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Analysis of trauma patients in a rural hospital in Turkey

Türkiye'nin kırsal bir hastanesindeki travma olgularının analizi

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BACKGROUND
There is a grey zone about the epidemiology of trauma in eastern Turkey. The present study was aimed at obtaining data on this subject.

METHODS
Trauma patients who applied to the emergency department (ED) between January 2006 and December 2007 were analyzed.

RESULTS
There were 6183 patients, of whom 87% were male. The mean age was 26.2±13.6 years. Assault was the most common cause (63.2%). Motor vehicle injury (MVI) and fall were encountered at frequencies of 21.2% and 6.5%, respectively. The most frequently injured body regions were head-neck and extremities. The majority of patients were managed and discharged from the ED (89.8%) with no consultation (81.8%). Interestingly, the discharge rate of assault cases was 98.7%. Patients were hospitalized (4.2%) mostly for MVI (32.6%) and fall (19%); however, hospitalization rates for firearm and piercing/cutting injury (36.1% and 16.7%) were significantly high. Among the transported patients (5.3%), the rates of MVI and fall were high (41.5% and 24.3%, respectively). In groups, for burn and firearm injuries, these were 42.1% and 24.1%, respectively. Forty-eight patients (0.8%) died, mostly from MVI by number, but by self-infliction and firearm by rate (8.3% and 6%).

CONCLUSION
Assault cases caused an excessive trauma patient density in the ED, as 98.7% were discharged from the ED. Further studies are needed regarding the high rate of assault cases.

Key Words: Epidemiology; rural; trauma; Turkey.

AMAÇ
Bu çalışmanın amacı, travma ile ilgili yeterli verinin olmadığı Türkiye'nin doğusundan epidemiyolojik veriler yanında hastaların çıkış durumlarını sunmaktadır.

GEREÇ VE YÖNTEM
Muş Devlet Hastanesi Acil Birimi'ne Ocak 2006 - Aralık 2007 tarihleri arasında başvuran travma hastalarının kayıtları retrospektif olarak incelendi.

BULGULAR
Toplam 6183 hastanın 5377'si (%87) erkek ve ortalama yaş 26,2±13,6 idi. Darp-şiddet 3910 (%63,2) hasta ile en sık travma nedeni idi. Ardından trafik kazası ve düşme sırasıyla %21,2, %6,5 oranlarında idi. En sık baş-boyun ve ekstremite yaralanmaları görülmüştür. Olguların %89,8'inin, darp şiddet olgularının ise %98,7'sinin acil polikliniğinde müdahale sonrası taburcu edildiği gözlendi. Konsültasyona hastaların çoğunda (%81,8) ihtiyaç duyulmadı. Yatışı yapılan 258 (%4,2) hastanın %32,6'sı trafik kazası, %19'u düşme olguları idi. Ancak ateşli silahla ve delici-kesici aletle yaralanan olguların yatış oranları (%16,7, %36,1) yüksekti. Hastaların %5,3'ü sevk edildi. Sevk edilen hastaların %41,5'i trafik kazası, %24,3'ü düşme olguları idi. Bununla birlikte yanık ve ateşli silahla yaralanma olguları arasında sevk daha yüksek oranda (%42,1, %24,1) idi. Yarısı trafik kazasından olmak üzere 48 (%0,8) hasta hayatını kaybetti. Ancak canına kastetmeye ve ateşli silahla yaralanmaya bağlı ölüm oranı (%8,3,%6) daha yüksek bulundu.

SONUÇ
Darp şiddet olguları acil biriminde travma hastası yoğunluğuna neden olmaktadır. Yüksek darp şiddet oranı ile ilgili ileri çalışmalar gerekli gözükmektedir.

Anahtar Sözcükler: Epidemiyoloji; kırsal; travma; Türkiye.

