ORIGINAL ARTICLE

Analysis of risk factors of mortality in abdominal trauma

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ABSTRACT

BACKGROUND: The present study aims to analyze blunt and penetrating abdominal traumas that were evaluated in our emergency department, the treatment approaches and risk factors of mortality.

METHODS: Six hundred and sixty-four patients were admitted to our emergency department for surgical evaluation for trauma between January 2009 and April 2019. After the exclusion of dead on arrival, patients with missing data and patients without abdominal trauma were excluded from this study. Hundred and thirteen patients with abdominal trauma admitted to our department were evaluated in this study. Demographic, clinical, prognostic and mortality related factors were retrospectively analyzed.

RESULTS: The mean age of the patients was 36.08±16.1 years. There were 90 male patients. Eighty patients (70.8%) had blunt abdominal trauma (BAT). Twenty-eight patients (24.7%) had isolated liver and two patients (1.7%) had isolated spleen injury. Combined liver and spleen injury was found in two patients (1.7%). Twenty-two (19.4%) patients had mortality. Causes of mortality were an irreversible hemorrhagic shock (40.9%) and central nervous system (13.6%) injuries. BAT was the main mechanism of injury in patients with mortality (86.4% versus 67%; p<0.001). The frequency of retroperitoneal injury was significantly higher in patients with mortality (50% versus 16.5%, p<0.001). The frequency of extra-abdominal injury in patients with mortality was higher (68.1% versus 49.4%; p=0.047). Mean arterial pressure at admission was found to be significantly lower in patients with mortality (67±26.8 mmHg versus 84.3±17 mmHg; p=0.02). The number of packed erythrocytes transfused in patients with mortality was higher (8.8±8.6 versus 3.3±5.9 units; p=0.047). Mean international normalized ratio (INR) was significantly higher in patients with mortality (4.3±7.1 versus 2.7±4; p=0.016). Mean lactate dehydrogenase level was higher in patients with mortality (1685.7±333.8 versus 675.8±565.3 IU/mL; p<0.001). Mean alanine aminotransferase (ALT) was significantly higher in patients with mortality (430±619 versus 244±448 IU/mL; p<0.001). Mean alkaline phosphatase (ALP) level in patients with mortality was higher (76.9±72.8 versus 67.3±27.8 IU/mL; p=0.003). The presence of retroperitoneal injury and ALT >516 IU/mL were independent risk factors o mortality.

CONCLUSION: We have found certain laboratory variables to increase in patients with mortality. These are related to the severity of trauma. Retroperitoneal injury and increased ALT levels being risk factors of mortality is the most important finding of this study. Our results can guide other centers in the evaluation of trauma patients, and high-risk groups can be identified.

Keywords: Abdominal trauma; blunt abdominal trauma; mortality; penetrating abdominal trauma.

INTRODUCTION

The abdominal cavity is the third most common site affected in trauma.[1] The abdominal region is affected in 1/3rd of the cases. One-fourth of the cases undergo explorative surgery for evaluation of the abdominal injury.[2] Although the majority of the abdominal trauma requires conservative management, and only a small fraction requires surgery, the overall mortality rate ranges from 10–36%.[2–5]

In Turkey, approximately 400000 patients are victims of traumatic injury, including accidents, assault, vehicle collisions and penetrating trauma. Aldemir et al. have reported the mortality rate of 10.1% in 1048 penetrating abdominal trauma

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victims.[4] Tekesin et al.[6] have analyzed 138.352 trauma victims, which is the largest cohort that has been reported so far. Fifty-five percent of the patients have blunt abdominal trauma, whereas 10.1% were penetrating trauma victims. The reported mortality rates were 0.16%.[6] Therefore, it is a major cause of death, especially among young males; and a public health problem in Turkey.

In Turkey, there are very few centers that are focused on the management trauma patients. Therefore, throughout the country, each surgical clinic deals with trauma victims in their region. High volume center should share their experiences regarding the management of trauma patients to guide other low volume hospitals for the management of abdominal trauma.

