Characteristics of Trauma Patients Admitted to a Tertiary Care University Hospital Emergency Service: One year Cross-sectional Analysis

Üçüncü Basamak Üniversite Hastanesi Acil Servisine Başvuran Travma Hastalarının Özellikleri: Bir Yıllık Kesit Analizi

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Abstract

Introduction Trauma is a important cause of mortality and morbidity in the world. Lay out and prevent the causes of trauma will significantly affect the quality of patient care and the quality of patients' lives. The purpose of this study is to identify the characteristics of trauma patients who refer to the emergency room and assess the mortality impact of pathologies that patients have.

Materials and Methods In this study, 14423 trauma patients who admitted to tertiary care emergency department between January 1, 2019 and December 31, 2019 were retrospectively evaluated by using the hospital information management system. The trauma types of these patients were evaluated together with their radiological imaging, and their effects on hospital discharge, hospitalization and survival were evaluated. The analysis of the data obtained has reached by SPSS and MEDCALC program.

Results It was determined that 8948 (62%) of 14423 patients included in our study were male and 5475 (38%) were female. It was found that the median age of the patients was 24 (IQR:25). 1680 (11.6%) of patients had head trauma, spinal trauma in 203 (1.4%), thorax trauma in 461 (3.2%), abdomen trauma in 209 (1.5%), and extremity related trauma in 4157 (28.8%) patients were found in the study. In our study, 12630 (87.6%) were discharged from the emergency department, 1747 (12.1%) were hospitalized, 16 (0.111%) died in the emergency room, and 30 (0,2%) of patients were transferred to another hospital. 1747 patients who were hospitalized, 40 (53.8%) of them were operated at least once during their hospitalization. 43 patients (2.4%) died after hospitalization. When the effects of the pathologies of the patients included in the study on mortality were evaluated; presence of scalp incisions, ventricular hemorrhage, subarachnoid hemorrhage, spinal fracture, rib fracture, lung contusion, presence of intra-abdominal fluid were statistically significant with mortality.

Conclusion Knowing the epidemiological characteristics, current trauma and trauma mechanisms of trauma patients with a significant share in emergency services admissions will be important in predicting morbidity and mortality. Comprehensive and multicenter studies are needed more to increase the quality of patient care and to effect morbidity and mortality.

Keywords Emergency service, Trauma, Epidemiology.

Özet

Amaç Travma, tüm dünyada önemli bir morbidite ve mortalite sebebidir. Bu nedenle, travma hastalarının acil servis başvuruları büyük bir önem arz etmektedir. Travmanın önlenebilir nedenlerini ortaya koymak ve engellemek, hasta bakım kalitesini arttırmak, hastaların yaşam kalitelerine önemli ölçüde etki edecektir. Bu çalışmanın amacı, acil servise başvuran travma hastalarının özelliklerini belirleyip, hastaların sahip olduğu patolojilerin mortaliteye etkisini değerlendirmektir.

Gereç ve Yöntemle Bu çalışmada; 1 Ocak 2019 ve 31 Aralık 2019 tarihleri arasında üçüncü basamak acil servisimize başvuran 14423 travma hastası, hastane bilgi yönetim sistemi kullanılarak retrospektif olarak değerlendirilmiştir. Elde edilen verilerin analizinde SPSS ve MEDCALC programından yararlanılmıştır.

