

Organ Damage In Penetrating Injuries

Penetran Yaralanmalarda Organ Hasarı

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Abstract

Background: Trauma and injuries are the most common reasons for presenting to emergency services. The aim of the present study was to comprehensively evaluate the injuries from gunshot and penetrating objects presented to the emergency department of Kafkas University Medical School Research Hospital along with the organ(s) effected and the degree of injury. It is crucial to determine the nature of the injury and the condition of the effected organ in order to refer the patients to the relevant branch for effective treatment.

Materials and Methods: In this study, a total of 73 cases who were admitted between the years of 2017-2019 were examined retrospectively. For statistical analysis, a Windows-compatible IBM SPSS 20.0 package program was used. Results are expressed as mean \pm standard deviation.

Results: About 68 of them were male and 5 were female. The mean age was 33.85 and a majority of patients were comparatively young. Consultation was requested for about 44 patients. 44 patients were consulted by the relevant departments to determine and treat the condition of the injury and the condition in the organ it damaged. Six patients died due to gunshot wounds and one patient died due to sharp object-based injury.

Conclusions: These studies will contribute to the development of new strategies to solve the social problem of individual armament. Because of the high mortality rate in penetrating injuries, patients should be diagnosed quickly and the necessary treatment should be initiated immediately.

Key Words: Penetrating injuries, Emergency department

Öz.

Amaç: Travma ve yaralanmaya bağlı hasarlar, acil servislere en sık başvuru nedenlerini oluşturur. Bu çalışmada amacımız Kafkas Üniversitesi Tıp Fakültesi Sağlık Araştırma ve Uygulama Hastanesi Acil Servisi'ne başvuran ateşli silah ve delici kesici alet yaralanmalı olguları incelemek, hangi organların ne şekilde yaralandığını, yaralanan organ hasarının morbidite ve mortalite üzerine etkilerini araştırmaktır.

Materyal ve Metod: Çalışmada 2017-2019 yılları arasında başvuran 73 vaka retrospektif olarak incelenmiştir. İstatistiksel analiz için Windows uyumlu bir IBM SPSS 20.0 paket programı kullanıldı. Sonuçlar ortalama \pm standart sapma olarak ifade edildi.

Bulgular: Bu hastaların 68'i erkek, 5'i ise kadın hasta idi. Yaş ortalaması 33.85 olup, çoğunluğu genç hastaydı. Yaralanmanın türü ve hasar verdiği organdaki durumun tespit ve tedavisi için 44 hastaya ilgili bölümler tarafınca konsültasyon istendi. Ateşli silah yaralanmalarına bağlı 6 hasta exitus olurken, 1 hasta da delici ve kesici alet yaralanmasına bağlı exitus olmuştur.

Sonuç: Bu çalışmalar, bireysel silahlanmanın sosyal sorununu çözmek için yeni stratejilerin geliştirilmesine katkıda bulunacaktır. Penetran yaralanmalarda yüksek mortalite oranı nedeniyle, hastalara hızlı bir şekilde teşhis konulmalı ve gerekli tedaviye derhal başlanmalıdır.

Anahtar kelimeler: Penetran yaralanmalar, Acil servis

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Introduction

Trauma is the most common cause of death among young adults. The traumatic cases are divided into two groups as blunt and penetrating trauma cases. Penetrating trauma cases result in high mortality and morbidity (1,2). While the most common causes of blunt injuries are traffic accidents, penetrating injuries are mostly due to the firearm injuries and sharp object injuries. Although sharp object-based penetrating injuries are three times higher than that of firearms, the mortality is lower than firearms (3). The difference is attributed to the fact that the area affected by the sharp object injuries is smaller and the accompanying organ injuries are less. Mortality rate in firearms-based injuries is two times higher than in injuries caused by sharp objects. The risk of injury to abdominal organs is higher in sharp objects compared to firearms (4).

A very high proportion of penetrating injuries are caused by firearms and other type of weapons where they could be eliminated or reduced based on the effective juristic measures or law enforcement. In order to implement such measures, the nature and the incidence of the cases should be comprehensively evaluated (5,6).

In this study, it was aimed;

- (i) to determine the most common body localizations,
- (ii) morbidity and mortality rates in penetrating injuries,
- (iii) to determine the demographic data of patients with penetrating trauma, and
- (iv) to compare the prevalence of sharp objects-based injuries and firearm-based injuries.