Management of abdominal trauma is a challenging task for there are blunt, penetrating and mixed mechanisms involving the development. The reported incidence of blunt abdominal trauma is 90%.[7] Ozpek et al.[8] have reported the most frequent causes of blunt abdominal trauma as motor vehicle accidents in 62% and fall from heights as 27% of the cases. Mortality is seen in nearly 10% of the cases.[8] The causes of mortality are mainly occult extra-abdominal injuries involving the central nervous system and thorax, which was present in 96% of the cases reported by Pimentel et al.[3] On the other hand, penetrating abdominal trauma, including gunshot wounds, are more common in regions where terrorism or crime levels, including interpersonal conflicts, are high.[9] The mortality rate in penetrating abdominal trauma is around 2–13%.[2] The causes of mortality in penetrating abdominal trauma are either immediate death at the crime scene due to exsanguination or septic complications and multiorgan failure in the late postoperative period.[2,9] Iflazoglu et al.[10] have analyzed 120 gunshot wounds and the reported mortality rate as 39%. Risk factors of mortality were a shock at admission, the number of injured organs and the number of transfusions required to the patient.[10]

In the present study, we evaluated 664 trauma victims that were admitted to our emergency department with various sites and severity of trauma. We evaluated patients with abdominal trauma to evaluate the causes and risk factors of mortality to develop a management protocol and to guide other centers in the region.

MATERIALS AND METHODS

Patients Included in This Study

Between January 2009 and April 2019, 664 patients that were admitted to Inonu University Turgut Ozal Medical Center Department of Emergency medicine with suspected abdominal trauma and admitted for follow-up by the surgical team have been analyzed retrospectively. The patients with an intra-abdominal injury that were either operated or conservatively followed by the surgical team were included in this study. The patients who were declared dead upon emergency department admission, patients with inadequate clinical and operative data, and patients without abdominal trauma at the end of the follow-up period were excluded from this study. In total, 113 patients who had intra-abdominal injury that were operated or conservatively followed by the surgical team were included. The characteristics of the cohort analyzed in this study are summarized in Table 1. The patients operated at the end of a follow-up period were included in the operative management group. The patients that have not been operated have been included in the conservative management group. Due to the retrospective nature of this study, we did not apply for approval of the local institutional review board since patient data were only retrospectively analyzed.

Study Parameters

The patient database of Inonu University Turgut Ozal Medical Center was retrospectively analyzed. Demographic Data, mode of injury (Blunt, Penetrating, mixed), duration of hos-

Table 1. Characteristic of the patients in the study

Patient characteristics	
Gender (Male/Female)	90/23
Age (years), mean±SD	36.08±16.1
Duration of hospitalization (days), mean±SD	21.4±52.9
Trauma type, n (%)	
Blunt	80 (70.8)
Penetrating	29 (25.7)
Mixed	4 (3.5)
Mortality, n (%)	22 (19.4)
HR on admission (beats/min) mean±range	91.6±22.6
Management, n (%)	
Conservative	19 (16.8)
Operative	94 (83.2)
Intraoperative findings, n (%)	
Liver	87 (77)
Spleen	23 (20.3)
Bowel	9 (8)
Colon	9 (8)
Mesentery	8 (7)
Retroperitoneal	26 (23)
Diaphragm	14 (12.4)
Adrenal	10 (9)
Extra abdominal	68 (60.2)
Mean arterial pressure (mmHg), mean±range	81.1±20.2
Transfusion ES unit, mean±SD	4.4±6.9
Angiographic intervention, n (%)	3 (2.2)

All continuous variables are expressed as mean±SD and categorical variables are expressed as number and percentage of the study population. SD: Standard deviation; HR: Heart rate; ES: Erythrocyte suspension.

pitalization, treatment of choice (conservative vs operative), outcome of the patient and the causes of mortality, organ(s) that were injured, heart rate and mean arterial pressure on admission, laboratory data, including complete blood count, biochemistry in preoperative period, number of erythrocyte suspension that was transfused, were all included and analyzed in this study.

The continuous and discrete data were further analyzed to find risk factors for mortality in the study cohort. Therefore, the study cohort was divided into two groups consisting of patients with (n=22) and without mortality (n=91).

Classification of the Injuries in the Abdominal and Extra-Abdominal Regions

Solid-organ injuries, hollow organ injuries, injuries in the small bowel and colon mesentery, injuries to the retroperitoneal organs, adrenal injuries and encountered diaphragmatic ruptures were all classified as intra-abdominal injury.

Injuries in the musculoskeletal system, such as the vertebrae, costae, and lungs, extremity, abdominal musculature, pelvic rim, injuries to the central nervous system, were considered as extra-abdominal injury.