Bulgular Çalışmamıza alınan 14423 hastanın 8948'inin (%62) erkek, 5475'inin (%38) kadın olduğu saptanmıştır. Hastaların ortanca yaş değerinin 24 (IQR:25) olduğu sonucuna varılmıştır. Hastaların 1680'inde (%11,6) kafa travması, 203'ünde (%1,4) spinal travma, 461'inde (%3,2) toraks travması, 209'unda (%1,5) abdomen travması, 4157'sinde (%28,8) ekstremite travması ile ilgili patoloji saptanmıştır. Çalışmaya dahil edilen hastaların 12630'u (%87,6) acil servisten taburcu edilmiş, 1747'sinin (%12,1) hastaneye yatışı gerçekleşmiş, 16'sı (%0,111) acil serviste hayatını kaybetmiş, 30'u (%0,2) başka hastaneye sevk edilmiştir. Hastaneye yatırılan 1747 hastanın 940'ı (%53,8) yatışları süresince en az bir defa opere edilmişlerdir. Hastaneye yatan hastaları 43'ü (%2,4) ise yatışından sonra hayatını kaybetmiştir. Çalışmaya dahil edilen hastaların sahip olduğu patolojilerin mortaliteye etkisi değerlendirildiğinde; skalp kesilerinin olması, ventriküler hemoraji, subaraknoid hemoraji, spinal fraktür, kot fraktürü, akciğer kontüzyonu, batın içi serbest sıvı varlığı istatistiksel açıdan mortalite ile ilişkili bulunmuştur.

Sonuç Acil servis başvuruları arasında önemli bir paya sahip olan travma hastalarının epidemiyolojik özelliklerinin, mevcut travmaların ve travma mekanizmalarının bilinmesi hastalarda yol açabilecek morbidite ve mortaliteyi öngörmede büyük ölçüde yol gösterecektir. Hasta bakım kalitesini artırabilmek, morbidite ve mortaliteye etki edebilmek için daha kapsamlı ve çok merkezli çalışmalara ihtiyaç vardır.

Anahtar Kelimeler Acil Servis, Travma, Epidemiyoloji

INTRODUCTION

Trauma is still an important cause of morbidity and mortality all over the world. The mechanism of trauma, life-saving interventions in the field, the way of admission to the hospital, emergency service interventions and subsequent medical interventions have important effects on survival. According to World Health Organization data, an estimated 5 million people died from injuries in 2000 all over the world. In 2000, 9% of deaths in the world and 12% of the diseases were injured (1). Almost 50% of the world's injury-related death rate occurs in young people aged 15-44, who are the most economically productive members of the global population.

Multiple system trauma means that; It should cover at least two regions of the human body as head-neck, thorax, abdomen and extremities. In addition, one major system and two or more major bone fractures are considered as multiple system trauma (2). Patients' vital findings should be evaluated quickly and efficiently. Patient management consists of initiating a rapid primary examination and more detailed secondary examination, and resuscitative care with simultaneous resuscitation of vital findings (2).

Life-threatening injuries are evaluated in primary care. Primary care include the airway (A), breathing (B), circulation (C), disability (D), exposure (E) stages of the trauma managment. After the injury at any stage is treated or resuscitative interventions are done, the next stage proceeds. The patient should also be evaluated with ultrasound (FAST=Focused Assessment with Sonography for Trauma) in terms of trauma at this stage,

Secondary care includes a complete evaluation of the patient from head to toe. After the primary care of the patient is over, detailed anamnesis, detailed physical examination, registration and examination requests are included at this stage of care.

MATERIAL and METHODs

This study was conducted as a descriptive cross-sectional study in the Emergency Department of Antalya Akdeniz University Hospital, a tertiary care center. Before starting the study, ethics committee approval was obtained from the Clinical Research Ethics Committee of Akdeniz University Faculty of Medicine with the decision number KAEK-439 dated 24.06.2020.

Trauma patients of all age groups who applied to Akdeniz University Hospital Emergency Department between 01.01.2019 and 31.12.2019 were included in the study, retrospectively. The patients included in the study were reached by using trauma-related diagnosis codes via the hospital information management system. The traumas of these patients were evaluated together with their radiological imaging, and their effects on hospital discharge, hospitalization and survival.

Statistical analysis

"IBM SPSS Statistics 20" and "MedCalc statistical software" were used in the analysis of the obtained data. Logistic regression analysis was used to evaluate the parameters effecting the mortality of the patients. Results with P value below 0.05 were considered statistically significant.