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Trauma is an important problem worldwide and causes huge economic and social losses. Twelve percent of all the diseases in the world have been reported to be associated with trauma, and five million people were reported dead due to injuries in 2000.[1] The economic cost of trauma is estimated to be around $406 billion in the United States alone.[2] By taking appropriate legal and social preventive steps, the economic and social burdens of trauma, along with mortality rates, are considered reducible at significant levels.[3,4] Trauma system organization and effective trauma centers have been reported to reduce morbidity and mortality rates by 15-39% among patients with trauma.[5,6]

Data on trauma epidemiology vary between countries and even among different regions of a country.[3,4,7-9] This variance brings about differences in solutions and priorities as well. Therefore, different regional management methods are carried out.[10-14]

The current study was conducted in the rural Muş province located in the eastern part of Turkey, where there is little information available on trauma, with an aim to analyze the trauma cases, compare our results with previous literature reports, and discuss possible solutions.

MATERIALS AND METHODS

The Muş province is a predominantly rural area with an underdeveloped industry and education level and with high unemployment rates. As in other similar rural regions, agriculture is the main employment source. There are few motor vehicles in the province. Buildings are generally single-storey. The population is not centered in a single area and therefore has a low density. Winters are harsh and extended in duration. Between winter and summer, roads are usually closed due to the heavy snow and mud.

Muş State Hospital serves a population of 400,000 people, the majority of whom live in rural areas, and has a 360-bed capacity. The hospital, which provides general healthcare services, is classified as a Level II healthcare center according to the Turkish classification system, which corresponds to a Level III hospital in the literature.[15] There are five community healthcare centers within a 25-100 km radius of Muş State Hospital, each of which has less than a 30-bed capacity. As the closest Level II and III healthcare centers are more than 250 km in each direction, Muş State Hospital is a crucial healthcare provider for the region (although only a Level III healthcare center).

In the current study, all the trauma or suspected trauma cases presented to the emergency department (ED) of Muş State Hospital between January 2006 and December 2007 due to assault, motor vehicle injuries (MVI), falls, stab wounds, firearm injuries, burns, or self-inflicted trauma were evaluated retrospectively based on the data included in the forensic reports. Evaluation was made in terms of demographic characteristics, trauma mechanism, injury site, consultations, and ED discharge forms. Of the 6720 forensic reports, 537 were excluded from the study. The excluded reports were either incomplete or previously enrolled or pertaining to cases of intoxication with various agents (e.g. alcohol, drug, food, carbon monoxide). Patients of all ages were included in the study. MVI cases included both passengers and pedestrians. Similarly, cases of falls included all kinds of falls. The term 'normal' used for injury sites refers to minor abrasions or ecchymosis with a radius of a few centimeters or pain without any lesion. Statistical analysis was performed by using descriptive statistics.

RESULTS

The ratio of trauma cases to all the cases presenting to the ED within the study period was 2.0% (6720/337,608). Among the 6183 patients included in the study, 5377 were male, and 806 were female. The mean age was 26.2±13.6 (1 month-81 years). The discharge status of the cases regarding their trauma mechanisms are outlined in Table 1.

The most common causes of the trauma cases presented to the ED were assault (63.2%), MVI

Table 1. Trauma mechanisms and discharge status of cases

	Discharge n [%]	Inpatient n [%]	Transfer n [%]	Exitus n [%]	Total n [%]
Assault (%)	3861 (98,7) [69,5]	26 (0.7) [10.1]	22 (0.6) [6.8]	1 – [2.1]	3910 [63.2]
MVI (%)	1065 (81,2) [19,2]	84 (6.4) [32.6]	135 (10.3) [41.5]	27 (2.1) [56.3]	1311 [21.2]
Fall (%)	267 (66,6) [4,8]	49 (12.2) [19.0]	79 (19.7) [24.3]	6 (1.5) [12.5]	401 [6.5]
P/CI (%)	197 (74,9) [3,5]	44 (16.7) [17.1]	18 (6.8) [5.5]	4 (1.5) [8.3]	263 [4.3]
Firearm (%)	28 (33,7) [0,5]	30 (36.1) [11.6]	20 (24.1) [6.2]	5 (6.0) [10.4]	83 [1.3]
Burn (%)	39 (51,3) [0,7]	4 (5.3) [1.6]	32 (42.1) [9.8]	1 (1.3) [2.1]	76 [1.2]
Self infliction (%)	18 (75,0) [0,3]	1 (4.2) [0.4]	3 (12.5) [0.9]	2 (8.3) [4.2]	24 [0.4]
Others (%)	77 (67,0) [1,4]	20 (17.4) [7.8]	16 (13.9) [4.9]	2 (1.7) [4.2]	115 [1.9]
Total n (%)	5552 (89,8) [100]	258 (4.2) [100]	325 (5.3) [100]	48 (0.8) [100]	6183 [100]

Percentage in brackets is of outcome rate in total; percentage in parenthesis is of trauma mechanism rate in total.

