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RESEARCH ARTICLE

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Evaluation of Multitrauma Patients Applying to the Emergency Department: A Retrospective Cross-Sectional Study

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ABSTRACT

Multitrauma-related deaths are more common in non-developed countries and approximately 50 million people in the world remain disabled after multitrauma every year. We aim of this study is to retrospectively evaluate the clinical features and risk factors affecting mortality in multitrauma patients admitted to the emergency department (ED). The study included 188 patients hospitalized from the ED to the Anesthesia Intensive Care Unit due to multitrauma. 75% of the cases were male and the mean age was 45.55 ± 19.29 years. The most common type of trauma was traffic accident 61.7% and injuries were 47.1% rib fracture. 6.9% of the cases died. When the risk factors affecting mortality were evaluated by multivariate analysis: it was determined that intubating the cases and high lactate level increased the risk of mortality independently of other variables. In these cases, the frequency of mortality and morbidity can be reduced by taking more serious precautions in the early period and by appropriate treatment management. The most effective way to reduce mortality and morbidity is to prevent trauma.

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Multitrauma, Emergency department, Intensive care unit, Mortality.

Introduction

Trauma is defined as an experience that leaves signs of injury in the living body and/or soul, a local wound that deforms the structure or shape of a tissue or organ and can be formed by mechanical, thermal, electrical, or chemical energies [1]. Worldwide, trauma is one of the most common causes of death in people under the age of 44 [2]. More than 10,000 deaths due to trauma are reported daily [3]. Trauma is expected to become the third leading cause of disability worldwide in the next decade [2]. Epidemiological studies estimate that trauma will have risen to the fourth leading cause of death by 2030 [4].

Trauma is defined as multitrauma if it occurs in at least two regions affecting the head, neck, chest, abdomen, extremities, or if there is more than one long bone fracture in the extremities [5]. Multitrauma-related deaths are more common in underdeveloped countries, and approximately 50 million people worldwide remain disabled after multitrauma each year [6]. Therefore, the individual and community management of multi-trauma patients is challenging in terms of medical, social, economic and logistical aspects both in the short and long term. Studies have reported that 10% of deaths in the world are due to multitrauma and that these deaths are more than deaths due to infectious diseases [7].

The most common causes of death due to trauma are brain damage, high-level spinal cord injuries and that comes out related this apnea, heart and great vessel injuries. Almost the only way to reduce these deaths will be possible by preventing the occurrence of trauma. Because these injuries, which lead to death, occur a few minutes early after the trauma and often die until the patient is transferred to a health center or until the health care providers reach the patient. The second most common time period for death is within a few minutes to a few hours. The importance of the second time period is that the injury that allows the patient to survive (such as subdural or epidural hemorrhages, spleen rupture, liver laceration, hemothorax, pneumothorax, pelvis fractures, large amounts of blood loss) can be reversed by a specialist team in a timely manner and with appropriate intervention. In the period when deaths increase within a few days or a few weeks following the trauma, the cause is often sepsis and multi-organ failure syndrome. The trauma care provided from the first moment of the trauma to this period affects the morbidity and mortality results of the patient at this stage [2]. Recent studies have reported that the third time period in which post-traumatic deaths peak is no longer observed [8,9]. It is thought that the reason for this is developing intensive care systems and resuscitation practices [8,9].

Technical failures in surgical interventions applied to trauma patients, unintentional extubation, injuries missed at first glance, and complications after intravascular catheterization are the most common preventable causes of morbidity in trauma patients [10]. All care given to the trauma patient, starting from the first medical intervention, has an impact on long-term patient outcomes. In a study, it was reported that the morbidity and mortality levels of patients with severe trauma injury who were treated at specific trauma centers were significantly

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lower [11]. Therefore, it can be ensured that patients who are treated in pre-hospital and trauma centers can continue their lives with a better quality of life [6]. Many variables such as advanced age, patient's comorbidities, length of stay (LOS) in the hospital, mechanical ventilator support, Glasgow Coma Score (GCS), Revised Trauma Score (RTS), score obtained from scoring systems such as shock index (SI) are among the factors affecting the mortality of the patient [5].

The underlying hypothesis of our study was that the injury characteristics of the patient and RTS, GCS, SI scoring systems would be effective in predicting mortality in multitrauma patients. In this study, it was aimed to evaluate the clinical characteristics such as injury mechanism, injury site, trauma clinical scoring scores, blood parameters, and to determine retrospectively the risk factors affecting mortality in patients with multitrauma who applied to the emergency department (ED).

Materıal and Methods

Ethical Approval

This retrospective cross-sectional study was carried out in Usak Research and Training Hospital. The study protocol was accepted by Usak University Faculty of Medicine Non-Interventional Clinical Research Ethics Committee with the number/date of 119-119-03/29.06.2022. This study was conducted in accordance with the Declaration of Helsinki. Written informed consent was waived due to the retrospective nature of the study.

