Research Article (Araştırma Makalesi)

Etiological Differences in Thoracic Traumas After Earthquake

Deprem Sonrası Toraks Travmalarında Etiyolojik Farklılıklar

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Özet

Amaç: Türkiye fay hatları üzerinde bulunan bir coğrafyaya sahip olduğundan, bu bölgede deprem olma olasılığı her zaman var olmaya devam edecektir. Bir depremden sonra çeşitli travmalar meydana gelebilir. Torasik travmalar da depremlerde sıklıkla yaşanan yaralanmalardır.

Gereç ve Yöntemler: Kahramanmaraş Sütçü İmam Üniversitesi Göğüs Cerrahisi Kliniği'nde deprem öncesi ve deprem sonrası toraks travmaları olmak üzere 124 hasta incelendi. Deprem öncesi grup, grup 1; deprem sonrası grup ise grup 2 olarak adlandırıldı. Hastaların cinsiyeti, yaşı, travma tipi ve travmaların dosya kayıtları incelendi.

Bulgular: Erkeklerde travma sıklığı kadınlara göre artmıştır. Hemotoraks vakalarında anlamlı artış görülmüştür. Künt travma etiyolojisinin yine en sık travma nedeni olduğu ancak künt travma etiyolojisinin yüksekten düşme lehine arttığı görülmüştür.

Sonuç: Konut sorununun zamanla ortadan kaldırılması planlanmakta ve bölgede bu konuda yoğun çalışmalar yürütülmektedir. İnşaat çalışmalarının yoğunluğunun azalması ve ters göçün başlamasıyla birlikte, deprem sonrası travma etyolojilerindeki bu değişen farklılıkların zamanla deprem öncesi döneme döneceğine inanıyoruz.

Anahtar kelimeler: Travma, künt travma, hemopnömotoraks, deprem, farklılıklar

Abstract

Objective: Since Türkiye has a geography located on fault lines, the possibility of an earthquake occurring in this region will always continue to exist. After an earthquake, a variety of traumas can occur. Thoracic traumas are also injuries frequently experienced in case of earthquakes.

Material and Methods: At Kahramanmaraş Sütçü İmam University Thoracic Surgery Clinic, 124 patients were examined, including pre-earthquake and post-earthquake chest trauma. The pre-earthquake group was called Group 1, and the post-earthquake group was called Group 2. Gender, age, type of trauma of the patients as well as the file records of traumas were examined.

Results: The frequency of trauma increased in men compared to women. There was a significant increase in hemothorax cases. It was observed that blunt trauma etiology was again the most common cause of trauma, but the etiology of blunt trauma increased in favor of falling from a height.

Conclusion: It is planned to eliminate the housing problem in time and intensive work is being carried out in the region on this issue. We believe that with the decrease in the intensity of construction work and the beginning of reverse migration, these changing differences in the etiologies of trauma after the earthquake will return to the pre-earthquake period in time.

Keywords: Trauma, blunt trauma, hemopneumothorax, earthquake, differences

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Submission date: 13.06.2024

Acceptance date: 05.09.2024

DOI: 10.17517/ksutfd.1500861

INTRODUCTION

Earthquakes are the most destructive natural disasters affecting life in human history (1). Several earthquakes occur in the world every year (2). Of the more than 780,000 deaths due to natural disasters in the last decade, earthquakes caused approximately 60%. Additionally, two billion people were directly affected by earthquakes during this period (3). It is also predicted that the earthquake threat will increase day by day because services are concentrated in urban areas due to global urbanization and major urban centers become vulnerable. Because some of the settlements are located on fault lines, millions of people are directly exposed to earthquakes (4). Unfortunately, most earthquakes result in disasters because as a result of the construction of buildings with poor quality materials and poor structural standards, high death rates, and many traumatic injuries causing mass losses (5).

On February 6, 2023, two earthquakes occurred in Türkiye, 8 h apart, with magnitudes of 7.7 and 7.6 megawatts (MW) on the Richter scale. It caused enormous destruction in an area of 110.000 square kilometers (km2), which includes 11 provinces of Türkiye. More than 50.000 dead and hundreds of thousands injured were reported by the official authorities (6).

One-fourth of trauma-related injuries are in the thoracic region. The incidence of thoracic injuries and related complications increases with the severity of trauma. In earthquakes, injuries usually occur due to exposure to debris (7). Thoracic trauma has a large place among earthquake injuries. When we compare the pre-earthquake and post-earthquake periods in the geography we live in, that is Türkiye, differences are observed in every area. This study was planned after observing that the demographic data and admission diagnoses of the patients applied to the hospital were also affected by these differences. In this retrospective study, it was aimed to examine the differences caused by the earthquake on the demographic characteristics and trauma etiologies of the patients by comparing the pre-earthquake and post-earthquake periods of the patients who applied to the emergency service with the diagnosis of thoracic trauma.

