ORIGINAL ARTICLE

Evaluating the effectiveness of trauma scores in predicting morbidity and mortality in patients with concomitant thoracic trauma

Suzan Temiz Bekce,[1] Dincer Göksülük[2]

[1]Department of Thoracic Surgery, Kayseri City Hospital, Kayseri-*Türkiye*

[2]Department of Biostatistics, Erciyes University Faculty of Medicine, Kayseri-*Türkiye*

ABSTRACT

BACKGROUND: Trauma is a major global health concern due to its potential to affect multiple organ systems and its association with high rates of morbidity and mortality. This study aimed to comparatively evaluate the accuracy of various trauma scoring systems in predicting morbidity and mortality among patients with blunt thoracic trauma across different age groups.

METHODS: A retrospective analysis was conducted on 210 patients treated for thoracic trauma at the Department of Thoracic Surgery, Kayseri City Hospital, between October 2022 and January 2024. Patients were categorized into three age groups: 18–44 years, 45–64 years, and ≥65 years. Data collected included demographic characteristics, comorbidities, anticoagulant use, mechanism of injury, thoracic and extrathoracic injuries, and histories of intensive care unit (ICU) admission and intubation. The predictive performance of the Glasgow Coma Scale (GCS), Revised Trauma Score (RTS), Chest Trauma Score (CTS), Injury Severity Score (ISS), and Trauma and Injury Severity Score (TRISS) for mortality, intubation, and ICU admission was assessed using receiver operating characteristic (ROC) analysis.

RESULTS: The mean age of the patients was 53.43 years, with a predominance of males. Traffic accidents were the most common cause of trauma. The prevalence of comorbidities and anticoagulant use increased with age. The ICU admission rate was 32.38%, and the overall mortality rate was 4.28%. ROC analysis demonstrated that ISS and TRISS had strong predictive performance for mortality, need for intubation, and ICU admission across all age groups.

CONCLUSION: Thoracic trauma is a severe form of injury associated with high rates of morbidity and mortality. The findings suggest that ISS and TRISS are reliable predictors of trauma severity regardless of age. Incorporating these scoring systems into hospital triage and clinical decision-making may facilitate early diagnosis and support timely, effective management.

Keywords: Morbidity; mortality; thoracic trauma; trauma scoring systems.

INTRODUCTION

Thoracic trauma represents a significant category of injuries, ranging from minor conditions to life-threatening situations. Depending on the patient's clinical status, it remains a major contributor to morbidity and mortality worldwide.[1-3]

Patients with thoracic trauma may present with a variety of clinical conditions at the time of injury, including rib fractures, hemopneumothorax, and pulmonary contusion. Additionally, secondary complications that develop during follow-up may further worsen the clinical course.

A thorough evaluation of thoracic injuries is essential for guiding management and determining appropriate follow-up strategies.[4] Among the factors influencing prognosis and

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Address for correspondence: Suzan Temiz Bekce

Department of Thoracic Surgery, Kayseri City Hospital, Kayseri, Türkiye

E-mail: suzantemiz@erciyes.edu.tr

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mortality, the severity of trauma remains one of the most critical determinants.[5]

Treatment algorithms based on trauma scoring systems have been shown to improve patient outcomes and reduce the duration of hospitalization.[6,7] Moreover, standardized trauma assessment models are recommended to ensure accurate prediction of clinical outcomes and to identify potential risk factors in patients with thoracic trauma.[8]

Reducing mortality and achieving effective triage remain the primary goals of trauma management.[9] In addition, variables such as patient age and sex have been reported to influence both injury pattern and clinical outcomes following trauma.[10]

The mechanisms of trauma and the prevalence of comorbidities vary across different age groups. In this study, patients with thoracic trauma were stratified into three age categories: 18–44 years, 45–64 years, and ≥65 years. The primary aim was to evaluate the predictive value of several trauma scoring systems for morbidity and in-hospital mortality across these age groups. Additionally, the study sought to determine whether integrating these scoring systems into triage protocols could facilitate the rapid and effective implementation of treatment strategies.

Given the challenges associated with accurately assessing the severity of thoracic injuries in the early post-traumatic period, this study also evaluated the predictive performance of various trauma scoring systems in estimating the need for mechanical ventilation and intensive care across different age groups.