Statistical Analysis

The continuous variables were analyzed with the Kolmogorov-Smirnoff Test for evaluation of the distribution of normality. Since all the variables were normally distributed, the continuous variable was expressed as mean and standard deviation. The categorical data were expressed as the percentage of the study population. The dependent and independent variables were compared using the Student t-test. Multiple variables were analyzed by ANOVA for any difference concerning the variables. Any p-value less than 0.05 was considered as statistically significant. Initially, ROC analysis was performed on continuous variables to determine a cut-off value, determining the 90% sensitivity and specificity for the determination of mortality. Following ROC analysis, univariate and multivariate logistic regression analysis was performed to determine independent risk factors that determine the mortality of the patients. All statistical analyses were performed using the Statistical Program for Social Sciences software package 20 (SPSSv20, IBM, USA).

RESULTS

Characteristics of the Patients

Hundred and thirteen patients with abdominal trauma and various intra-abdominal lesions were included in this study. The male to female ratio was 90/23. The mean age of the patients was 36.08±16.1 years.

The distribution of the trauma type was blunt trauma in 80 patients (70.8%), penetrating trauma in 29 patients (25.7%) and mixed trauma in 4 (3.5%). Nineteen patients (16.8%) were treated expectantly. The characteristics and the total number of patients with various organ injuries are summarized in Table1. Twenty-eight patients (24.7%) had isolated liver injury. Two patients (1.7%) had isolated spleen injury. Combined liver and spleen injury was found in two patients (1.7%). The rest of the cohort had combined bowel, solid organ injuries and retroperitoneal injuries accompanied by extra-abdominal injuries, such as injuries to the musculoskeletal system, central nervous system, diaphragmatic injury. The site of extra-abdominal injury is summarized in Table 2.

Twenty-two (19.4%) patients had mortality. The causes of mortality in this study were central nervous system complications in three patients (13.6%), intraoperative loss due to hemorrhagic shock in nine patients (40.9%), septic complications in nine patients (40.9%), and unknown in one patient (4.6%). The demographic, clinical and laboratory values of the patients with and without mortality are summarized in Table 3 and 4. The following section will analyze the study parameters among the patients with and without mortality.

The Demographic, Clinical and Laboratory Characteristics of the Patients with and without Mortality

The demographic, clinical, operative and laboratory data of the patients are summarized in Table 3 and 4. Briefly, the mean age of the patients with and without mortality was 37.9±20.5 and 35.6±14.9 years, respectively (p=0.03). Gender did not have a significant impact on the mortality of the patients.

Blunt abdominal trauma was the main mechanism of injury in 19 patients (86.4%) with mortality, whereas it was observed in 61 (67%) in patients without mortality. This difference was statistically significant (p<0.001). The frequency of retroperitoneal injury was significantly higher in patients with mortality when compared with patients without mortality [n=11 (50%) versus n=15 (16.5%); p<0.001]. Similarly, the frequency of extra-abdominal injury in patients with and without mortality was 68.1% (n=15 patients) and 49.4% (n=45 patients),

Table 2. The distribution of extra abdominal injuries in the study [No injury: 44 (38.9%)]

Extra-abdominal injuries	n	%
Thorax	27	23.9
Central nervous system	15	13.3
Extremity	11	9.7
Vertebra	3	2.7
Others*	13	11.5

*This group includes the pelvic rim, abdominal musculature, renal and ovarian injury.

Table 3. The demographic and clinical characteristics of the study groups in the study

	Mortality		p
	Yes (n=22)	No (n=91)	
Gender (Male/Female)	17/5	73/18	=0.5
Age (years), mean±SD	37.9±20.5	35.6±14.9	=0.03
Duration of hospitalization (days), mean±SD	8.4±12.9	35.6±14.9	=0.2
Trauma type, n (%)			<0.001
Blunt	19 (86.4)	61 (67)	
Penetrating	3 (13.6)	26 (28.6)	
Mixed	0	4 (4.4)	
HR on admission (beats/min), mean±range	94.8±28.9	90.8±20.9	=0.15
Management, n (%)			=0.7
Conservative	4 (18.2)	15 (16.5)	
Operative	18 (81.8)	76 (83.5)	
Intraoperative findings, n (%)			
Liver	17 (77.3)	70 (76.9)	=0.9
Spleen	4 (18.2)	19 (20.9)	=0.5
Bowel	2 (9.1)	7 (7.7)	=0.7
Colon	2 (9.1)	7 (7.7)	=0.7
Mesentery	2 (9.1)	6 (6.6)	=0.6
Retroperitoneal	11 (50)	15 (16.5)	<0.001
Diaphragm	2 (9.1)	8 (13.2)	=0.3
Adrenal	2 (9.1)	8 (8.8)	=0.9
Extra-abdominal	15 (68.1)	45 (49.4)	=0.047
Mean arterial pressure (mmHg), mean±range	67±26.8	84.3±17	=0.02

