

Demographic characteristics, surgical approaches and outcomes of 1872 patients with head trauma

Kafa travmalı 1872 hastanın demografik özellikleri,
cerrahi yaklaşımlar ve sonuçları

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Öz

Amaç: Beyin cerrahisi acillerinde kafa travmaları önemli bir yer tutmaktadır. Bu çalışmada, ülkedeki epidemiyolojik çalışmalara katkıda bulunmak amaçlanmıştır. **Materyal ve Metot:** Bu çalışmada, Ocak-2006 ile Ocak 2012 yılları arasında acil serviste görülmüş 1872 hasta yaş, cinsiyet, travma etyolojisi, geliş Glasgow Koma Skoru (GKS), travmanın oluş şekli, komplikasyonlar, hastanede kalış süresi ve Glasgow Çıkış Skoru (GCS) açısından geriye dönük olarak değerlendirilmiştir. **Bulgular:** Hastaların yaş ortalamasının 28 olduğu ve çoğunluğu erkek hastaların (%67) oluşturduğu bulunmuştur. Etiyolojide en sık neden trafik kazalarıdır (%48). Hastaların %95'inde geliş GKS'u 8 ve üzerindedir. Hastaların %36'si hastaneye yatırılmış ve bu yatışların çoğunluğu (414 hasta- 2362) beyin cerrahi servisine olmuştur. Opere edilen hastaların oranı %23'tür. Cerrahi girişimlerin çoğu epidural kanama (%33) ve çökme kırığı (%33) nedeni ile uygulanmıştır. **Sonuç:** Kafa travmalarının çoğunluğunu trafik kazaları ile görülen hafif kafa travmaları oluşturmaktadır. Aynı zamanda ölümcül kafa travmaları da trafik kazalarına bağlı oluşmaktadır. Önlemlerin artırılması gerekmektedir. Halkın eğitiminin ve aydınlatılmasının tam sağlanmadığı görülmektedir.

Anahtar Kelimeler: kafa travması, glasgow koma skalası, glasgow sonuç skalası

Abstract

Background: Head traumas are serious problems among neurosurgical emergencies. In this study, we aimed to contribute to the epidemiological studies in our country. **Material and Method:** In this study, 1872 cases consulted in the emergency service of Suleyman Demirel University Medical School between January-2006 and January-2012 were evaluated retrospectively for ages, gender, etiology, arrival Glasgow Coma Score(GCS), modalite, complications, duration of stay in the hospital, and Glasgow Outcome Score(GOS). **Results:** In the result, it is found that the mean age of the cases was 28, and most of them were male (67%). Traffic accidents (48%) were the most seen etiological cause. The ratio of the cases with arrival GCS 8 or higher was 95%. Hospitalized patients were 36%, and most of the cases (414 cases-62%) were hospitalized in the neurosurgery clinic. The ratio of the operated patients was 23%. The surgical intervention was administered mostly for epidural hematomas (33%), and descending fractures (33%). **Conclusion:** In general, traffic accidents with mild head injuries consist most of the head traumas, also most of the mortal accidents are caused by traffic accidents. It is seen that the cautions should be increased, training and illumination of society is still not maintained.

Key Words: head trauma; Glasgow Coma Scale; Glasgow Outcome Score

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Introduction

Head trauma is one of the most important global public health problems. Annually, nearly 10 million severe traumatic brain injuries (TBI) result with death or at least hospitalisation for treatment (1). Nonetheless, approximately 57 million of people with one or more TBIs have been evaluated in the hospitals, but ratio of the patients living with TBI-related disabilities are not known (2). According to the studies, in USA 37% of the patients admitted to emergency services are trauma patients. The deaths related to trauma is 50% and this ratio shows the importance of acute intervention to the patients with TBI (3).

Although the emergency management is important in terms of mortality ratios of head injured patients, their lives after trauma are also influenced. Some studies promote that epilepsy, Alzheimer, depression and increase of alcohol usage after trauma is also associated with head traumas (4-7). In reducing these organic and psychiatric injuries occurred after trauma, evident protocols should be formed for the resuscitations made in the hospitals and emergency services that the initial intervention done.