MATERIALS AND METHODS

This retrospective descriptive study was approved by the Ethics Committee for Clinical Research of Kayseri City Hospital (Date: 06.12.2023; Decision No: 970) and conducted in accordance with the principles of the Declaration of Helsinki. Patients who were referred to the Department of Thoracic Surgery for thoracic trauma between October 2022 and January 2024 were included in the study. Cases were categorized into three age groups: 18–44 years (Group 1), 45–64 years (Group 2), and ≥65 years (Group 3). The study population included a broad spectrum of cases, ranging from simple injuries to complex multiple traumas.

During data collection, the following variables were evaluated: demographic characteristics, comorbidities, anticoagulant use, vital signs, mechanisms of injury, rib fractures, associated bone and organ injuries, anatomical location of thoracic trauma, tube thoracostomy procedures, history of intubation, complications during follow-up, laboratory findings, and mortality outcomes. All patients included in the study underwent thoracic computed tomography imaging.

To assess the severity of thoracic injuries, several trauma scoring systems were utilized, including the Glasgow Coma Scale (GCS), Revised Trauma Score (RTS),[11] Chest Trauma Score (CTS),[12] Injury Severity Score (ISS),[13] and Trauma and Injury Severity Score (TRISS).[14] Although TRISS is calculated differently for penetrating and blunt trauma, only blunt trauma cases were included in this study.

Blunt thoracic trauma typically results from increased intrathoracic pressure.[15] Compared with penetrating trauma, blunt thoracic injuries may present with less apparent and more difficult-to-detect findings on physical examination.[16]

To ensure consistency in clinical evaluation, patients with penetrating injuries were excluded. Individuals younger than 18 years were also excluded. In addition, patients with missing laboratory data or inadequate imaging findings (n=154) were excluded from the analysis. Post-discharge mortality was not considered; only in-hospital mortality during the follow-up period was evaluated. After applying these criteria, a total of 210 patients were included in the study.

Statistical Analysis

Statistical analyses were performed using IBM SPSS (version 26.0; IBM Corp., Armonk, NY, USA), TURCOSA (version 1.0; Turcosa Ltd., Kayseri, Türkiye; available at www.turcosa.com.tr), and the R programming language (version 4.3.0; R Foundation for Statistical Computing, Vienna, Austria; available at www.r-project.org). The choice of software depended on the type of analysis and specific requirements. Numerical variables were summarized as mean ± standard deviation or median (interquartile range), depending on the distribution. Categorical variables were expressed as frequencies and percentages. The normality of numerical variables was assessed using both graphical methods (e.g., histograms, box plots, and Q-Q plots) and analytical tests, including the Shapiro–Wilk test. Parametric and non-parametric hypothesis tests were applied for group comparisons based on data distribution. For normally distributed variables, intergroup comparisons were performed using Student's t-test and one-way analysis of variance (ANOVA). When the assumption of normality was not met, the Mann–Whitney U test and Kruskal–Wallis test were used. Categorical variables were analyzed using chi-square tests, including Pearson's chi-square and Fisher's exact test, as appropriate.

Correlation analyses were conducted to evaluate relationships between variables, using Pearson correlation coefficients for normally distributed data and Spearman correlation coefficients for non-normally distributed data. Survival analyses were performed to identify risk factors influencing morbidity, mortality, and survival outcomes. Kaplan–Meier analysis was used to compare survival times between groups.

To assess the discriminatory ability of each scoring system in predicting mortality, receiver operating characteristic (ROC) curves were generated, and the area under the curve (AUROC) was calculated. A p-value <0.05 was considered statistically significant for all analyses.

RESULTS

Statistical analysis was completed for patients who met the inclusion criteria and presented with thoracic trauma. Of the 210 patients, 149 (70.95%) were male and 61 (29.04%) were female, with a mean age of 53.43 years (range: 18–92 years). The mechanisms of trauma differed across age groups: traffic accidents were most common in the younger group (Group 1), falls from height or stairs predominated in the middle-aged group (Group 2), and same-level falls were most frequent in the older group (Group 3) (p<0.001) (Table 1).

A significant increase in the prevalence of chronic comorbidities was observed with advancing age (p<0.001). Similarly, anticoagulant use was significantly higher in Groups 2 and 3 compared with Group 1 (p<0.001) (Table 1).