SD: Standard deviation; HR: Heart rate.

respectively (p=0.047). Mean arterial pressure at admission was found to be significantly lower in patients with mortality when compared to patients without mortality (67±26.8 mmHg versus 84.3±17 mmHg; p=0.02). The number of packed erythrocytes transfused in patients with mortality was 8.8±8.6 units, whereas it was 3.3±5.9 units in the patients without mortality. This difference between the patients with and without mortality was statistically significant (p=0.047). Other clinical and trauma-related characteristics did not significantly differ among patients with and without mortality.

The laboratory values in patients with and without mortality were also analyzed (Table 2). Mean platelet count in patients with and without mortality was 70887±100294 corpuscles/mL and 108134±120002 corpuscles/mL, respectively (p=0.057). Although this difference did not reach statistical significance, the p-value is very close to 0.05 and maybe more significant with a higher volume of patients in the future. Mean international normalized ratio (INR) was significantly higher in patients with mortality when compared to patients without mortality (4.3±7.1 versus 2.7±4; p=0.016). Mean lactate dehydrogenase (LDH) level in patients with mortality was 1685.7±333.8 IU/mL, whereas it was 675.8±565.3 IU/mL in patients without mortality. This difference was statistically significant (p<0.001). Mean aspartate aminotransferase (AST) level in patients with and without mortality was 850±2349.6 IU/mL and 239±366.05 IU/mL, respectively (p<0.001). Mean alanine aminotransferase (ALT) was significantly higher in patients with mortality when compared to patients without mortality (430±619 versus 244±448 IU7mL; p<0.001). Mean alkaline phosphatase (ALP) level in patients with mortality was 76.9±72.8 IU/mL, whereas it was 67.3±27.8 IU/mL in patients without mortality. This difference was statistically significant (p=0.003). Other laboratory values did not show significant differences among patients with and without mortality.

Risk Factors Determining Mortality

We determined the cut-off values for INR, LDH, ALT, ALP and mean arterial pressure on admission with ROC analysis. These cut-off values were included in the logistic regression analysis to analyze the risk factors determining mortality in the patients. Multivariate analysis showed that retroperitoneal injury (HR: 5.7 CI: 95% Range: 1.9–16.3; p=0.001) and

Table 4. Distribution of the parameters among the study groups

	Exitus	Alive	p
	Mean±SD	Mean±SD	
Transfusion	8.8±8.6	3.3±5.9	=0.047
Hemoglobin (g/dL)	10.4±4.8	10.4±4.3	=0.9
Hematocrit (%)	26.4±11.8	31.6±12.3	=0.8
Platelet (corpuscle/mm^3)	70887±106294	108134±120002	=0.057
Neutrophil (corpuscle/mm^3)	67±22.4	70.1±23.3	=0.9
Leukocyte (corpuscle/mm^3)	12100±8187	15516±8387	=0.9
International normalized ratio	4.3±7.1	2.7±4	=0.016
Fibrinogen (Units/mL)	164.2±135.7	790±249.6	=0.1
Creatinine (mg/dL)	1.2±0.7	0.7±0.4	=0.057
Lactate dehydrogenase (IU/mL)	1685.7±333.8	675.8±565.3	<0.001
Aspartate aminotransferase (IU/mL)	850±2349.6	239±366.5	<0.001
Alanine aminotransferase (IU/mL)	430±619	244±448	=0.048
Total bilirubin (mg/dL)	0.3±0.5	0.3±0.4	=0.2
Direct bilirubin (mg/dL)	0.1±0.2	0.1±0.2	=0.2
Alkaline phosphatase (IU/mL)	76.9±72.8	67.3±27.8	=0.003
Gamma glutamyl transferase (IU/mL)	28.7±27.2	31.7±26.1	=0.7
Albumin (g/dL)	2.4±0.9	2.8±1.1	=0.4
Glucose (mg/dL)	166±59.5	166±57	=0.7

SD: Standard deviation.