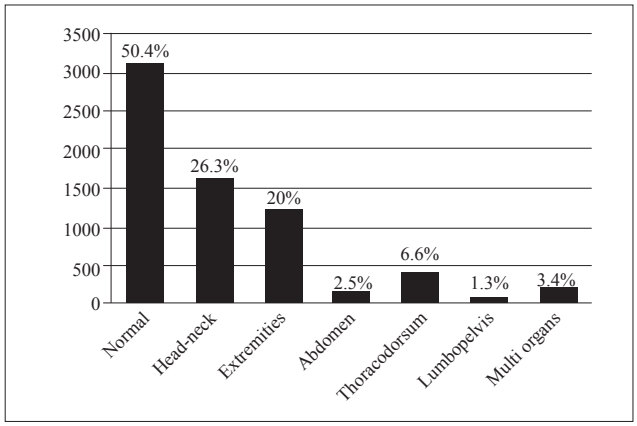

Fig. 1. Distribution of injured body regions in all trauma patients.

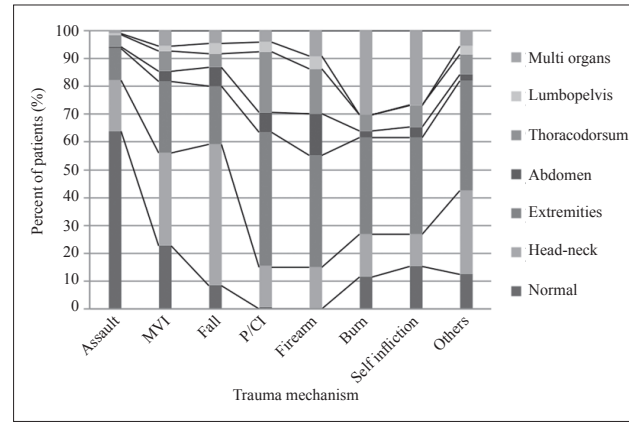

Fig. 2. Distribution of injured body regions due to each trauma mechanism.

(21.2%) and falls (6.5%). According to the evaluation performed within the groups, the most common trauma types treated on an outpatient basis and discharged were assault (98.7%), MVI (81.2%), self-inflicted traumas (75.0%), and piercing/cutting injury (P/CI) (74.9%). In the firearm injury cases, this rate was found to be 33.7%. The majority of the patients (89.8%) were discharged after treatment in the ED.

Hospitalization rates were 32.6%, 19.0% and 17.1%, respectively, for MVI, falls and P/CI cases. However, hospitalization rates within groups were as follows: firearm injuries (36.1%), P/CI (16.7%), falls (12.2%), and MVI (6.4%). Hospitalization rates of firearm injuries and P/CI were significantly high.

Transfer rates (rate of patients referred to other healthcare institutions) of MVI, fall and burn cases were 41.5%, 24.3% and 9.8%, respectively. However, transfer rates within groups were as follows: burns (42.1%), firearm injuries (24.1%) and falls (19.7%). The transfer rate for burn injuries was remarkably high.

In total, 48 patients (0.8%) died, of whom 27 were in the MVI group. Furthermore, 11 patients (22.9%) were ascertained to be dead upon arrival at the hospital.

The patients were assessed regarding injury sites, and 3116 of the 6183 patients (50.4%) were found to display minor signs and were deemed normal (Fig. 1). Head-neck injuries and abdominal injuries accounted for 26.3% and 2.5% of the injured body sites. Approximately 86.5% of the patients who showed minimal physical findings (referred to as normal) were in the assault group (Fig. 2). However, 68.9% of the assault cases were evaluated to be normal. Patients who were hospitalized and transferred or who died were suggested to have major trauma. Herein, 631 cases were assessed as major trauma.