Study Design and Population

This cross-sectional study was carried out by examining medical records from patient files in the archive at Usak Training and Research Hospital. The population of the study consists of patients who applied to the ED between 01.01.2018-30.04.2022 and were hospitalized in the Anesthesia Intensive Care Unit (ICU) due to trauma. The sample was not selected in the study, and it was aimed to reach the entire universe. A total of 353 patient files were analyzed in the study. Multitrauma patients aged 18 and over, admitted to the ED of Usak Training and Research Hospital on the specified dates, admitted to the Anesthesia ICU, were included in the study. Patients with at least two head-neck, chest, and abdomen injuries, or at least one long bone fracture and at least one major system injury, or patients who needed follow-up/treatment by at least two different specialists were considered multi-trauma patients. Patients who did not meet at least one of these criteria, who were transferred to the ICU from another center, and who had missing at least one of their data were excluded from the study. After excluding patients who met the exclusion criteria, 188 patients were included in the study. The exclusion criteria and number of patients in the study are shown in Figure 1.

Data Collection

The medical records of all patients included in the study were examined in from the patient files in the hospital archive. All patients' age, gender, comorbidities, laboratory results (hemogram, biochemistry, coagulation, blood gas), RTS, SI, GCS scores, time from ED admission to ICU admission, mechanism of injury, body affected by trauma regions, LOS in mechanical ventilation and ICU, and clinical outcomes (exit from ICU and mortality status) were examined and analysed.

Statistical Analysis

SPSS 22.0 (Armonk, NY: IBM Corp) program was used in the analysis of the study. Data are summarized with number (%), mean, standard deviation, median, minimum and maximum values. Chi-square test and Fisher's exact test were used to compare categorical variables between groups. The conformity of continuous numerical variables to the normal distribution was evaluated with the Shapiro Wilk test. The Mann-Whitney U test was used to compare the numerical parameters with normal distribution between the two groups, and the independent samples (stutent's) t test was used for the comparison of the parameters with normal distribution between the two groups. The power of the examined parameters in predicting mortality was evaluated by receiver operating characteristic (ROC) analysis. By using Youden index, ideal cut-off points were determined and sensitivity and specificity values for that cut-off point were presented. In order to determine the parameters affecting mortality independently from other variables, multivariate logistic regression analysis (backward conditional) was performed. The results are summarized as odds ratio (OR) and 95% confidence interval (CI). For all analyses, $p<0.05$ was accepted as significant.

Glasgow Coma Scale

In the calculation of this score, the ability of the subjects to open their eyes and their motor and verbal functions are taken into account. GCS has become the gold standard scoring in many units in terms of assessing consciousness. Studies have shown that as GCS value decreases, mortality rates increase and prognosis worsens. GCS is a physiological evaluation system, and it only gives an idea about the severity of head trauma in patients with multitrauma, but is insufficient for other parameters. The RTS is more useful in evaluating patients with multitrauma, but it is necessary to know the patient's GCS score in order to make this scoring system [12].

Revised Trauma Score

The RTS basically consists of systolic blood pressure (SBP), respiratory rate (RR) and GCS parameters. These three outputs are scored and scored between 0-4. Higher scores from RTS indicate that the clinical condition of the case is more positive [12]. RTS used in 2 forms:

1. Triage revised trauma score: T-RTS

RTS is determined by adding each of the coded values together. RTS ranges from 0-12. This is how it was calculated in our research.

2. RTSc

Coded form of the RTS. RTS = 0.7326 SBP + 0.2908 RR + 0.9368 GCS [13].

Shock Index

It is used to evaluate the severity of bleeding in patients with acute hemorrhage. Depending on the severity of bleeding, there is an increase in pulse rate and a decrease in blood pressure in patients with bleeding [14].

Shock index = pulse rate / systolic arterial pressure was calculated by the formula [14].

Results

75% of the cases evaluated in the study were male and the mean age was 45.55 ± 19.29 (range: 18-91). The mean age of the surviving cases was 44.82 ± 18.75, while the mean age of the deceased cases was 55.31 ± 24.29 years. The age difference between the living and the deceased was not statistically significant (p=0.10). The mean SBP of the subjects in this study was 123.48 ± 24.87 mmHg, and the mean diastolic blood pressure was 73.6 ± 15.65 mmHg. Mean GCS was 13.16 ± 3.3, RTS was 11.29 ± 1.69, and SI was 0.85 ± 0.63. Compared to survivors, heart rate was statistically significantly higher (p=0.003), RR, GCS and RTS were significantly lower among those who died (p=0.001, p=0.02, p=0.002). The distribution of the physical examination findings and clinical scores of the cases and the relationship with mortality are listed in Table 1.

The area of the body most affected by trauma is the thorax. Compared to other cases, subarachnoid hemorrhage, subdural hemorrhage, pneumocephalus and brain edema were statistically significantly less common in the deceased (p=0.02, p=0.001, p<0.001, p<0.001). Parietal bone and occipital bone fractures were statistically significantly less in patients with exitus (p=0.005, p=0.009). The distribution of the injury sites and their relation with mortality are listed in Table 2.

