

Forensic medical evaluation of penetrating abdominal injuries

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ABSTRACT

BACKGROUND: This study aims to discuss the characteristics, origins, degree of injury, results, reporting, and forensic medical aspects of penetrating abdominal injuries.

METHODS: In this study, 28,619 cases who applied to the emergency department of Kutahya Health Sciences University Evliya Celebi Training and Research Hospital between January 1, 2016 and December 31, 2020 were reviewed. The forensic reports and medical documents of 85 cases with penetrating abdominal injuries were evaluated retrospectively, with the approval of the ethics committee.

RESULTS: Among the patients included in the study, 87.1% were male and 12.9% were female. The mean age was found to be 31±13 years. When the origins of the cases were analyzed, 87.1% were found to have developed as a result of intentional injury. The incidents predominantly occurred between 20:00 and 04:00 hours. As a result of the examinations performed at the hospital after the incident, alcohol was detected in 36.5% of the cases, while 30.6% of the individuals did not consume alcohol. It was observed that 32.9% of the cases were not tested for alcohol. The most common injuries identified were sharp injuries, accounting for 69.4% of cases, and firearm injuries, comprising 27.1%. Organ damage was noted in 68.2% of the cases, with the small intestine being the most frequently damaged organ. The average number of wounds present was 3.6. Intra-abdominal hemorrhage was detected in 61.2% of the cases, and intra-abdominal artery injuries were found in 8.2%. The mortality rate for penetrating abdominal injuries was 8.2%.

CONCLUSION: In forensic traumatology, penetrating abdominal injuries commonly lead to life-threatening conditions and loss of organ function, which represent the most severe category in trauma severity assessment. Penetrating abdominal injuries most often result from violent incidents, as observed in our study and in the literature.

Keywords: Abdominal injuries; forensic medicine; penetrating injuries.

INTRODUCTION

The frequency of firearms and sharp weapon use, commonly encountered in cases of violence, is alarming. The increase in individual armament and the ease of access to unlicensed weapons contribute to these violent incidents. Sharp objects are the most frequently encountered weapons in violence and injury incidents due to their availability in homes and workplaces, their widespread sale, affordability, and the lack of sanctions for carrying them if they do not meet legal specifica-

tions.^[1,2]

Articles 86 and 87 of the Turkish Penal Code provide important details on the grading of injuries. These articles specify that injuries may have different legal consequences depending on their severity. Injuries treatable with simple medical interventions are considered the least serious injuries in the eyes of the law and usually refer to easily treatable conditions such as shallow cuts or minor bruises. However, more serious health conditions such as bone fractures, tendon damage, ma-

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for blood vessel or nerve injuries, or internal organ damage, are not considered treatable with simple interventions. These types of injuries require more complex medical interventions and may result in more serious legal consequences.

An injury that causes a life-threatening situation is classified as such when a person's life is exposed to immediate danger following an injury but can be saved either by the individual's own bodily resistance or by medical assistance. Importantly, a life-threatening situation must have occurred during the incident; death is not necessary. The fact that the person subsequently recovers, with or without treatment, does not alter this classification. When making a decision, the medical findings (the effect on the person) should be taken into account, rather than the magnitude, severity, or dangerousness of the event that caused the injury.^[3]

Persistent impairment or loss of function of one of the senses or organs: For this condition to be recognized after the injury, the impairment of the function of one of the senses or organs must be permanent.^[3]

In Article 86 of the Turkish Penal Code, if the offense of intentional injury is committed with a weapon, a more severe form of the crime occurs and the penalty is increased. Crimes of intentional injury are classified as crimes subject to complaint. However, in cases where the crime is committed against a superior, subordinate, spouse, or sibling, or against a person who cannot defend themselves physically or mentally, or is committed with a weapon, a lawsuit may be filed without a complaint. Article 6 of the Turkish Penal Code defines a weapon as any kind of cutting, piercing, or bruising tool made for use in attack and defense.

In our study, we aimed to analyze the demographic characteristics of penetrating abdominal injuries, including the most common age range, the time periods during which the injuries occurred, and the effects of alcohol and substance use on such injuries. We also examined the extent of the injuries, the organs most commonly damaged, the mortality rate, and sought to contribute to the trauma data of our country.

The research aims to contribute to more effective management of injury cases by addressing the challenges in forensic medicine practice. It also aims to provide an important reference point for the development of injury prevention and intervention strategies by exploring the social dimensions of such injuries and the legal framework in response to them, providing foundational information for the development of relevant legal and health policies.