Head-neck injuries were most commonly observed in assault (774), MVI (511) and fall (231) cases. However, this order changed with evaluation within each group as follows: falls (57.6%), MVI (39.0%) and assault (19.8%). In 7.0% of the patients with head-neck injuries, facial injuries were present as well.

Extremity injuries and thoracodorsal injuries were seen at a higher rate in the P/CI and firearm groups. Abdominal injuries were more commonly encountered in firearm (15.7%) and P/CI (8.0%) cases compared to fall (7.7%) and MVI (4.3%) cases.

The highest number of multiple organ injuries among the groups occurred in the MVI cases (85 patients), whereas within the groups, it was present in firearm, MVI and fall cases at frequencies of 9.6%, 6.5% and 5.2%, respectively. Lumbopelvic injuries were found to be most common in firearm (4.8%), fall (4.2%) and MVI (2.1%) cases.

In the ED, the rate of consultation varied depending on the trauma etiology, and in the majority (81.8%), no consultation was deemed necessary. One of the most interesting findings of the present study was that ED physicians suggested the initial treatment as adequate in 96.0% of the assault cases and did not consult any other specialty (Table 2). On the contrary, a specialist was consulted in most of the firearm cases (81.9%). Consultation was sought in more than half of the burn and fall cases. The three most frequently consulted medical specialties, in decreasing order, were neurosurgery, orthopedics and general surgery (Table 3).

While 37.6% of the patients hospitalized had head-neck injuries, 33.7%, 15.5% and 11.6% had extremity, thoracodorsal and abdominal injuries, respectively (Fig. 3). Nonetheless, the evaluation performed with regard to the injury sites revealed a hospitalization rate of 30.2%, 19.6% and 18.8% for patients with extremity, abdominal and lumbopelvic injuries, respectively.

Table 2. Consultation rates in certain trauma mechanisms

Consultations	None (%)	Yes (%)
Assault	96.0	4.0
MVI	64.9	42.1
Fall	44.4	55.5
Burn	57.8	57.9
P/CI	18.1	42.2
Firearm	66.7	81.9
Self infliction	52.2	33.3
Others	35.1	47.8
Total	81.8	18.2

Table 3. Rates of consulted specialties

Consultations	%
None	81.8
Neurosurgery	8.3
Orthopedics	6.2
General surgery	5.2
Thoracic surgery	1.6
Plastic surgery	1.1
Otolaryngology	1.1
Others	1.4
Multiple	3.9

Among cases with head-neck injuries, the hospitalization rate was 6.0%.

The rate of head-neck injury cases was significant (43.1%) among the patients transferred to other institutions, followed by patients with extremity injuries (30.2%) and with multiple organ injuries (17.5%). Regarding the injury site, patients with multiple organ (27.1%), lumbopelvic (22.5%) and abdominal injuries (19.6%) were found to be the most commonly transferred patients. Among major trauma patients (631 patients), the transfer rate rose to 51.5%.

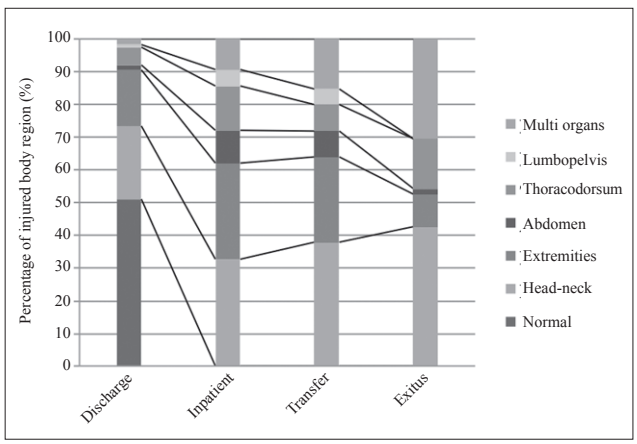

Fig. 3. Outcomes of the cases based on the injured body regions.