Regarding pulmonary contusion, bilateral minimal contusion was the most common finding across all groups (p<0.001). However, no significant differences were observed between groups in terms of bilateral rib fractures (p=0.623), multiple fractures of the same rib (p=0.802), or the presence of flail chest (p=0.775). Tube thoracostomy was performed in 45 patients (21.42%), with no significant differences between groups (p=0.775) (Table 2).

There were also no statistically significant differences between groups in terms of complications (atelectasis: p=0.279; pneumonia: p=0.446; others: p=0.372) or history of intubation (p=0.524). A total of nine patients (4.28%) died; however, mortality rates did not differ significantly between groups (p=0.091) (Table 2).

Analysis of trauma score means revealed no significant differences between groups for GCS (p=0.469), RTS (p=0.256), or TRISS (p=0.57) (Table 3). CTS values increased with age and differed significantly among the groups (Group 1: 3.6; Group 2: 4.9; Group 3: 5.72; p<0.001). ISS was significantly higher in Group 1 compared with the other groups (p<0.001), while no difference was observed between Groups 2 and 3 (Table 3). Among patients admitted to the intensive care unit, both CTS (p<0.001) and TRISS (p=0.003) were significantly associated with ICU admission across all groups (Table 4).

In subgroup analyses of intubated patients, GCS, RTS, and TRISS demonstrated the highest predictive performance in Group 1 (AUROC=1, p<0.001). In Group 2, TRISS (AUROC=0.99), ISS (AUROC=0.98), CTS (AUROC=0.96), and GCS (AUROC=0.90) were strong predictors (all p<0.001). In Group 3, ISS (AUROC=0.98) and TRISS (AUROC=0.96) demonstrated the best predictive performance (all p<0.001) (Table 5).

For predicting ICU length of stay, TRISS (AUROC=0.83, p<0.001) and ISS (AUROC=0.82, p<0.001) were significant predictors in Group 1. In Group 2, ISS (AUROC=0.86, p<0.001) and TRISS (AUROC=0.85, p<0.001) showed the highest predictive accuracy. In Group 3, TRISS (AUROC=0.76, p<0.001) and ISS (AUROC=0.75, p<0.001) also demonstrated significant predictive value (Table 5).

In the analysis of mortality, ISS (AUROC=0.98, p<0.001), TRISS (AUROC=0.97, p<0.001), and GCS (AUROC=0.97, p<0.001) were significant predictors in Group 1. In Group

Table 1. Descriptive statistics of demographic characteristics, mechanisms of trauma, comorbidities, and anticoagulant use

	All patients (n=210)	Group 1 (18–45 years) (n=70) (%)	Group 2 (46–64 years) (n=70) (%)	Group 3 (≥65 years) (n=70) (%)	p value
Sex					
Female	61	15 (24.59)	23 (37.70)	23 (37.70)	0.228
Male	149	55 (36.91)	47 (31.54)	47 (31.54)	
Age	53.43±19.40	30.47±8.22	55.41±5.48	74.42±7.51	<0.001
Cause of trauma					<0.001
Traffic accident	105	53 (50.47)	31 (29.52)	21 (20)	
Fall from height	36	9 (25)	17 (47.22)	10 (27.77)	
Fall from ladder	11	2 (18.18)	5 (45.45)	4 (36.36)	
Same-level fall	44	1 (2.27)	13 (29.54)	30 (68.18)	
Other causes (bicycle accidents, animal bites, lifting-related injuries, carrying-related injuries, massage-related injuries, sports injuries)	14	5 (35.71)	4 (28.57)	50.44 (35.71)	
Presence of comorbidities	100	12 (12)	27 (27)	61 (61)	<0.001
Anticoagulant use	36	2 (5.55)[a]	12 (33.33)[b]	22 (61.11)[b]	<0.001

*Values are presented as mean ± standard deviation or number (percentage), as appropriate. In multiple comparisons, groups sharing the same letter do not differ significantly, whereas different letters indicate a statistically significant difference.