After trauma patients had mean international normalized ratio (INR) 1.06 ± 0.15 and mean lactate in blood gas was 2.63 ± 2.28 U/L. Compared to survivors, INR (p=0.02) and lactate (p=0.003) values were statistically significantly higher among those who died.

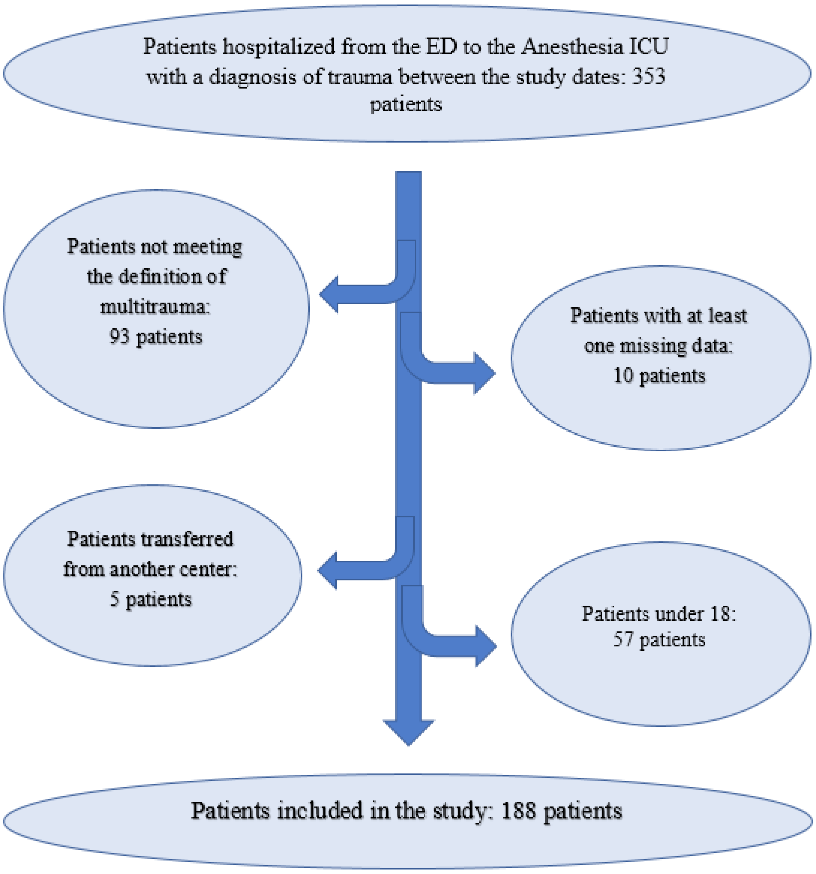

Figure 1: Exclusion criteria and patient numbers.

Table 1: The distribution of the physical examination findings and clinical scores of the cases and the relationship with mortality.

Variables	Total N 188 Mean ± SD	Total N 188 Median (min - max)	Survivors N(n%) 175(93.1%) Mean ± SD	Non-Survivors N(n%) 13(6.9%) Mean ± SD	P value
SBP	123.48 ± 24.87	122.5 (63 - 189)	123.92 ± 24.89	117.54 ± 24.87	0.347*
DBP	73.6 ± 15.65	72.5 (40 - 121)	73.63 ± 15.83	73.08 ± 13.46	0.902*
Pulse	95.02 ± 17.65	92.5 (56 - 146)	94.0 ± 16.85	108.77 ± 22.72	**0.003***
Peripheral oxygen saturation	94.91 ± 4.24	96 (78 - 100)	95.11 ± 4.08	92.23 ± 5.46	0.053
Respiratory rate	15.4 ± 3.5	16 (7 - 27)	15.67 ± 3.31	11.77 ± 4.07	**0.001**
GCS	13.16 ± 3.3	15 (3 - 15)	13.47 ± 2.82	9.0 ± 5.87	**0.020**
RTS	11.29 ± 1.69	12 (4 - 12)	11.45 ± 1.44	9.15 ± 2.97	**0.002**
SI	0.85 ± 0.63	0.74 (0.41 - 8.61)	0.84 ± 0.64	0.99 ± 0.38	0.077

*Fischer's exact test was used in the analysis. Chi-square test was used in other analyzes.

Table 2: Injury area distribution of the cases and their relationship with mortality.

