

A Stitch in Time Saves Nine - Analytic Review of 66 Cases of Chest Trauma

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Abstract

Human passion for speed and quarrels has contributed a lot to morbidity and mortality. Trauma stands amongst the major causes of death all over the globe. Amongst all variants of trauma chest trauma demands the maximum number of lives due to its severity. A study claims that 25% deaths are caused by thoracic trauma in USA. When we bring in to consideration the developing countries, the toll is considerably higher. A prompt evaluation and quick intervention can significantly reduce this number. We reviewed 66 patients who presented with chest trauma. In all of them a thoracotomy, whether open or Video Assisted, was performed after an initial Tube thoracostomy. These patients were operated during one year and follow-up made for a minimum of 3 months. Majority of them belonged to the age group 10-40 years with a predominance of males. 30 had blunt while 36 penetrating injuries. Haemo-pneumothorax was the most common presentation (46/ 66). 56 were managed by Video-assisted thoracotomy while the rest were offered a limited/ standard thoracotomy. The time interval between injury and thoracotomy was less than 72 hours in 56. A good outcome was achieved in 54 patients where lung was completely restored with no morbidity. All remained well in their follow-up visits with no complication regarding surgery.

It is concluded that early surgery in Thoracic Trauma in selective cases not only improves the outcome but reduces financial burden by decreasing hospital stay.

Keywords: Chest Trauma, Video-Assisted Thoracotomy, Haemo-Pneumothorax

Introduction

Human beings are in a habit of quarreling for different reasons since their creation. The first quarrel that has been narrated in religious books dates back to the beginning of humanity. The invention of the wheel added acceleration to human passion for speed, leading to an increase in the magnitude and intensity of trauma resulting in ever-growing morbidity and mortality. Trauma on the whole, remains the leading cause of death in young and bread-earning individuals. The American Association for Surgery of Trauma determined that 1.2 million people die in road traffic accidents in a year, 90 % of which belong to developing or under-developed countries [1]. This fact has got a significant impact on the social life as well as economy of these countries. The developing countries suffer more in this regard owing to the lack of health facilities as well as delayed transportation to treatment centers. Most of the patients received in hospitals have already lost the precious golden hour of the management of trauma. It is therefore essential that a prompt management should be initiated as soon as possible to these patients. Majority of these patients are sufferers of poly trauma. Although the medical education and training courses like BLS and ATLS have contributed a lot towards the development of patient care in trauma patients, yet, a lot has to be done. The newly developed diagnostic techniques and proficient anesthesia play a key role. An estimate by WHO reveals that nearly

5 million people die due to injury every year. This alarming situation can be effectively dealt with by increasing the awareness of trauma management in health professionals.

A large number of these patients suffer from Polytrauma with Thoracic trauma making a major component. Ludwig et al observed that approximately 2/3rd of the Polytrauma patients have chest trauma [2]. It has also been observed that there are nearly 17000 deaths due to trauma with nearly 25% of these directly attributed to thoracic injury [3]. Chest trauma can be penetrating or blunt. Although penetrating has a higher morbidity / mortality, yet fortunately 90% incidents are of blunt. Nevertheless, chest trauma stands 2nd highest in mortality after head injury [2]. Waydhas C. found that mortality was reported to dramatically increase in patients with thoracic trauma [4]. Thoracic injuries are not only responsible for early mortality, but they have a definite role in late deaths. This is because of the fact that thoracic injuries cause not only excessive haemorrhage but also injury to the lung. Lung injuries contribute to the development of Multi Organ Failure and therefore represent major cause of late death [5]. Regardless of the type of chest trauma, prompt evaluation and management decision making is required to deal with it successfully. Anything starting from a simple tube thoracostomy and ending up with emergency thoracotomy may be needed. The pivot of management stands quick awareness of the full extent of injuries. Gage A and colleagues suggest that blunt chest trauma should be managed by strong analgesics, fixation