Table 2. Clinical findings, trauma characteristics, hospitalization data, complications, and mortality across age groups

	All patients (n=210)	Group 1 (18–45 years) (n=70) (%)	Group 2 (46–64 years) (n=70) (%)	Group 3 (≥65 years) (n=70) (%)	p value
Rib fracture (any)	179	44 (24.58)[a]	65 (36.3)[b]	70 (39.10)[b]	<0.001
Bilateral rib fractures	16	5 (31.25)	7 (43.75)	4 (25)	0.623
Flail chest	4	1 (25)	1 (25)	2 (50)	0.775
Sternum fracture	16	7 (43.75)	6 (37.5)	3 (18.75)	0.415
Contusion					<0.001
Minimal (right lung parenchyma)	21	9 (42.85)	9 (42.85)	3 (14.28)	
Extensive (right lung parenchyma)	6	3 (50)	1 (16.66)	2 (33.33)	
Minimal (left lung parenchyma)	16	9 (56.25)	5 (31.25)	2 (12.5)	
Extensive (right lung parenchyma)	4	0	1 (25)	3 (75)	
Minimal (bilateral lung parenchyma)	61	19 (31.14)	27 (44.26)	15 (24.59)	
Extensive (bilateral lung parenchyma)	5	5 (100)	0	0	
All patients with contusions	113	45 (39.82)	43 (38.05)	25 (22.11)	
Parenchymal injury (pulmonary hematoma, pulmonary laceration, pneumatocele)	31	15 (48.38)	9 (29.03)	7 (22.58)	0.140
Hemothorax	53	16 (30.18)	18 (33.96)	19 (35.84)	0.838
Pneumothorax	58	25 (43.1)	20 (34.48)	13 (22.41)	0.075
Hemopneumothorax	32	10 (31.25)	10 (31.25)	12 (37.5)	0.863
Pneumomediastinum	10	4 (40)	5 (50)	1 (40)	0.255
Subcutaneous emphysema	28	8 (28.57)	12 (42.85)	8 (28.57)	0.517
Chest tube placement	45	16 (35.55)	16 (35.55)	13 (28.88)	0.775
Extrathoracic injuries					
Head and neck	52	19 (36.53)	19 (36.53)	14 (26.92)	0.528
Lower extremity	32	20 (62.5)[a]	7 (21.8)[b]	5 (15.62)[b]	<0.001
Upper extremity	36	17 (47.22)[a]	14 (38.88)[a]	5 (13.88)[b]	0.020
Pelvis	28	14 (50)	9 (32.14)	5 (17.85)	0.081
Abdomen	50	24 (48)[a]	15 (30)[ab]	11 (22)[b]	0.030
Surgery after trauma	39	23 (58.97)[a]	11 (28.20)[b]	5 (12.82)[b]	<0.001
Hospitalization	151	58 (38.41)[a]	51 (33.77)[ab]	42 (27.81)[b]	0.011
Hospital stay (days)	6.49	9.08 (1-120)	6.11 (1-40)	4.28 (1-50)	0.055
Complications					
Atelectasis	18	7 (38.88)	8 (44.44)	3 (16.66)	0.279
Pneumonia	13	5 (38.46)	6 (46.15)	2 (15.38)	0.446
Other complications (prolonged air leak, acute kidney injury, empyema, hemothorax, pneumothorax, pneumomediastinum, pleural effusion, etc.)	24	7 (29.16)	11 (45.83)	6 (25)	0.372
Intubation	15	6 (40)	6 (40)	3 (20)	0.524
ICU admission	68 (32.38%)	31 (45.58%)[a]	23 (33.82%)[ab]	14 (20.58%)[b]	0.009
ICU stay (days)	9.02±19.77	11.83±21.93	8.21±9.70	5.85±3.97	0.470
Mortality	9 (4.28%)	2 (22.22%)	3 (33.33%)	4 (44.44%)	0.911

In multiple comparisons, groups sharing the same letter do not differ significantly, whereas different letters indicate statistically significant differences.

Table 3. Comparison of trauma scoring system values across age groups

Scoring system	Overall (n=210)	Group 1 (n=70)	Group 2 (n=70)	Group 3 (n=70)	p value
HGCS	14.12	13.8	14.22	14.35	0.469
RTS	7.48	7.31	7.55	7.59	0.259
CTS	4.74	3.6[a]	4.9[b]	5.72[c]	<0.001
ISS	11.73	15.11[a]	11.48[ab]	8.59[b]	<0.001
TRISS	7.80	7.2	9.65	6.54	0.57

In multiple comparisons, groups sharing the same letter do not differ significantly, whereas different letters indicate statistically significant differences.