MATERIALS AND METHODS

The study is retrospective, observational, and single-centered. 124 patients who were diagnosed with thoracic trauma in the emergency service and hospitalized and treated in the thoracic surgery clinic during the period approximately one year before the Kahramanmaraş-centered earthquake on February 6, 2023, and one ear after the earthquake, were included in the study investigating the effects of earthquakes on the demographic data and trauma etiologies of patients coming with thoracic trauma. While Group 1 included 54 patients who were hospitalized with a diagnosis of thoracic trauma in the pre-earthquake period (March 1, 2022 - February 6, 2023), Group 2 included 70 patients who were treated as inpatients in the post-earthquake period (March 1, 2023 - March 1, 2024). Patients under 18 years of age and those who applied to the hospital within two weeks immediately after the earthquake were not included in the study.

The demographic characteristics of the patients such as age, gender, etc, type of trauma, and accompanying pathologies were obtained from the hospital's electronic record system and file archive. The pathologies were detected by examining the direct X-rays and thorax computed tomographies taken during the hospitalization of all patients and the two groups were compared.

Statistical Analysis

The differences in the frequency distribution of qualitative variables between the groups were examined using the Chi-Square test and Fisher's exact test. The statistical significance was accepted as $p<0.05$. The statistical parameters were expressed as number (n) and ratio (%). IBM SPSS version 22 program was used to evaluate the data.

RESULTS

Of the 54 patients (group 1) who were followed up and treated as inpatients in the pre-earthquake period, 85.2% applied to the emergency service due to blunt thoracic trauma, and 14.8% applied due to sharp object injuries (SOI). When the etiologies of the cases were examined, it was seen that 44.4% of the cases were traffic accidents (TA), 35.1% were falls from height (FH), 3.7% were pounding, and 1.8% were animal kicks. Of the 54 patients in Group 1, 63% were male and 37% were female. When the pathologies of the patients were examined, rib fracture was detected in 68% of the cases, hemothorax or /and pneumothorax in 22.2%, sternal fracture in 11.1%, lung contusion in 11.1%, and subcutaneous emphysema in 3.7% (Table 1). Hemopneumothorax cases were treated with a chest drain. While

Table 1. Distribution of gender, trauma types, and pathologies by groups

		Pre-earthquake		Post-earthquake		
		n	%	n	%	p
Gender	male	34	63.0	57	81.4	**0.021***
	female	20	37.0	13	18.6	
Trauma	penetrating trauma	8	14.8	7	10.0	0.415
	blunt trauma	46	85.2	63	90.0	
Blunt Trauma	falls from height	19	35.2	45	64.3	**0.005***
	traffic accident	24	44.4	18	25.7	
	pounding	2	3.7	0	0.0	
	animal kicks	1	1.9	0	0.0	
Pathology						
Rib fracture		37	68.5	63	90.0	0.003*
Hemothorax or/and pneumothorax		12	22.2	29	41.4	**0.024***
sternal fracture		6	11.1	3	4.3	0.176
lung contusion		6	11.1	12	17.1	0.344
subcutaneous emphysema		2	3.7	0	0.0	0.188

Chi-Sqaure test; Fisher exact test; a=0.05; * the distributional difference between the groups is statistically significant

a conservative approach was sufficient for treatment in 5 of 6 cases with sternal fracture, stabilization was applied in 1 patient. While analgesic treatment was administered to patients with rib fractures, necessary fluid replacement and antibiotic therapy were also administered to patients with lung contusions in addition to analgesic treatment.

Of the 70 patients with thoracic trauma who were treated as inpatients (group 2) in the post-earthquake period, 90% applied to the emergency service due to blunt thoracic trauma and 10% due to SOI. 64.2% of the cases were FH and 25.7% were TA. Of the 70 patients in Group 2, 81% were male and 19% were female. When the pathologies of the patients were examined, rib fracture was detected in 90% of the cases, hemothorax or/and pneumothorax in 41.4%, lung contusion in 17.1%, and sternal fracture in 4.2%. Analgesic treatment was administered to the patients with rib fractures, while necessary fluid replacement and antibiotic therapy were also administered to the patients with lung contusions in addition to analgesic treatment. While a conservative approach was sufficient for patients with sternal fractures, hemopneumothorax cases were treated with a chest drain. There was no need for additional surgical procedures.

