Original Article

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Role of Conservative Management of Traumatic Chest Injuries: A Retrospective Study & Review of Literature

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Abstract

Introduction: Chest injuries continue to be a major cause of acute respiratory distress with its morbidity and mortality in otherwise healthy young people. Airway access and control, oxygen therapy, and chest tube drainage are the mainstay of therapy. Chest tube drainage carries a risk of complications ranging from minor in over one-third of cases to around a 5% incidence of more serious events.

Objectives: To examine the management of traumatic chest injuries in surgery department where some of these injuries do not receive chest tubes.

Materials and Methods: A retrospective study of the management of traumatic hemo/pneumothorax performed in surgery department where many of these injuries have been treated conservatively.

Results: 60 patients with chest injuries in a year identified. Of these, 35 patients (58.3%) were initially managed without chest tube. 3 patients subsequently required chest tube insertion due to radiological enlargement of the pneumothorax. No patients worsened during conservative treatment.

Conclusion: Chest tube insertion for mild or small sized traumatic chest injury may be avoided, if there are no associated significant injuries.

Key words: Chest injuries, Chest tube, Conservative, Hemothorax, Pneumothorax, Trauma

INTRODUCTION

Chest injuries secondary to trauma are on the rise due to increased frequency of road traffic accidents (RTAs) and increase in community violence. RTAs stand first among all traumatic injuries and are in the rising trend in India even in rural population.[1] The number of accidental deaths in India is more when compared to the Western World.[1] Thoracic trauma contributes heavily to these figures along with head injury, orthopedic injuries, and abdominal injury. Approximately, one-quarter of civilian trauma deaths are caused by trauma to thorax, and many of these deaths can be avoided by precise diagnosis and proper management.[2]

Managing a grievously injured patient presents a clinical challenge, especially in semi-urban and rural centers. The combination of clinical foreknowledge, ability to spot changing clinical signs, and even-tempered surgical courage to perform simple but lifesaving procedures can bring about a profound difference in outcome for the chest injured patient - even in resource-limited settings.[3]

In spite of all these, chest tube insertion for traumatic chest injuries can lead to significant morbidity and complications. In 1997, Collop *et al.* reported 3% early complication rate including misplacement and an 8% delayed complication rate including dislodgement, infection, and kinking.[4]

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Chest tubes are a source of intrathoracic infections such as empyema and pneumonia. However, the efficacy of antibiotics given as prophylaxis against such complications has not been substantiated.[5,6] Nevertheless, there have been some more serious misplacements, for example, perforation of the left atrium[7] and liver injury with a large bore chest tube[8] and vascular injuries, esophageal injuries, chylothorax, and cardiac dysrhythmias.[9]

Some of the chest injuries leading to hemothorax and pneumothorax can be managed conservatively without chest tube drainage provided it is mild or small, and the patient is able to maintain oxygenation without supportive treatment.

In this study, we examine the management of traumatic pneumo/hemothorax in our department where some of these injuries are managed without chest tube drainage.

MATERIALS AND METHODS

Patients treated at the Department of General Surgery at R. L. Jalappa Hospital, Tamaka, Kolar, India with a diagnosis of traumatic chest injury were identified by a search of the departments' computerized database from the period of 1st January 2014 to 31st December 2014. The hospital notes and A and E records were retrieved, and information obtained concerning the cause, nature, and mode of injury, the presence of other associated injuries, and the method adopted for the treatment of traumatic chest injury. Associated injuries which needed some surgical procedure for the patient were defined as significant. As the radiographic technique was variable, the effort to quantify the size of the pneumo/hemothorax was limited. The records containing the clinical assessment of the patient, treatment, and outcome were analyzed.

RESULTS

The retrospective study included a total of 60 patients, of which 49 (81.6%) were male patients, and 11 (18.3%) were female patients (Table 1). In this study, chest injury was highest in the 3rd decade of life, accounting 45% of cases. The lowest incidence observed in 10-20 years age group, i.e., 3% of cases. Mean age was 39 years (Graph 1).

The mechanisms of injury and methods of treatment shown in Tables 2 and 3).

Initial treatment involved insertion of a chest tube in 25 patients with a chest injury. The majority of patients, in this group, had significant associated injuries. Most of these patients were from RTAs.

