ORIGINAL ARTICLE

Prognostic indicators in patients with isolated thoracic trauma: A retrospective cross-sectional study

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ABSTRACT

BACKGROUND: Thoracic trauma is a significant cause of mortality, especially among those arriving at hospitals. This study explores the associations between mortality, the shock index (SI), and specific metabolic and biochemical markers in patients with isolated thoracic trauma.

METHODS: This retrospective cross-sectional study included all consecutive adult patients presenting with isolated thoracic trauma to a high-volume emergency department from January 2019 to December 2023. The predictive capability of SI levels and selected biomarkers upon admission for estimating mortality was assessed by determining the areas under the receiver operating characteristic curves (AUCs). Optimal cutoff values were determined using the Youden index method.

RESULTS: The study involved 352 patients, with 285 (81%) being males and an average age of 50.0±17.7 years. The mortality rate was 9.6%. Mortality was significantly associated with higher shock index (odds ratio [OR]: 14.02, [95% confidence interval [CI] 0.847-0.916], AUC=0.885, p=0.001), glucose/potassium ratio (OR: 1.24 [95% CI 1.14-1.35], AUC=0.869, p<0.001), and lactate levels (OR: 4.30 [95% CI 2.29-8.07], AUC=0.832, p<0.001). The optimal cutoff values determined for the shock index, glucose/potassium ratio, ionized calcium, and lactate were 1.02 (sensitivity, 94.1%; specificity 69.5%; positive predictive value [PPV], 24.8; negative predictive value [NPV], 99.1), 36.85 (sensitivity, 76.5%; specificity, 87.7%; PPV, 40.0; NPV, 97.2), 1.23 (sensitivity, 94.1%; specificity, 56.0%; PPV, 18.6; NPV, 98.9), and 1.98 (sensitivity, 70.6%; specificity, 80.5%; PPV, 27.9; NPV, 96.2), respectively.

CONCLUSION: This study demonstrates that higher shock index, glucose/potassium ratio, and lactate levels are significantly associated with increased mortality in patients with isolated thoracic trauma. These findings suggest that these markers can be effective prognostic indicators, potentially guiding clinical decision-making and improving patient outcomes.

Keywords: Thoracic trauma; injury; mortality; shock index; glucose/potassium ratio; lactate; calcium.

Cite this article as: Yazıcı R, Bulut B, Genc M, Akkan Öz M, Hanalioglu D, Kokulu K, Sert ET, Mutlu H. Prognostic indicators in patients with isolated thoracic trauma: A retrospective cross-sectional study. Ulus Travma Acil Cerrahi Derg 2024;30:737-744.

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Ulus Travma Acil Cerrahi Derg 2024;30(10):737-744 DOI: 10.14744/tjtes.2024.15003

Submitted: 11.09.2024 Revised: 23.09.2024 Accepted: 25.09.2024 Published: 07.10.2024

INTRODUCTION

Thoracic trauma is a major cause of mortality. While many patients succumb to thoracic trauma upon arrival at the hospital, timely diagnosis and intervention can significantly reduce fatalities. Surgical intervention is required in fewer than 10% of blunt chest injuries and 15% to 30% of penetrating chest injuries. Most patients with thoracic trauma are treatable using technical procedures recommended by the Advanced Trauma Life Support principles.[1] A recent meta-analysis found that older age (over 65 years) significantly increases the mortality rate in patients with blunt chest wall trauma. Additionally, the presence of three or more rib fractures or cardiopulmonary disease also heightens the risk of death. Other reported risk factors for mortality in blunt thoracic trauma include an increasing Injury Severity Score, the need for mechanical ventilation, obesity or a body mass index less below 18.5, time elapsed since injury, lateral rib fractures, vital capacity and predicted forced vital capacity, pulmonary contusion, surgical emphysema, early hyperoxemia, elevated lactate and base excess levels, prehospital use of anticoagulants or antiplatelets, and alcohol use disorder. This study concluded that further high-quality research is needed before recommending changes to current practice.[2]