RESULTS

15918 patients with trauma-related diagnosis code were included in the study in 2019. 1495 patients with missing files or incorrect diagnostic codes were excluded from the study. The datas of the remaining 14423 patients was accessed through the hospital information management system. (Figure 1).

When the demographic characteristics of the patients were evaluated, 8948 (62%) of the 14423 patients included in the study were male and 5475 (38%) were female. The median age of the patients was 24 (IQR: 25).

X-ray imaging was not performed in 5115 (35.5%) of the patients included in the study, and trauma-related pathology was found in 2428 (26.1%) patients who underwent X-ray imaging. Imaging was normal in 6880 (73.9%) patients.

12,892 (89.4%) of the patients were not evaluated with FAST for trauma, and trauma-related pathology was detected in 79 (5.2%) of the patients who evaluated with FAST.

Figure 1: Flow chart of patients

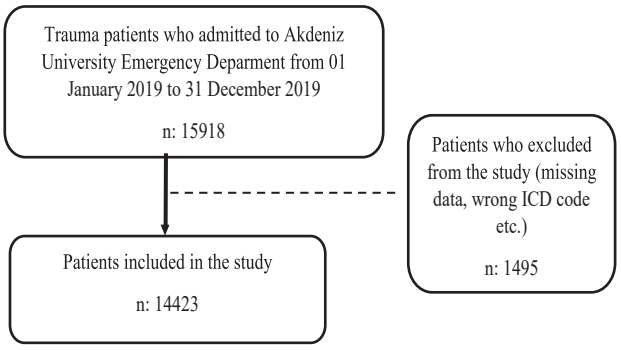

Table 1. Distribution of injuries to body areas

	Number (n)	Percantage (%)
Head Trauma	1595	11,1
Spinal Trauma	203	1,4
Chest Trauma	386	2,7
Abdominal Trauma	150	1,0
Extremity Trauma	3731	25,9
Burn	525	3,6

Table 2. Distribution of head injuries

Head Injuries	Number (n)	Percantage (%)
Laceration	1297	77,2
Fracture	401	23,8
Subdural hemorrhage	115	6,8
Subarachnoid hemorrhage	99	5,9
Burn	88	5,2
Contusion	71	4,2
Epidural hemorrhage	49	3
Parenchymal hemorrhage	33	2
Ventricular hemorrhage	15	0,9
Total	2168	129

FAST was normal in 1452 (94.8%) patients.

Computed tomography imaging was performed in 2428 (16.9%) patients, and trauma-related pathology was found in 1222 (50.3%) patients. Imaging results were reported normal in 1206 (49.7%) patients. Computed tomography imaging was not performed in 11995 (83.2%) patients.

The distribution of injuries of the patients included in the study by body regions is detailed in Table 1. Patients with head injury are detailed in Table 2. Spinal trauma was not found in 14220 (98.6%) of the patients included in the study. Spinal fracture was found in 203 patients (1.4%). There was no pathology associated with thoracic trauma in 13962 (96.8%) of the patients included in the study (Table 3.).

Abdominal injuries were found in 209 (1.5%) of the patients included in the study, while extremity injuries were found in 4,157 (28.8%) patients.

1747 (12.1%) patients were hospitalized. 1279 (8.9%) of patients were hospitalized in the related services for further examination and treatment, 197 (1.4%) patientswere hospitalized in the intensive care unit, and 271 patients (1.9%) were taken to emergency surgery by the relevant departments. 12630 patients (87.6%) were discharged from the emergency department. 16 patients (0.1%) were admitted ex in the emergency department. 30 patients (0.2%) were referred to other centers for lack of room in the hospital or for further examination and treatment (Table 4). 1747 patients who were hospitalized, 940 (53.8%) of them were operated at least once during their hospitalization. 43 patients (2.5%) died after hospitalization. Hospitalized patients were hospitalized for minimum of 1 day and a maximum of 159 days. . The median value for hospital stay was 3 days (IQR: 5).