The aim of our study is to establish data sources for emergency services, that determines the outcomes and epidemiological features of the patients admitted to the emergency service with head trauma, and to make contribution for enhancing new trauma protocols.

Material and Methods

In our study, 1872 head injured patients admitted to our emergency service between 01.01.2006-31.12.2012 were evaluated retrospectively. All age groups were included. The patients that we could not accessed to whole data were not included to the study. The etiology of the trauma was grouped as in vehicle traffic accident (IVTA), out vehicle traffic accident (OVTA), falls, strikes, assault, and gunshot injuries. The initial Glasgow Coma Scale (GCS) of the patients was enrolled as mild (13-15), medium (9-12), and severe (3-8). The outcomes of the patients were analysed and the datas of the patients admitted to the neurosurgery service were evaluated seperately. Diagnosis, operations, staying time duration and dischargement time Glasgow Outcome Score (GOS) were noted.

The evaluation of the groups was made with descriptive

statistical analysis with using the software statistical package for the statistical package for the social sciences (SPSS) 13.0 to analyse the data.

Results

In this study, 67.4% (n=1261) of the patients were male and 32.6% (n=611) were female. The mean age was 27.84-20.8. The age groups were as 35.6% (n=672) pediatric, 57.3% (n=1073) adult and 6.8% (n=127) geriatric. The mean age of pediatric patients was 7.04 +/- 4.9, and 60.9% (n=409) of the pediatric patients were male, 39% (n=262) were female.

When we considered the admission etiology, traffic accidents (47.9%) were the most common reason followed by falls-strikes (46.9%). In all traffic accidents IVTA patients were 32.6% (n=610) and OVTA patients were 15.3% (n=287). In the emergency service 4.6% of the patients (n=86) were evaluated for assault and 0.6% (n=11) for gunshot injuries (table-1).

Table 1- Etiologies of trauma

Etiology	Number of patients (percentage, %)
Traffic accident	897 (47.9)
In the vehicle	610 (32.6)
Out of the vehicle	287 (15.3)
Falls-strikes	878 (46.9)
Assault	86 (4.6)
Gunshot injuries	11 (0.6)

Among the pediatric cases, 454 (67.7%) patients admitted with falls and strike, 205 patients (30.5%) with traffic accident, 12 (1.8%) patients with blow and 1 (0.1%) patient admitted with burn injury.

GCS of 110 patient was <8 (severe), 151 patient was 9-12 (medium), 1611 patient was 13-15 (mild). After observation period and integral interferences were done 63.0% (n=1180) of the patients were discharged from emergency service, and 35.7% (n=669) were taken into the integral services. In the emergency service, 1.0% (n=19) of the patients were died during the diagnose and treatment period, and 0.2% (n=4) of the patients were referred to other hospitals because of lack of bed

count in services and intensive care unit. When mortality ratio in the emergency service was investigated, it was found that 68.4 % (n=13) of IVTA patients and 31.6% (n=6) of OVTA patients died during hospitalisation.

Patients with head trauma (n=456, 68.2%), had suffered from traffic accidents that hospitalised into the integral services. Most of the patients were hospitalised into the neurosurgery service (n=414, 61.9%). Among these patients, 6.1 %(n=41) of them were taken into the intensive care unit for treatment. As other traumas were attended, 38.1% (n=255) of the patients were hospitalised into related services for follow-up and treatment. Additional to the head trauma, extremity fractures were the most concomitant pathology, so 68 patients (10.2%) were taken into the orthopedy service. Fourty five patients (6.7%) were taken into the plastic surgery service for maxillofacial fractures (table-2).

Surgical intervention was administered to 24.1% of the patients who were taken into the neurosurgery service and internal care unit. As the etiology of the surgical interventions were evaluated, it is found that most of the patients (33 patients, 30%) were operated for epidural hematomas, and 25 patients (26.2%) for depressed fractures. Second surgery was required for 9.09% (n=10) of the patients. 12 patients (2.63%) died during follow up and treatment period.