Despite advances in imaging techniques and the establishment of various clinical decision tools to predict mortality likelihood in trauma patients, trauma centers continue to strive for reliable, feasible, and effective prognostic indicators.[3,4] Research has shown that the shock index (SI), a measure obtained by dividing the pulse rate by systolic blood pressure in trauma patients, has been effective in predicting poor prognosis. Mortality rates rise in patients with an SI greater than 1, which has proven more significant than low blood pressure and increased heart rates in trauma patients.[5-9] The glucose-to-potassium ratio has also been associated with mortality in trauma.[8,10] In response to trauma, increased catecholamines are responsible for glucose spikes and a decline in potassium concentration, leading to an increased glucose-to-potassium ratio. Several studies have reported that hyperglycemia or the glucose-potassium ratio (GPR) can be a rapid and effective predictor of morbidity and mortality in patients with acute intracerebral hemorrhage, aneurysmal subarachnoid hemorrhage, pulmonary embolism, traumatic brain injury, and isolated blunt abdominal trauma.[8,10-13]

This study seeks to explore the links between mortality and the shock index, as well as specific metabolic and biochemical markers (such as the glucose/potassium ratio and lactate levels) in patients who arrive at the emergency department with isolated thoracic trauma.

MATERIALS AND METHODS

Ethics Approval, Study Design, and Setting

This study was approved by the Ankara Bilkent City Hospital under approval number: TABED 2-24/329, is in line with the Declaration of Helsinki, and adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.[14] Informed consent was not required. We conducted a single-center retrospective cross-sectional study, including all consecutive patients with isolated thoracic trauma who presented to the emergency department of Emergency Medicine from January 2019 to December 2023. Our institution is an academic tertiary referral center receiving around 300,000 emergency department visits annually. In our emergency department (ED), basic blood chemistry [including glucose, electrolytes, blood urea nitrogen (BUN), creatinine, uric acid, alanine transaminase (ALT), aspartate transaminase (AST)], and blood gas analysis are ordered for every patient presenting with trauma.

Subjects and Data Collection

We identified patients using an electronic medical records database. We included all adult patients in consecutive order and excluded those with incomplete medical records. The data collected included patient demographics such as age, gender, and mechanism of injury, along with clinical information such as presenting symptoms, Glasgow Coma Scale (GCS) score, and physiological parameters-heart rate (HR), systolic blood pressure (SBP), and oxygen saturation-recorded within 10 minutes of arrival at the emergency department. The shock index (HR/SBP) was also calculated. Laboratory results included hemoglobin, hematocrit, white blood cell count, absolute neutrophil and lymphocyte counts, neutrophil-to-lymphocyte ratio, blood gas analyses (pH, lactate, bicarbonate), and biochemical markers such as glucose, electrolytes (sodium, potassium, calcium), renal function tests (blood urea nitrogen, uric acid, creatinine), and liver transaminase levels. Additionally, radiologic findings and management characteristics, such as lengths of stay in the ED, ward, and intensive care unit (ICU), as well as final disposition, were recorded. Reference values for laboratory results were obtained from previous literature.[15] Only laboratory tests performed at the initial presentation were collected.

Study Groups

Patients were divided into two groups based on mortality. Group A consisted of survivors, while Group B included deceased patients following isolated thoracic trauma.

Outcome Measure

The primary outcome was to identify associations between mortality and the shock index as well as selected metabolic and biochemical markers. Secondary outcomes were defined as comparing the basic characteristics of the two study groups.

Statistical Analysis

Statistical analyses were conducted using SPSS v27.0 software (IBM Corp., Armonk, NY, USA) and MedCalc v15.8 (MedCalc Software, Ostend, Belgium). The normality of distribution was assessed using the Kolmogorov-Smirnov test, skewness-kurtosis, and graphical methods (histogram, Q-Q Plot, stem and leaf plot, boxplot). Descriptive statistics were presented as mean±standard deviation (SD), median [interquartile range (IQR)], or as numbers (percentages), as appropriate. The independent samples t-test, Mann-Whitney U test, and chi-square test were used to compare parametric continuous, non-parametric continuous, and categorical variables between two independent groups, respectively. The receiver operating characteristic (ROC) curve was utilized to measure the discriminative power of the variables, and binary logistic regression test (enter method) was employed to determine risk ratios. Results are presented as odds ratios (OR) and 95% confidence intervals (CI). A p-value <0.05 was considered statistically significant, while a p-value ranging from 0.05 to 0.1 indicated a trend towards significance.