MATERIALS AND METHODS

In our study, we retrospectively reviewed the hospital archives and forensic reports of 28,619 cases who were admitted to the Emergency Department of Kütahya Evliya Çelebi Hospital over a five-year period from January 1, 2016 to December 31, 2020, with the approval of the ethics committee.

All cases with penetrating abdominal injuries were included in the study. A total of 85 cases were analyzed. Out of the 28,619 cases screened, 85 (0.29%) were included in the study. After examining the forensic reports of the cases, data were obtained by reviewing the past medical histories of the patients from the hospital's information management system. The data obtained from the examination were evaluated for demographic characteristics, time of the incident, type of incident, and site and degree of injury using a statistical program.

Statistical Analysis

The data obtained in the study were analyzed using the IBM SPSS (Statistical Package for the Social Sciences) Statistics 22 program. For quantitative data, descriptive statistics such as mean, standard deviation, median, and maximum-minimum value were used. For qualitative data, frequency tables including frequency and percentage values were utilized. Double or triple cross-tables and chi-square tests were employed to examine the relationship between variables. Cramer's V was used to calculate the degree and direction of the relationship between the categorical variables. To determine if there was a statistically significant difference between two independent groups regarding a numerical variable, the data were first tested for normal distribution using the Kolmogorov-Smirnov and Shapiro-Wilk tests. As the data did not conform to normal distribution, the Mann-Whitney U test, a non-parametric test, was applied. Column graphs were created. For statistical significance, a 0.05 margin of error and a 0.95 confidence level were set, and the results obtained were statistically significant.

Ethics

Approval for this study was obtained from the Non-Interventional Clinical Research Ethics Committee of the Rectorate of Kütahya Health Sciences University with decision number 2021/11-20 on June 30, 2021. Since our study was an analytical retrospective study, data were obtained from the hospital health data system. Utmost attention was paid to the privacy of the individuals' identity information, and it was not shared with anyone outside the study team. Only health data relevant to the study were used; other data were not recorded.

RESULTS

Of the 85 patients with penetrating injuries to the abdominal cavity, 74 (87.1%) were male and 11 (12.9%) were female.

The mean age was 31.3 ± 13 years, with the youngest being 12 years old and the oldest age 81 years old. The most common age range was 21-30 years (40%). The mean age for both sexes was again 31 years.

When analyzing the time intervals in which the incidents occurred (dividing the day into three 8-hour periods), it was observed that while there was no difference among women, a notable concentration of incidents among men occurred during the evening and night hours. The most incidents were

Table 1. Distribution of injury origins according to gender

	Gender			
	Woman		Male	
	n	%	n	%
Intentional Injury	8	72.7	66	89.2
Accident	1	9.1	4	5.4
Suicide	2	18.2	3	4.1
Animal Attack	0	0	1	1.4
Total	11	100	74	100

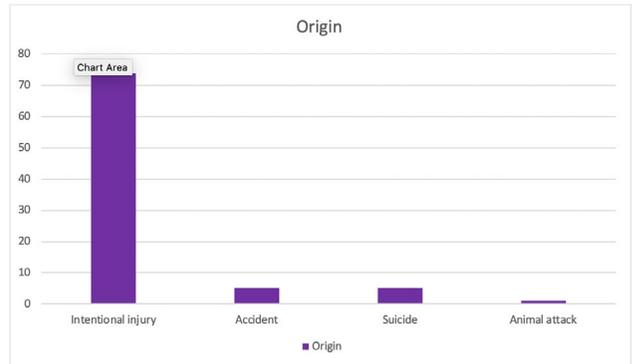


Figure 1. Distribution of penetrating abdominal injuries according to their origin.

recorded between 20:00-04:00 hours, accounting for 64.9%, while the fewest occurred between 04:00-12:00 hours, accounting for 10.8%.

When categorizing the locations of the incidents into urban centers and districts, it was found that 83.5% of the incidents occurred in the urban center, and 16.5% in districts.

When the origins of the injuries were analyzed, it was found that 87.1% were caused by intentional injury, 5.9% by accidents, 5.9% by suicide, and 1.2% by animal (boar) attacks (Fig. 1).

When analyzing the distribution of origins by gender, it is observed that the rate of victims of intentional injury is the

highest in both genders (Table 1).

When the distribution of the origins according to the time of day was analyzed, it was found that intentional injuries were most common, occurring at a rate of 66.2% between 20:00-04:00 hours (Table 2).

