The correlation between Injury Severity Score, vital signs, and hemogram values on mortality in firearm injuries

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ABSTRACT

BACKGROUND: Several scoring systems have been and continue to be developed in numerous countries with the goal of quickly and accurately assessing the severity of trauma injuries. The aim of this study was to identify factors that help to determine the gravity of damage and to minimize it, in order to reduce mortality and morbidity. It is important that the criteria set for the determination of the severity of trauma are objective, measurable, and comparable. This study was an assessment of the contribution of vital signs, hemogram values, and trauma severity scores recorded at initial admission in the prediction of mortality in patients with firearm trauma wounds.

METHODS: This was a retrospective cohort study. Patients with gunshot injuries who were admitted to the emergency department (ED) of a single facility between December 2015 and March 2016 were included in the study. Statistical software was used to perform bivariate analyses using a t-test or the Mann-Whitney U test for continuous variables, depending on the distribution of variables, and logistic regression analysis was utilized to determine independent predictors of mortality after ED admission. A p value of <0.05 was considered statistically significant.

RESULTS: A total of 418 patients were included. A statistically significant difference was found between the white blood cell count, respiratory rate, Glasgow Coma Scale score, Abbreviated Injury Scale score, and the Injury Severity Score (ISS) of the patients who survived and those who died ($p<0.05$). The analysis also indicated that a systolic blood pressure below 90 mmHg and a heart rate above 100 beats/minute were independent variables in terms of the expectation of mortality.

CONCLUSION: The objective assessment of the ISS at admission to the ED is an important element in the calculation of hemoglobin requirements, mortality, and morbidity.

Keywords: Firearm injury; hemogram; Injury Severity Score; mortality; vital values.

INTRODUCTION

Trauma injury, defined as the structural tissue damage resulting from the transfer of kinetic, thermal, or chemical energy to tissues in more than one body area or system, is one of the most serious problems currently confronting society, and represents significant economic, social, and health costs.[1] Despite advancements, trauma continues to be the leading cause of death in people younger than 40 years of age, and is fourth in people over 45 years of age. Trauma accounts for 50% of deaths under the age of 14, 80% of deaths in the 15 to 24 age group, and 65% of deaths in the 25 to 40 age group. It has been established that 50% of these deaths occur in the first few minutes, 30% in the early period (the first 3 hours), and 20% in the late period (after the first 3–4 days).[2–4] One definition of multiple trauma is an injury that affects at least 2 of the 4 regions of the human body: the head and neck, the chest, the abdomen, and the extremities; or injuries to 2 of the major systems (head/chest/abdomen); or a major system and 2 major extremities (femur/humerus).[5]

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In Turkey and globally, traffic accidents are the leading cause of trauma.[6] In England, the total annual economic loss due to major trauma has been estimated to be between 3.3 and 3.7 billion pounds.[7,8]

Among the causes of trauma, warfare injuries are very different from most cases encountered in daily life. The quantity of tissue damage and contamination typically seen in warfare injuries is unlike that seen in the ordinary trauma practice.[9,10]

Procedures such as laparoscopy, radioscopic embolization, and intramedullary nailing are not a problem for today's surgeons, but it is of no use to know these techniques when faced with a patient with abdominal injury due to a land mine or a patient with a complex hip injury that is the result of an automatic weapon.[9,11] The most common cause of death following trauma in military operations is hemorrhage.[12] Hemorrhagic deaths account for approximately 30% of overall traumatic deaths and 50% in battle environments.[8]

The most important factor affecting mortality in major injuries is time, and this has been described as the "golden hour" rule. This concept originated with emergency health services, which developed rapidly in civilian life, and the importance of this concept is well established in blunt trauma cases.[12] Experience gained in war conditions in the past and in the present have revealed the accuracy of the "golden hour" concept. In the race to achieve an adequate intervention in time, triage has a unique importance. In triage care, the critical point is to quickly and correctly determine the necessary medical attention necessary according to a score of the patient's injuries. Adequate triage in severe traumatic events is one of the key points for trauma care.[13] Severe injuries and risk of death can be determined by assessing physiological parameters in the majority of trauma patients.[14] The triage system applied to major trauma patients is a cornerstone for the care process of these patients.[13] Patients at risk can be identified in the early period following trauma-related injury using physiological data associated with mortality.