RESULTS

Demographic and Clinical Characteristics

This study included 352 patients with isolated chest wall trauma, 285 (81%) of whom were male. The mean age was 50.0±17.7 years. The median GCS score at initial presentation was 15. Chest wall trauma most frequently resulted from motor vehicle crashes (n=142, 40.3%), followed by ground-level falls and falls from height (n=95, 27% and n=71, 20.2%, respectively). Most patients did not require respiratory support. Advanced airway support was deemed necessary in only one patient. The mean systolic blood pressure was 111.5±20.6 mmHg, the mean heart rate 101.6±16.3 beats per minute, and the mean shock index, calculated as heart rate/systolic blood

Table 1. Basic characteristics of the study population

		Mortality		
Characteristic (n=352)	**Total**	**Present (n=318)**	**Absent (n=34)**	**p value**
Age, mean±SD, years	50.0±17.7	50.4±18.1	45.9±13.9	0.092[b]
Gender				
Male, n (%)	285 (81)	257 (80.8)	28 (82.4)	1.000[a]
Trauma mechanism				
Motor vehicle crash	142 (40.3)	130 (40.9)	12 (35.3)	0.892[a]
Ground level fall	95 (27.0)	85 (26.7)	10 (29.4)	
Fall from height	71 (20.2)	64 (20.1)	7 (20.6)	
Pedestrian vs. motor vehicle	17 (4.8)	15 (4.7)	2 (5.9)	
Struck between two objects	11 (3.1)	10 (3.1)	1 (2.9)	
Penetrating injury	10 (2.8)	8 (2.5)	2 (5.9)	
Assault	6 (1.7)	6 (1.9)	0 (0)	
Airway support				
None	236 (67.0)	218 (68.6)	18 (52.9)	0.003[a]
Low flow oxygen	115 (32.7)	100 (31.4)	15 (44.1)	
Intubation	1 (0.3)	0 (0)	1 (2.9)	
Arterial pulse oxygen saturation, median [IQR], %	97.0 [95.0-98.0]	97.0 [96.0-98.0]	90.0 (85.9-95.7)	<0.001[c]
Systolic blood pressure, mean±SD, mmHg	111.5±20.6	113.8±19.6	89.4±15.6	<0.001[b]
Heart rate, mean±SD, beats per minute	101.6±16.3	100.8±16.6	109.9±11.5	<0.001[b]
Shock index, mean±SD	0.9±0.2	0.9±0.2	1.3±0.3	<0.001[b]
Glasgow Coma Scale Score, median [IQR]	15.0 (15.0-15.0)	15.0 (15.0-15.0)	15.0 (13.0-15.0)	<0,001[c]
Length of stay – ED observation area, mean±SD, hours (n=352)	13.7±4.7	13.6±4.6	14.1±5.7	0.549[b]
Length of stay – ward, mean±SD, days (n=114)	3.5±2.9	3.1±2.1	6.9±5.7	0.032[b]
Length of stay – intensive care unit, mean±SD, days (n=6)	3.0±1.8	2.3±1.2	3.7±2.3	0.422[b]
Disposition				
Outpatient follow-up	103 (29.3)			
Admitted to ward	203 (57.7)			
Transferred to another facility	12 (3.4)			
Exitus	34 (9.7)			

a: Chi-Square Test (n/%); b: Independent Samples t-Test (Mean±SD); c: Mann-Whitney U Test (Median [IQR]).

pressure, was 0.9±0.2. The majority of patients received inpatient care. The mean length of stay was 13.7±4.7 hours for the ED observation unit, 3.5±2.9 days for the ward, and 3.0±1.8 days for the intensive care unit. The mortality rate was 9.6%. General characteristics of the patients are presented in Table 1.