According to the effects of trauma on mortality by body region, head trauma, thoracic trauma and abdominal trauma were found to be associated with mortality (Table 5.). When the effects of head trauma injuries on mortality are evaluated separately, “presence of skin lacerations on the head”, “presence of ventricular hemorrhage and subarachnoid hemorrhage” were found to be statistically associated with mortality in patients (Table 6). The presence of spinal fractures has been found to be associated with mortality (Table 7.).

The presence of “non-vertebra thorax fracture” and “contusion in the lung” in patients taken into the study was found to be related to mortality (Table 8.). Similarly, in patients

Table 3. Patients who have thoracic trauma

Thorax Trauma	Number (n)	Percentage (%)
Non-vertebral Fracture	259	56,1
Laceration	42	9,2
Pneumothorax	135	29,3
Hemothorax	44	9,6
Contusion	135	29,3
Vascular Injury	3	0,6
Pneumomediastinum	4	0,9
Burn	76	16,4
Total	**698**	**151,4**

Table 4. Outcomes of patients

	Number (n)	Percantage (%)
Discharged	12630	87,6
Admitted to Hospital	1279	8,9
Admitted to Intensive Care Unit	197	1,4
Urgent Surgery	271	1,8
Death in Emergency Department	16	0,1
Transferred to Another Hospital	30	0,2
Total	**14423**	**100,0**

Table 5. Effects of traumas on mortality by body area

			95% CI	
	SD	P value	Lower Limit	Upper Limit
Total Head Trauma	0,30406	<0,0001	0,126	0,414
Total Chest Trauma	0,32316	0,0002	0,160	0,568
Total Abdominal Trauma	0,34693	0,0436	0,252	0,980

	Odds Ratio	95% CI	
Total Head Trauma	4,3875	2,4176	7,9623
Total Chest Trauma	3,3190	1,7617	6,2530
Total Abdominal Trauma	2,0139	1,0203	3,9751

Table 6. Head-injury and mortality

			95% CI	
	SD	P value	Lower Limit	Upper Limit
Laceration	0,34028	0,0226	0,236	0,897
Ventricular Hemorrhage	0,64705	0,0171	0,06	0,76
Subarachnoid Hemorrhage	0,35435	<0,0001	0,058	0,232<

	Odds Ratio	95% CI	
Laceration	2,1729	1,1153	4,2335
Ventricular Hemorrhage	4,6789	1,3163	16,6312
Subarachnoid Hemorrhage	8,6158	4,3020	17,2553

with abdominal trauma, the presence of "free abdominal fluid" was found to be associated with mortality (Table 9.).

DISCUSSION

Patients with trauma-related injuries applied to a tertiary care university hospital emergency department within a year were taken into our study. With the obtained data, epidemiological characteristics of trauma patients, applied tests, pathologies and primary outcomes were reached.

According to the study of DiMaggio et al., when the gender distribution of patients admitted to primary care trauma centers, it was seen that female patients were 38.2%, and similar results were obtained in our study (3). The median age of the patients included in our study was 24 (IQR:25). According to the study of DiMaggio et al., in 2011, the mean age of discharge from traumatic injury was 59.58, and the median value was 65(3).

In our study, extremity trauma (25.9%) was the most common, followed by head trauma (11.1%). The least common trauma is abdominal trauma (1%). According to a study by Haldun Akoğlu et al., the most common local trauma is extremity trauma, followed by head-neck, thorax and abdomen trauma (4).

Throughout our study, we know that all kinds of trauma patients come to our emergency department, which is determined as level 3 care by the ministry of health. During our study, it was found that the most common pathology was skin incisions. Edema, bleeding, hematoma, abrasion, laceration, etc. occurring in the injury site are the most common symptoms. These findings should be investigated with a careful and attentive physical examination, and organ injuries that may cause mortality and morbidity in these regions should be investigated.