Materials and Methods

Our study was accepted by the Ethics Committee of Kafkas University Faculty of Medicine on 30.10.2019 with the number 80576354-050-099/237. A total of 73 patients admitted to Kafkas University Research and Application Hospital emergency department for penetrating trauma between 2017 and 2019 were retrospectively analyzed using Hospital Information System (HIS). The low number of cases is directly proportional to the low population of Kars province where our hospital is located. Patients were evaluated for age, gender, organ injury, admission time, hospitalizing pattern (e.g. hospitalized or non-hospitalized), and mortality and morbidity. The statistical analyses program SPSS version 20 was used for statistical analyses of data. Results are expressed as mean \pm standard deviation. Chi-square test or Fisher Exact test was used for comparisons of categorical data and a p-value of <0.05 was considered statistically significant.

Our inclusion criteria were: (i) All patients of firearm-based injuries and sharp objects-based injuries who presented to the emergency department of our institution with penetrating trauma in the last 2 years and (ii) patients whose complete data including patient observation forms and forensic data records were accessible from hospital HIS. Our

exclusion criteria were the cases of penetrating traumas that were not sharp objects-based injuries or firearm-based injuries.

Results

A total of 68 (93.2%) patients were male and 5 (6.8%) were female. The overall average age was 33.8 ± 14.6 , the mean age was 39.54 ± 14.9 among patients with firearm-based injuries and was 28.61 ± 12.4 among patients with sharp objects-based injuries. When the location of the injury is considered, 26 (35.6%) patients had thorax, abdomen, and both thoracic and abdominal injuries, 48 (65.8%) had extremity injuries, and 7 (9.6%) had head, neck and spinal injuries. Some patients had multiple organ injuries. About 52% (n = 38) of the patients had sharp objects-based injuries whereas about 48% (n = 35) had firearm-based injuries. Two (4.7%) of sharp objects-based injuries had head and /or neck injuries, one (2.6%) had heart injury, three (7.9%) had lung injury, two (5.3%) had vascular, 15 (39.5%) had upper extremity injuries, nine (23.7%) had lower extremities, four (10.5%) had non-abdominal injury, and two (5.3%) had rectum injury. Five (14.3%) of firearm-based injuries were head and/or neck injuries, four (11.4%) were lung injuries, one (2.9%) was liver injury, one (2.9%) was bowel injury, five (14.3%) were vascular injuries, 5 (14.3%) were upper extremity injuries, one (31.4%) was lower extremity injuries, and three (8.6%) were non-abdominal injuries (Table 1). A large number of the cases (n=39) reported to the emergency department between 08:00 to 16:00 hours

Table 1. Consultation request rates according to injured organs.

Location of Injury	Firearm-based injuries (33 Consultations)	Sharp object-based injuries (18 Consultations)
Head/Neck/Eye	5	1
Torax/Abdomen	14	8
Extremite/Vein	14	9

Table 2. The Final state of penetrating injuries presented to the emergency department.

Injury Type	Admission to Hospital	Discharge/Ex	Consultation request
Firearm-based injuries	7	28	26
Sharp object-based injuries	13	25	18

When all patients with thorax and intra-abdominal organ injuries were evaluated, all 10 patients were hospitalized. Eighteen patients in sharp objects-based injuries and 26 patients in firearm-based injuries were consulted. When hospitalization of the patients was examined, seven patients in firearm-based injuries and 13 patients in sharp objects-based injuries were hospitalized. A total of seven patients were accepted as exitus (ex) (Table 2). 6 of these were due to firearm-based injuries and one was due to

sharp objects-based. Two patients with head/neck, two with lungs, one with the liver and one with vascular injuries were exitus. One ex patient was received due to sharp objects-based injury occurred at the heart.