Laboratory and Radiological Characteristics

The average white blood cell and absolute neutrophil counts, as well as the mean neutrophil-lymphocyte ratio (NLR), liver transaminases, ALT, and AST, were slightly elevated. The mean levels of hemoglobin, hematocrit, sodium, potassium, total calcium, blood urea nitrogen, creatinine, total protein, and albumin were within normal reference ranges. Serum glucose levels were elevated, with a mean concentration of 120.1±31.0 mg/dL. However, ionized calcium levels were slightly decreased. The mean lactate concentration was 1.4±1.1 mmol/L. Laboratory results are presented in Table 2.

Table 2. Laboratory characteristics

Characteristic (n=352)	Total	Mortality		p value
		Absent (n=318)	Present (n=34)	
White blood cell count ($10^3/\mu L$)	13.6±7.8	13.3±7.6	16.1±9.0	0.056[b]
Hemoglobin (g/dL)	11.5±2.3	14.6±1.4	11.2±2.1	<0.001[b]
Hematocrit (%)	41.7±5.7	42.4±5.4	35.1±3.7	<0.001[b]
Absolute neutrophil count ($10^3/\mu L$)	12.3±5.6	12.1±5.1	14.3±9.1	0.177[b]
Absolute lymphocyte count ($10^3/\mu L$)	4.6±3.4	4.5±3.5	4.8±2.3	0.302[b]
Neutrophil to lymphocyte ratio	2.83±1.32	2.73±1.27	3.04±1.57	<0.001[b]
Aspartate aminotransferase (U/L)	51.1±82.0	50.7±85.6	54.9±33.2	0.775[b]
Alanine aminotransferase (U/L)	42.3±60.9	43.2±63.6	33.6±24.6	0.382[b]
Protein (g/L)	63.8±18.6	64.0±19.0	63.2±18.5	0.888[b]
Albumin (g/L)	39.6±8.2	40.0±4.4	38.7±13.4	0.665[b]
Total calcium (mg/dL)	9.3±0.6	9.4±0.4	8.2±0.6	<0.001[b]
Creatinine (mg/dL)	0.9±0.8	0.9±0.8	1.1±0.7	0.247[b]
Blood urea nitrogen (mg/dL)	36.2±13.4	35.9±13.4	39.4±13.4	0.154[b]
Glucose (mg/dL)	120.1±31.0	116.2±29.1	155.9±25.6	<0.001[b]
Potassium (mmol/L)	4.2±0.4	4.2±0.4	4.0±0.4	0.003[b]
Glucose to potassium ratio	29.2±8.3	28.1±7.5	39.8±7.6	<0.001[b]
Sodium (mmol/L)	140.3±37.3	140.6±39.3	137.4±5.3	0.634[b]
cCa^{++} (mmol/L)	1.10±0.37	1.11±0.48	0.96±0.31	<0.001[b]
HCO_3-act (mmol/L)	23.8±4.2	24.9±3.3	20.3±4.9	0.002[b]
HCO_3-std (mmol/L)	22.8±3.9	23.8±2.9	20.0±5.0	0.009[b]
Lactate (mmol/L)	1.4±1.1	1.2±0.7	2.9±2.2	0.004[b]

[a]Chi-Square Test (n/%); [b]Independent Samples t-Test (Mean±SD).

Table 3. Logistic regression analyses

Risk Factor	B	SE	Wald	Odds	95% CI	p
Shock index	2.640	0.817	10.444	14.02	2.83-69.52	0.001
Glucose/potassium	0.215	0.045	23.044	1.24	1.14-1.35	<0.001
cCa^{++} (mmol/L)	-0.807	0.571	1.998	0.45	0.15-1.37	0.158
Lactate (mmol/L)	1.459	0.321	20.638	4.30	2.29-8.07	<0.001
Constant	-13.639	2.271	36.073			

*Binary Logistic Regression Test. Nagelkerke R2=0.624, Hosmer and Lemeshow Test=0.975.