In four of the five suicide cases, it was found that a sharp instrument was used, one case involved a firearm, all of them resulted in anterior abdominal injuries, one case had no injury to the abdominal organs, one case involved a stomach injury, one case a liver injury, and two cases had intestinal injuries. Four patients had a single wound, and one patient had 11 wounds. It was found that five of the wounds of the patient

Table 2. Distribution of injury origins according to time intervals of the incident

	20:00-04:00	04:00-12:00	12:00-20:00	Total
Origin				
Intentional Injury				
n	49	8	17	74
%	66.2%	10.8%	23%	100%
Accident				
n	1	2	2	5
%	20%	40%	40%	100%
Suicide				
n	2	0	3	5
%	40%	0%	60%	100%
Animal Attack				
n	0	1	0	1
%	0%	100%	0%	100%
Total				
n	52	11	22	85
%	61.2%	12.9%	25.9%	100%
p=0.017 (95% CI: 0.016-0.021)	Cramer's V=0.3			

CI: Confidence Interval.

Table 3. Distribution of instruments used according to the origin of injury

	Firearm	Stab Wounds	Other	Total
Origin				
Intentional Injury				
n	22	52	0	74
%	29.7%	70.3%	0%	100%
Accident				
n	0	3	2	5
%	0%	60%	40%	100%
Suicide				
n	1	4	0	5
%	20%	80%	0%	100%
Animal Attack				
n	0	0	1	1
%	0%	0%	100%	100%
Total				
n	23	59	3	85
%	27.1%	69.4%	3.5%	100%
p<0.001 (95% CI: <0.001-<0.001)		Cramer's V=0.546		

CI: Confidence Interval.

diagnosed with psychosis, who injured himself in 11 places with a sharp instrument, penetrated into the abdominal cavity, one penetrated the pericardium, and there was also a liver laceration and left ventricular injury; he was operated on and discharged.

According to the evaluation made based on the instrument used in the injury cases, it was found that the most common injuries were stab wounds with a rate of 69.4%, firearm injuries with a rate of 27.1%, and other causes (falls from a height, harvester accidents, and animal attacks) with a rate of 3.5% (Table 3). Of the firearm injuries, 52% were gunshot bullet injuries, and 48% were shotgun pellet injuries.

In all categories, the rate of stab wounds was higher than that of firearm injuries (Table 3).

Of the seven cases admitted as deceased, four were due to firearm injuries and three were due to stab wounds. While the majority of the total number of instruments used were for stabbing, firearm wounds were more common than stab wounds in cases that resulted in death.

When we examine the instruments used according to gender, we observe a high rate of stabbing in both genders, while males have a higher rate of firearm injuries than females. However, this difference was not found to be statistically sig-

nificant ($p=0.43$).

In the forensic reports of 23 cases with firearm injuries, it was noted that localization was described in all cases, 11 of them had multiple wounds due to pellet injuries, eight of the 12 cases with gunshot wounds were described as having entry and exit wounds, and the nature of the wound was not mentioned in four of them.

When analyzing the alcohol levels of the cases upon their arrival at the hospital after the incident, it was found that alcohol was detected in 36.5%, not detected in 30.6%, and not tested in 32.9%. Of the cases where alcohol was detected, the levels were between 0-50 mg/dL in 7.1%, between 50-100 mg/dL in 4.7%, and higher than 100 mg/dL in 24.7%.

When alcohol values were analyzed according to gender, it was found that 72.7% of the women were not analyzed for alcohol, 18.2% were not detected alcohol and 9.1% were detected alcohol, whereas 40.5% of the men were detected alcohol, 32.4% were not detected alcohol and 27% were not analyzed for alcohol (Table 4). The rates of alcohol analysis in male subjects were statistically significant compared to female subjects ($p=0.002$).

When analyzing the alcohol values of the cases according to the time of admission to the hospital, it was observed that

Table 4. Alcohol analysis of cases according to gender

	Gender						Total	
	Woman			Male				
	n	%	AT**%	n	%	AT**%	n	%
No Alcohol	2	18.2	66.7	24	32.4	44.4	57	67
Alcohol	1	9.1	33.3	30	40.5	55.6		
Alcohol Not Tested	8	72.7	-	20	27.0	-	28	33
Total	11	100	100	74	100	100	85	100

*Alcohol tested.

Table 5. Alcohol values of the cases according to the time of the incident

	No Alcohol	0-0.5 mg/dL	0.5-1 mg/dL	>1 mg/dL	Alcohol Not Tested	Total
20:00-04:00						
n	20	3	4	16	9	52
%	38.5%	5.8%	7.7%	30.8%	17.3%	100%
04:00-12:00						
n	1	0	0	4	6	11
%	9.1%	0%	0%	36.4%	54.5%	100%
12:00-20:00						
n	5	3	0	1	13	22
%	22.7%	13.6%	0.0%	4.5%	59.1%	100%
Total						
n	26	6	4	21	28	85
%	30.6%	7.1%	4.7%	24.7%	32.9%	100%

p=0.003 95% CI: 0.002-0.004 Cramer's V=0.367

CI: Confidence Interval.

