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Results of Thoracotomy in Penetrating Chest Trauma

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Abstract

***Background*:** Thoracotomy is a surgical procedure to access the chest components, which is often performed after severe bleeding caused by heart damage, lung laceration and other similar injuries.
***Materials and Methods*:** This is a cross-sectional study which was conducted on all patients with penetrating chest trauma during April 2000 to October 2008.
***Results*:** In 5% of cases, thoracotomy was used for treatment in which severe bleeding was the main surgical indication. It was the most common finding followed by lung laceration thoracotomy.
***Conclusion*:** Most urban injuries are treatable by chest tube. About 3 to 10 percent of cases may require a thoracotomy in which severe bleeding is the most common indication of surgery.

Introduction

In today's world, along with the advancement of science and technology as well as industrialization of communities, trauma is considered as the first cause of mortality, hospitalization and disability in age groups of 1 to 40 years of age and it can be stated that it has the greatest social and economic effect on all cases of disease [1]. Given that trauma affects mostly the young population, it leads to loss of more working years compared to the other causes. At present, almost six thousand out of 100 thousand cases of annual disability are caused by chest trauma [2,3]. Chest injuries cause 10-30% of various traumas and cause more than 45% of demises in trauma patients. However, 85% of risky injuries of chest can be easily overcome through simple interventions of doctors and emergency service personnel [4]. Most asymptomatic lesions of chest wall, which occur as a result of ordinary events, do not require any special action, and the patient should be only observed. Then, a plain radiography of chest should be conducted 6 hours after the first radiography and if no change was observed in patient status, the patient can be discharged and only follow up the issue [5]. Any penetrating injury to the chest may cause serious complications, but the most dangerous complications are the injuries occurring within midclavicular lines and between jaws and xiphoid process of sternum. These injuries require accurate surgical exploration, because there is a risk of damage to internal organs [5,6]. Thoracotomy is a surgical procedure to access lung, esophagus, trachea, aorta, heart and diaphragm and is performed on the right or the left side of chest depending on the location of disease and heart injuries. Especially regarding cardiac injury cases which constitute 42-45% of prevalence of penetrating chest trauma, it is an emergency action to save the patient [7]. The operation takes 3-4 hours and the duration of hospitalization is 5 to 10 days [8]. Thoracotomy in trauma patients is often performed after severe bleeding. According to studies, this bleeding can be caused by cardiac injuries, lung tissue rupture, damage to intercostals arteries, and rupture of trachea, bronchus and esophagus. Today, one of the major challenges for surgeons is penetrating chest trauma suspected with cardiac injury, which will be improved up to 70-80% through appropriate and quick action if they reach hospital alive [9]. Generally, 85% of chest traumas do not require thoracotomy, but urgent use of protective devices is usually necessary [10].
Given that Shahid Bahonar Hospital is a trauma referral center and given the high frequency of chest injuries in injured patients, by examining the type and frequency of findings during thoracotomy surgery, it can be determined what kind of injury we are faced in penetrating chest trauma with different mechanisms, so that better and faster measures would be taken to diagnose and treat patients.

Materials and Methods

This Study was conducted retrospectively. The files of 828 patients, who were admitted to the Center during April 2000 to October 2008 for chest trauma with/out its associated damage, were studied. Chest trauma in this study means all chest injuries caused by penetrating trauma. The required information including age, gender,

cause of trauma, type of injury, location of injury, associated damages and thoracotomy findings were inserted to questionnaire. Data analysis was conducted using SPSS-17 software.

Results

In this study, 828 cases were totally examined 811 of whom (97.6%) were male and 17 people (2.4%) were female. The average age was 24 years. Regarding the mechanisms and causes of trauma, the most frequent cause of trauma is stab wound with 776 cases (93.7%) and the least frequent cause is cow horn with 3 cases (0.36%). Regarding the location of chest trauma, in 481 cases (58%), trauma was occurred to the left, in 328 cases (39%) to the right and in 19 cases (2.2%) trauma was imposed to both sides of the chest. Regarding the trauma associated with chest trauma, orthopedic trauma with 116 cases, has been the most common associated trauma. The total length of hospitalization was between 1 and 13 days. The lengthiest hospitalization was 2-5 days in chest tube insertion and 4-9 days in thoracotomy approach. This difference was statistically significant (p= 0.038).