Table 1: Distribution of patients according to gender in the study

Sex	Number of patients (%)
Male	49 (81.6)
Female	11 (18.3)
Total	60 (100)

Table 2: Distribution of patients according to mode of chest injury in the study

Cause	Number of patients	Percentage
RTA	40	66.6
Assault	6 (1 knife stab)	10
Fall from height	10	16.6
Building	(4)	
Tree	(6)	
Self-fall	2	3
Fall of heavy object	1	1.6
Others	1 (bull gore injury)	1.6
Total	60	100

RTA: Road traffic accidents

Table 3: Number of pneumo/hemothorax by mechanism of injury, and mode of management

Mechanism of injury	Conservative management	ICD insertion	Total
RTA	21	19	40
Falls	5	5	10
Assault	3	3	6
Industrial	1	0	1
Other significant injuries	2	1	3
Total	32	28	60

RTA: Road traffic accidents

In 35 chest injury patients, initial management was observation only, either as an inpatient or as an outpatient. Chest tube insertion subsequently undertaken in 3 patients because of radiological enlargement of the pneumothorax 4 h after admission. None of these patients had clinical deterioration before insertion of the chest tube. A total of 32 patients were managed conservatively and recovered without a chest tube.

All patients with hemo/pneumothorax treated conservatively were described as "mild" or "small." All chest injuries described as "large" or "severe," were treated initially with chest tube insertion.

The retrospective study included total of 60 patients of which 81.6% were male, and only 15.3% were female patients.

In our study, 3rd decade of life shows the highest incidence of chest injuries, accounting to 45%. The lowest incidence was observed in 10-20 age group, i.e. only 3%. Mean age was 39 years (Graph 1).

RTA being the most common mode of injury in our study accounting as high as 66.6% of the total 60 patients. There were 10% patients with chest injuries because of assault, of this only one had assault with a knife. 16.6% of patients sustained chest injuries due to fall from height. (Table 2)

Most of the patients had multiple complaints on presentation, of which most common was chest pain (36 patients) followed by an external wound (32 patients). Least common presentation was unconsciousness, which was seen in only 3 patients (Graph 2).

In our study, among 60 patients, 42 patients had a pneumothorax, 12 patients had hemothorax, 5 patients had hemo/pneumothorax, and only 1 patient had tension pneumothorax (Graph 3).

In our study, most common clinical sign noticed was positive chest compression seen in 65.3% patients, followed by reduced breath sounds in 38.4% patients. Tracheal deviation and paradoxical breathing were the least common signs and were noted in one patient each (Graph 4).

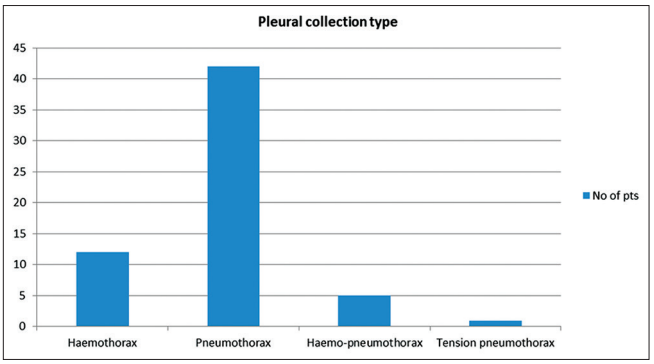
Among 60 patients, 32 patients were managed conservatively and 28 patients with chest tube insertion (Pie chart 1).

DISCUSSION

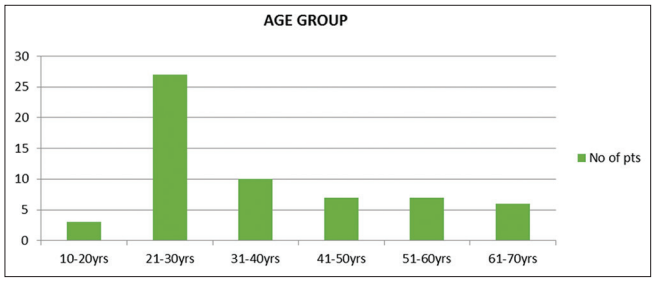
Chest injuries, often a part of polytrauma, were isolated injuries in this study. The majority of the patients were managed conservatively without the insertion of a chest tube. This suggests that some traumatic pneumo/hemothorax will resolve spontaneously when managed conservatively.

Catheter aspiration for simple pneumothorax for outpatient management has been reported.[10] However, conservative management of chest injuries is rarely followed.