30.8% of the cases admitted between 20:00-04:00 hours had an alcohol value higher than 100 mg/dL, while only 4.5% of the cases between 12:00-20:00 hours had such high alcohol values (Table 5).

When analyzing the presence of alcohol according to the origin of the injury, it was found that alcohol was detected in 39.2% of the cases of intentional injury, 32.4% of the cases where alcohol was not detected, and 28.4% of the cases where alcohol was not tested. Alcohol was detected in 40% of suicide cases. Alcohol was not tested in 80% of accident cases.

It was determined that 48% of the cases in which alcohol was detected were between the ages of 21-30, and 29% were between the ages of 31-40.

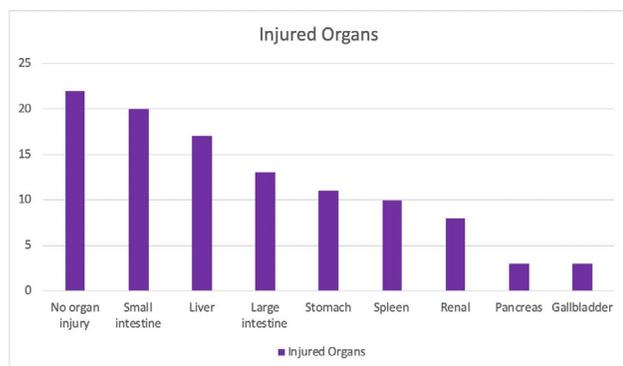
In our study, the impact of alcohol levels on injury severity was analyzed. The relationship between alcohol levels and the necessity for surgery was not statistically significant ($p=0.698$). Similarly, the relationship between alcohol levels and the length of hospital stay was not statistically significant ($p=0.341$). Additionally, the relationship between alcohol levels and the likelihood of being admitted as deceased was not statistically significant ($p=0.906$).

When analyzed according to whether they underwent surgery by general surgery or not, 81% of the cases required surgery, 13% did not require surgery, and 6% died without undergoing surgery.

When examining the organs damaged as a result of injuries penetrating the abdominal cavity, it was found that all abdom-

Table 6. Intra-abdominal organ injuries in penetrating abdominal injuries

	n	%
Single Organ Injury	38	44.7
Multiple Organ Injury	20	23.5
No Organ Injury	22	25.9
Ex - Unknown	5	5.9

**Figure 2.** Frequency of organ injuries in penetrating abdominal injuries.

inal organs were intact in 25.9% of the cases. Nearly half of the cases, 44.7% had a single organ injury, while 23.5% had damage to more than one organ (Table 6). Including the cases involving multiple organ damage, the small intestine was the most frequently injured organ, affected in 23.7% of cases, followed by the liver at 18.9%, and the stomach at 13.1% (Fig. 2). The gallbladder and pancreas were the least frequently injured organs, each affected in 3.6% of cases. Since 5.9% of patients died, there is no data on organ injuries in our hospital (Table 6).

When we analyzed for organ dysfunction or loss, we found that 72 (84.7%) patients experienced no loss or dysfunction of abdominal organs, 7 (8.2%) patients suffered intra-abdominal organ loss, and 6 (7.1%) patients died. Among the surgeries for organ loss, there were 2 splenectomies, 1 nephrectomy, 2 cholecystectomies, 1 combined splenectomy and distal pancreatectomy, and 1 combined splenectomy and nephrectomy. It was found that extra-abdominal organ loss (an eye) occurred in 1 case, which was not included in these rates.

It was found that 6 of the cases resulting in organ loss were caused by stab wounds and 1 was caused by a firearm injury.

When analyzing the origins of the cases that resulted in organ loss, it was observed that all were due to intentional injury crimes, and no organ loss occurred in cases with other origins.

Looking at the number of wounds across the entire body, 45 (52.9%) had a single wound, 10 (11.8%) had 2 wounds,

Table 7. Rates of extra-abdominal injuries in penetrating abdominal injuries

	n	%
Extremity	20	23.5
Thorax+Extremity	11	12.9
Thorax	8	9.4
Diaphragm	3	3.5
Thorax+Heart	2	2.4
Head	1	1.2
None	40	47.1

10 (11.8%) had 3 wounds, and 25 (23.5%) had more than 4 wounds. The average number of wounds was 3.6. The average number of wounds from firearms was 5.8, and 2.7 from stab wounds. Since the distribution of shotgun pellet injuries was not described in detail, it was assumed that these injuries occurred from a single shotgun shot.