Accurate evaluation of mortality and morbidity factors and continuous development of the triage system is at the core of major trauma research. Various scoring systems are used in traumatic injury outcome prediction and triage system research.[15] In this study, the aim was to examine and report the effectiveness of physiological parameters and trauma scores of major trauma patients in predicting mortality and morbidity.

MATERIALS AND METHODS

Patients

This study was designed as a retrospective, single-center, clinical trial. It was evaluated and approved at the fifth session of the Gülhane Training and Research Hospital ethics committee on April 5, 2016 (protocol no: 206). Emergency department (ED) data from this tertiary care facility, where 150,000 adult patients are admitted annually, from the period between December 1, 2015 and March 31, 2016 were reviewed and analyzed. Patients over 18 years of age admitted to the ED with a gunshot injury, with or without intervention, were included. The data regarding primary measures, trauma scores, vital findings, and hemogram values were extracted from the archives. Patients with any of these data lacking were excluded from the study. In addition, patients whose diagnoses were entered into the system with the International Classification of Diseases (ICD) code for a gunshot injury, but who were not recently injured and those who applied with a posttraumatic stress pre-diagnosis were also excluded from the study.

Methods

Patients with a direct referral from the field to the ED with a gunshot injury, and patients who were referred to the ED following a primary intervention at another hospital were included in the study. Patient information was obtained through a retrospective screening of the hospital data system using the ICD code for gunshot injury and by screening emergency service patient files. The sociodemographic data of the patients were obtained from the hospital data system. Patient files were then extracted from the archive and the vital signs of the patients at the time of admission to the emergency room and the hemogram results in the computer system were recorded. Data regarding any required blood transfusion, how many units were administered, and what kind of blood product was transfused, were also retrieved from the hospital data system. Mortality statistics related to the relevant injury were also determined through the hospital data system and the national death registration system.

The Injury Severity Score (ISS) was calculated by summing the squares of the severity of the injuries in the 3 most seriously injured anatomical regions. For patients referred from other hospitals, ISS values were calculated and recorded using the examination findings obtained from the patient epicrises.

Collection of Data and Statistical Methods

Frequency and percentage were used to describe sociodemographic data. Normal distribution of the data was tested using the Kolmogorov-Smirnov test. Mean, SD, minimum, and maximum values were used for the data with normal distribution, and median, interquartile range, minimum, and maximum values were used for data with non-normal distribution. When the groups were divided according to mortality status, a t-test was used for continuous variables with normal distribution, the Mann-Whitney U test was used for continuous variables with non-normal distribution, and a chi-square test was used for categorical variables to determine the intergroup differences.

The effect of multiple variables on mortality was assessed using logistic regression analysis. SPSS Statistics for Windows, Version 17.0 (SPSS Inc., Chicago, IL, USA) was used to perform the statistical analysis. A p value <0.05 was considered statistically significant. The primary measurement criteria of the trauma score, physiological parameters and hemogram values, and the effect of primary criteria on mortality were evaluated. Sociodemographic data, such as age, gender, etc., and the injured areas, were secondary criteria.

RESULTS

A total of 418 patients were included in the study, and all of the patients were male. The mean age of the study participants was 30.17±7.36 years (min-max: 20–51 years). The systolic blood pressure (BP), heart rate, fever, Glasgow Coma Scale (GCS) score, Abbreviated Injury Scale (AIS), ISS, laboratory results, and the number of days of hospitalization for all of the patients are provided in Table 1.