Table 4. The average scores and p-values of patients admitted to the intensive care unit

Scoring system	Group 1 (n=31)	Group 2 (n=23)	Group 3 (n=17)	p value
GCS	15 [11, 15]	15 [14, 15]	15 [10, 15]	0.899
RTS	7.8 [6.9, 7.8]	7.8 [7.5, 7.8]	7.8 [6.66, 7.8]	0.578
CTS	4 [3, 6]	6 [5, 8]	7 [5, 8.25]	<0.001
ISS	18 [13, 29]	17 [12, 27]	14.5 [4.75, 20.5]	0.145
TRISS	1.3 [0.9, 6.7]	6.1 [3.5, 21.3]	5.1 [2.27, 17.05]	0.003

*Values are presented as mean ± standard deviation or median [first quartile, third quartile] depending on data distribution.

Table 5. Receiver operating characteristic (ROC) analysis of trauma scoring systems for predicting intubation, intensive care unit admission, and mortality

	Group 1	p value	Group 2	p value	Group 3	p value
History of intubation						
GCS	1 (0.95-1)	<0.001	0.90 (0.81-0.96)	<0.001	0.79 (0.68-0.88)	0.088
RTS	1 (0.95-1)	<0.001	0.82 (0.71-0.90)	0.003	0.64 (0.52-0.75)	0.429
CTS	0.73 (0.61-0.83)	0.064	0.96 (0.89-0.99)	<0.001	0.69 (0.57-0.79)	0.141
ISS	0.95 (0.88-0.99)	<0.001	0.98 (0.91-0.99)	<0.001	0.98 (0.91-0.99)	<0.001
TRISS	1 (0.94-1)	<0.001	0.99 (0.93-1)	<0.001	0.96 (0.88-0.99)	<0.001
ICU admission						
GCS	0.67 (0.55-0.78)	<0.001	0.66 (0.53-0.76)	0.002	0.69 (0.56-0.79)	0.006
RTS	0.69 (0.57-0.79)	<0.001	0.63 (0.50-0.74)	0.005	0.62 (0.50-0.73)	0.051
CTS	0.70 (0.58-0.80)	0.001	0.81 (0.71-0.89)	<0.001	0.71 (0.59-0.82)	0.003
ISS	0.82 (0.71-0.90)	<0.001	0.86 (0.76-0.93)	<0.001	0.75 (0.63-0.85)	<0.001
TRISS	0.83 (0.72-0.91)	<0.001	0.85 (0.75-0.92)	<0.001	0.76 (0.64-0.85)	<0.001
Mortality						
GCS	0.97 (089-0.99)	<0.001	0.97 (0.89-0.99)	<0.001	0.84 (0.74-0.92)	0.007
RTS	0.95 (0.87-0.98)	<0.001	0.80 (0.69-0.88)	0.071	0.73 (0.61-0.83)	0.125
CTS	0.88 (0.78-0.94)	<0.001	0.97 (0.90-0.99)	<0.001	0.76 (0.64-0.85)	0.020
ISS	0.98 (0.91-0.99)	<0.001	0.98 (0.92-0.99)	<0.001	0.99 (0.94-1)	<0.001
TRISS	0.97 (0.91-0.99)	<0.001	0.98 (0.92-0.99)	<0.001	0.97 (0.90-0.99)	<0.001

*Values are presented as AUC (95% confidence interval). AUC: Area under the receiver operating characteristic (ROC) curve.

