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Original Article

Study of Various Factors Which Influence the Outcome of Patients with Blunt Injury Chest

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Abstract

Introduction: Injury is the most common cause of death among people aged 1–34 years. The most common cause of injury is a road traffic accident and the majority is confined to the thoracic cage. These consist of rib fractures with underlying pulmonary contusion. When ignored, underestimated or inadequately treated chest injuries may cause the death of a patient during surgical intervention for seemingly more pressing intracranial or abdominal hemorrhage.

Aim: This study aims to study the outcome of blunt injury chest patients in emergency and various modalities of treatment to identify possible risk factors for mortality.

Materials and Methods: A prospective review of all cases of trauma with blunt chest injuries evaluated with X-ray or computed tomography scan. The cases were examined for age, type of injuries, presence or absence of rib fractures, hemothorax, or pneumothorax.

Results: There were 50 patients included in this study. All had rib fractures and hemo/pneumothorax, 3 had lung contusion, 19 patients had associated injuries, 1 patient underwent emergency thoracotomy, 3 patients were kept on ventilator support, and 3 expired.

Conclusion: Close attention to improving gas exchange and early management of hemo/pneumothorax might improve outcomes in blunt injury chest.

Key words: Blunt injury, Management, Rib fractures

INTRODUCTION

Trauma-related mortality accounts for 9% of deaths in all age groups and most cases involve blunt injuries.[1,2] Multiple trauma is the main cause of disability and a major contributor to health cost approximately 16% of global medical expenses. Chest trauma is one of the most common injuries suffered by polytrauma patients with an incidence of 45–65% associated with a mortality rate of about 60%. Blunt trauma to chest in isolation is fatal in 10% of patients, rising to 30% in the presence of other injuries. Early deaths after thoracic trauma are due to hypoxemia, hypovolemia, and tamponade.[1-3] The first step in treating such patients should be to diagnose and treat these problems as early as possible because they may be readily corrected. Therefore, thoracic injury is important in the overall management of polytrauma patients requiring a longer stay in the intensive care unit (ICU) and the use of mechanical ventilation.[3-7] The present study analyzed the outcomes of blunt injury chest patients in emergency and various modalities of treatment to identify possible risk factors for mortality.

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Aim

This study aims to study the outcome of blunt injury chest patients in emergency and various modalities of treatment to identify possible risk factors for mortality.

MATERIALS AND METHODS

The study included 50 patients who presented to the casualty with blunt injury to chest with rib fractures

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and significant hemo/pneumothorax requiring tube thoracostomy with or without associated injuries. The various modes of injury, various presentations, and the various factors associated with poor outcomes such as elderly patients, multiple rib fractures, first and second rib fractures, coexisting chronic lung disease, and flail chest have been evaluated. Stable patients have been evaluated with chest X-ray, ultrasonography abdomen and pelvis, and computed tomography chest for assessing various chest injuries and associated injuries. Unstable patients with clinical evidence of tension pneumothorax, tube thoracostomy has been done without waiting for X-ray chest. Simple rib fractures were managed with analgesics, antibiotics. The first and second rib fractures were evaluated for potentially serious injuries to the chest and other organs. Patients with lower rib fractures were evaluated for underlying abdominal visceral organs (spleen on left and liver on right). Patients with multiple rib fractures and flail chest were managed in the ICU and provided thoracic epidural analgesia and ventilator support.

RESULTS

There were 50 patients included in the study. Elderly patients, especially those with the pre-existing chronic pulmonary disease, have a higher risk. In this study, six patients were aged more than 60 years of whom one patient died. Fractures involving the first and second ribs are a definitive risk factor. In this study, two of the eight patients with fracture first or the second rib died with a mortality rate of 25%.

Flail chest is a serious injury. In this study, two patients had multiple rib fractures with a flail chest. With tube thoracostomy and ventilator support and thoracic epidural analgesia, one patient improved well. The other patient died.

The presence of lung contusion indicates serious chest injury and serious associated injuries. In this study, all three patients with lung contusion had serious chest and associated injuries.

In this study, five patients had associated head injury, three patients had spinal injuries, and nine patients had fracture bones of extremities and pelvis. Two patients died due to associated head and spinal injuries [Figure 1].

The various factors which adversely affect the outcome of a patient with blunt injury chest are flail chest, multiple rib fractures, first and second rib fractures, underlying lung contusion, and associated injuries to other vital organs. The most common cause of blunt injury chest is a road traffic accident [Figures 2 and 3].

Thoracic epidural analgesia gives good pain relief and improves survival in multiple rib fractures and flail chest patients [Figure 4].

Rib fractures with underlying hemo/pneumothorax can usually be managed effectively by tube thoracostomy.

All trauma patients should be managed by the steps of advanced trauma life support (ATLS).[8,9]

a. Primary survey with simultaneous resuscitation to identify and treat what is killing the patient
b. Secondary survey to proceed and identify all other injuries
c. Tertiary survey and definitive care.