Table 1. Distribution of demographic data of all of the study patients

	n	Min.	Max.	Mean	SD
White blood cell	418	1.50	41.10	12.1330	4.50057
Hemoglobin	418	3.00	18.10	12.7672	2.39049
Hematocrit	418	10.80	56.20	38.8117	7.04521
SBP	418	61.00	152.00	119.4952	15.79716
Heart rate	418	52.00	128.00	87.0694	15.30466
Fever	418	35.80	38.80	36.8392	.49819
Respiratory rate	418	10.00	28.00	16.2416	4.17098
GCS	418	3.00	15.00	12.9019	2.74276
AIS	418	1.00	7.00	3.0579	1.21242
ISS	418	1.00	75.00	12.4522	13.73346
Hospitalization period (days)	418	1.00	177.00	18.0981	19.52131
Age (years)	418	20.00	51.00	30.1746	7.36318

Min.: Minimum; Max.: Maximum; SD: Standard deviation; SBP: Systolic blood pressure; GCS: Glasgow Coma Scale; AIS: Abbreviated Injury Score; ISS: Injury Severity Scores.

Table 2. The distribution of the patients according to the clinic in which they were hospitalized

	n	%
Intensive care	38	9.1
General surgery	34	8.1
Orthopedics	149	35.6
Plastic surgery	66	15.8
Brain surgery	31	7.4
Chest surgery	26	6.2
Ophthalmology	36	8.6
Other (ear nose throat, urology, cardiovascular)	38	9.1
Total	418	100.0

The distribution of injuries according to the mechanism of trauma was 48.6% (n=203) homemade explosives (HMEs) and 51.4% (n=215) gunshot injuries. Of 418 cases, 18 (4.3%) resulted in mortality.

When the distribution of the location of the injuries was examined, the most frequently seen was the extremities, followed by the head and neck, and the thorax, respectively. The distribution of injured areas is given in Figure 1.

The distribution of the organ- or limb-threatening pathologies revealed fractures in 198 patients as the most common, followed by penetrating eye injuries that represent a risk to visual function in 50 patients, hearing pathology that is a risk to hearing function in 17 patients, and intracranial hemorrhage that may be life-threatening in 17 patients (Fig. 2).

The orthopedic clinic was the most frequent clinic of admission, followed by the plastic and reconstructive surgery clinic. The distribution of the patients according to the clinic of hospitalization can be seen in Table 2.

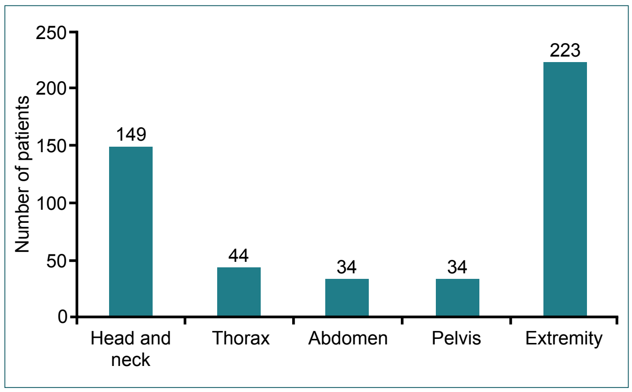

Figure 1. The distribution of the injured areas.

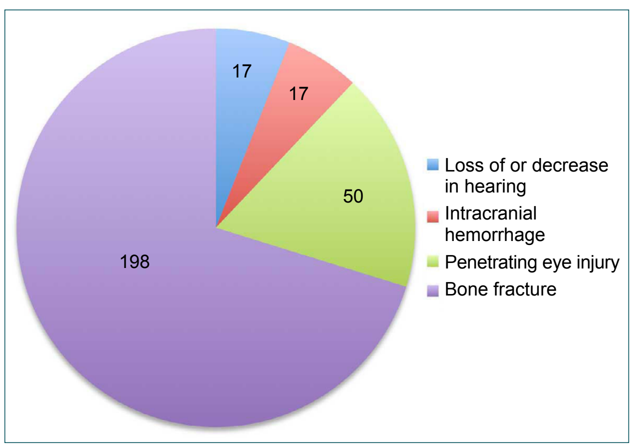

Figure 2. Distribution of patients with additional pathologies.

