter (PAC) and group II patients received liberal fluid management using Central Venous Catheter (CVC). Results obtained were tabulated and analyzed. P value<0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 86		
Gender	**Male**	**Female**
Number	48	38

Table I, graph I shows that out of 86 patients, males were 48 and females were 38.

Graph I Distribution of patients

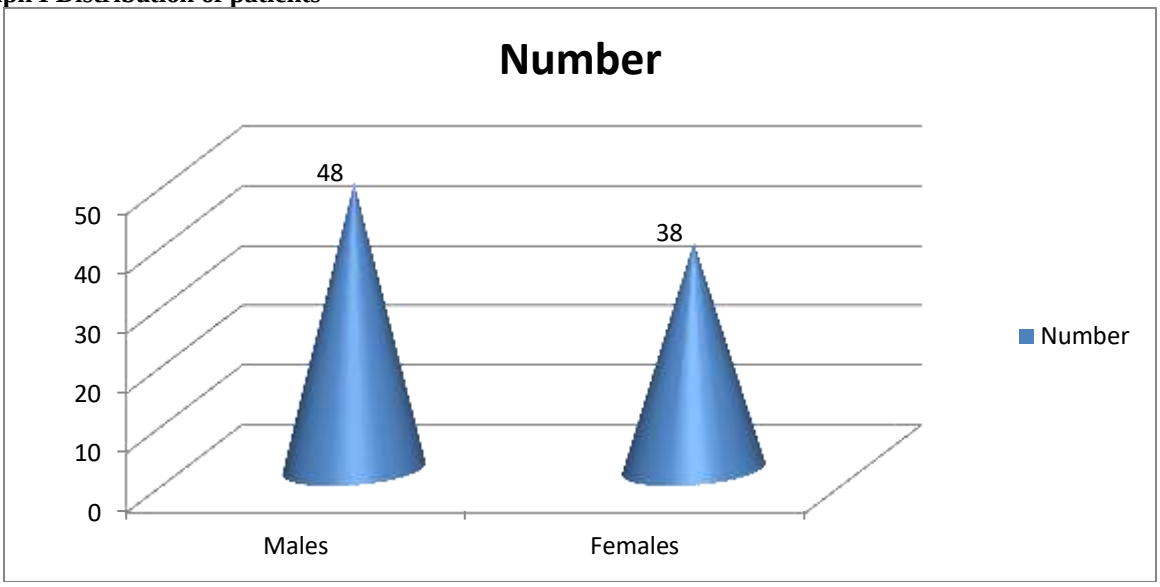
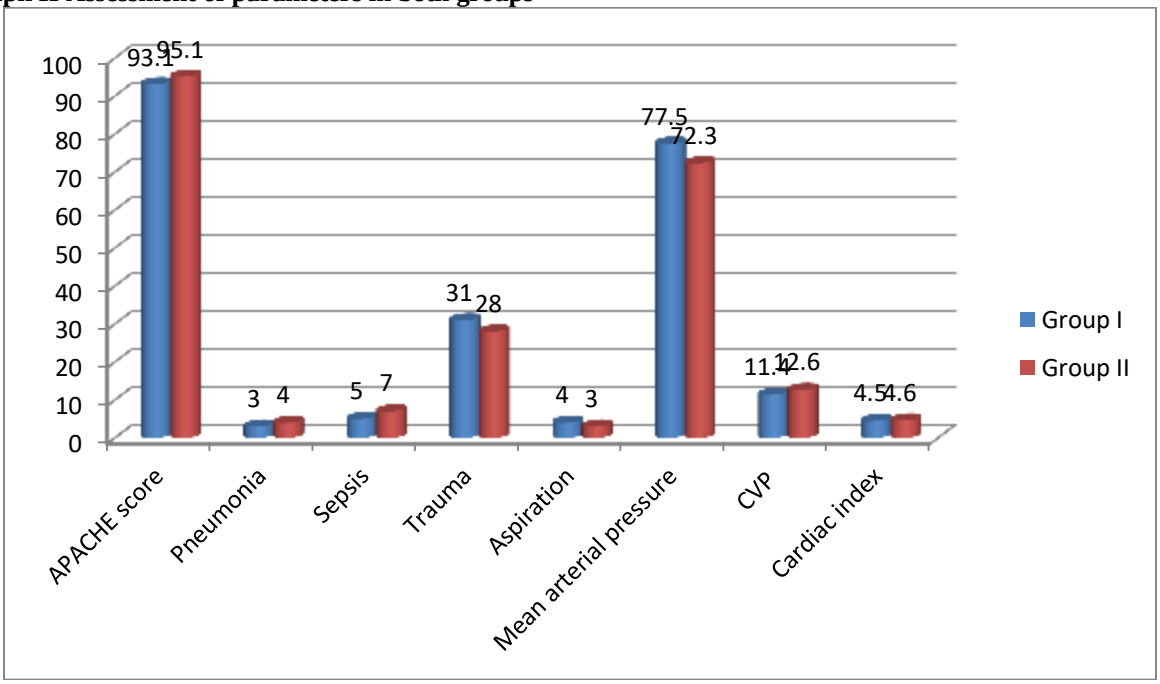