Table 4. Receiver operating characteristic curve results

	AUC	95% CI	Cut Off	Sensitivity	Specificity	Youden Index	PPV	NPV	NP*
Shock index	0.885	0.847 - 0.916	1.02	94.1	69.5	0.636	24.8	99.1	<0.001
Glucose/potassium	0.869	0.830 - 0.903	36.85	76.5	87.7	0.642	40.0	97.2	<0.001
cCa_2^+ (mmol/L)	0.726	0.676 – 0.772	0.93	94.1	56.0	0.501	18.6	98.9	<0.001
Lactate (mmol/L)	0.832	0.788 - 0.869	1.98	70.6	80.5	0.511	27.9	96.2	<0.001

*Receiver operating characteristic (ROC) curve analysis.

The most frequently identified pathology on thoracic computed tomography imaging was rib fractures. In 120 patients (34%), only one rib fracture was reported, while in 114 patients (32%) multiple rib fractures were documented, along with 42 cases (12%) of pneumothorax and 20 cases (6%) of hemothorax. Pulmonary contusion and sternum fractures were rare, occurring in eight patients (2.3%) and six patients (1.7%), respectively.

Comparison of Study Groups

Group A consisted of patients who survived following chest wall trauma (n=318, 90.3%), while Group B consisted of patients who died within the first 30 days during the hospital course following the injury (n=34, 9.6%).

Physiological Parameters

The mean systolic blood pressure was significantly lower in the non-survivors (89.4±15.6 mmHg) compared to the survivors (113.8±19.6 mmHg, p<0.001), while the heart rate (109.9±11.5 beats per minute vs. 100.8±16.6 beats per minute, p<0.001) and average shock index (1.3±0.3 vs. 0.9±0.2, p<0.001) were significantly higher. A comparison of the two groups is presented in Table 1.

The median arterial pulse oxygen saturation was 97.0% (95.0-98.0).

Hemogram Parameters and Metabolic Indices

Hematocrit percentages, mean serum calcium, ionized calcium concentration, serum potassium, and bicarbonate concentrations were significantly lower in non-survivors, while hemoglobin concentrations, serum glucose concentration, and glucose/potassium ratio were significantly higher. Other laboratory findings were similar across the two groups. A comparison of laboratory parameters across the two groups is presented in Table 2.

Factors Associated with Mortality

A higher shock index increased the odds of mortality 2.5 times (OR: 14.02, [95% CI 0.847-0.916], area under the curve [AUC]=0.885, p=0.001), while a higher glucose/potassium ratio did so 1.2 times (OR: 1.24 [95% CI 1.14-1.35], AUC=0.869, p<0.001), and higher lactate levels 4.3 times (OR: 4.30 [95% CI 2.29-8.07], AUC=0.832, p<0.001) and remarkably predicted mortality. Lower ionized calcium was also associated with mortality, but this association did not reach statistical significance (OR: 0.45, [95% CI 0.676-0.772], AUC=0.726, p=0.158). Using the Youden index method, the optimal cut-off values determined for the shock index, glucose/potassium ratio, ionized calcium, and lactate were 1.02 (sensitivity, 94.1%; specificity, 69.5%; positive predictive value [PPV], 24.8%; negative predictive value [NPV], 99.1%), 36.85 (sensitivity, 76.5%; specificity, 87.7%; PPV, 40.0%; NPV, 97.2%), 0.93 (sensitivity, 94.1%; specificity, 56.0%; PPV, 18.6%; NPV, 98.9%), and 1.98 (sensitivity, 70.6%; specificity, 80.5%; PPV, 27.9%; NPV, 96.2%), respectively. The overall accuracy rate was found to be 94.3%. The findings are summarized in Tables 3, 4, and 5, as well as Figure 1.