Region	*Lesion n (%)*		*Survivors (N=175) n(%)*	*Non-Survivors (N=13) n(%)*	*P value*
HEAD NECK	Subarachnoid hemorrhage 52 (%27.7)	+	45 (%86.5)	7 (%13.5)	**0.029**
		-	130 (%95.6)	6 (%4.4)	
	Subdural hemorrhage 37 (%19.7)	+	30 (%81.1)	7 (%18.9)	**0.001**
		-	145 (%96)	6 (%4)	
	Epidural hemorrhage 7 (%3.7)	+	6 (%85.7)	1 (%14.3)	0.400*
		-	169 (%93.4)	12 (%6.6)	
	Parenchymal hemorrhage 10 (%5.3)	+	8 (%80)	2 (%20)	0.145*
		-	167 (%93.8)	11 (%6.2)	
	Pneumocephalus 19 (%10.1)	+	14 (%73)	5 (%26.3)	**<0.001**
		-	161(%95.3)	8 (%4.7)	
	Contusion cerebri 24 (%12.8)	+	21 (%87.5)	3 (%12.5)	0.221*
		-	154 (%93.9)	10 (%6.1)	
	Brain edema 14 (%7.4)	+	9 (%64.3)	5 (%35.7)	**<0.001**
		-	166 (%95.4)	8 (%4.6)	
	Frontal bone fracture 15 (%8)	+	13 (%86.7)	2 (%13.3)	0.278
		-	162 (%93.6)	11 (%6.4)	
	Parietal bone fracture 12 (%6.4)	+	8 (%66.7)	4 (%33.3)	**0.005**
		-	167 (%94.9)	9 (%5.1)	
	Occipital bone fracture 14 (%7.4)	+	10 (%71.4)	4 (%28.6)	**0.009**
		-	165 (%94.8)	9 (%5.2)	
	Temporal bone fracture 18 (%9.6)	+	15 (%83.3)	3 (%16.7)	0.114
		-	160 (%94.1)	10 (%5.9)	
	Maxillofacial fracture 39 (%20.7)	+	35 (%89.7)	4 (%10.3)	0.476
		-	140 (%94)	9 (%6)	
	Orbital fracture 21 (%11.2)	+	18 (%85.7)	3 (%14.3)	0.164
		-	157 (%94)	10 (%6)	
	Mandible fracture 12 (%6.4)	+	12 (%100)	0 (%0)	1.0
		-	163 (%92.6)	13 (%7.4)	
	Nasal bone fracture 27 (%14.4)	+	25 (%92.6)	2 (%7.4)	1.0
		-	150 (%93.2)	11 (%6.8)	
THORAX	Pneumothorax 56 (%29.8)	+	52 (%92.9)	4 (%7.1)	1.0*
		-	123 (%93.2)	9 (%6.8)	
	Hemothorax 56 (%29.8)	+	49 (%87.5)	7 (%12.5)	0.051
		-	126 (%95.5)	6 (%4.5)	
	Lung contusion 78 (%41.5)	+	71 (%91)	7 (%9)	0.349
		-	104 (%94.5)	6 (%5.5)	
	Rib fracture 89 (%47.3)	+	84 (%94.3)	5 (%5.6)	
		-	91 (%91.9)	8 (%8.1)	0.782
	Pnömomediasten 5 (%2.7)	+	4 (%80)	1 (%20)	0.304*
		-	171 (%93.4)	12 (%6.6)	
	Sternum fracture 6 (%3.2)	+	6 (%100)	0 (%0)	1.0*
		-	169 (%92.9)	13 (%7.1)	
ABDOMEN	Free intra-abdominal fluid 50 (%26.6)	+	46 (%92)	4 (%8)	0.748
		-	129 (%93.5)	9 (%6.5)	
	Free air in the abdomen 12 (%6.4)	+	11 (%91.7)	1 (%8.3)	0.588
		-	164 (%93.2)	12 (%6.8)	
	Liver injury 19 (%10.1)	+	17 (%89.5)	2 (%10.5)	0.625
		-	158 (%93.5)	11 (%6.5)	
	Spleen injury 23 (%12.2)	+	21 (%91.3)	2 (%8.7)	0.663
		-	154 (%93.3)	11 (%6.7)	
	Kidney injury 7 (%3.7)	+	6 (%85.7)	1 (%14.3)	0.400
		-	169 (%93.4)	12 (%6.6)	
	Bladder injury 7 (%3.7)	+	7 (%100)	0 (%0)	1.0
		-	168 (%92.8)	13 (%7.1)	
	Gastrointestinal perforation 6 (%3.2)	+	6 (%100)	0 (%0)	1.0
		-	169 (%92.9)	13 (%7.1)	