During follow-up, 119 (28.5%) patients were administered blood or blood products. The blood transfusion distribution according to mortality is given in Table 3.

When the injury mechanisms were evaluated according to mortality, it was observed that the rate was highest among those with HME injuries (Table 4).

The GCS results were grouped as GCS <9, GCS 9–12, and GCS >12. The distribution of patients was evaluated according to mortality and it was detected that 94.4% of the patients who died had a GCS <9, while 5.6% of the fatalities had a GCS of 9–12. It is noteworthy that there was no case of mortality with a GCS of >12. The mortality distribution by GCS score is provided in Table 5.

Table 3. The distribution of mortality according to blood transfusion use

Mortality	n	%
Mortality is absent		
Transfusion (–)	282	70.5
Transfusion (+)	118	29.5
Total	400	100.0
Mortality is present		
Transfusion (–)	17	94.4
Transfusion (+)	1	5.6
Total	18	100.0

Table 4. The distribution of mortality by injury mechanism

Mortality	Frequency	%
Mortality (–)		
Bullet	208	52.0
Handmade explosives	192	48.0
Total	400	100.0
Mortality (+)		
Bullet	7	38.9
Handmade explosives	11	61.1
Total	18	100.0

Table 5. The distribution of mortality according to GCS group

Mortality	GCS score	Frequency	%
Mortality (–)	<9	13	3.3
	9–12	96	24.0
	>12	291	72.8
Total	400	100.0	
Mortality (+)	<9	17	94.4
	9–12	1	5.6
Total	18	100.0	

GCS: Glasgow Coma Scale.

Comparisons of mortality in terms of sociodemographic parameters, physiological parameters, laboratory results, and trauma scores yielded a statistically significant difference in white blood cell count (WBC) (p<0.001), respiratory rate (p<0.001), GCS (p<0.001), AIS (p<0.001), and ISS (p<0.001) parameters. No statistically significant difference was found between the groups in terms of age (p=0.867), hemoglobin (Hb) (p=0.088), hematocrit (Hct) (p=0.167), systolic blood pressure (BP) (p=0.542), heart rate (HR) (p=0.052), fever (p=0.386), or number of days in hospital (p=0.052) (Table 6). Receiver operating characteristic (ROC) analysis was performed to estimate the mortality of patients using the data of age, systolic BP, HR, respiratory rate, Hb, Hct, WBC, GCS, AIS, and ISS values. The highest area under the curve (AUC) values were the ISS (AUC: 0.993) and the AIS (AUC: 0.978). The ROC curves according to the parameters studied are illustrated in Figure 3 and the AUC values are given in Table 7.

Based on the current literature, the cutoff point used in logistic regression analysis for systolic BP was 90 mmHg and below. The cutoff values used for the ISS were 16 and 20, 8 mg/dL was used for the Hb measure, and 12 or less and 20 or more were applied to the respiratory rate.

An ISS of 16 or more or an ISS of 20 or more was not significant as independent variable for mortality with a 95% confidence interval (p<0.001). The mortality rate was determined to be 6.49 times (min-max: 1.02–41.25 times) greater in patients with a systolic BP of less than 90 mmHg (p<0.048),