The final diagnosis is done based on radiography result, clinical course or surgery. The most common diagnostic method used was a simple imaging of chest taken in all patients. Simple radiography of organs, with 68.5% of frequency, was at the next rank. The lowest frequency was observed in the use of lung CT scan, which was only performed in 6% of cases. The most common traumatic damage is totally pneumothorax and Hemothorax was at the second level (Table 1).

Table 1. Various types of injuries caused by trauma

Injuries caused by trauma	Number
Unilateral pneumothorax	305(36.8%)
Bilateral pneumothorax	3(0.36%)
Unilateral Hemothorax	289 (34.9%)
Bilateral Hemothorax	1(0.12%)
Unilateral hemopneumothorax	215(25.9%)
Bilateral hemopneumothorax	4(0.48%)
Rib fractures	127 (15.3%)
Pulmonary contusion	72 (8.69%)
Tamponade	18 (2.17%)
Cardiac injury	12 (1.44%)
Diaphragm rupture	4(0.47%)

In terms of treatment, among total 828 cases, 38 cases (5%) underwent thoracotomy surgery; chest tube was inserted for 778 (93%) patients, for 12 of which chest tube was inserted both sides of chest and in the rest, supportive treatment was conducted. Among 828 cases which were reviewed, eight patients (0.96%) died, 3 cases of which were due to thoracic aorta rupture and 5 cases were due to cardiac rupture with Hemopericardium. 30% of those who had a chest tube and 50% of patients who underwent thoracotomy, developed complications. the most common complication in both procedures were pain, dyspnea and fever. More serious complications such as death were seen only in patients who underwent thoracotomy and no death was seen after chest tube insertion. Some complications such as emphysema was seen only in patients with chest tube and a complication such as bronchial fistula was only seen in patients who underwent thoracotomy. This difference was statistically significant (p=0.042). No statistically significant difference was either observed between the complications in the two methods of age and gender distribution (p=0.042). Lung laceration is the most common finding during thoracotomy and was ranked second in terms of damage to the intercostal arteries (Table 2).

Table 2. Frequency distribution based on thoracotomy results

Results	Case	Percent
Lung laceration	14	36.84
Damage to heart	5	13.15
Diaphragm rupture	4	10.52
Damage to the intercostal arteries	11	28.94
Damage to the aortic	3	7.89
Esophagus rupture	1	2.36

Discussion

In this study, chest trauma is mostly observed in men, which is consistent with findings of other studies. In these studies, this frequency has been reported 79-98.7% in men and 24.6-25.5% in women [7,8]. The most common age group in this study is 20-29 years of age and the least common age group is 50-59 years and the average age is 24 years which is 34 in similar studies [9,10]. Trauma in general, is mostly common in young people who have the highest performance in the community. The most common associated trauma was orthopedic trauma, whereas in other studies, rib fracture has been the most common findings. In every traumatic patient, especially patients with chest trauma, it is necessary to consider and pay attention to all parts of body and examine the patient generally. In this study, the final diagnosis based on radiographic results or surgery was performed and pneumothorax was the most common diagnosis. These findings are consistent with some studies [6]. This shows that among various chest traumas, the most common injury is related to chest wall injuries which are mostly superficial and are less considered. The main surgical indication in this study is severe bleeding or bleeding continuance after chest tube insertion, which is also consistent with all the similar studies [3,4].

In this study, the most common finding after thoracotomy was lung laceration and the damage to intercostals vessels is ranked second. This result is also consistent with some studies [7,4]. The most common diagnostic method used was simple chest imaging performed on all patients .This is also consistent with other similar studies [6,7]. In our study, the most common complication occurred after chest tube insertion and thoracotomy was pain in the intended location and dyspnea was at the second level. However, in other studies, complications are not mentioned by percentage and the complications which have caused death of patients [3,4,7], have been mainly mentioned. In our

study, the complication of creation of bronchopleural fistula was only seen at thoracotomy method. This finding was also consistent with other studies. Among the 38 patients who underwent thoracotomy, the cause of trauma was bullet in 12 cases and stab wound in other cases, but it has not been mentioned in other studies. Finally, chest tube insertion is the simplest and most important treatment for the pulmonary parenchyma injuries caused by urban accidents. Generally, about 3-15% of these patients require thoracotomy, in which the surgeon's judgment during visit is the most important issue in selection of this method. In the end, it is recommended to conduct this study in cases of blunt chest trauma as well and the results should be compared with penetrating trauma cases, so that better solutions would be achieved to treat chest trauma.

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