DISCUSSION

In this study, we evaluated the associations between mortality, shock index, and specific metabolic and biochemical

Table 5. Accuracy of the established model

	Estimation		
	Mortality Absent	Mortality Present	Accuracy %
Actual Group			
Mortality Absent	313	5	98.4
Mortality Present	15	19	55.9
Accurately Classified Cases %	94.3		

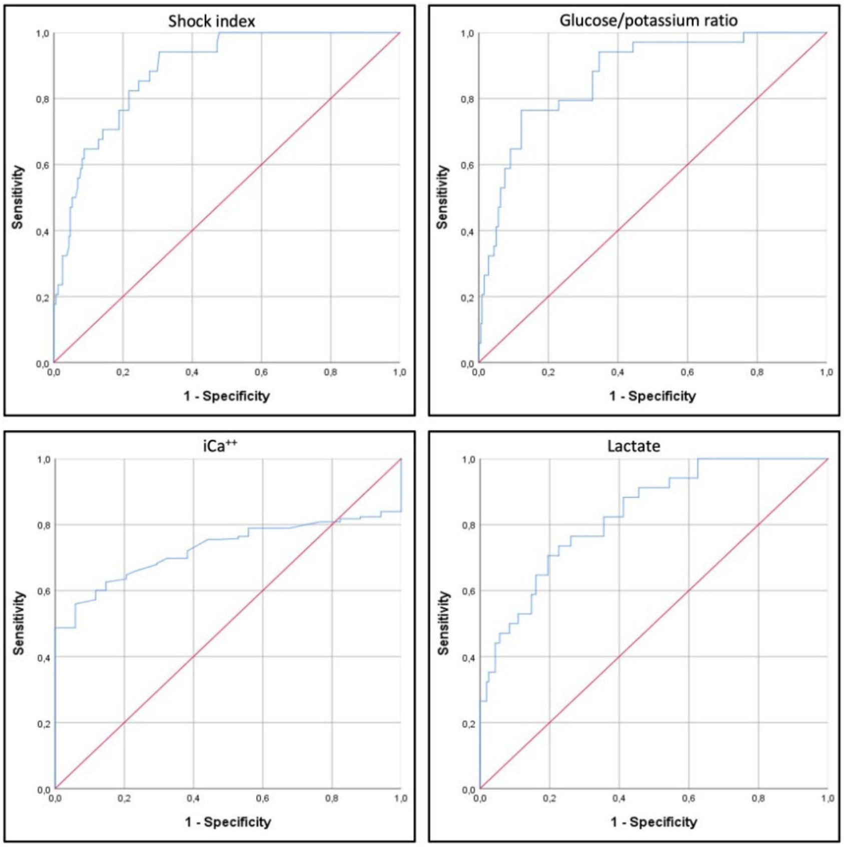

Figure 1. Receiver operating characteristic (ROC) curve analysis.

markers in patients with isolated thoracic trauma. We demonstrated that higher shock index, glucose/potassium ratio, and lactate levels are significantly associated with increased mortality in these patients.

The mortality rate of isolated thoracic trauma in this study cohort was 9.6%. Previous studies have reported mortality rates for thoracoabdominal traumas ranging between 10% and 36%.

Several studies have explored reliable, effective, and feasible predictors of mortality in patients suffering from trauma. Vital signs such as hypotension and tachycardia have been shown to predict outcomes. However, due to compensatory mechanisms, they can appear within normal ranges during the early phases of trauma. The shock index, a physiology-based and practical score, has been shown to be a more reliable predictor of mortality than either hypotension or tachycardia alone and was similarly effective as the Injury Severity Score.[5-9,16,17] In this study, we demonstrated that a shock index exceeding 1.02 indicates an estimated mortality with 94.1% sensitivity, 69.5% specificity, 24.8% PPV, and 99.1% NPV, consistent with previous studies. McNab et al. examined 16,269 patients and identified a link between elevated prehospital shock index in trauma patients and higher mortality rates.[17] The systematic review by Olaussen et al.[16] emphasized the importance of predicting massive bleeding and planning treatment when the shock index exceeded 0.9. Turan et al.[8] found that in 102 patients with isolated thoracoabdominal trauma, an SI cutoff value of 0.86 (AUC 0.809, 82% sensitivity, 77% specificity) successfully estimated mortality. Similarly, the study by Singh et al.[18] involving 9,860 patients demonstrated improved results by incorporating diastolic pressure into the shock index calculation. Cinar et al.[19] found that the mean shock index was 0.8 and did not observe a significant impact on survival. They attributed this to the small size of the study.