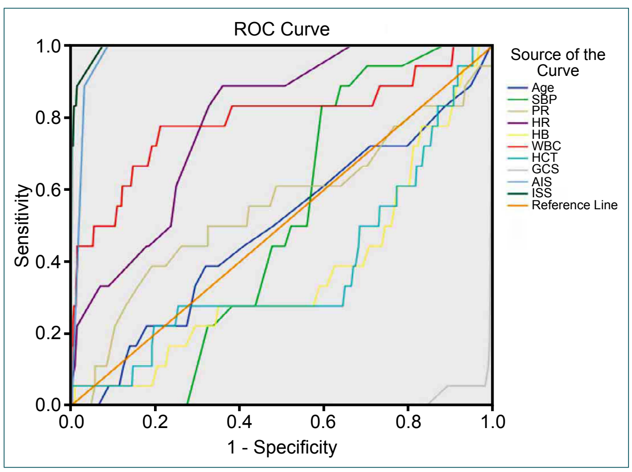

Figure 3. ROC curves for mortality estimation using physiological criteria, laboratory results, and trauma scores. AIS: Abbreviated Injury Scale; Hb: Hemoglobin; Hct: Hematocrit; ISS: Injury Severity Score; HR: Heart rate; ROC: Receiver operating characteristic; RR: Respiratory rate; SBP: Systolic blood pressure; WBC: White blood cell.

Table 6. Trauma scores and physiological parameters according to survival

	n	Minimum	Maximum	Mean	Standard deviation
Survival					
White blood cell	400	1.50	41.10	11.8153	4.05113
Hemoglobin	400	3.00	18.10	12.8095	2.38408
Hematocrit	400	10.80	53.30	38.9138	6.99868
Systolic blood pressure	400	61.00	152.00	119.3950	16.06297
Heart rate	400	61.00	128.00	86.9400	15.13039
Fever	400	35.80	38.80	36.8348	.48539
Respiratory rate	400	10.00	26.00	16.0450	4.07117
Glasgow Coma Scale	400	3.00	15.00	13.3075	1.95512
Abbreviated Injury Score	400	1.00	7.00	2.9305	1.07425
Injury Severity Scores	400	1.00	75.00	10.1725	7.67333
Hospitalization period (days)	400	1.00	177.00	18.4900	19.76072
Age (years)	400	20.00	51.00	30.1875	7.38062
Non-survival					
White blood cell	18	7.70	32.00	19.1944	7.51551
Hemoglobin	18	8.50	17.30	11.8278	2.40681
Hematocrit	18	26.70	56.20	36.5444	7.88679
Systolic blood pressure	18	100.00	130.00	121.7222	7.74449
Heart rate	18	52.00	116.00	89.9444	19.06173
Fever	18	36.00	38.40	36.9389	.73974
Respiratory rate	18	14.00	28.00	20.6111	4.07487
Glasgow Coma Scale	18	3.00	11.00	3.8889	2.21993
Abbreviated Injury Score	18	5.00	6.00	5.8889	.32338
Injury Severity Scores	18	25.00	75.00	63.1111	20.12283
Hospitalization period (days)	18	1.00	41.00	9.3889	9.94182
Age (years)	18	21.00	44.00	29.8889	7.16108

Table 7. Area under the curve values for mortality estimation using physiological criteria, laboratory results, and trauma scores

Test result variables	Area	Standard deviation	Asymptotic Sig.[b]	Asymptotic 95% confidence interval	
				Lower limit	Upper limit
Age (years)	.492	.072	.913	.351	.634
Systolic blood pressure	.497	.040	.962	.418	.576
Heart rate	.554	.080	.441	.397	.711
Respiratory rate	.792	.044	.000	.706	.878
Hemoglobin	.367	.068	.057	.234	.501
White blood cell	.795	.069	.000	.660	.929
Hematocrit	.382	.073	.090	.240	.524
Glasgow Coma Scale	.012	.008	.000	.000	.027
Abbreviated Injury Score	.978	.007	.000	.964	.992
Injury Severity Scores	.993	.004	.000	.984	1.000

and increased by 0.11 times (min-max: 0.023–0.56 times) ($p<0.008$) in tachycardic patients with a heart rate of 100/minute or more. The parameters of a respiratory rate below 12 or above 20 breaths per minute and an Hb value below

Table 8. Multivariable logistic regression analysis of primary criteria

	B	S.E.	Wald	df	Sig.	Exp (B)	95% Confidence interval (B)	
							Lower limit	Upper limit
Systolic blood pressure <90	1.870	.944	3.926	1	.048	6.488	1.020	41.251
Respiratory rate	.223	.729	.093	1	.760	1.249	.299	5.217
Heart rate	-2.183	.820	7.083	1	.008	.113	.023	.563
Hemoglobin <8 mg/dL	-19.068	11236.146	.000	1	.999	.000	.000	–
Injury Severity Scores <20	21.181	2066.608	.000	1	.992	1.581	.000	–
Constant	-21.036	2066.608	.000	1	.992	.000		

8 mg/dL were not significant as an independent variable for mortality (Table 8).