While the median number of injuries was 1 in living patients, it was 5 in patients who died. There was no statistically significant difference in the number of injuries between the patients who died and those who did not ($p=0.061$). The number of wounds did not contribute to mortality.

The rate of female patients with more than 3 wounds was 45%, while this rate was 20% in male patients.

When analyzing the abdominal injuries according to the direction of penetration, it was found that 66 (77.6%) of the cases had anterior abdominal injuries, 11 (12.9%) had injuries penetrating the abdominal cavity from the posterior part of the body, and 8 (9.4%) had lateral injuries.

Upon examining other injuries encountered in addition to those in the abdominal cavity, it was found that 47.1% of the cases had no extra-abdominal injury, 24.7% had lung injuries (pneumothorax, hemothorax), 36.4% had extremity injuries, 3.5% diaphragm injuries, 2.4% had heart injuries, and 1.2% had facial injuries (Table 7).

The mean duration of hospitalization was 9 days (Fig. 3). The hospitalization duration ranged from 1 to 10 days for most patients, while it exceeded 20 days for a few patients.

When the cases were evaluated for bone fractures, it was found that 75 (88.2%) had no bone fractures, 4 (4.7%) had rib fractures, 3 (3.5%) had fractures in facial and extremity bones, and 3 (3.5%) had no data on bone fractures because they were deceased upon arrival. When analyzing the origins of the cases with bone fractures, it was observed that all were due to intentional injury.

It was determined that 70 (82.4%) of the cases had no arterial injury, 7 (8.2%) had intra-abdominal arterial injuries, 2 (2.4%) had extra-abdominal arterial injuries, and 6 (7.1%) had no

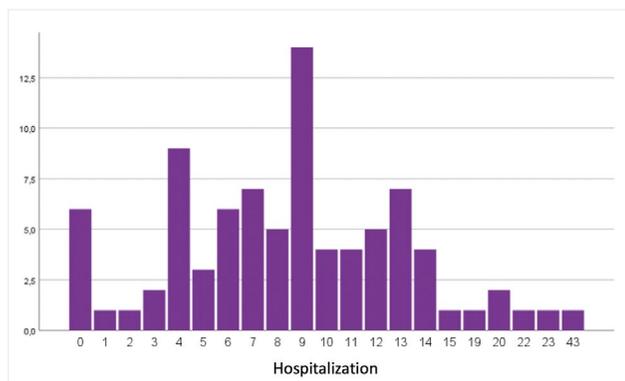


Figure 3. Distribution of hospitalization times (days).

Table 8. Rates of intra-abdominal hemorrhage in penetrating abdominal injuries

	n	%
Intra-abdominal Hemorrhage	52	61.2
Ex/Unknown	5	5.9
None	28	32.9

data on vascular injuries because the patients died.

It was found that 52 (61.2%) of the cases had intra-abdominal bleeding, 28 (32.9%) did not have intra-abdominal hemorrhage, and 5 (5.9%) had no data because they were deceased (Table 8).

When analyzing the mortality rates of injuries to the abdominal cavity, it was found that 78 (91.8%) of the cases were discharged, and 7 (8.2%) died in the hospital. It was determined that 6 of the cases who died had been in cardiac arrest before arriving at the hospital, were admitted to the emergency department accompanied by cardiopulmonary resuscitation (CPR) from the 112 team, did not regain respiration or circulation, and were declared deceased, while 1 case was declared deceased after the first 24 hours.

When examining the origins of the cases admitted as deceased, it was understood that all were of intentional injury origin.

The mean age of the cases admitted as deceased was 29.6 years.

DISCUSSION

In our study, the abdominal injuries admitted to Kütahya Evliya Çelebi Hospital over a 5-year period were analyzed. It was found that most victims of such injuries were around 30 years old, predominantly male, and victims of violence. It was observed that the most common time for admission was at night and that the injuries were mostly inflicted with sharp instruments. While the majority of injuries were caused by

sharp instruments, firearm injuries were more common in cases resulting in death. The fact that young men are at higher risk is often attributed to social and psychological factors, where risky behaviors are more common. Alcohol and substance use may be more prevalent, and tendencies toward conflict or violence may be higher.