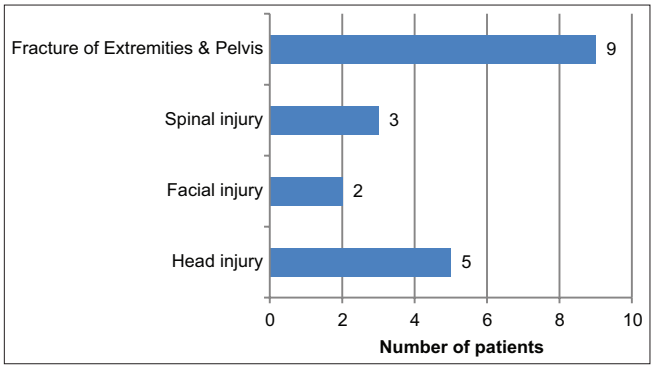

Figure 1: Distribution of associated injuries

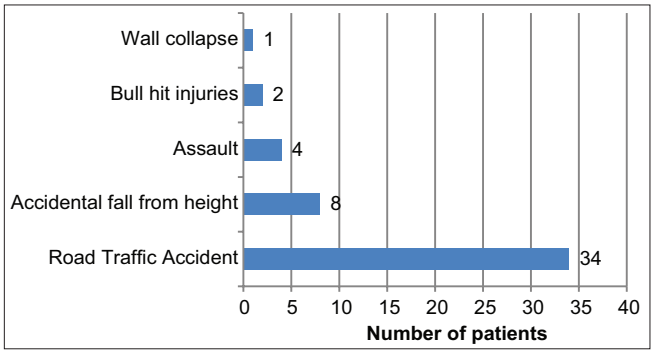

Figure 2: Distribution of mode of injury

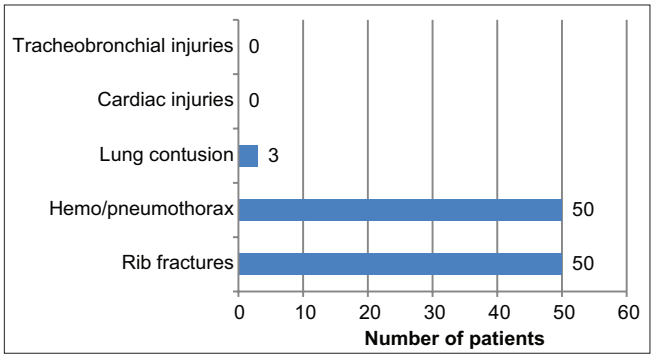

Figure 3: Distribution of clinical presentation

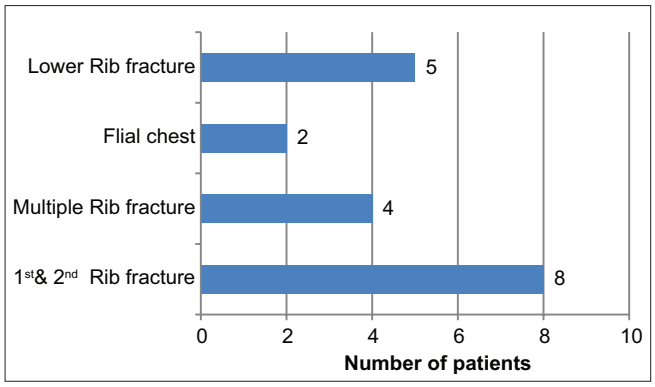

Figure 4: Distribution of rib fractures

Indications of thoracotomy

a. More than 1500 ml of blood drained on chest tube insertion
b. More than 300 ml/h of drainage for 3 consecutive h
c. Massive air leak associated with pneumothorax
d. Drainage of esophageal or gastric contents from the chest tube.

Flail chest patients should be managed aggressively by tube thoracostomy, oxygen, chest physiotherapy, thoracic epidural analgesia, and ventilator support if required.

Patients with a fracture of the first or second ribs should be evaluated carefully for a serious chest injury and serious injury to other vital organs.

DISCUSSION

Road traffic accidents (68%) are the most common cause of blunt injury chest, the next being falls from height (16%). Blunt trauma injuries predominantly affect male individuals (70%).[1-3]

About 10% increase in speed translates into 40% rise in case fatality risk for the occupants of the motor vehicle.[4] The use of seat belts reduces the risk of death or serious injury for front seat occupants by 45%. Helmets reduce the risk of fatal head injury by about one-third and facial injury by two-thirds among persons who ride two-wheelers. Avoiding alcohol before driving is an important preventive step.[4,5,10]

In the management of polytrauma patients, the following steps in the ATLS philosophy should be followed.[8]

a. Primary survey with simultaneous resuscitation to identify and treat what is killing the patient
b. Secondary survey to proceed and identify all other injuries
c. Tertiary survey and definitive care of the injuries.

Steps in the primary survey are as follows:

a. Airway with cervical spine protection
b. Breathing and provision of oxygen
c. Circulation and hemorrhage control
d. Disability evaluation
e. Exposure and examination completely.