Approximately 52.1% of the patients who died had head-neck injuries, whereas 37.5% had multiple organ injuries. Furthermore, 8.6% of the patients with multiple organ injuries, and 2.2%, 2.1% and 1.5% of the patients with thoracodorsal, abdominal and head-neck injuries, respectively, died.

DISCUSSION

Current epidemiological data differ from historical data because of today's dynamics and ever-improving societies.[16] Previous studies generally focused on the trauma mechanism in moderate-severe injuries.[7,8,14,16] Therefore, it is not easy to determine the frequency of the overall number of patients with trauma presenting to the ED. Nonetheless, some studies suggest that this rate is 24-30%.[17,18] Dalkılıç et al.[19] from Istanbul reported the number of trauma patients as 43,915, which corresponded to a rate of 49.5% for trauma cases out of all patients presented to the surgical ED of a Level I trauma center over 4 years. A high rate can be expected due to the presentation of selected cases to the ED of surgery. In the current study, the rate of trauma cases presenting to the ED was approximately 2.0%. This rate, which is not in agreement with literature reports, may be explained by the exploitation of the ED by nontraumatic patients. Patients demand to be examined, diagnosed and treated without delay by the ED staff. Preventing the abuse of ED utilization will increase the percentage of trauma cases among all ED cases relatively. However, the most important benefit will be the prevention of time loss suffered by trauma patients in the ED.

While more than half of the patients with a major trauma are hospitalized, most of the trauma patients (95% or above) presented to the ED are discharged after ambulatory treatment.[16,20-22] Nevertheless, the cost of patients receiving treatment on an outpatient basis is estimated to be rather high.

Vyrostek et al.[21] performed a survey study in the United States in 2001 and found 4.6 million unintentional strike cases and 1.4 million intentional strike cases, which accounted for 20.2% of all injury cases. In a rural health center in Kenya, 43% of patients presented to the ED were reported to be assault cases.[22] Prekker et al.[17] conducted a prevalence study with selected cases in which the authors particularly excluded patients younger than 18 years and people who could not speak the official language, and found the assault rate to be 35%. Among all ED cases, this rate may be higher because adolescent patients excluded from the study constitute the social age group that most frequently resorts to violence.[23] Moreover, people who cannot speak the official language are probably individuals at a low socioeconomic level among whom violence is known to be high. Furthermore, high unemployment rates and low income are known to be factors

Table 4. Distribution of major trauma mechanisms in the literature

	Muş, Turkey	Quebec, Can.[16]	LA, USA [8]	Ohio, USA[14]	Auckland, NZ[7]	Minneapolis, USA[17]
MVI (%)	246 (39.0)	7727 (27.3)	6467 (45.7)	2119 (65.3)	222 (49.5)	139 (13)
Assault (%)	49 (7.7)		5120 (36.4)	257 (7.9)	48 (10.7)	360 (35)
Fall (%)	134 (21.2)	13927 (49.2)	1274 (9.05)	534 (16.4)	83 (18.5)	239 (23)
P/CI (%)	66 (10.4)	1790 (6.3)		35 (1.0)		117 (11)
Firearm (%)	55 (8.7)	408 (1.4)		85 (2.6)		8 (1)
Burn (%)	37 (5.8)					
Self infliction (%)	6 (0.9)		539 (3.8)			
Blunt injury (%)		1261 (4.4)				
Hanging (%)					67 (14.9)	
Others (%)	38 (6.0)	1995 (7.0)	665 (4.7)	213 (6.5)	28 (6.2)	173 (17)
Total	631	28295	14065	3243	448	1036

that increase violence among people.[24] In the current study, the rate of assault cases was 63.2% (Table 1). The high nature of the assault rate in our study can be explained by the prevalent regional factors. In our region, the unemployment rate is high and the income level is low. Moreover, because of large families and the high number of relatives, a simple dispute between two people easily turns into a large-scale violence in which multiple numbers of families are involved. In big cities, violence is limited to individuals; however, in our region, each assault case has the potential to evolve into mass violence. Although the Van province is socioeconomically similar and close to the Muş province, probably due to the presence of a Level I healthcare center, the assault rate has been reported to be 5%.[25] The reason behind this low rate is probably because assault cases are treated at lower-level hospitals. We believe that another cause of the high assault rate in our study might be the patient's intention to file a lawsuit, as verified by minor or absent abrasion or ecchymosis in 68.9% of the cases.