by surgical techniques, chest physiotherapy and respiratory care along with mobilization of the patient as early as possible [6]. Most workers believe that early measures to deal with thoracic trauma include Tube thoracostomy, pain control, pulmonary toilet and observation. 85 -90 % patients can be managed with these measures [7]. However, trauma causing major bleeding and organ damage requires further intervention. In such situations one needs a complete assessment of the structures within the chest cage. At times one can come across confusing situations like diaphragmatic injury simulating a pneumothorax. Tube thoracostomy being a somewhat blind procedure, chances of piercing the stomach in suspicion of a pneumothorax after diaphragmatic injury are not so uncommon. Thoracotomy being an aggressive option is usually avoided unless required urgently. Video-assisted entry to the thoracic cage is no doubt a very useful alternative. Michael Goodman and colleagues stated that Video-assisted Thoracoscopy (VATS) has been used in the management of thoracic trauma for indications such as retained haemothorax, persistent air leak, empyema and evaluation of diaphragmatic and mediastinal injuries [8]. VATS is more frequently required to manage penetrating chest trauma due to reasons well known. Milanchi and colleagues recommend use of VATS even under local anesthesia and reproduced that a thoracotomy was avoided in 44% patients based on the findings of Thoracoscopy [9]. Use of VATS has successfully replaced thoracotomy in a significant number of cases. It has the merits of shorter operative time, non-blind area, exact surgical path and less bleeding [10]. Use of VATS is not limited; this highly reliable and effective procedure is very well tolerated by majority of patients and it can successfully diagnose and deal with lung injuries and rib fractures [11, 12]. The procedure also has the edge that it is a little more aggressive as compared to tube thoracostomy [11]. These facts support its use in both variants of chest trauma. While there is almost a consensus on frequent use of VATS in chest trauma, slight controversy prevails in the selection of time for VATS. Some people recommend its use within 24 hours while others would delay it for 72 hours [13, 14]. Use of VATS can replace tube thoracostomy wherever indicated. No matter at what time its application is selected, VATS has definitely changed the prognosis of trauma sufferers.

Materials and methods

This cross-sectional study was conducted in two tertiary care hospitals from January – December 2017. Both the hospitals are affiliated to medical colleges. 66 Patients with thoracic trauma who underwent operative management in the form of VATS or open thoracotomy regardless of age and gender discrimination were included. Patients of both blunt and penetrating trauma were included. General or regional anesthesia both were utilized as per requirement of the situation. Post operative follow up was done for 3 months. Outcomes of surgical management were evaluated in terms of post operative lung expansion, duration of chest drain and need for any other surgical intervention after the primary surgery. Informed consent was taken in all cases and surgery was performed as per patient's desire.

Results

A total of 66 patients were included in the study. All of them presented with a history of trauma in Emergency department of either of the 2 hospitals. After primary survey, it was found that they needed surgical intervention. Initially Tube thoracostomy was done in most of the patients. However in some of them tube thoracostomy was done in some other hospital and then they were referred to our

hospitals. Trauma, as we know, is not confined to age or sex. We received patients of all ages. Table 1 shows the age distribution in our patients. Larger number of these patients was more than 10 and less than 40 years.

Table 1: Age Distribution

Age in years	No. of patients	Percentage of patients
< 10	6	9.1%
10 – 20	10	15.1%
20-30	16	24.2%
30-40	22	33.3%
>40	12	18.2%

Following is the gender distribution in our patients.

Table 2: Gender distribution

MALE	45	45%
FEMALE	21	55%

Type of Trauma

The pattern of trauma was almost equal in both types as shown in the table below.

Penetrating injuries, however, are split into missile and sharp injuries depending upon their nature.

Table 3:

Type of Trauma	No. of Patients		
Blunt	30		
Penetrating	36	Missile injuries	4
		Sharp injuries	32

Variations of injury:

Table 4: Presents the variation of presenting problem in these patients

Problem at presentation	Number of Patients
Pneumothorax with lung injury	8
Haemo-pneumothorax with or without Rib fracture	44
Diaphragmatic Injury	12
Cardiac Injury	2

Indications for surgical intervention are shown in Table 5.

Table 5:

Indication	Number of Patients
Massive/ Clotted / Loculated Haemothorax	21
Pneumothorax with BP Fistula	22
Pyo-pneumothorax	9
Diaphragmatic Tear	12
Cardiac Injury	2

Table 6: Time duration between Injury & Surgery

Time duration	No. of patients	Percentage of patients
<24 hours	11	16.6%
24-72 hours	45	68.2%
>72 hours	10	15.2%

Table 7: The choice of procedure adopted

Procedure	No. Of Patients	Percentage of patients
VATS	56	85%
Limited / Standard Thoracotomy	10	15%

Outcome of surgery was evaluated as Good, Satisfactory and poor according to criteria mentioned below

- Good indicates that we achieved to have a fully expanded lung with no or negligible volume loss on chest x-ray and chest drains removed maximum within a week's duration.
- Satisfactory where more than 80% lung expansion achieved but patient had to be sent home with a chest drain for a leak.
- Poor where we couldn't achieve an expansion more than 60% and further surgical measures were advised.