DISCUSSION

Thoracic traumas are seen in 10-15% of all traumas, especially in the patient group under 40 years of age. The most common cause is motor vehicle accidents (8). In general terms, thoracic traumas can be divided into two groups: penetrating and blunt. Penetrating thoracic traumas constitute only 30% of all thoracic traumas. Sharp object injuries and gunshot injuries are the most common causes of penetrating thoracic trauma. While conservative or simple medical treatments are sufficient in 85-90% of thoracic traumas, surgical treatment is required in 10-15% (9).

Many cities in the world are located on fault lines. It is also predicted that the earthquake threat will increase day by day due to the rapid increase in urbanization in the world, the concentration of services in city centers, and the lack of adequate precautions against earthquakes. There will be an increase in thoracic traumas as a natural result of this. Earthquake losses are discussed under three headings: sudden, rapid, or delayed (10). Serious crushing resulting in external or internal bleeding, skull injuries, thorax injuries, or drowning due to earthquake-induced tsunamis cause sudden loss of life. Rapid losses occur within minutes or hours. Dust inhalation or chest tightness is associated with asphyxiation due to hypovolemic shock or exposure to harsh environmental conditions. Delayed losses that may occur days later are attributed to dehydration, hypothermia, hyperthermia, crush syndrome, wound infections, or postoperative sepsis (11, 12).

The patients could not be registered in the first 2 days of the earthquake due to the congestion in the hospital, the inadequacy of hospital technical staff, and electricity and internet outages immediately after the February 6 Kahramanmaras-centered earthquake (Photograph 1). Immediately after the earthquake, approximately 30,000 people were evaluated and nearly 400 patients underwent interventional procedures related to thoracic surgery. Since these numbers are estimates and not exact, the data dated 6-7 February 2023, from the moment of the earthquake, were not included in this study. Since the majority of thoracic trauma cases applied to the emergency service between February 6, 2023, and February 20, 2023, were cases of falling from a height, the cases between this period were not included in the study.

Photograph 1. Hospital entrance after the earthquake

While the gender difference in the patients with thoracic trauma was more evenly distributed in the pre-earthquake period (63% male), it was concentrated in favor of the male gender (81% male) in the post-earthquake period (p=0.021). We believe that this situation is caused by the increase in the etiological factors of trauma in favor of FH and the fact that the majority of workers in the construction industry are men.

Traumatic pneumothoraxes usually occur as a result of disruption of the integrity of the visceral pleura caused by broken ribs. Traumatic hemothorax usually occurs after thoracic traumas (13). The most common complications of intrathoracic trauma are hemothorax, pneumothorax, and hemopneumothorax (14). In the post-earthquake period, pneumothorax and/or hemothorax rates increased from 22% to 41% (p=0.024). We think that the reason for this increase is due to the increase in the etiology of blunt thoracic trauma in favor of falling from heights.

The sternal fracture can be observed in 3-8% of cases with chest trauma (15). The sternal fracture rate decreased from 11% to 4% in the post-earthquake period. We think that this proportional decrease in sternal fracture is due to the decreasing population and the decrease in traffic accidents among the etiologies of blunt trauma.

Flail chest is a traumatic condition of the thorax. It may occur when 3 or more ribs are broken in at least 2 places (16). In our study, no patient had a flail chest.

We think that the reason why the rates of penetrating traumas, which is another form of trauma, decreased from 15% to 10% in the post-earthquake period is the decreasing population and we think that this rate will increase with the increase in population due to the severe damage caused to people's psychology by this devastating earthquake.

Blunt trauma is statistically the most prominent form of trauma, and falling from a height stands out as the most prominent form of blunt trauma in the post-earthquake period (p:0.005). Although efforts were made to resolve the difficulties and impossibilities experienced in the working environment at the time of this devastating earthquake, which affected 11 cities, called the disaster of the century, on February 6, 2023, the earthquake left many economic and social negative effects in the region. Differences are noticeable in every aspect of life in the region. Regarding our field, the most striking are the differences in the etiologies of trauma patients coming to emergency services. Falling from a height has become by far the leading etiological cause of blunt trauma due to the decrease in traffic accident rates due to the decreasing population in the region and the direct effect of the increasing construction works in the region after the great destruction.

After this natural event that left its mark on every aspect of life, efforts are being made to return life to its normal flow. We believe that once the housing problem, economic problem, and reverse migration problem are solved, trauma patterns and rates will return to the rates in the pre-earthquake period.

Ethical approval: The study is approved by Kahramanmaras Sutcu Imam University Clinical Research Local Ethics Committee (date:10.06.2024; decision number: 01). All the procedures applied to human participants in this study were compatible with the ethical standards of the national research committee and the 1964 Helsinki Declaration and its later amendments.

Authors' contribution: The authors declare that they have contributed equally to the study.

Conflict of Interest: In this study, there is no conflict of interest among the authors on any subject.

Funding: Our study has not been financed by an institution and institution.

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