It was noted that the nature of the wound was not mentioned in four cases. Errors and omissions in forensic reports can frequently occur in emergency departments.^[4] In forensic reporting, accurate localization and description of wounds, and identification of entry and exit wounds in gunshot cases are crucial for the forensic process. Conclusions about the crime tool used can be made by evaluating the findings on the skin from knives, which are frequently used in cutting and piercing injuries. In some incidents, injuries may involve more than one defendant and knife. It is very important in forensic reporting to determine whether the injury on the person's body has a skin-subcutaneous course, affects deep soft tissues (muscle and fascia), crosses the peritoneum, and/or causes internal organ injury. These factors are important determinants in the severity of punishment received by the defendant. Detailed descriptions of surgical interventions, operation notes, and the lesions observed on the person's body before the first intervention are critical for guiding forensic medicine practices.

When analyzing the alcohol levels of the cases upon their arrival at the hospital after the incident, it was found that alcohol was detected in 36.5%, not detected in 30.6%, and not tested in 32.9%. In the study of Altun et al. on sharp object injuries in living subjects, 39% of the subjects were found to be alcoholic, 32% non-alcoholic, and 29% had no alcohol information.^[5] In a study by Bilgin et al. on forensic autopsy cases involving stab wounds, alcohol was detected in 34.6% of the cases, and narcotic-drug substances were detected in 4.7%.^[6] We believe that examining substance use in addition to alcohol analysis in cases of suicide and violence-oriented incidents will be useful in clarifying the forensic process and determining the underlying causes.

It was observed that alcohol tests were requested less frequently for female cases. Considering that these cases are forensic in nature, and that the use of alcohol and drugs is also important in the follow-up and treatment of penetrating abdominal trauma, it is necessary to perform these analyses in all forensic cases.

Alcohol was not tested in 80% of the accident cases. In emergency conditions, it was observed that the rate of requesting alcohol tests varied according to the type of injury.

When examining the results of alcohol levels on injury severity in our study, the relationship between alcohol levels and injury severity (surgery, hospitalization time, and emergency admissions) was not statistically significant. Göksu et al. found that blood ethanol level did not affect the duration of hos-

pitalization or the mortality rate in a study conducted on patients admitted to the hospital emergency department due to traffic accidents.^[7] Afshar et al. investigated the relationship between alcohol and injury and death in trauma patients and reported that the mortality rate was highest in the group with moderate blood alcohol concentration, and lowest in the group with very high blood alcohol concentration.^[8]

When analyzed according to whether the patients underwent surgery by general surgery or not, 81% of the cases required surgical intervention, and the organ most frequently injured was the small intestine, affected in 23.7% of cases. In a study conducted by Badak et al. on abdominal sharp injuries, injuries were reported as follows: 28% to the small intestine, 14.6% to the spleen, 12.1% to the liver, 10.9% to the colon, and 7.3% to the stomach.^[9]

When analyzing organ dysfunction or loss, we found that 84.7% had no loss or dysfunction of abdominal organs, and the most common organ loss was the spleen. It was also observed that the most common surgical procedure performed for blunt abdominal trauma was a splenectomy.^[10]

In the Turkish Penal Code, the crime of intentional injury under crimes against bodily inviolability is defined in Article 86, and the crime of injury aggravated by consequence is defined in Article 87. Paragraph 2b of Article 87 defines the crime of aggravated wounding, where the loss of function of one of the senses or organs constitutes the qualified form of the crime and results in an increase in the punishment received by the offender. In this context, the loss of organ function in penetrating abdominal injuries is significant. In our study, 58 patients had organ injuries, and 7 patients experienced intra-abdominal organ loss.

The average number of wounds was 3.6, with an average of 5.8 wounds in firearm injuries and 2.7 in sharp object injuries. The higher number of wounds from firearms may be attributed to the potential for both entry and exit wounds, which increases the total count. Additionally, the higher number of wounds could be due to the ease of shooting, as no interpersonal struggle is required and the distance between individuals is greater with firearms than with sharp objects. In the study by Altun et al., 53% of the cases had a single injury, 22.7% had 2, 10.9% had 3, 13.3% had 4 or more lesions.^[5] In Derkuş's study, it was observed that 54.6% of the cases had 1 injury, 18.3% had 2 injuries, 11.2% had 3 injuries, and 15.9% had more than 3 injuries.^[11]

While the mean number of injuries in living patients was 3.4, the mean number of injuries in deceased patients was 5.4. There was no statistically significant difference in the mean number of wounds between deceased and non-deceased patients ($p>0.05$). It was found that the number of wounds did not contribute to mortality. In Uysal's study, it was also found that the number of injuries did not contribute to mortality ($p>0.05$).^[12]

When analyzing the abdominal injuries according to the direction of penetration, it was seen that 77.6% of the cases had anterior abdominal injuries. In the study by Kurt et al. on sharp penetrating injuries to the abdomen, it was found that 7.7% of the cases penetrated the abdominal cavity from the posterior and flank, while 92.2% of the cases had penetration in the anterior abdominal cavity.^[13]