In the current study, we observed increased lactate levels. Higher lactate levels were associated with an increased risk of mortality (OR: 4.30 [95% CI 2.29-8.07], AUC=0.832, $p<0.001$). Lactate levels above 1.98 indicated estimated mortality with 70.6% sensitivity, 80.5% specificity, 27.9% PPV, and 96.2% NPV. Lactate levels increase due to reduced microcirculation and can be affected by low oxygen in the arteries, leading to increased lactic acid production via anaerobic glycolysis. Cinar et al. reported that for each 1-unit increase in lactate levels, the mortality rate increased by 1.19 times. This observation relates to the impact of trauma scores and changes in lactate levels on mortality in thoracic trauma and aligns with our findings.

Potassium levels were found to be within normal ranges in our study. An interesting experimental animal study simulating severe pulmonary contusion in pigs showed that serum potassium levels increased drastically in exposed animals following the trauma, peaking at 7.7 mmol/L 5 minutes after the impact. Subsequently, potassium levels decreased rapidly and returned to baseline after 15 minutes. The authors argued that extensive cell destruction in lung tissue and acidosis may explain the short-lived potassium peak.[20] Patients who suffer high-energy blunt thoracic trauma may experience a similar hyperacute surge in potassium levels, which could lead to lethal arrhythmias. This surge could potentially explain some unexplained prehospital deaths in trauma victims. The subsequent normalization of potassium levels were consistent with our findings.

One notable finding in our study was the presence of mild hyperglycemia. The published literature describes the stress response following trauma as causing an increase in catecholamines, which stimulates glycogenolysis and results in slightly elevated serum glucose levels, also known as stress hyperglycemia.[21] Research has shown that in the early period following life-threatening trauma, hyperglycemia has positively affected morbidity and mortality, although persistent hyperglycemia can negatively affect patient outcomes.[22,23]

Higher lactate levels were associated with an increased risk of mortality (OR: 4.30 [95% CI 2.29-8.07], AUC=0.832, $p<0.001$). Lactate levels above 1.98 indicated estimated mortality with 70.6% sensitivity, 80.5% specificity, 27.9% PPV, and 96.2% NPV.

Another interesting finding of our study was that the glucose-to-potassium ratio exceeding 36.85 accurately predicted mortality with 76.5% sensitivity, 87.7% specificity, 40.0% PPV, and 97.2% NPV in isolated thoracic trauma. The predictive value of the glucose-to-potassium ratio has been studied in various trauma mechanisms and reported to be highly effective in predicting mortality.[8,10-13] Turan et al.[8] found that the glucose-to-potassium ratio effectively predicted mortality with a cutoff value of 36.8 (AUC=0.854, 82% sensitivity, 88% specificity), almost equal to our findings. These results highlight the glucose-to-potassium ratio as a powerful and effective marker in predicting mortality in thoracic trauma.

The current study also found that ionized calcium with a cutoff value of 1.23 (AUC=0.726, 94.1% sensitivity, 56.0% specificity, 18.6% PPV, and 98.9% NPV) predicted mortality. The normal range of ionized calcium is 1.15-1.3 mmol/L.[24] Hypocalcemia is frequently observed in patients experiencing severe trauma. Colloid-induced hemodilution, severe shock, and/or ischemia-reperfusion have been found to be important causative factors.[24] In contrast to our findings, Katipoglu et al.[10] reported similar calcium levels (within normal reference ranges) across survivors and non-survivors of blunt abdominal trauma.

This study has several limitations, primarily due to its retrospective design. While all consecutive patients with isolated thoracic trauma were included, the presence of underlying medical conditions in some patients may have influenced their biochemical outcomes, introducing potential selection bias. Additionally, as the study was conducted at a single center, the generalizability of the findings to the broader population may be limited.

CONCLUSION

This study demonstrates that higher shock index, glucose-to-potassium ratio, and lactate levels are significantly associated with increased mortality in patients with isolated thoracic trauma. These findings suggest that these markers can be effective prognostic indicators, potentially guiding clinical decision-making and improving patient outcomes.