VERTEBRA & PELVIS	Thoracic vertebral fracture 20 (%10.6)	+	18 (%90)	2 (%10)	0.623
		-	157 (%93.5)	11 (%6.5)	
	Lumbal vertebral fracture 23 (%12.2)	+	22 (%95.7)	1 (%4.3)	1.0
		-	153 (%92.7)	12 (%7.3)	
	Transverse and spinous process fracture 46 (%24.5)	+	44 (%95.7)	2 (%4.3)	0.738
		-	131 (%92.3)	11 (%7.7)	
	Pelvis iliac fracture 21 (%11.2)	+	20 (%95.2)	1 (%4.8)	1.0
		-	155 (%92.8)	12 (%7.2)	
	Pelvis pubis fracture 32 (%17)	+	31 (%96.9)	1 (%3.1)	0.700
		-	144 (%92.3)	12 (%7.7)	
	Pelvis acetabulum fracture 19 (%10.1)	+	18 (%94.7)	1 (%5.3)	1.0
		-	157 (%92.9)	12 (%7.1)	
	Sacrum fracture 20 (%10.6)	+	19 (%95)	1 (%5)	1.0
		-	156 (%92.9)	12 (%7.1)	
LOWER LIMB	Femur fracture 31 (%16.5)	+	28 (%90.3)	3 (%9.7)	0.453*
		-	147 (%93.6)	10 (%6.4)	
	Tibia fracture 20 (%10.6)	+	20 (%100)	0 (%0)	0.367*
		-	155 (%92.3)	13 (%7.7)	
	Fibula fracture 12 (%6.4)	+	12 (%100)	0 (%0)	0.329
		-	163 (%92.6)	13 (%7.4)	
	Patella fracture 0 (%0)	+	0 (%0)	0 (%0)	1.0*
		-	175 (%93.1)	13 (%6.9)	
	Ossa tarsi fracture 3 (%1.6)	+	3 (%100)	0 (%0)	1.0*
		-	172 (%93)	13 (%7)	
UPPER LIMB	Scapula fracture 13 (%6.9)	+	13 (%100)	0 (%0)	0.605
		-	162 (%92.6)	13 (%7.4)	
	Clavicle fracture 15 (%8)	+	13 (%86.7)	2 (%13.3)	0.278
		-	162 (%93.6)	11 (%6.4)	
	Humeral fracture 12 (%6.4)	+	11 (%91.7)	1 (%8.3)	0.588
		-	164 (%93.2)	12 (%6.8)	
	Radius fracture 19 (%10.1)	+	19 (%100)	0 (%0)	0.369
		-	156 (%92.3)	13 (%7.7)	
	Ulna fracture 14 (%7.4)	+	14 (%100)	0 (%0)	0.603
		-	161 (%92.5)	13 (%7.5)	
	Ossa carpi fracture 1 (%0.5)	+	1 (%100)	0 (%0)	1.0
		-	174 (%93)	13 (%7)	

*Fischer's exact test was used in the analysis. Chi-square test was used in other analyzes.

Table 3: Relationship between gender, trauma type, consciousness status, intubation status and mortality.

	Survivors (N = 175)	Non-Survivors (N = 13)	
Variables	n (%)	n (%)	P value
Gender			
Female	45 (%95.7)	2 (%4.3)	0.407*
Male	130 (%92.2)	11 (%7.8)	
Type of trauma			
IVTA	78 (%92.9)	6 (%7.1)	0.602
NVTA	29 (%90.6)	3 (%9.4)	
Motorcycle accident	17 (%100)	0 (%0)	
Fall (≤1m)	3 (%100)	0 (%0)	
Fall (>1m)	20 (%100)	0 (%0)	
Gunshot injury	11 (%91.7)	1 (%8.3)	
Sharp object injury	7 (%87.5)	1 (%12.5)	
Other injuries**	10 (%83.3)	2 (%16.7)	
Consciousness			
Clear	112 (%96.6)	4 (%3.4)	**0.003**
Confusion	47 (%92.2)	4 (%7.8)	
Unconscious	16 (%76.2)	5 (%23.8)	
Intubation status			
Not intubated	139 (%100)	0 (%0)	**<0.001**
Intubation in ED	26 (%76.5)	8 (%23.5)	
Intubation in ICU	10 (%66.7)	5 (%33.3)	

*Fischer's exact test was used in the analysis. Chi-square test was used in other analyzes.
**3 were battered, 2 stuck between machines, 1 falling from a horse, 1 being under a dent, 1 firework explosion, 1 bull attack, 1 falling under a log, 1 falling off a bicycle. 1 natural gas explosion.
Abbreviations: IVTA=In Vehicle Traffic Accident, NVTA=Non-Vehicle Traffic Accident, ED=Emergency department, ICU=Intensive Care Unit.

Table 5: Multivariate logistic regression analysis showing mortality risk factors.

Variables	OR [%95 CI]	P value
Consciousness	0.359 [0.028 – 4.608]	0.431
Intubation status	20.068 [2.941 – 136.959]	**0.002**
Pulse (/min)	1.019 [0.972 – 1.067]	0.438
Respiratory rate (/min)	0.779 [0.582 – 1.044]	0.094
GCS	0.839 [0.444 – 1.585]	0.588
RTS	1.427 [0.51 – 3.991]	0.498
INR	30.637 [0.053 – 17862.845]	0.292
Lactate	1.316 [1.051 – 1.647]	**0.017**
Subarachnoid hemorrhage	0.520 [0.030 – 9.000]	0.653
Subdural hemorrhage	3.013 [0.155 – 58.413]	0.466
Pneumocephalus	0.158 [0.021 – 1.169]	0.071
Brain edema	0.341 [0.020 – 5.853]	0.458
Parietal bone fracture	0.846 [0.046 – 15.613]	0.910
Occipital bone fracture	0.530 [0.027 – 10.319]	0.675
(Constant)	0.894	0.940

Multivariate logistic regression (backward conditional) analysis, step 12, Nagelkerke R2: 0.565, p<0.001
Abbreviations: GCS=Glasgow Coma Scale, RTS=Revised Trauma Score, INR=International Normalized Ratio

In our study, it was observed that the mortality rate as a result of multitrauma was 7.8% (n=11) higher in male cases, but there was no statistically significant difference between them and the female gender (p=0.40). The most common type of trauma was in-car traffic accident with 44.7% (n=84). There was no statistically significant difference between trauma type and mortality of multitrauma cases (p=0.60). 11.2% (n=21) were unconscious, and 26.1% (n=49) were intubated in the ED or ICU. Considering the clinical outcomes of the cases in this study, 82.4% (n=155) were transferred to the service; 8.5% (n=16) were transferred to ICU; It was observed that 2.1% (n=4) were transferred out of the institution and 6.9% (n=13) died. Mortality frequency was statistically significantly higher among those who were in unconscious and intubated when compared to other cases (p=0.003, p<0.001). The relationship between gender, trauma type, consciousness status, intubation status and mortality of the cases are listed in Table 3.