DISCUSSION

This study was designed to examine the predictive efficacy of vital sign findings, WBC, Hb, and trauma scores on the mortality of 418 patients presenting after gunshot injuries in order to better predict mortality. In the group of patients with a high WBC, respiratory rate, AIS and ISS values, and a low Hb and low GCS, the AUC was high for the AIS and ISS, and a systolic BP below 90 mmHg and a heart rate higher than 100/minute were found to be independent variables for mortality.

Trauma is more common at younger ages, and as has been shown in studies, there is a strong relationship with factors such as age, sex, and the area of injury. Other studies have reported a similar gender ratio among trauma patients: Régnier et al.[16] found a distribution of 71.5% male and 28.5% female, and Odom et al.[17] reported 67.2% male and 32.8% female. In studies evaluating patients according to age, the mean age of survival and death reported by Régnier et al. was 37±15 years and 45±18 years, respectively, Odom et al. reported a mean of 48.20±22.1 years and 67.89±21.1 years. Callaway et al.[18] found that in a group aged more than 65 years, the mean was 80±8.3 years and 81±8.1 years, while it was 38±14 years and 42±14 years in the group with an age below 65 years, Molina et al.[19] determined in their study that the average age of patients who committed suicide by gunshot was 46.7 years, while the mean age of gunshot homicide victims was 34.3 years, and the ratio of females to males was 1/5 for all nonaccidental handgun death s. In our study, all of the patients were male. This was due to the fact that the vast majority of the patients included in the study were military and police officers working in operational units and that our hospital is a high-ranking military hospital. The mean age of survival and death in our study was 29.8±7.1 years and 30.18±7.3 years of age. This young age distribution of the patients was consistent with other studies. The age difference between the patients who survived and those who died was not statistically significant, likely as a result the small number of deaths, the mechanism of trauma, and the fact that all of the patients studied were young adults.

Figure 4. Hemopneumothorax and multiple costal fractures seen on chest X-ray. (Clinic I archive image of GATA Emergency Medicine AD).

Mortality in gunshot injuries is most often related to the location of the injury and the number of injured organs. The death rate due to gunshot injury has been reported to be between 12% and 18% in the literature. In isolated chest or abdominal injuries, the reported mortality is 17%, while for abdominal injuries accompanied by brain or lung injuries, mortality has been reported at 80% and death usually occurs on the first day (Fig. 4).[20–22]

Sheffy et al.[20] reported that gunshot injuries were most frequently associated with lower extremity injuries (42%), followed by head and neck injuries (39%) and thoracic injuries (23.5%), when evaluated according to the localization. Otte et al.[23] found that 69.6% of patients with multiple trauma had head trauma, 69.2% had chest injuries, 51.9% had abdominal injuries, and 33.1% had other injuries. In our study, the mortality rate was determined to be 4.3%, which is lower than the rates seen in the literature. We believe that the low mortality rate was associated with the fact that the great majority of patients were referred from other hospitals, and the losses seen in the first 24 hours were likely to have occurred at these hospitals or at the incident scene. The evaluation of the injury area revealed similar results in our study to those previously reported: the most commonly seen injured area was the extremities.

Findlay et al.[24] studied 774 patients who were admitted to the intensive care unit with multiple traumas, and they found that patients had a duration of stay of between 1 and 68 days, with a median stay of 2 days. In a study of 4651 patients, Render et al.[25] determined that the average length of stay of patients in hospital was 3.1 days. In our study, the mean duration of stay in hospital was 18.09 days (min-max: 1–177 days) and this long duration of stay was thought to be due to the injury mechanism of the patients included in the study, the different forms of trauma, the clinical treatment duration of the patients in our hospital, and the fact that the clinical treatment duration was not limited to intensive care, but also included subsequent treatment in the clinic and physical therapy.