Two (4.7%) of sharp objects-based injuries occurred at head and/or neck, two (4.7%) were vascular injuries, 13 (30.9%) were at thorax and/or abdominal injuries and 25 (59.5%) were extremity injuries. On the other hand, seven (14.8%) of firearm-based injuries were head and/or neck injuries, 19 (40.4%) were thorax and/or abdominal injuries, 19 (40.4%) were extremity injuries and 2 (4.2%) were vascular injuries. Ten patients with thorax and/or abdominal injuries due to sharp object-based injuries were hospitalized (Table 1). Pearson chi-square test for the type of injury and hospitalization pattern was significant ($p < 0.005$). Consultation was requested for three patients with extremity injuries. Likewise, consultation was requested for 18 patients in sharp object-based injuries and 26 patients in firearm-based injuries. The difference in the number of consultation requests between the two groups was significant based on Fisher Exact Test ($p < 0.05$). A total of 7 patients mortality cases were observed, 6 of these were due to firearm-based injuries and a single case was due to sharp object-based injury. We also examined variations in the occurrence of injuries based on seasonal differences and time of day; however, there was no significant difference in either variable ($p > 0.05$).

Discussion

In recent years, with the increase of violence worldwide, penetrating injuries have increased considerably (7,8). Although the number of licensed weapons has decreased in the data presented in the report of the General Directorate of Security in the field of individual armament in our country, there is no definite number / percentage regarding the number of weapons such as unlicensed or shotguns since individual armament is not fully detectable (8).

In our study, the overall average age was 33.8 ± 14.6 , the mean age was 39.54 ± 14.9 among patients with firearm-based injuries and was 28.61 ± 12.4 among patients with sharp object-based injuries. The reason for the high average age among patients with firearm-based injuries might be due to the fact that animal husbandry is the main source of income in our region and issuance of arms permits to the livestock farmers who are usually in the middle age group. We see relatively lower incidence among younger generation largely owing to the fact that they have limited access to firearms. Furthermore, the active implementation of the village guard system in the region has further intensified the possession of firearms in the middle age group in our province.

Penetrating injuries are increasing nowadays with the increase of individual armament. The diagnostic and therapeutic approaches to these injuries vary according to the site

of injury. While penetrating traumas constitute 3% of all trauma patients admitted to emergency departments in Ontario, Canada (9), it constitutes 5-6.3% in Australia and New Zealand (10). In the study conducted by Kahramansoy et al., trauma patients constitute 2% of the total patients in Turkey (11).

About 52% ($n = 38$) of the patients in our study had sharp objects-based injuries and 48% ($n = 35$) had firearm-based injuries. In the study of Çağlayan et al., the rate of sharp objects-based injuries was 70% and the rate of firearm-based injuries was 30% (12). The reason for the difference in the ratio of injury types between our study and aforementioned report could be attributed to the fact that our hospital has the third level emergency department where the patients with serious trauma are transferred by the 112-emergency services at the first examination. In our study, although a marginal increase was present in the ratio of sharp objects-based injuries compared with firearm-based injuries, the elevation was not statistically significant ($p > 0.05$).

Extremity traumas may cause vascular and nerve damage, bone fractures and amputations, albeit the mortality rate is lower than traumas in other body parts (13). Vascular traumas constitute 1-3% of all traumas (14). In our study, 2 patients with firearm-based injuries died after femoral artery injury. Two patients were admitted to the cardiovascular surgery department after injury in the thigh area. These 4 cases accounted for 5.4% of the total penetrating injuries. It corresponds to 28.5% of total fatal cases.

In the study performed by Jacob et al., the lower extremity was the most affected area in sharp object-based injuries. Of these, 16 were injured in the thigh, 13 in the chest, 5 in the neck, and 1 in the abdomen (15). In our study, 15 patients (39.4%) had the upper extremity injury including hand, wrist, arm and shoulder. Wong et al. reported that the most common site of injury in the firearm-based injury cases is the abdominal region (16). In our study, extremity injuries were most common in firearm-based injuries. We propose that the events of sharp object-based injuries and firearm-based injury in our region aimed to intimidate via injuries rather than aim or plan to kill. We believe that this is mainly due to the fact that the average age is particularly low in sharp object-based injuries and legal fears are dominant.

Thus, mortality and morbidity rates in sharp object-based injuries and firearm-based injuries were high as in other trauma types. The affected population was usually young-middle age men. Mortality was generally associated with head and large vein injuries, with a higher incidence among firearm-based injuries. These cases should be resuscitated rapidly and taken into emergency operation without delay. We also think that penetrating traumas can be reduced by increasing the level of education, increasing penal sanctions, and strict supervision of law enforcement officers.

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