Blunt trauma to the chest is fatal in 10% of patients in isolation, rising to 30% if other injuries are present.[6] The majority of chest injuries are confined to the thoracic cage. These consist of rib fractures with underlying pulmonary contusion, hemothorax, or pneumothorax.[7,10]

In this study, all the included patients had a rib fracture with significant hemo or pneumothorax which required tube thoracostomy.

Simple isolated rib fractures or rib fractures with minimal hemo or pneumothorax were managed conservatively with antibiotics, analgesics. However, they were not included in this study. Initially, parenteral analgesics were given later switched over to oral analgesics. Six patients with multiple rib fractures were given thoracic epidural analgesia. All the patients had good pain relief and were comfortable and improved well.

Patients with a fracture of the first or second ribs were evaluated carefully for serious injuries. Of the eight patients with the first or second rib fractures, two patients died. Mortality is high in the first and second rib fractures due to the associated injuries to the great vessels, abdomen and head and neck are common.

Patients with fractures of the lower ribs routinely underwent ultrasound abdomen to rule out injury to liver and spleen. Patients with pre-existing chronic pulmonary disease managed with bronchodilators, chest physiotherapy, and oxygen support.

Patients with rib fractures with underlying hemothorax or pneumothorax with respiratory distress underwent tube thoracostomy on the day of admission. Patients with multiple rib fractures with respiratory distress also underwent tube thoracostomy and were managed in the ICU and given ventilator support. Thoracic epidural analgesia was given for pain relief.

One patient with massive hemothorax and continuous blood loss in intercoastal drainage drain more than 1000 ml at the time of tube thoracostomy underwent emergency thoracotomy and was found to have a mediastinal tear which was ligated. A total of 5 units of blood transfused. Unfortunately, this patient died. Postmortem findings revealed fracture-dislocation of the left middle cranial

fossa, linear fracture of the left temporoparietal bone, laceration of the right cerebrum with subarachnoid hemorrhage, fracture right 2, 3, and 4 ribs, and fracture left 6 and 7 ribs with a left lung contusion. He appeared to have died of associated head injury.

Another patient who died was a 61-year-old male with fracture left 2, 3, 4, and 5 ribs with Glasgow Coma Scale – 3/15 with depressed fracture left frontal bone. Postmortem report revealed that he died due to associated head and cervical spine injury. Another patient who died had sustained fractures 2, 3, 4, and 5 ribs with flail chest and hemothorax. Postmortem revealed that he died due to chest injury.

Thus of the three patients who died in this study, one had died due to chest injury and the other two patients had associated head and cervical spine injury.

No patient with cardiac injury was encountered in this study.

However, the main inference from the study is that blunt trauma and pulmonary contusions can have considerable mortality, especially in the face of hypoxemia and measures to limit hypoxemia should be undertaken early.

CONCLUSION

The various factors which adversely affect the outcome of a patient with blunt injury chest are age, pre-existing chronic pulmonary disease, first and second rib fractures, multiple rib fractures, flail chest, failure to insert a chest drain when indicated, and associated injuries to other vital organs. The most common cause of blunt injury chest is a road traffic accident. The majority of chest injuries are confined to the thoracic cage. Rib fractures with underlying hemo or pneumothorax can be usually managed effectively by tube thoracostomy. Thoracic epidural analgesia gives good pain relief and improves survival in multiple rib fractures and flail chest patients.

REFERENCES

1. Williams NS, Bulstrode CJK, O'Connell PR. Bailey and Love's Short Practice of Surgery. 26th ed. United States, Boca Raton: CRC Press; 2013. p. 870-3.
2. Morris PJ, Wood WC. Oxford Textbook of Surgery. 2nd ed. Oxford: Oxford University Press; 2000. p. 2544-56.
3. Shackford SR, Smith DE, Zarins CK, Rice CL, Virgilio RW. The management of flail chest. A comparison of ventilatory and nonventilatory treatment. Am J Surg 1976;132:759-62.
4. Committee on Trauma, American College of Surgeons. Advanced Trauma, Life Support Manual. Chicago: American College of Surgeons; 1981.
5. Bergeron E, Lavoie A, Clas D, Moore L, Ratte S, Tetreault S, *et al*. Elderly trauma patients with rib fractures are at greater risk of death and pneumonia. J Trauma 2003;54:478-85.
6. Richardson JD, Adams L, Flint LM. Selective management of flail chest and pulmonary contusion. Ann Surg 1982;196:481-7.
7. Campbell DB. Trauma to the chest wall, lung, and major airways. Semin Thorac Cardiovasc Surg 1992;4:234-40.
8. Symbas PN. Chest drainage tubes. Surg Clin North Am 1989;69:41-6.
9. Livingston DH, Richardson JD. Pulmonary disability after severe blunt chest trauma. J Trauma 1990;30:562-6.
10. Richardson JD. Indications for thoracotomy in thoracic trauma. Curr Surg 1985;42:361-4.

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