Several studies have evaluated the effects of vital findings on mortality in trauma patients. In studies performed by Jo et al.[15] and Régnier et al.,[16] a low BP was associated with mortality, and as the heart rate increased, the BP increased. [15,16] In a study of patients with head trauma conducted by Butcher et al.,[26] the prognosis was better in cases where the systolic BP was between 90 and 120 mmHg than in patients with lower or higher levels. They reported that the result was worse in cases in which both oxygen deficiency and low BP were seen than in cases in which only 1 of these parameters appeared.[26] There was no statistically significant difference in patient mortality according to the systolic BP or heart rate in our study; however, mortality was 6.49 times greater ($p<0.048$) in patients with a systolic BP of less than 90 mmHg at admission to the emergency service. We think that the small difference in the systolic BP and heart rate between the surviving and non-surviving patients in our study, as seen in the published literature, was mostly due to the fact that the vast majority of patients were brought to our hospital after receiving fluid resuscitation, blood transfusions, and damage control surgery.

In addition to intensive care scoring systems, various trauma scoring systems are used in the evaluation of patients with multiple trauma. Developed by Jennett and Teasdale,[2] the GCS is used to assess cerebral dysfunction, particularly neurological condition, and is often applied in cases of multiple trauma associated with head trauma. The GCS can reliably assesses the degree of consciousness and coma in patients with craniocerebral injury. The GCS scoring system can provide quick, detailed information, is simple to evaluate, does not require additional examination, and is therefore frequently used. The benefits are fewer in severely hypotensive, tachycardic patients with hemorrhage. Nonetheless, in 2 studies conducted by Teasdale and Jennet[27] and Cho and Wang,[28] the GCS was reported to have a high accuracy rate of 81.9% and 92%, respectively, in predicting mortality in patients with head trauma. It has been recommended that the GCS be used in combination with other scoring tools in multitrauma cases.[28] Teoh et al.[29] studied 1390 patients who were treated in intensive care units and followed up for 4 years, and found a significant relationship between the GCS score and mortality. Mpe et al.[30] conducted a retrospective study and found that the mortality rate was high in trauma patients, the prognosis of patients with a GCS value of 4 and below at admission to the intensive care unit was poor, and that very few patients with low GCS values were able to fully recover.[30] In the present study, the mean GCS of patients who died was low; 17 of the 18 cases of mortality had a GCS below 9. No deaths were seen in patients with a GCS >12. Our results were consistent with the literature.

The ISS is an anatomical trauma score used to assess the severity of injury and was developed primarily for blunt trauma. The value scored is between 3–75 and is directly proportional to mortality. Mortality increases as the score increases. It is considered severe trauma if the score is above 15. If the ISS is above 25, mortality is seen in 20% to 30% of patients under 50 years of age and in 40% to 50% of patients above 50 years of age. When all age groups are considered, mortality is 30% to 40%. The ISS has some limitations. A disadvantage of the system is that it relies on the AIS scoring, and therefore ignorance of other organ injuries in either another other system or the same system due to the reliance on the 3 systems where only the most serious injury is present in patients with multiple system injuries will increase ISS error. Another weakness is that the severity of all system injuries are considered equal, which may cause a head injury, in particular, to not be given sufficient significance with respect to mortality. It is also inadequate in differentiating patients with the same score but different hemodynamic status. Simmons et al.[31] reported that the mean ISS value of military service members receiving a massive transfusion before and after a change in guidelines was 24 and 25. Eastridge et al.[32] found that 28.6% of the patients in the field before reaching a hospital had an ISS value of 25 or less, 61.2% had between 25 and 50, and 10.2% had an ISS over 50.[32] A low GCS (especially <5), low Revised Trauma Score (RTS), and a high ISS (especially >16) has been reported to be associated with high mortality in clinical trials examining the GCS, ISS, and RTS.[33–35] In our study, the mean ISS was 63.11 in patients who did not survive and 10.17 in patients who survived. The ISS values were found to be significantly higher in patients who died, which is in accordance with the literature. The ISS had the highest value in our assessment of the prediction of mortality, with an AUC value of 0.993. Despite limitations, the ISS was found to be a useful tool and may be especially valuable in cases of severe trauma.