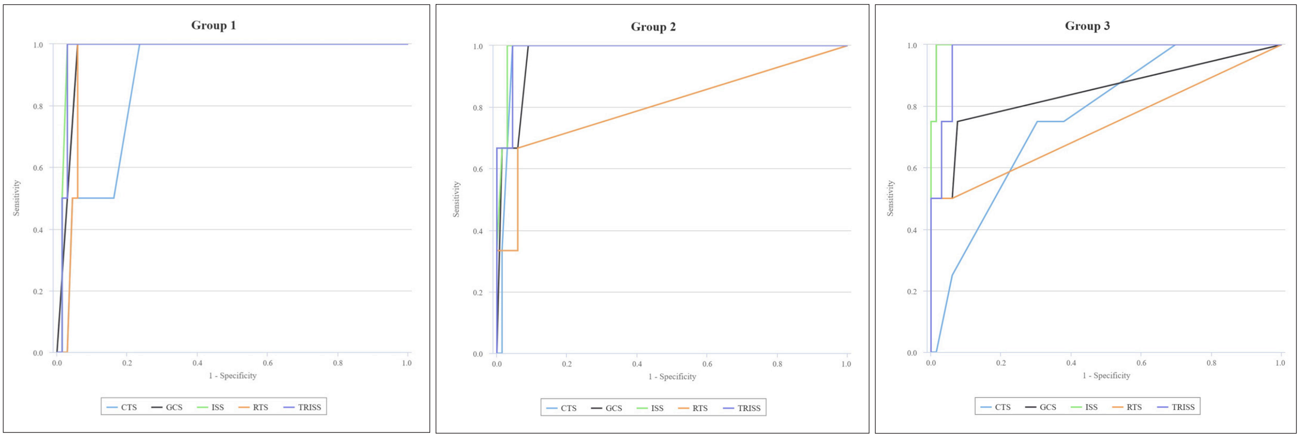

Figure 1-3. Receiver operating characteristic (ROC) illustrating the predictive performance of trauma scoring systems for mortality in each age group (Group 1, Group 2, and Group 3, respectively). The figures display the following scoring systems with their corresponding colors: Glasgow Coma Scale (GCS, black), Revised Trauma Score (RTS, orange), Chest Trauma Score (CTS, blue), Injury Severity Score (ISS, green), and Trauma and Injury Severity Score (TRISS, dark blue).

2, TRISS (AUROC=0.98, p<0.001), ISS (AUROC=0.98, p<0.001), and GCS (AUROC=0.97, p<0.001) were the most influential parameters. In Group 3, ISS (AUROC=0.99, p<0.001) and TRISS (AUROC=0.97, p<0.001) demonstrated strong predictive performance (Table 5). Mortality-related AUROC curves are presented as Figures 1, 2, and 3 for the respective age groups.

DISCUSSION

In this retrospective study, we aimed to compare the performance of various trauma scoring systems in predicting mortality, morbidity, and injury severity across different age groups. Additionally, we evaluated whether age-stratified trauma scores provide optimal predictive value for in-hospital triage.

Previous studies on blunt thoracic trauma have reported mean ages of 48.9±19.3 years in Korea,[17] 44.7 years in China,[18] and 46.1 years in the German Trauma Registry (Trauma Register DGU®).[19] In the present study, the mean age of the patient population was 53.4±19.4 years.

A predominance of male patients has been consistently reported in previous studies. Similarly, in the present study, 70.9% of the patients were male, with no statistically significant differences among age groups (p=0.228).[20-22]

Khursheed et al. (2019) reported that 56.17% of thoracic injuries were related to traffic accidents.[20] Likewise, Asim et al.[21] (2020) found that 52.2% of blunt thoracic trauma cases were caused by road traffic accidents. A 2021 study from China also reported that 54% of blunt trauma cases resulted from traffic accidents.[18] Simple falls have also been identified as an important cause of trauma, particularly among elderly patients.[23,24,25] In our study, traffic accidents were identified as the primary cause of trauma in 105 patients (50%). Subgroup analyses showed that traffic accidents were more frequent in Group 1, falls from height or stairs predominated in Group 2, and same-level falls were most common in Group 3 (p<0.001).

In a Norwegian study of patients aged over 18 years with thoracic trauma, anticoagulant use was reported in 18% of cases.[26] In our study, anticoagulant use was higher in Groups 2 and 3 compared with Group 1. Similarly, the prevalence of comorbidities was highest in Group 3. However, despite this, no increase in mortality was observed in Group 3, and mortality rates did not differ significantly between the groups.

Most studies report that extrathoracic injuries are present in the majority of chest trauma cases.[27-29] Kavurmacı et al.[25] found that head trauma was significantly more common in patients aged 65 years and older.