Table 2: Clinical distribution of the hospitalised patients

Clinics	Number of patients (percentage, %)
Neurosurgery	414 (61.9)
Intensive care	41 (6.1)
Orthopedy	68 (10.2)
Plastic Surgery	45 (6.7)
Pediatric surgery	26 (3.9)
Surgery	20 (3)
Cardiothorasic surgery	11 (1.6)
Ear, nose and throat	17 (2.5)
Eye	10 (1.5)
Cardiovascular surgery	11 (1.6)
Obstetric	6 (0.9)
Total	669

The most common complication among the operated patients was infection (sepsis and wound infection). In addition the other complications were; hydrocephaly, pneumocephaly, CSF fistula, abscess, and subdural effusion.

The mean staying time duration in the hospital was 10 days for the hospitalized patients. As the GOS was evaluated for the hospitalized patients before dischargement, complete recovery ratio was 95% (GOS 5), mild disability ratio was 0.7% (GOS 4), severe disability ratio was 1.5% (GOS 3), permanent vegetatif state ratio was 0.2% (GOS2), exitus ratio was 2.9% (GOS 1).

Discussion

Patients with head injury have a seperate importance, especially for high mortality ratios among all trauma patients in emergency services. In the emergency service, during the time from the initial admission to conclusion, current diagnose and treatment algorithms should be developed to decrease the morbidity and mortality ratios for these patients. Carefully recorded epidemyologic data bases are needed for recoveries in the emergency services as the number of patients are progressively increase.

It is a fact that in the whole world and also in our country, traumas are progressively increase parallel to the development of industry. Although there are some differences between countries, the ratio of male is excess then female between employees. For this reason, males are exposed to traumas more then females (8,9). In our study, the ratio of male was 67.4 % , the ratio of female was 32.6% and this was compatible with the literature. As the etiology of the deaths are considered, traffic accidents are the most seen cause in our country as parallel to the datas of the world. According to data of Turkish Statistical Institute, 2.7% of our country population suffered from mortal and wounded traumas between the years of 2006-2012. The mean mortality rate was reported as 3.97% per traffic accident (10).

As the outcomes of the traffic accidents in 2011 were analysed according to the statistical region units classification, traffic accidents are almost seen at Aegean region , then Mediterranean region (Antalya, Isparta, Burdur) and as the mortality rates in these accidents were analysed Mediterranean region is again seen secondly. In the Mediterranean region, direct proportion with the

population, traffic accidents are seen mostly in Antalya and then in our city, Isparta (10).

In the study of Isik et al. (11), that evaluated the patients hospitalized for head traumas, which children were not included, the ratio of cases with the etiology of traffic accidents was reported as 75%. It attracted attention that head injuries according to falls take the first line in the etiology of head traumas in two studies applied in emergency service of second step health institute. In one of these studies it was reported as falls were 31.4% and traffic accidents were 22.9% in 716 patients evaluated by neurosurgeons with head injury (12). In the other study that predicts geographical and cultural differences pass through to results, Yilmaz et al. (13) reported the ratio of head traumas according to falls as 77%. Besides this, in similar literatures the most seen cause in head traumas during childhood was reported as falls (14). In our study, as etiologies of patients with head traumas admitted to the emergency service, were evaluated, and it is found that the ratio of traffic accidents and falls-strikes was very comparable (47.9% traffic accidents, 46.9% falls). The ratio of traffic accidents among the hospitalized patients was 68.2%. Especially in childhood the most seen cause in head traumas is falls-strikes, and this ratio is compatible with the literature. Also in the studies that head traumas evaluated, it can be seen that the variabilites of the case groups included to the study may cause the etiological differences. Besides this, the difference may be caused because of in some studies, head injured patients admitted to the emergency service included to the study and in some only head injured patients admitted to the neurosurgery clinics were included to the study.

In the literature, the ratio of head traumas occurred from gunshot wound was 1.4%-4.0%. These ratios were reported in the studies that produced in patients hospitalized in neurosurgery services, and in the same studies mortality rate from gunshot wound was reported as 60-82% (15, 16). In our study, head traumas occurred according to gunshot wounds ratio was compatible with the literature, but mortality rates can not be compared as there were no exitsuses. Although there are three big military training troops in the region that the study held, contrary to expectations head traumas according to gunshot wound ratios were conformable to the other studies.