The mean time between admission to the ED and admission to the ICU was 145.2 ± 105.78 minutes. Average LOS in the ICU was 5.66 ± 5.79 days, mean intubation time of 49 patients who were intubated was 5.67 ± 6.28 days, mean time to death after admission to the ED in 13 patients who died was 200.54 ± 155.01 hours. The mean duration of hospitalization from the ED to the ICU was 117.08 ± 99.82 minutes and was shorter in patients with death. The average LOS in the ICU of these cases was 175 ± 144.5 hours and was longer. It was observed that they were intubated longer than the surviving cases, but there was no statistically significant difference between the surviving and deceased cases in terms of these clinical durations (p=0.12, p=0.18, p=0.79). RR, the parameter with the highest sensitivity in predicting mortality, was able to predict mortality with a sensitivity of 76.9% and a specificity of 69.1% at a cut-off point of <15 (AUC: 0.763 [95%CI: 0.608-0.918], p =0.002). The parameter with the highest specificity, GCS, was able to predict mortality with a sensitivity of 53.8% and a specificity of 94.3% at a cut-off point of <8 (AUC: 0.669 [95%CI: 0.475-0.894], p =0.04). The characteristics of clinical findings and scores in terms of predicting mortality status are listed in Table 4.

In order to determine the risk factors that affect mortality in multitrauma cases independently of other variables, a multivariate logistic regression analysis was performed by establishing a model that included parameters found to be significant in terms of mortality in univariate analyzes. It was determined that being intubated (OR: 20.068 [95%CI: 0.941 - 136.959], p=0.002) and high lactate level (OR: 1.316 [95%CI: 1.051 - 1.647], p=0.01) increased the risk of mortality independent of other variables. Multivariate logistic regression analysis showing mortality risk factors is listed in Table 5.

Discussion

It is thought that men are more exposed to trauma because they spend more time outside than women in daily life and work in more risky jobs. In our study, approximately 8 out of 10 cases were male and the mean age was 45.6 years. In the study of Yazar et al. and Adıyaman et al., it was observed that most of the cases exposed to trauma were male [15,16]. Trauma was more common in men and in the more active age group. Age and gender of the cases were not associated with mortality. Akça et al. consistent with our study, it has been shown that mortality in trauma cases occurs independently of the age and gender of the individuals [17].

In the studies conducted by Durdu et al. and Kara et al. in Turkey, the most common type of trauma is traffic accident, followed by falling [18,19]. In these studies, no significant relationship was found between the type of trauma and mortality [18,19]. In our study, consistent with previous studies, the most common types of trauma were 44.7% in-vehicle traffic accidents, 17.0% non-vehicle traffic accidents and 10.6% fall injuries; No relationship was found between the mechanism of trauma and mortality. This situation can be explained by the extent of the damage suffered by the individual during the injury, the affected area or the clinical interventions performed, rather than the mechanism of injury. Traffic accidents are the most common type of trauma in developing countries [2]. The fact that it is the most common type of trauma in our country shows that the people do not obey the traffic rules and do not have sufficient education and awareness on this issue.

In a meta-analysis by Manoochehry et al., they reported that the sensitivity of RTS for post-traumatic mortality was 82% and the specificity was 91% (AUC: 0.93) and that it could be used to predict mortality [20]. In the study of Ahun et al. and Yousefzadeh et al., it was found to be a successful score in predicting mortality in RTS trauma patients [21,22]. In the multivariate analyzes performed in our study, no significant relationship was found between the RTS scores of the cases and their mortality status, but considering the results of previous studies and the specificity value found in our study, it can be said that the use of RTS in clinical practice in determining the clinic of trauma cases is still valuable. We could not find a significant relationship between the SI, which is one of the other scoring systems used to evaluate the trauma clinic, and mortality. In the study of Odom et al. and Montoya et al., it was reported that getting a high score in this scoring was effective in predicting mortality [23,24]. GCS, the parameter with the highest specificity in terms of mortality in our study, could predict mortality with a specificity of 94.3% and a sensitivity of 53.8% at a cut-off point of <8, but it was not associated with mortality as an independent variable. In the studies of Yazar et al. and Kara et al., low GCS was reported as an independent risk factor in predicting mortality [15,18]. It has been observed that RTS, SI, GCS, which are commonly used trauma scoring systems, are not effective in predicting mortality alone. It has been observed that GCS, RTS, SI scores are valuable in determining the patient's clinic, but the use of these scores alone is not effective in predicting a patient's mortality in multitrauma patients. It was thought that the difference between the results of our study and the literature data may have been affected by the small number of patients in our study and the fact that our patients were multitrauma patients.