Conclusion

In this study we evaluated the effects of vital findings, laboratory results, and trauma scores on mortality in emergency patients admitted after gunshot injuries, and found that the WBC, respiratory rate, GCS, AIS, and ISS values differed significantly between the patients who survived and those who did not. A systolic BP value below 90 mmHg and a heart rate above 100/minute were found to be independent variables for mortality. In addition, the AIS and ISS trauma scores were significantly successful in the prediction of mortality. As a result, systolic BP and heart rate, and the AIS and ISS will be helpful during the evaluation of patients with gunshot injuries during triage before admission to the hospital, transportation from the field and treatment at the appropriate trauma center, admission to the emergency service, and the evaluation of additional treatment and the prediction of the mortality.

Conflict of interest: None declared.

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ORİJİNAL ÇALIŞMA - *ÖZET*

Ateşli silah yaralanması olgularında mortalite üzerine yaralanma şiddeti skoru (ISS), yaşamsal skorlar ve hemogram değerleri arasındaki korelasyonun etkisi

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AMAÇ: Birçok ülkede kişilerin maruz kaldığı travmanın şiddeti ve ortaya çıkan hasarı değerlendirmek için bazı skorlama sistemleri geliştirilmiş ve geliştirilmeye devam etmektedir. Burada amaç hastanın hasar oranlarını en iyi biçimde belirleyerek mortalite ve morbiditeye etki eden faktörleri saptayarak bunları en aza indirgemeye çalışmaktır. Travmanın ağırlığının tespiti için ortaya konulan kriterlerin ölçülebilir ve karşılaştırılabilir objektif kriterler olması önemlidir. Bu amaçla anatomik ve fizyolojik birçok puanlama sistemleri oluşturulmuştur. Bu araştırmada acil servise ilk kabul anındaki vital skorların, hemogram değerlerinin ve yaralanma şiddeti skorunun (ISS) mortaliteyi öngörmeye katkısını ortaya koymaktır.

GEREÇ VE YÖNTEM: Bu çalışma geriye dönük kohort çalışması olarak tasarlandı. Aralık 2015–Mart 2016 tarihleri arasında acil servisimize başvuran ateşli silah yaralanması olan hastalar çalışmaya alındı. Değişkenlerin dağılımı açısından sürekli değişkenler için t-testi veya Mann-Withney U-testi kullanılarak ikili değişkenler analiz edildi. Acil servise kayıttan sonra bağımsız mortalite belirleyicilerini belirlemek için lojistik regresyon ve istatistiksel analiz için SPSS17.0 programı kullanıldı. $P<0.05$ değeri istatistiksel olarak anlamlı kabul edildi.

BULGULAR: Toplam 418 hasta alındı. Sağ kalan ve ölen hastalar arasında beyaz kan hücresi (WBC), solunum hızı, Glasgow Koma Skalası (GCS), Kısaltılmış Yaralanma Skoru (AIS) ve ISS arasında istatistiksel olarak anlamlı bir fark bulundu ($p<0.05$). Sistolik kan basıncının 90 mmHg'nin altında ve kalp atım hızının 100 atım/dk üzerinde olmasının mortalite açısından bağımsız değişkenler olduğu belirlendi.

TARTIŞMA: Acil servise kabul anındaki ISS'nin objektif değerlendirmesi, hemoglobin gereksinimi, mortalite ve morbiditeyi öngörmek için önemli bir unsurdur.

Anahtar sözcükler: Ateşli silah yaralanması; hemogram ve yaşamsal değerler; mortalite; yaralanma şiddeti skoru.

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