When we examined the other injuries encountered in the body in addition to injuries to the abdominal cavity, we found that 47.1% of the cases had no extra-abdominal injuries, 24.7% had lung injuries (pneumothorax, hemothorax), 36.4% had extremity injuries, 3.5% had diaphragm injuries, 2.4% had heart injuries, and 1.2% had facial injuries. In Uysal's study, 28.1% of the cases had extremity injuries and 10.2% had head and neck injuries.^[12] Muratoğlu's study on deaths due to penetrating injuries found that 12.5% had thoracic injuries, 7.7% abdominal injuries, 5.2% extremity injuries, and 35.4% injuries in more than one region.^[14] In Polat's study on blunt and penetrating abdominal injuries, 25% had thoracic and 25% had extremity injuries.^[15]

It was found that 61.2% of the cases had intra-abdominal bleeding, 32.9% did not have intra-abdominal bleeding, and 5.9% had no data because they died. In Taçyıldız's study on penetrating abdominal traumas, intra-abdominal hemorrhage exceeding 1000cc was found in 59.5% of the cases.^[16]

The mean age of the patients who were admitted as deceased was 29.6 years. In Taçyıldız's study, the mean age of deceased patients in cases of penetrating abdominal trauma was 31.2 years.^[16]

All our cases involved life-threatening injuries, as they all were patients with injuries to the abdominal cavity. The absence of death and recovery does not change this situation in legal terms. In the forensic traumatological evaluation of all cases, it was observed that the effect of the injury on the person was 'not mild enough to be resolved by simple medical intervention.' Likewise, cases that do not require surgery or organ damage do not change this situation. Attention should be paid to these issues in forensic reporting.

Forensic medicine experts may be expected by the courts to determine as experts whether the wounds in persons injured with a sharp instrument were self-inflicted or caused by another person during a struggle. Forensic medicine reports are crucial for distinguishing between the crime of attempted intentional homicide and the crime of intentional injury. In cases of intentional killing, where the result can be separated from the act, if the perpetrator could not complete the executive acts of the crime he started due to reasons beyond his control (i.e., if the victim did not die), the crime is considered intentional killing. At this point, it is important to differentiate between attempted intentional homicide and intentional injury. The determination of attempted intentional killing or intentional wounding is made by considering factors such as the targeted body area, the number and severity of the blows,

the nature of the wounds, whether the act ended spontaneously or due to an obstacle, and the perpetrator's behavior towards the deceased or the victim after the incident.^[17] The localization of the wounds, their characteristics, severity, and number are important in this context. Therefore, wounds should be accurately described in forensic reporting.

Our case involving a patient diagnosed with psychosis who injured himself with a sharp instrument in 11 places—5 of which penetrated the abdominal cavity and one penetrated the pericardium, resulting in liver laceration and left ventricular injury—illustrates how seriously a person can injure himself. Suicidal behavior is a significant psychiatric issue often seen in mental disorders. Compliance of the person with mental disorders with treatment may be impaired. This may also necessitate inpatient treatment depending on the patient's clinical condition. In this context, an important issue in the inpatient treatment of psychiatric patients is consent. Article 432 of Civil Code No. 4271 stipulates that freedom can be restricted for protection purposes. Under this legal regulation, individuals with mental illness, mental impairments, alcohol or drug addiction can be hospitalized for treatment against their will, following a medical board report, when there is a risk of harm to themselves or others. Everyone has the right to report such situations to the authorities.

CONCLUSION

Injuries to the abdominal cavity are among the most common types encountered in emergency departments and are frequently reported in forensic medicine. These injuries are considered life-threatening due to their penetration into the abdominal cavity. In our study, we analyzed demographic characteristics, times of injury, types of injuries, and their outcomes.

Penetrating injuries to the abdominal cavity were most commonly inflicted with sharp instruments and, secondarily, with firearms, and were typically related to violent incidents. The majority of the cases involved young adult males, and the incidents predominantly occurred during the night hours. The rate of alcohol consumption was found to be high. There was a tendency to request fewer alcohol tests in emergency services during first encounters, in cases involving females, and in non-violent cases. It was observed that half of the cases received a single injury blow, and the majority of the injuries were to the front of the body. Most cases required surgical intervention. The organs most frequently damaged were the small intestine and liver, with the spleen being the most commonly lost organ. Bone fractures and arterial injuries were less common. The mean duration of hospitalization was 9 days, and the mortality rate for injuries to the abdominal cavity was 8.2%. However, 6 of the 7 patients who died from penetrating abdominal injuries were admitted as deceased cases, and one patient, known to have sustained a splenic injury, died 9 days after admission.