The most common injuries in our study were thoracic region injuries; In order of frequency, 47.1% rib fracture, 41.5% lung contusion, 29.8% pneumothorax and hemothorax, 26.6% intra-abdominal free fluid, 24.5% transverse and spinous process fractures. In the literature, there are studies reporting similar and different frequencies to our study in this respect. In a study of a multitrauma center, the most common injury sites were bone fractures in 78%, head and neck in 77%, and thorax in 65% in patients with multitrauma [25]. In the study of Demir et al., the most common extremity injuries in 69.2%, thorax 52.3%, and head traumas 49.2% were observed in patients with multitrauma [5]. In the study of Özpek et al., the affected body regions in trauma patients were reported as 55% thorax and 46% abdomen, respectively [26]. In our study, the most common type of trauma was in-vehicle traffic accidents, and the reason for the most common injury to the thorax can be explained by not wearing a seat belt during the accident. While Hefny et al. reported that the mortality rate was higher in patients with head trauma, Kara et al. reported that there was no relationship between head, thorax, and abdomen injuries and mortality, and that bone fractures were more common in survivors [18,27]. In our study, as a result of logistic regression analysis, it was seen that there was no significant relationship between the injured area and mortality. In future studies on this subject, it is thought that healthier results will be obtained by examining the size and severity of the lesion that occurs in trauma.

In laboratory results, it was observed that high lactate level increased the risk of mortality independently of other variables. In the study of Çay et al. and Yavuz et al., high lactate level was considered as an independent risk factor increasing mortality, whereas in the study of Freitas et al., no significant relationship was found between lactate level and mortality in multitrauma patients [14,28,29]. We thought that the serum lactate level increased due to the hypoxia in the tissues due to bleeding, the increase in the need for anaerobic respiration in these regions and the acceleration of muscle destruction as a result of the death of the patients. Perfusion problems due to trauma and possible deterioration in kidney functions, problems that can be seen in the elimination of lactate from the body can also be held responsible for this increase in lactate level.

In a study conducted by Kara et al., mortality was higher in patients who were intubated and connected to invasive mechanical ventilation [18]. Fevang et al. reported that intubation in the ED was associated with an increased incidence of death in a systematic review and meta-analysis study in which they evaluated the effect of intubation on clinical outcome in trauma cases [30]. They stated that intubation increased the risk of mortality in 12 studies, and in 7 studies, no relationship was found between intubation and mortality [30]. In our study, it was determined that being intubated was associated with the risk of mortality. It can be said that this situation is due to the fact that intubated cases have a more serious clinic rather than intubation being directly related to mortality.

One of the most important limitations of this study is that it is a cross-sectional retrospective study conducted in a single center. Another limitation is that the data of the study was accessed through the file records in the archive due to the inadequacy of the hospital electronic medical records.

Conclusıon

Trauma scoring systems such as RTS, SI, GCS in multitrauma patients were found to be valuable in predicting mortality, but they were not independently associated with mortality risk. It was determined that being intubated at any stage and having a higher lactate level significantly increased the risk of mortality. With this study, it was aimed to shed light on future prospective controlled randomized studies by contributing to the trauma data of our country.

References

1. Solgun B. Investigation of parameters that may be effective on mortality in geriatric trauma patients presenting to the emergency department. Specialization thesis. 2018.
2. https://www.emergencymedicinekenya.org/wp-content/uploads/2021/09/ATLS-10th-Edition.pdf
3. Aslar AK, Kuzu MA, Elhan AH, Tanik A, Hengirmen S. Admission lactate level and the APACHE II score are the most useful predictors of prognosis following torso trauma. Injury. 2004; 35(8): 746-752.
4. Zhang GX, Chen KJ, Zhu HT, Lin AL, Liu ZH, et al. Preventable deaths in multiple trauma patients: The importance of auditing and continuous quality improvement. World J

Surg. 2020; 44(6): 1835-1843.