In the study that Mirzai et al. (14) had evaluated the head

traumas, the severity of the trauma according to GCS was found as 79.1% mild (GCS:13-15), 3.95% medium (GCS 9-12), 16.95% severe (GCS:3-8). Yilmaz et al. (13) had reported the ratios of head traumas as 45% of the patients' mild, 30% medium, and 25% severe. In a study made in our region that evaluated the head traumas admitted to the secondary care emergency services, it was found that in 90.3% of the patients the severity of the head trauma was mil(11). In our study the severity of head trauma according to GCS was mild in 86.1%, medium in 8.1%, and severe in 5.9% of the patients. To see the mild head traumas commonly and severe head traumas rarely, it causes the morbidity and mortality ratios to be more fewer. The cause of the different ratios in the literature is the location of the centers in the city that the study held, and also preferability of the other centers for the initial admission of trauma patients.

In the study of Işık et al. (11) the mortality rates of head injured patients taken into the neurosurgery service was reported as 19.4%, and 28% in the study of Yilmaz et al.(13). In our study the mortality reates were lower differently from literature. The mortality ratios in the emergency service among the whole head traumas admitted to this service was 1.0% and among the patients taken into and fallowed in the neurosurgery service was 2.63%. It is communicable that the low of our mortality rates can be the result of the initial admission of the patients to the hospitals in the centrum of the city because of the location of our hospital in the city. As the patients initial medication and resusitation is done in those hospitals, this can be the reason of our low mortality rates, although referances of these patients to our hospital are high.

In the study of Mirzai et al. (14) 24.3% of the patients admitted to emergency services for head traumas were hospitalized in neurosurgery service, 18.7% in the other services, and 4.5% in intensive care unit. The hospitalization of the patients were reported as 10% in the study of Çökük et al. (17) among 5200 head injured patients. The etiology of the hospitalized patients was 48% traffic accidents, 32% falls, 8% strike, 4 % gunshotwounds. In the same study, 39% of the hospitalized patients for head trauma had other traumas like vertebrae fracture with the highest ratio (21%). In our study, 35.7% of the patients were hospitalized and mostly to the neurosurgery clinic (61.9%). In the literature, the reason for the difference of the

hospitalized patients ratio attended to emergencies can be that in some hospitals observation of the patients are done in the emergency clinics or all trauma patients are taken to the hospital that is the one and the only trauma center in that region. The ratio of the additional pathologies with the trauma was 38% and compatible with the literature. In our study, the most seen additional pathology was extremity fractures, but in the study of Çökük et al. (17) vertebrae fractures were reported as the mostly seen pathology. This can be associated with the differences in trauma mechanisms or with the comparison of the patients groups that have additional traumatic pathologies. In some of the studies additional pathologies were evaluated in only hospitalized patients, and in some in the whole trauma groups.

In the study of Karasu et al. (16) that evaluated the hospitalized 430 patients in neurosurgery clinic for head trauma, the ratio of surgery was reported as 11.6%, and the diagnosis were epidural hematoma (22%), subdural hematoma (22%), depression fracture (4%). Işık et al. (11) had reported that 18.5% of the patients hospitalized were taken to the operation for subdural hematoma (43%9) and epidural hematoma (31.5%). In the initial study, the patient population was occurred from children and adults, but in the other study only adults were taken to the study. In our study, 24.1% of the patients hospitalized in neurosurgery clinic were taken into operation and epidural hematoma was the most seen etiological reason. The differences in operation rates can be according to that our hospital is the tertiary care and reference hospital for severe head traumas.

Conclusion

The etiology in adult population is mostly traffic accidents, and falls in pediatric population. If the mortality and morbidity rates are analysed it can be seen that mortality in traffic accidents per hundred thousand people decreases and morbidity increases. As part of preventive medicine, beside making people conscious of traumas, resuscitation of the patients should be done instantly, and injuries occurred according to trauma should be determined immediately. Prospective studies including radiological diagnostic processes are needed to develop diagnose and management protocols belong to our country for trauma.