The outcome of patients is presented below on the basis of criteria mentioned.

Table 8:

Outcome	Number of Patients	Percentage of patients
Good	54	82%
Satisfactory	10	15%
Poor	2	3%

All the patients were followed up for at least 3 months postoperative and were in satisfactory state of health.

Discussion

Trauma is perhaps the most significant killer in human beings. The intensity of the problem is similar for both developed and developing countries. Whereas the developing countries face the threat due to lack of facilities, the developed world faces the consequences of development. Faster traveling modes and sophisticated weapons are examples of that. An estimated figure of 1.2 million annual deaths due to trauma clearly defines the severity of the issue [1]. One should not be surprised to know that 90% of these deaths take place in developing countries, the principal reason behind it being lack of transport and health facilities. The Golden first hour after trauma is usually wasted in developing countries. So it's essential that a quick management protocol must be followed in tertiary care hospitals. The need for quick response is much more enhanced in patients having chest trauma. Lungs being more vulnerable to infections lead to Multi Organ Failure ultimately resulting in death, thus chest injuries need to be managed more quickly [5]. Both the hospitals where the study was conducted are fortunately near highways and that made our job more convenient.

Chest Trauma is potentially life threatening because of the associated complications. A wide range of complications is attributed to Thoracic Trauma. Ronald and colleagues determined that respiratory failure, pneumonia and pleural sepsis are the most common complications

[15]. While the first two require medical treatment, Pleural sepsis can be accurately managed by adding surgery. Clotted haemothoraces are not only difficult to be drained with simple tube thoracostomy but also play an important role in pleural sepsis. Major surgical intervention was thought to be too aggressive in the past so it was denied in most of the patients. Evolution of VATS along with safer anaesthesia techniques has provided a sigh of relief for these patients. Following guidelines by Chou et al we utilized VATS in majority of these cases (85%) [11]. Patients who directly came to our Emergency departments were given the option of Tube Thoracostomy or VATS and those who opted for VATS were operated after getting baseline workup. So the majority of them were operated within 72 hours of injury (56/66). Early surgical intervention is recommended by most people. We tried to keep this interval as short as possible following Gabal and H. Sing [13, 14]. VATS was applied as a standard procedure in most of the patients. This is also well documented in most of the studies [9- 12]. However in 12 patients VATS incision had to be extended to a limited thoracotomy because of uncontrollable bleeding, air-leak or diaphragmatic injury. An initial thoracotomy incision was made in patients with missile injuries or those who were referred to us by other hospitals where an initial Tube Thoracostomy remained unsuccessful. Patients with suspected cardiac injury were also kept in this category.

Although the literature quotes more incidence of blunt trauma as presenting mode of injury, in our study 55% patients are of penetrating trauma. It pertains to high incidence of interpersonal conflicts in our society and use of weapons in minor conflicts [2]. Also the inclusion of patients of stab wounds of upper abdomen causing diaphragmatic injury shifted the injuries towards penetrating injuries. In a study by Biplah Mishra, 21 cases of cardiac injury were reported over a period of 5 years [16]. Our study includes 2 cases of cardiac injury. One of these patients had a self-inflicted gunshot where the bullet lodged in the lower lobe of lung after creating a partial rent in right ventricle. The other one was a stab wound causing tear in pericardium and cardiac muscles. Both patients survived due to early intervention (open thoracotomy).

The outcomes of surgical intervention in trauma are assessed by duration of hospital stay and cessation of drainage in chest tube. In the literature, hospital stay after VATS ranges between 5-12 days [9, 17]. In our study, 82% patients had a good outcome as the lung expanded within a week, chest tube was removed and the patient discharged home. In a study by Milanchi, hospital stay was reported to be 12 days [9].

Conclusion

Chest trauma being the major component in Polytrauma patients needs early thoracic surgical intervention. VATS has promising results and must be employed in the management of thoracic trauma patients.

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