5. Demir O, Sarıtaş TB. Retrospective evaluation of multitrauma patients in the intensive care unit. J Turk Soc Intens Care. 2022; 20(4): 207-213.
6. Sakran JV, Greer SE, Werlin E, McCunn M. Care of the injured worldwide: Trauma still the neglected disease of modern society. Scand J Trauma Resusc Emerg Med. 2012; 20: 64.
7. Lendrum RA, Lockey DJ. Trauma system development. Anaesthesia. 2013; 68: 30-39.
8. Gunst M, Ghaemmaghami V, Gruszecki A, Urban J, Frankel H, et al. Changing epidemiology of trauma deaths leads to a bimodal distribution. Proc (Bayl Univ Med Cent). 2010; 23(4): 349-354.
9. Rauf R, Matthey FV, Croenlein M, Zyskowski M, Griensven MV, et al. Changes in the temporal distribution of in-hospital mortality in severely injured patients-An analysis of the TraumaRegister DGU. PLoS ONE. 2019; 14(2): e0212095.
10. Teixeira PGR, Inaba K, Salim A, Rhee P, Brown C, et al. Preventable morbidity at a mature trauma center. Arch Surg. 2009; 144(6): 536-541.
11. MacKenzie EJ, Rivara FP, Jurkovich GJ, Nathens AB, Frey KP, et al. A national evaluation of the effect of trauma-center care on mortality. N Engl J Med. 2006; 354(4): 366-378.
12. Ünlü AR, Ülger F, Dilek A, Baris S, Murat N, et al. Evaluation of the relationship between "Revised Trauma Score" and "Trauma and Injury Severity Score" with prognosis in trauma patients followed in the intensive care unit. Journal of Turkish Anest Rean Soc. 2012; 40(3): 128-135.
13. http://lifeinthefastlane.com/ccc/trauma-scoring-systems/
14. Çay F, Çetinkaya HB. The usability of shock index and lactate in predicting mortality in multitrauma patients presenting to the emergency department. Anatolian Curr Med J. 2022; 4(2): 185-189.
15. Yazar MA, Sarıkuş Z, Horasanlı E. Thirty-day mortality outcomes of trauma patients in the intensive care unit: A three-year retrospective study. Turkish J Intensive Care. 2019; 17(1): 18-24.
16. Adıyaman E, Tokur ME, Bal ZM, Gökmen AN, Koca U. Retrospective analysis of trauma patients who were treated and followed in anesthesia intensive care unit. Turkish J Intensive Care. 2019; 17(3): 146-153.
17. Akça HŞ, Algın A, Özdemir S, KOÇKARA E, EROĞLU SE. Comparison of the efficacy of trauma scores in predicting prognosis and hospitalization. CUMJ. 2021; 46(4): 1596-1605.
18. Kara İ, Altınsoy S, Gök U, Onur A, Sarıbapıççı R. Mortality analysis of trauma patients in general intensive care unit of a state hospital. Tybdd. 2015; 13(2): 68-74.
19. Durdu T, Kavalcı C, Yılmaz F, Yilmaz MS, Karakilic ME, et al. Analysis of trauma cases admitted to the emergency department. J Clin Anal Med. 2014; 5(3): 182-185.
20. Manoochehry S, Vafabin M, Bitaraf S, Amiri A. A comparison between the ability of revised trauma score and kampala trauma score in predicting mortality; a meta-analysis. Arch Acad Emerg Med. 2019; 7(1): e6.
21. Ahun E, Köksal Ö, Sığırlı D, Torun G, DönmezSS, et al. Value of the Glasgow coma scale, age, and arterial blood pressure score for predicting the mortality of major trauma patients presenting to the emergency department. Ulus Travma Acil Cerrahi Derg. 2014; 20(4): 241-247.
22. Yousefzadeh-Chabok S, Hosseinpour M, Kouchakinejad-Eramsadati L, Ranjbar F, Malekpouri R, et al. Comparison of revised trauma score, injury severity score and trauma and injury severity score for mortality prediction in elderly trauma patients. Ulus Travma Acil Cerrahi Derg. 2016; 22(6): 536-540.
23. Odom SR, Howell MD, Gupta A, Silva G, Cook CH, et al. Extremes of shock index predicts death in trauma patients. J Emerg Trauma Shock. 2016; 9(3): 103-106.
24. Montoya KF, Charry JD, Calle-Toro JS, Núñez LR, Poveda G. Shock index as a mortality predictor in patients with acute polytrauma. Jjoad. 2015; 4(3): 202-204.
25. Dziubiński D, Abramczyk U, Ciechanowicz D, Kozłowski J, Pakulski C, et al. An analysis of causes of trauma, spectrum of injuries and treatment outcomes in patients treated at Multitrauma Centre of the University Teaching Hospital No 1 in Szczecin in 2015. Comparison of results from years 2015 and 2007. Pol Przegl Chir. 2019; 91(4): 29-35.
26. Özpek A, Yücel M, Atak İ, Baş G, Alimoğlu O. Multivariate analysis of patients with blunt trauma and possible factors affecting mortality. Ulus Travma Acil Cerrahi Derg. 2015; 21(6): 477-483.
27. Hefny AF, Idris K, Eid HO, Abu-Zidan FM. Factors affecting mortality of critical care trauma patients. Afr Health Sci. 2013; 13(3): 731-735.
28. Yavuz B, Erdoğan M, Çolak Ş. Predictors of early and late mortality in multitrauma patients. Eurasian j Crit Care. 2020; 2(1): 135-138.
29. Freitas AD, Franzon O. Lactate as predictor of mortality in polytrauma. Arq Bras Cir Dig. 2015; 28(3): 163-166.
30. Fevang E, Perkins Z, Lockey D, Jeppesen E, Lossius HM. A systematic review and meta-analysis comparing mortality in pre-hospital tracheal intubation to emergency department intubation in trauma patients. Crit Care. 2017; 21(1): 192.