Patients who are hospitalized and transferred or who die generally have moderate or major trauma.[7,8,14,16] In the current study, among patients evaluated to have major trauma, the prevalence of assault was 7.7%. Willette[14] found a similar rate (Table 4). This rate is markedly lower than the one reported in Demetriades' study,[8] which was 36.4%. In light of the data mentioned above, we understand that assault cases that lead to major trauma do not have as high a frequency as predicted in the literature.

Data available on MVI in the literature vary.[7,8,17] In our study, the MVI rate (21.2%) was slightly higher than that reported in the United States in 2000 and 2001 (10-15.2%, respectively).[2,21] Considering the low number of automobiles relative to the population in our region, the elevated MVI rate may be explained by rural characteristics as well as the failure to comply with the traffic codes and mass MVIs. Geographic conditions, delay in arrival to the hospital and the seclusion of the trauma location may have a negative effect on both the number of patients and the injury severity.[13,17,26]

The most severe trauma arising from fall is observed in cases of high falls. Generally, varying rates are reported for all types of fall (9-55%).[13,16,17] In the current study, falls were the second most common (21.2%) major trauma mechanism (Table 4).

P/CI and firearm injuries have a high morbidity and mortality rate among intentional injuries. While Corso and Vysotek reported a rate of 8% for the United States on a national basis, the same rate was found to be 11% in a rural ED of the same country.[2,17,21] If the patients who were younger than 18 and who did not speak the official language had been included, the rate in Prekker's study may have been higher.[17] Considering that Corso excluded cases with mild injuries of the musculoskeletal system, the true P/CI prevalence may be considered to be higher.[2] In this study, the rate of P/CI (4.3%) seems low enough.

The prevalence of firearm injuries is reported as 0.2-2.7%.[2,16,21] Firearm injuries are the most lethal among other major trauma factors. Therefore, such patients are generally hospitalized or transferred to other hospitals. In another study, Newgard[15] reported the rate of hospitalized patients with a firearm injury as 8%, whereas the transfer rate was 5.5%. In the present study, we obtained similar results for hospitalization and transfer, as 11.6% and 6.2%, respectively.

The frequency of suicidal acts is reported as 1.1-14% in Western countries. However, the mortality rate reaches up to 100%.[7,8,21] In the current study, the frequency of suicidal/self- inflicted cases was as low as 0.4%, but mortality in this group was 8.3%. Mortality rates may appear lower than the true values because if mortality occurs at the scene, autopsies are performed there and such cases are not entered into hospital records. The parameters influencing this rate must be investigated further.

The sites most commonly affected in trauma are the extremities, head-neck, thorax, and abdomen.[16,17,27] While musculoskeletal injuries constitute the majority among ED cases, head and thorax injuries are prevalent in major traumas.[20] Therefore, neurosurgery and orthopedics consultations are observed more frequently. Since Turkey has no medical training program for trauma surgery, general surgery specialists take part in general trauma consultations. Nonetheless, the consultation rate of general surgery is not higher than that of neurosurgery or orthopedics. The consultation rate for all patients is estimated to be approximately 18.2%. The aforementioned low rate might be associated with the high frequency of patients presenting to EDs with minor trauma, which results in emergency physicians considering consultation unnecessary. Nonetheless, the frequencies of consultation in major trauma cases due to firearm injuries, burns and falls were above 50% (Table 2).