Ethics Committee Approval: This study was approved by the Bilkent City Hospital Ethics Committee (Date: 26.06.2024, Decision No: 329).

Peer-review: Externally peer-reviewed.

Authorship Contributions: Concept: R.Y., B.B., D.H., K.K., E.T.S.; Design: R.Y., M.G., M.A.Ö., H.M.; Supervision: R.Y., B.B., M.A.Ö., H.M.; Resource: B.B., M.G., G.H., K.K.; Materials: R.Y., M.G., K.K., H.M.; Data collection and/or processing: M.G., M.A.Ö., E.T.S.; Analysis and/or interpretation: R.Y., M.A.Ö., E.T.S., H.M.; Literature search: B.B., D.H., K.K., H.M.; Writing: M.G., M.A.Ö., D.H., K.K.; Critical reviews: R.Y., M.A.Ö., D.H., E.T.S.

Conflict of Interest: None declared.

Financial Disclosure: The author declared that this study has received no financial support.

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ORİJİNAL ÇALIŞMA - *ÖZ*

İzole toraks travması hastalarında prognostik göstergeler: Retrospektif kesitsel bir çalışma

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AMAÇ: Toraks travması, özellikle hastanelere gelenler arasında önemli bir mortalite nedenidir. Bu çalışma, izole toraks travmalı hastalarda mortalite, şok indeksi (SI) ve spesifik metabolik ve biyokimyasal belirteçler arasındaki ilişkileri araştırmaktadır.

GEREÇ VE YÖNTEM: Bu retrospektif kesitsel çalışmaya Ocak 2019-Aralık 2023 tarihleri arasında yüksek hacimli bir acil servise izole toraks travması ile başvuran tüm ardışık yetişkin hastalar dahil edilmiştir. SI düzeylerinin ve başvuru sırasında seçilen biyobelirteçlerin mortaliteyi tahmin etme kabiliyeti, alıcı işletim karakteristik eğrileri (AUC'ler) altındaki alanlar belirlenerek değerlendirildi. Optimal kesme değerleri Youden indeksi yöntemi kullanılarak belirlenmiştir.

BULGULAR: Çalışmaya 285'i (%81) erkek ve yaş ortalaması 50.0±17.7 yıl olan 352 hasta dahil edildi. Mortalite oranı %9.6 idi. Mortalite, yüksek şok indeksi (OR: 14.02 [%95 GA 0.847 - 0.916], AUC=0.885, p=0.001), glukoz/potasyum oranı (OR: 1.24 [%95 GA 1.14-1.35], AUC=0.869, p<0.001) ve laktat düzeyleri OR: 4.30 [%95 GA 2.29 - 8,07], AUC=0.832, p<0,001). Şok indeksi, glukoz/potasyum oranı, iyonize kalsiyum ve laktat için belirlenen optimal kesme değerleri 1.02 (duyarlılık, %94.1; özgüllük %69.5; PPV, 24.8; NPV, 99,1), 36.85 (duyarlılık, %76.5; özgüllük, %87.7; PPV, 40.0; NPV, 97.2), 1.23 (duyarlılık, %94.1; özgüllük, %56.0; PPV, 18.6; NPV, 98.9) ve 1.98 (duyarlılık, %70.6; özgüllük, %80.5; PPV, 27.9; NPV, 96.2) olarak bulunmuştur.

SONUÇ: Bu çalışma, yüksek şok indeksi, glukoz/potasyum oranı ve laktat düzeylerinin izole toraks travmalı hastalarda artmış mortalite ile anlamlı şekilde ilişkili olduğunu göstermektedir. Bu bulgular, bu belirteçlerin etkili prognostik göstergeler olabileceğini, potansiyel olarak klinik karar verme sürecine rehberlik edebileceğini ve hasta sonuçlarını iyileştirebileceğini düşündürmektedir.

Anahtar sözcükler: Kalsiyum; laktat; mortalite; şok indeksi, glukoz/potasyum oranı; toraks travması; yaralanma.

Ulus Travma Acil Cerrahi Derg 2024;30(10):737-744 DOI: 10.14744/tjtes.2024.15003