The least common head trauma-related pathology in our study was ventricular hemorrhage. According to the study of Marin et al., we see that the most common pathologies in head trauma are unidentified head injuries, concussions and skull fractures. In Marin et al. Study we see that epidural hemorrhage is the least common pathology in head trauma (5). According to the results of our study, the presence of head cuts, ventricular hemorrhage and suba-

Table 7. Spinal fracture and mortality

			95% CI	
	SD	P value	Lower Limit	Upper Limit
Spinal Fracture	0,30847	<0,0001	0,105	0,353

	Odds Ratio	95% CI	
Spinal Fracture	5,1897	2,8351	9,5000

Table 8. Thoracic trauma and mortality

			95% CI	
	SD	P value	Lower Limit	Upper Limit
Non-vertebra Thorax Fracture	0,36437	0,0054	0,178	0,741
Lung Contusion	0,36567	<0,0001	0,101	0,424

	Odds Ratio	95% CI	
Non-vertebra Thorax Fracture	2,7572	1,3499	5,6316
Lung Contusion	4,8313	2,3594	9,8930

Table 9. Free abdominal fluid and mortality

			95% CI	
	SD	P value	Lower Limit	Upper Limit
Free Abdominal Fluid	0,32017	<0,0001	0,077	0,271

	Odds Ratio	95% CI	
Free Abdominal Fluid	6,9205	3,6949	12,9619

rachnoid hemorrhage were associated with mortality in patients with head trauma.

According to a study by Martins et al., it was shown that subarachnoid hemorrhage is associated with mortality and has similar results with our study (6).

According to a study by Lalwani et al., similar to our study results, the relationship between spinal trauma and mortality increases with having other system pathologies. The most common association of spinal trauma is head trauma-related trauma (7).

According to the results of our study, it is seen that the most common pathology associated with thoracic trauma is rib fracture. Pathologies as pneumothorax and lung contusion flooow it. According to a study by Veysi et al., the most common pathologies associated with thoracic trauma are rib fracture (33%), lung contusion (15%) and pneumothorax (10%), and they have similar results with our study (8). According to our results, the presence of rib fracture and lung contusion in patients with thoracic trauma was found to be associated with mortality.

According to a study by Beshay M. et al., the presence of lung contusion was found to be associated with mortality (9).

According to another study by Cheau-Feng Lin et al., it was shown that traumatic rib fractures were associated with mortality and had similar results with our study (10).

As seen in the results of our study and other studies, the presence of rib fracture and lung contusion are associated with mortality, and it should be kept in mind that especially patients with blunt thoracic trauma should be carefully evaluated and followed up.

According to a study by Arumugam et al., the most common pathology in patients with abdominal trauma is liver injury, 36% of them (11). Similarly, in our study, half of the patients with abdominal injury had intra-abdominal organ injury. According our study, the presence of free abdominal fluid was associated with mortality in patients with abdominal trauma. According to the study of Pimentel et al., the most mortality-related pathology in patients with abdominal trauma is solid organ injury (12). Similar results were in our study, since patients with solid organ injuries also had free intra-abdominal fluids.

In a study by Bolandparvaz et al., when the injury patterns of trauma patients were evaluated, it was concluded that the extremities were the most injured body region with a rate of 43.4%, and in our study, it was found that the most injured body region was the extremities (13).

16 (0.1%) of the patients died in the emergency department and 43 (0.3%) of them died after hospitalization. According to another study by DiMaggio et al., the trauma-related mortality rate was found to be 0.09% in level 1 or 2 trauma centers, and it was observed that the trauma-related mortality rate was approximately five times higher in our study (14).

As a result; since trauma is an important cause of morbidity and mortality worldwide, and these patients are

primarily evaluated in emergency services, it is very important to determine the characteristics of trauma patients and to reveal preventable factors. The data from our work needs to be redesigned to accommodate more multi-center patients in order to benefit more.

CONCLUSION

Trauma is important cause of morbidity and mortality all over the world. Trauma patients admitted to the emergency department cannot be underestimated. For these reasons knowing the specialitis of trauma patients can improve patients' care in emergency department and reduce the rates of mortality and morbidity. We need more studies which are descriptive and multi-centered.

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