In our study, extrathoracic injuries were observed in 107 patients (50.95%), with the head and neck region being the most frequently affected area (24.76%). Lower extremity injuries were significantly more common in Group 1 compared with Groups 2 and 3 (p<0.001), while no significant difference was observed between Groups 2 and 3. Upper extremity injuries were more frequent in Groups 1 and 2 than in Group 3 (p=0.020). Similarly, abdominal injuries were significantly more common in Groups 1 and 2 compared with Group 3 (p<0.001), with no significant difference between Groups 1 and 2.

The literature indicates that the majority of thoracic injuries can be effectively managed with tube thoracostomy.[21,30-32] In our study, tube thoracostomy was performed in 21.42% of cases, with no statistically significant difference among the three age groups.

Rib fractures are the most commonly reported injury in thoracic trauma.[20,21,33] Consistent with the literature, rib fractures were the most frequent injury in our cohort, although they were significantly less common in the younger age group.

A 2021 study from China reported an ICU admission rate of 68.1% among patients with blunt thoracic trauma, while a Norwegian study found that 41% of patients required ICU monitoring.[18,26] A retrospective analysis based on the Trauma Register DGU® reported a mean ICU stay of 11.7 days and a mean hospital stay of 25 days in patients with multiple injuries and blunt thoracic trauma.[19] Novakov et al. reported a mean hospital length of stay of 8.7 days, whereas Khursheed et al. reported 9.88 days.[20,34]

In our study, the ICU admission rate was 32.38%, with no statistically significant differences between groups. The mean hospital length of stay was 6.49 days, and no significant intergroup differences were observed.

Mortality rates in thoracic trauma vary widely in the literature. Khursheed et al.[20] reported a mortality rate of 13.7% in patients with blunt thoracic trauma, whereas Asım et al.[21] reported a rate of 2.6%. Kavurmacı et al.[25] found a mortality rate of 1.5% among patients aged 65 years and older. Another study conducted in China in 2021 reported a mortality rate of 11.8% in patients with blunt trauma.[18] In our study, the in-hospital mortality rate was 4.28%, with no significant differences observed between age groups.

Harde et al.[35] stratified patients into two groups based on the CTS (low CTS <5 and high CTS ≥5) and reported that a CTS greater than 5 was significantly associated with higher rates of pneumonia, increased need for mechanical ventilation, and mortality in thoracic trauma. Similarly, a 2024 study reported that patients with severe thoracic trauma had a mean CTS of ≥6.[36]

In our study, the mean CTS was 4.74, with values of 3.66 in Group 1, 4.9 in Group 2, and 5.72 in Group 3. The age-related increase in CTS and the differences between groups, particularly among patients admitted to the intensive care unit, were statistically significant. The AUROC for the association between CTS and mortality was 0.877 (p<0.001).

In a 2022 study comparing Mechanism, Glasgow Coma Scale, Age, and Arterial Pressure (MGAP) score, ISS, New Injury Severity Score (NISS), and TRISS scores, TRISS (AUROC=0.920) and MGAP (AUROC=0.900) demonstrated the highest accuracy in predicting mortality.[37] Another study published in 2008 reported AUROC values of 0.934 for TRISS and 0.907 for ISS.[38] Taslak Şengül et al.[39] reported an AUROC of 0.888 for ISS, while Lancey and Poole demonstrated significant correlations between mortality and ISS, RTS, and TRISS.[40,41] Our study also showed that TRISS, ISS, and GCS had high statistically significant predictive accuracy for in-hospital mortality.

In a 2021 study from China, the mean ISS was 21.14, with higher values observed in patients admitted to the intensive care unit.[18] In contrast, a 2012 study including 278 patients reported a mean ISS of 28.7 but found limited predictive performance for acute respiratory distress syndrome (ARDS) and mortality (AUROC for ARDS: 0.56, p=0.537; AUROC for mortality: 0.61, p=0.776).[42] A Korean study comparing TRISS (AUROC=0.942), ISS (AUROC=0.866), and RTS (AUROC=0.894) concluded that TRISS had the highest predictive value.[17] Ünlü et al.[43] also reported significant correlations between the duration of mechanical ventilation and GCS, RTS, and TRISS scores.

In our study, the predictive performance of trauma scoring systems for morbidity varied across age groups. Among intubated patients, GCS, RTS, TRISS, and ISS demonstrated the highest predictive accuracy in Group 1; TRISS, ISS, CTS, and GCS in Group 2; and ISS and TRISS in Group 3. For predicting intensive care unit length of stay, ISS and TRISS were the most reliable scoring systems across all age groups. In terms of mortality prediction, ISS, TRISS, GCS, and RTS showed the best performance in Group 1, whereas ISS and TRISS were the most effective predictors in Groups 2 and 3.