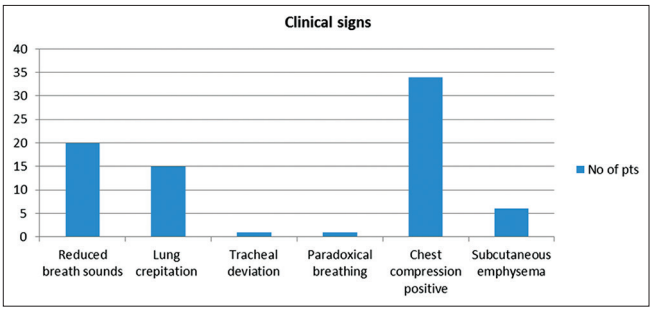
In a large South African series of predominantly penetrating injuries to the chest,[11] traumatic pneumothorax were initially managed conservatively if there was <20% reduction in lung volume. More than 40% patients were initially managed conservatively. In 10% of these, a chest drain insertion was subsequently done because of expansion of the pneumothorax.



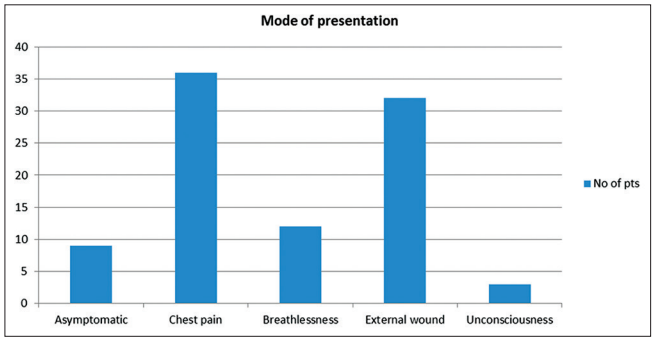
Graph 3: Distribution of patients according to the type of pleural collection in the study



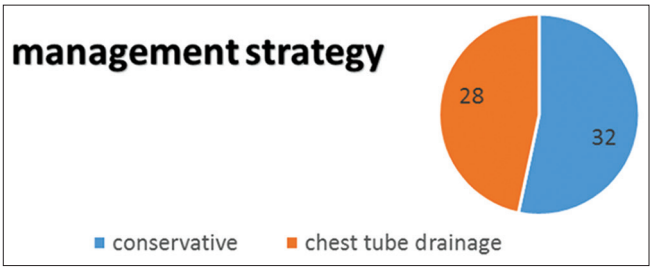
Graph 1: Distribution of patients according to age group



Graph 4: Distribution of patients according to clinical signs in the study



Graph 2: Distribution of patients according to mode of presentation of patients in the emergency department



Pie chart 1: Distribution of patients according to management strategy of patients in the study

Occult pneumothorax, defined as those recognized by abdominal computerized tomographic (CT) scanning but not detected on routine screening chest X-rays, occur in 2-6% of patients undergoing CT scanning for blunt abdominal trauma.[12] These patients do not require any further assessment like a repeat chest X-ray. They can be managed conservatively.

There are a few prospective studies which compare the conservative approach with chest tube approach in patients with traumatic chest injuries. One randomized study shows that patients can be treated conservatively in the absence of the use of intermittent positive pressure ventilation (IPPV). However, patients with an occult pneumothorax who also received IPPV had a high rate of progression of the size of their pneumothorax, with 3 out of 21 developing tension pneumothorax.[13]

This approach of conservative management can be applied to patients with mild or small injuries, patients who have no other significant injuries, and patients who are maintaining vital signs and oxygenation. The insertion of a chest tube is therefore not an essential part of the treatment of all chest injuries.[14]

Patients need admission for observation, require pain medication, and monitoring of vital signs. If they develop any signs of respiratory distress, they need to undergo the insertion of the chest tube.

A repeat chest X-ray has to be done after 4 h to see any enlargement of hemo/pneumothorax. Any expansion in the size of hemo/pneumothorax mandates the insertion of the chest tube. Most of the patients with mild or small injuries will resolve spontaneously without exposing the patient to the risks associated with the chest tube insertion.

However, a chest tube is compulsory for patients in respiratory distress on presentation, patients who require IPPV, patients with associated significant injuries, and patients who develop respiratory distress during conservative management.

CONCLUSION

Mild or small sized chest injuries can be managed conservatively without the need for a chest tube. Chest tube insertion is required in patients who present with respiratory distress, need IPPV and patients with associated significant injuries.

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