Penetrating abdominal injuries require careful evaluation and meticulous planning for surgical intervention. Optimizing surgical interventions is critical both for protecting patient health and for achieving the best possible outcomes. At this point, triage and evaluation, patient-specific planning, a minimally invasive approach, a multidisciplinary approach, emergency preparedness, adequate blood and blood product supply, and postoperative follow-up are important. In each case, the most appropriate intervention method should be determined by considering the specific situation and needs.

Alcohol and substance abuse are more common in forensic traumatic cases than in the general population. The severity of the injury may cause life-threatening internal organ or vascular injuries. Substance and alcohol use may complicate the interpretation of the clinical picture and the management of the case. In our study, it was observed that substance analysis was not requested in the cases, and alcohol testing was predominantly performed in male cases. In forensic traumatic cases, it would be useful to request both alcohol and drug tests to clarify the clinical process and enhance the accuracy of forensic reporting.

Various factors affect the length of hospital stay. These factors can range from the general health status of the patient to the severity of the injury, the patient's age and comorbidities, treatment methods, presence of complications, quality of postoperative care, and social and psychological factors.

Detailed analysis of data collected in emergency departments allows for a better understanding of trauma cases and the identification of risk factors. These data can contribute to the development of forensic and public health policies. For research, detailed epidemiologic studies are recommended to understand the demographic distribution of trauma-related deaths and injuries.

Forensic evaluation of traumatized cases is particularly important in identifying cases of violence and abuse. The forensic medical examination processes of such cases should be integrated into emergency department protocols.

Collaboration with public health agencies can help prevent a wide range of trauma-related health problems. These collaborations can develop early intervention strategies for chronic health issues and psychological problems that may develop as a result of trauma.

National policies and regulations should be developed for trauma care in emergency departments, and the necessary resources should be provided for the implementation of these policies.

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ORİJİNAL ÇALIŞMA - ÖZ

Penetran batın bölgesi yaralanmalarının adli yönünden değerlendirilmesi

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AMAÇ: Çalışmamızda penetran batın yaralanmalarının özellikleri, orjinleri, yaralanma derecesi, sonuçları, raporlanması, adli tıbbi boyutunun tartışılması amaçlanmıştır.

GEREÇ VE YÖNTEM: Bu çalışmada 01.01.2016-31.12.2020 tarihleri arasında Kütahya Sağlık Bilimleri Üniversitesi Evliya Çelebi Eğitim ve Araştırma Hastanesi acil servisine başvurusu bulunan 28619 vaka taranarak penetran batın yaralanması bulunan 85 olgunun adli raporları ve tıbbi evrakları etik kurul onayı alınarak retrospektif olarak değerlendirilmiştir.

BULGULAR: Çalışmaya dahil edilen olguların %87.1'i erkek, %12.9'u kadınlardan oluşmaktadır. Ortalama yaş 31 ± 13 yıl olarak bulunmuştur. Orjinleri incelediğinde %87.1'i kasten yaralama neticesinde gelişmiş olduğu görülmüştür. Olguların maruz kaldığı olayların gerçekleşme saati 20.00-04.00 saatleri arasında yoğunlaşmıştır. %36.5'inde alkol saptanmış olup, %30.6'sında alkol saptanmamıştır. Olguların %32.9'unda alkol testi istenmediği anlaşılmıştır. Olgularda en sık görülen yaralanmanın %69.4 oranında kesici delici alet yaralanması ve %27.1 oranında ateşli silah yaralanması olduğu belirlenmiştir. Vakaların %68.2'sinde organ hasarı saptanmış ve en sık hasar gören organın ince bağırsak olduğu görülmüştür. Mevcut yaraların ortalama sayısı 3.6 bulunmuştur. Olguların %61.2'sinde batın içi kanama, %8.2'sinde ise batın içi arter yaralanması tespit edilmiştir. Penetran batın yaralanmalarının ölüm oranı %8.2 olarak bulunmuştur.

SONUÇ: Adli travmatolojide travmanın ağırlık derecesi değerlendirilmesinde en ağır grubu oluşturan yaşamsal tehlikenin ve organ işlev kaybının meydana gelmesi penetran batın yaralanmalarında sıklıkla görülmektedir. Penetran batın yaralanmaları bizim çalışmamızda ve literatürdeki çalışmalarda en sık şiddet olayları sonucu meydana gelmektedir.

Anahtar sözcükler: Düdüklü tencere; patlayıcı yanık; yanık.

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