CONCLUSION

In this study, we evaluated patients with blunt thoracic trauma to determine the predictive performance of various trauma scoring systems for mortality and morbidity. A statistically significant association was identified between intensive care unit admission and mortality. ROC analysis demonstrated that TRISS, ISS, and GCS had strong predictive performance for mortality. For predicting the need for intubation, ISS and TRISS showed high accuracy across all age groups. Similarly, ISS and TRISS were the most effective predictors for intensive care unit admission regardless of age.

Although GCS and RTS are the most commonly used trauma scoring systems in our country, our findings indicate that ISS and TRISS provide reliable estimates of trauma severity across all age groups. Furthermore, the use of ISS and TRISS may offer valuable support for in-hospital triage and clinical decision-making.

Ethics Committee Approval: This study was approved by the Ethics Committee for Clinical Research of Kayseri City Hospital (Date: 06.12.2023, Decision No: 970).

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Informed Consent: Written informed consents were obtained from patients who participated in this study.

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ORİJİNAL ÇALIŞMA - *ÖZ*

Toraks travmasının eşlik ettiği hasta gruplarında travma skorlarının nihai sonuçlarının morbidite ve mortaliteyi öngörmedeki başarısının incelenmesi

AMAÇ: Travma, çoklu organ sistemlerini etkileyebilmesi ve yüksek morbidite ile mortalite oranlarına yol açması nedeniyle hem ülkemizde hem de küresel düzeyde önemli bir sağlık sorunudur. Künt toraks travmalı hastalarda farklı travma skorlama sistemlerinin yaş gruplarına göre morbidite ve mortaliteyi öngörmedeki başarılarının karşılaştırmalı olarak değerlendirilmesi amaçlanmıştır.

GEREÇ VE YÖNTEM: Ekim 2022-Ocak 2024 tarihleri arasında Kayseri Şehir Hastanesi Göğüs Cerrahisi Kliniğinde toraks travması tanısıyla izlenen 210 hasta retrospektif olarak incelendi. Olgular, yaş değişkenine göre üç grupta sınıflandırıldı: Birinci grup (18-44 yaş), ikinci grup (45-64 yaş) ve üçüncü grup (65 yaş ve üzeri). Hastaların demografik özellikleri, komorbid hastalıkları, antikoagülan kullanımı, travma mekanizması, torasik ve ekstratorasik yaralanmaları, yoğun bakım ve entübasyon öyküleri değerlendirildi. GKS (Glasgow Koma Skoru), RTS (Revize Travma Skoru), CTS (Göğüs Travma Skoru), ISS (Yaralanma Şiddet Skoru) ve TRISS (Travma ve Yaralanma Şiddet Skoru) sistemlerinin mortalite, entübasyon ve yoğun bakım gereksinimini öngörmedeki performansları ROC analizi ile karşılaştırıldı.

BULGULAR: Hastaların yaş ortalaması 53.43 yıl olup, çoğunluğu erkekti. En sık travma nedeni trafik kazasıydı. Yaş ilerledikçe komorbiditeler ve antikoagülan kullanımı oranlarının artış gösterdiği gözlendi. Yoğun bakım yatış oranı %32.38, mortalite oranı %4.28 olarak belirlendi. ROC analizine göre ISS ve TRISS skorları tüm yaş gruplarında mortalite, entübasyon gerekliliği ve yoğun bakım gereksinimini öngörmede iyi performansı sergiledi.

SONUÇ: Toraks travmaları, yüksek morbidite ve mortalite oranlarıyla seyreden ciddi yaralanmalardır. Bulgular, ISS ve TRISS skorlarının yaş farkı gözetmeksizin travma şiddetini belirlemede güvenilir göstergeler olduğunu ortaya koymaktadır. Bu skorların hastane içi triyaj ve klinik karar verme süreçlerinde kullanılması, erken tanı ve etkili tedaviye önemli ölçüde katkı sağlayabilir.

Anahtar sözcükler: Morbidite; mortalite; toraks tavması; travma skor sistemleri.

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