Table II Assessment of parameters in both groups

Parameters	Group I	Group II	P value
APACHE score	93.1	95.1	0.12
Primary lung injury			
Pneumonia	3	4	0.01
Sepsis	5	7	
Trauma	31	28	
Aspiration	4	3	
Mean arterial pressure	77.5	72.3	0.98
CVP	11.4	12.6	0.81
Cardiac index	4.5	4.6	0.93

Table II shows that APACHE score in group I was 93.1 and in group II was 95.1, primary lung injury in group I was pneumonia seen 3 in group I, 4 in group II, sepsis in 5 in group I and 7 in group II, trauma 31 in group I and 28 in group II, aspiration 4 in group I and 3 in group II. Mean arterial pressure was 77.5 mm Hg in group I and 72.3 mm Hg in group II CVP was 11.4 and 12.6 in both groups, cardiac index was 4.5 in group I and 4.6 in group II. The difference was non- significant (P> 0.05).

Graph II Assessment of parameters in both groups



DISCUSSION

Acute lung injury (ALI) and its more severe form, acute respiratory distress syndrome (ARDS), may result from a variety of different initial insults, including sepsis, aspiration, pneumonia, multiple transfusions, and trauma.[5] The recognition that patients with ALI are a heterogeneous group has led to significant advances in understanding the pathogenesis of the syndrome. An increasing body of literature strongly suggests that the pathogenesis of ALI may vary with the clinical risk factor that precedes the development of ALI.[6] Multiple studies have reported that trauma-related ALI has a lower mortality than ALI owing to other clinical risk factors. Moreover, a recent study found that ALI does not increase mortality in patients with trauma, in contrast to other studies that have shown that ALI significantly increases mortality in septic patients.[7]

Prior studies also have suggested that trauma-related ALI may differ pathophysiologically from nontrauma–related ALI. Previous studies of biological specimens from patients with ALI have demonstrated the utility of plasma biomarkers both for predicting patient outcomes and for providing important insights into disease pathogenesis.[8] Patients with trauma-related ALI had lower levels of biomarkers that reflect endothelial activation—von Willebrand factor antigen (vWF), intercellular adhesion molecule-1 (ICAM-1), and E-selectin—than patients with sepsis as a risk factor for ALI, even after controlling for severity of illness. Similarly, previous studies of patients from the ARDS Network's trial of low tidal volume ventilation noted that levels of vWF were significantly lower in trauma patients than in patients with other risks for lung injury.[9] The present study was conducted to compare two fluid-management strategies in acute lung injury following traumatic injuries to chest.

In present study, out of 86 patients, males were 48 and females were 38. We divided patients into 2 groups of 43 each. Group I patients received conservative fluid management Pulmonary-Artery Catheter (PAC) and group II patients received liberal fluid management using Central Venous Catheter (CVC).

Goss et al[10] in a randomized study, compared a conservative and a liberal strategy of fluid management using explicit protocols applied for seven days in 1000 patients with acute lung injury. The primary end point was death at 60 days. Secondary end points included the number of ventilator-free days and organ-failure–free days and measures of lung physiology. The rate of death at 60 days was 25.5 percent in the conservative-strategy group and 28.4 percent in the liberal-strategy group. The mean cumulative fluid balance during the first seven

days was 136 ml in the conservative-strategy group and 6992 ml in the liberal-strategy group (P<0.001). As compared with the liberal strategy, the conservative strategy improved the oxygenation index ([mean airway pressure × the ratio of the fraction of inspired oxygen to the partial pressure of arterial oxygen] × 100) and the lung injury score and increased the number of ventilatorfree days and days not spent in the intensive care unit during the first 28 days but did not increase the incidence or prevalence of shock during the study or the use of dialysis during the first 60 days (10 percent vs. 14 percent, P = 0.06).

We found that APACHE score in group I was 93.1 and in group II was 95.1, primary lung injury in group I was pneumonia seen 3 in group I, 4 in group II, sepsis in 5 in group I and 7 in group II, trauma 31 in group I and 28 in group II, aspiration 4 in group I and 3 in group II. Mean arterial pressure was 77.5 mm Hg in group I and 72.3 mm Hg in group II CVP was 11.4 and 12.6 in both groups, cardiac index was 4.5 in group I and 4.6 in group II.

CONCLUSION

Authors found that lung injury is commonly encountered in chest trauma. Primary lung injury was pneumonia, sepsis, trauma and aspiration.

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