It is an important fact that an increase in the mortality rates according to head traumas, whatever the reason

is, impresses the personal psychological, social and economics beside the countries' economics. With this study, we would like to highlight to the head injuries those impresses the life qualities of people and also make a contribution to the epidemiological studies.

References

1. Langlois J A, Rutland-Brown W R, Wald MM. The Epidemiology and Impact of Traumatic Brain Injury. *J Head Trauma Rehabil* 2006; 25(5):375-378
2. Murray C J, Lopez A D. *Global Health Statistics*. Geneva: World Health Organization, 1996
3. Ceylan S, Açıklık CH, Dündaröz R, Yaşar M, Güleç M, Özışık T. Bir Eğitim Hastanesi Acil Servisine Travma Nedeniyle Başvuran Hastaların Sıklığının ve Travma Özelliklerinin Saptanması. *T Klin Tıp Bilimleri* 2002; 22:156-161
4. Ferguson PL, Smith GM, Wannamaker BB, Thurman DJ, Pickelsimer EE, Selassie AW. A population-based study of risk of epilepsy after hospitalization for traumatic brain injury. *Epilepsia* 2010;51(5):891-898
5. Holsinger T, Steffens DC, Phillips C, Helms MJ, Havlik RJ, Breitner JC, et al. Head injury in early adulthood and the lifetime risk of depression. *Arch Gen Psychiatry* 2002;59:17-22
6. Özbakır MŞ, Aydın H. Alzheimer hastalığında klinik bulgular Demans Dizisi 1999;3:73-80
7. Genc G, Koc G, Kasıkcı T, Odabasi Z. Post travmatik gec baslangicli serebral iskemi *JCAM* 2012;DOI:10.4328/JCAM.967
8. Biros MH, Heegard GH, Marks JA. *Rosen's Emergency Medicine Textbook*. Philadelphia: Elsevier 2010;295-323
9. Durdu T, Kavalci C, Yilmaz F, Yilmaz MS, Karakilic ME, Arslan ED, et al. Analysis of trauma cases admitted to the emergency department *J Clin Anal Med* 2014;5(3):182-5
10. Türkiye İstatistik Kurumu (TÜİK): Trafik Kaza İstatistikleri (Karayolu) 1-98. Ulaşım adresi: http://www.tuik.gov.tr/IcerikGetir.do?istab_id=70, 2011
11. Işık HS, Bostancı U, Yıldız Ö, Özdemir C, Gökyar A. Kafa travması nedeniyle tedavi edilen 954 erişkin olgunun retrospektif değerlendirilmesi: Epidemiyolojik çalışma. *Ulus Travma Acil Cerrahi Derg* 2011;17(1):46-50
12. Senol N. Isparta Devlet Hastanesi Acil Birimine Başvuran Kafa Travmalı Olguların Demografik Özellikleri. *Süleyman Demirel Üniversitesi Yaşam Dergisi* 2009;1(1):14-16
13. Yılmaz ER, Hastürk AE, Kahiloğulları G. Acil Serviste Kafa Travması Nedeni İle Değerlendirilen 1114 Hastanın Epidemiyolojik İncelemesi. *Türk Nöroşirürji Dergisi* 2011;21(3):242-245
14. Mirzai H, Yağlı N, Tekin İ. Celal Bayar Üniversitesi Tıp Fakültesi acil birimine başvuran kafa travmalı olguların epidemiyolojik ve klinik özellikleri. *Ulus Travma Dergisi* 2005;11(2):146-152

15. Akyel S, Şimşek O, Süt N. Kafa Yaralanmalarında Sonucu Belirleyen Etkenler. *Ulus Travma Acil Cerrahi Derg* 2012;18(2):125-132
16. Karasu A, Sabancı PA, Cansever T, Hepgül KT, İmer M, Dolaş İ, et al. Kafa travmalı hastalarda epidemiyolojik çalışma. *Ulus Travma Acil Cerrahi Derg* 2009;15(2):159-163
17. Çökük A, Kozacı N, Ay MO, Açıklan A, Seviner M, Satar S. Acil Servise Başvuran Kafa Travması Olgularının Değerlendirilmesi. *Cukurova Medical Journal* 2013;38(1):63-71