

Incidence of Delayed Pneumothorax in Patients with Penetrating Chest Trauma

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Abstract: Introduction: Pneumothorax can lead to severe respiratory distress and acute heart conditions. Dyspnea, agitation, tachypnea, tachycardia, hypotension, altered mental status and decrease in respiratory sounds are its signs and symptoms. The aim of this study was to assess the prevalence of delayed pneumothorax among patients with penetrating chest trauma who have a normal CX-Ray on admission. Method: In this descriptive study 172 patients with penetrating trauma who were asymptomatic and had no signs of pneumothorax or hemothorax in their initial chest X ray were included. Demographics and history and physical examination data were collected. All the patients were studied for delayed hemothorax and pneumothorax by chest X ray. The incidence of delayed hemothorax and pneumothorax were compared in one and 3 hours after admission using descriptive statistics and SPSS software. Results: Mean participants age was 25.24±7.91. Among the participants 167 (97.1%) were male and 5 (2.9%) were female. In 103 patients (59.9%) the trauma was in front and in 69 (40.1%) was in back. Incidence of delayed pneumothorax and hemothorax was 0% in one hour after admission. The incidence of delayed pneumothorax was 0.6% in 3 hours after admission. Conclusion: Considering the incidence of delayed pneumothorax between 1 and 3 hours after admission of the patient it isn't recommended to decrease the duration of follow up to 1 hour.

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1. Introduction

Penetrating chest trauma includes a wide range of damages to a person. Most of the information regarding this goes back to the Second World War. The mortality of such injuries was about 50% in those wars (1). They usually occur with a gun or a knife. Industrial injuries and falling down are other common reasons for penetrating chest trauma. This includes, about 10% of major traumas in the United States and about 4.5% in Europe (2-4). Many organs can be injured including trachea, bronchus, heart, esophagus and diaphragm (5-7).

Pneumothorax can lead to severe respiratory distress and acute heart conditions. Dyspnea, agitation, tachypnea, tachycardia, hypotension, altered mental status and decrease in respiratory sounds are its signs and symptoms (8, 9).

Since the nature, size and direction of the injury isn't clear, penetrating chest trauma is a controversial issue in clinic (2). The first diagnostic step in these patients is obtaining a chest x ray. Patients who do not show any sign or symptoms are observed for about 3 to 6 hours and are assessed with another CX-Ray during this time. The results of previous studies show that delayed injuries (delayed pneumothorax or

delayed hemothorax) normally occur on the first few hours after admission (3).

The aim of this study was to assess the prevalence of delayed pneumothorax among patients with penetrating chest trauma who have a normal CX-Ray on admission.

2. Materials And Methods

This descriptive study evaluated pneumothorax and delayed pneumothorax, one and three hours after penetrating trauma to chest and abdomen in 2011. All the patients who attended to the emergency department of Shahid Mohammadi Hospital with penetrating trauma and a normal chest x ray were included in this study. With considering a confidence interval of 95%, a power of 80% and an anticipated frequency of 3%, the sample size was calculated to be 172. The participants were selected using convenience sampling.

Patients with clinical signs of pneumothorax, or those who showed hemothorax, pneumothorax, pulmonary contusion or pericardial effusion in their primary chest x ray, or those who needed emergency surgery, or expired before taking the x rays were excluded from the study.

Penetrating trauma was defined by a trauma that passed the hypoderm and created a laceration and perforation. A posterior-anterior chest x ray was ordered for each patient on admission and if it was normal, two other chest x rays were ordered after one and three hours.

Demographic data, site of trauma, accompanied injuries and the results of all diagnostic procedures including the primary and secondary x rays were collected. Data was entered SPSS v. 16 and analyzed using descriptive statistics.

3. Results

The mean age of the 172 participants was 25.24 ± 7.91 years. Among the participants, 167 (97.1%) were male and 5 (2.9%) were female. Among all the participants, 103 (59.9%) were injured in the anterior region and 69 (40.1%) were injured from the posterior region. Also, 171 participants (99.4%) were stabbed and 1 (0.6%) was injured with a bullet.

The patients arrived the hospital between 5 and 180 minutes after injury (mean= 26.09 ± 20.9 minutes). None of the patients had pneumothorax on admission or after one hour. Only one patients (0.6%) experienced pneumothorax and no cases of heamothorax were found.

4. Discussion

This study evaluated the prevalence of delayed pneumothorax among patients with penetrating chest trauma among patients who attended Shahid Mohammadi Hospital. In this study, three x- rays were ordered for each patient. One was ordered on admission, and two others were ordered one and three hours after admission. The importance of this issue is that due to recent studies, the follow up time of these patients has been decreased from six hours to three hours which resulted in a significant decrease in health costs. According to what described above, this study was conducted to determine if the follow up period of such patients could decrease to one hour or not. As mentioned before, none of the patients of this survey experienced pneumothorax after an hour, and only one case of pneumothorax was seen after three hours. The incidence of delayed pneumothorax was 0.6%.

Zehtabchi et al also found some similar findings in their study. They assessed 185 patients and reported two cases (1.1%) of pneumothorax. They ordered only one chest x ray for follow up which was taken between three and six hours after the first CX-Ray. In their study most of the participants were male (97%) which was consistent with our findings. The mean age of the participants of their study was 28 years old which was slightly higher than our study (10).

Shatz et al also conducted another similar study and showed that only one patient (0.08%) experienced delayed pneumothorax. This case occurred three hours after admission which was similar to our study. However, Shatz et al demonstrated that unlike our study, 80% of their participants were admitted with stab wound and the rest were shot by a bullet (11).

Byrd et al also showed that pneumothorax only occurs in the early stages after FNA and further CX-Rays are not necessary. Seamon et al also conducted a study on 100 patients and showed that only 2 patients experienced pneumothorax. These cases also occurred after three hours. In their study, the mean age of participants was above ours (32.5) and only 75% of them had a stab wound (12).

According to the findings of our study, delayed pneumothorax is not frequent among patients with a normal first CX-Ray. However, it will occur after three hours and may not show any signs in a CX-Ray after one hour. Thus, it is crucial to observe the patients for at least three hours.

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