The hospitalization rate parallels that of trauma severity. Vyrostek[21] reported a hospitalization and transfer rate of 4.8% in accidental injuries and of 34.2% in major trauma cases. Moreover, several conditions, such as the characteristics of the hospital and the region and the availability of relevant specialists, all influence the hospitalization rate, which can alter it from <1% to 46.8%.[9,11,17,28] A nationwide study performed in the United States indicated an increase in the hospitalization rate as the population decreased, such as in rural regions.[28] In the current study, the 4.2% hospitalization rate is not very low. Nonetheless, based on the transfer rate mentioned below, the hospitalization rate can be suggested as low. The hospitalization/transfer ratio is predicted to be 3/1–3/2.[13,15,20] Further studies are required to reveal the causes of this hospitalization rate.

The majority of the transferred patients are known to be blunt and major trauma cases such as fall or MVI. In our study, the distribution was consistent with the available knowledge. The exception was the transfer of half of the burn patients due to the absence of a burn unit or intensive care unit. According to the literature, the transfer rates vary depending on the level of the hospital. About 25-40% of patients presented to a Level I hospital are known to be transferred cases.[11,29,30] In the present study, the transfer rate was 5.3%, and the high rate of assault cases represented a relatively low portion. However, the transfer rate in patients with major trauma was 51.5%. As mentioned by Sampalis,[30] the reason behind this might be the effort to transfer patients to a Level I hospital with minimal time loss. Based on Svenson's[31] assumption, this high rate might also be due to negligence in transferring patients after maintaining hemodynamic stability and determining cases with minor trauma. Patients could have been more accurately selected for transfer based on the severity of the trauma after stabilization, as noted by Newgard and Svenson, because 28-37% of the transferred patients were those with a minor trauma.[15,31]

In Scotland, patients have been reported to be transferred to an ED in 40-50 minutes in urban areas and in 70 minutes in rural areas.[13] However, geographic variables such as traffic congestion may prolong this time. For patients admitted to the ED, a mean time of 40 minutes to 4 hours passes for examination and stabilization.[14,31] Some studies report the transfer length between hospitals as 30-110 minutes.[11,29] In United States-based sources, transfer distances are noted to vary between 5 and 144 miles (231 km).[15,29] Our region is situated 250 km away from Level I and II hospitals in all directions. The geographic and climatic conditions are challenging. Therefore, a transferred patient does not reach an upper-level healthcare center in less than 4 hours. During the study period, since airway transfer had not been established, the only means of transfer was by land. In brief, it takes around 5 hours for a patient to present to the ED and be transferred to an upper-level hospital. It is known that more than half of the mortalities observed in trauma patients appears within the first 4 hours, due to a rush to reduce the total transport time that impedes accurate assessment of the severity of the cases; those with minor trauma and unstable cases may be among the transferred patients from the ED at the rates noted by Newgard and Svenson.[15,31,32] Moreover, Certo[33] mentioned that the death of 22% of transferred patients can be prevented by patient stabilization and resuscitation. In the present study, there are no data on mortality rates occurring during or immediately after the transfer of patients. Further studies on this issue are required.

The rate of mortality associated with trauma is known to be 0.6-10%.[12,15,17,21] Mortality increases in cases with major trauma. It is most commonly seen secondary to traffic accidents and falls.[32] In our study, 56.3% of the deaths were due to MVIs. Previous studies indicate that 46-57% of mortalities occurred due to head injuries.[31,34] In the present study, similar to those studies, we frequently observed deaths associated with head-neck, multiple organ and thoracodorsal injuries.

As of the end of the data collection period (December 2007), the hospital lacked an effective radiology department and intensive care unit. No possibility of radiology consultation was available off-hours. Therefore, craniovertebral tomographic examinations were carried out by neurosurgeons. Under normal circumstances, general surgeons do not make ultrasonographic thoracoabdominal evaluations for medical/legal reasons and lack of proper education in this field. These details have been provided here as we think that they might influence the hospitalization and transfer rates.

In conclusion, while assault cases, most of which are associated with minor trauma cases, are encountered frequently in our region, assault is not observed to be a common major trauma cause. Major trauma cases have a high transfer rate. Improving hospital conditions (i.e. establishing an effective radiology department and an intensive care unit) for the management of major trauma cases is believed to increase the hospitalization rate, and the number of deaths occurring during or after prolonged transfers could thus be reduced.

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