ALT >519 IU/mL (HR: 4.5 CI: 95% Range: 1.3–15; p=0.015) levels before the operation were independent risk factors predicting mortality.

DISCUSSION

Abdominal trauma is a major world health problem leading to mortality in more than 30% of the cases.[3] In the present study, we found that there is no gender difference concerning the trauma type, most frequent mechanism of injury was blunt abdominal trauma which is mostly due to vehicle collisions and liver was affected in 87% of the patients and 80% of the patients required surgery for their injuries. Furthermore, we found that the presence of retroperitoneal injury predicted the mortality of the patients (68.1% versus 49.4%).

The blunt abdominal trauma rate was observed in 86.4% of the emergency department admissions in the present study. Blunt abdominal trauma, frequently injured extra-abdominal regions are a thoracic cavity in 45% of the cases and central nervous system in 42% of the patients.[11] In the present study, we also found thorax to be the most frequent site of extra-abdominal injury, which is observed in 23.9% of the cases. Central nervous system injury was observed in 13.3% of the cases, which was the second most frequent site of extra-abdominal injury. Furthermore; the presence of extra-abdominal injury was significantly higher in patients with mortality.

In the present study, 79.4% of the patients were male. In the literature, male are more frequent victims of both blunt and penetrating abdominal trauma, and reported rates have been 82–88%.[5,12–14] This difference is because males are more active in daily life and subject to road traffic accidents and interpersonal conflicts. Furthermore, we found no difference about gender distribution in patients with and without mortality. This suggests that although females are infrequent victims of abdominal, trauma-related mortality developed more frequently in female patients. It has been reported that females are vulnerable to brain injury due to various reasons.[15] This may explain the difference between trauma frequency and mortality rates between the two genders. The mortality rate of abdominal trauma has been reported to range between 2 to 27% in cases with early admissions, whereas in late admissions, mortality is reported to increase to 4 to 36%.[4,10,11] In the present study, the mortality rate was 19.4%. The majority of causes of death are due to occult central nervous system injuries and irreversible hemorrhagic shock. Our result suggests that admissions to the emergency department were relatively late, and the patient's general condition is more critical. The difference of distribution of age between the patients with and without mortality (37.9 versus 35.6 years) is not a major difference and these patients can be considered as being at the same age interval. Therefore, we can easily say that age is not a determining factor for the development of mortality in patients with abdominal trauma.

The retroperitoneal injury was an independent risk factor for mortality in the present study. Haddad et al.[16] have also reported retroperitoneal hematoma to be an independent risk factor of mortality. We believe this can be explained by the energy of trauma and any trauma leading to retroperitoneal injury is the result of a high-energy injury and therefore, the mortality of the patients might have increased. Various trauma scores, including Injury Severity Score (ISS) and Revised Trauma Scores (RTS), have been used to describe the severity of the injury. Karaca et al.[17] found that ISS >50 was a predictor of mortality in gunshot wound injuries. Both Haddad et al.[16] (ISS=37 versus 29) and Gad et al.[12] (Low RTS was associated with five times higher mortality rate) have reported more severe trauma in patients with mortality, all of which supports our hypothesis.

Experimental models of ischemia and reperfusion injury have shown that ALT, AST, LDH are markers showing the extent of liver injury.[18] Therefore, if these laboratory parameters are high, the extent of liver injury is high. In the present study, we found higher ALT, AST and LDH levels in patients with mortality. This is related to the trauma severity and the extent of liver injury. Furthermore, ALT levels over 519 IU/mL were an independent risk factor for mortality, which is the unique finding of the present study. Hemodynamic parameters of the patients have been shown to increase the mortality risk of the patients.[2,3,19]

Systolic blood pressure has been frequently reported parameter, and blood pressures below 60–90 mmHg have been shown to increase mortality nearly four times,[2,3] We evaluated the differences in mean arterial pressures between patients with and without mortality. We found that patients with mortality had significantly lower mean arterial pressure when compared to patients without mortality. This result suggests the severity of hemorrhagic shock upon admission to the emergency department. However, our logistic regression analysis did not show mean arterial pressure as an independent risk factor for mortality.

Low hemoglobin levels have previously been reported to be lower in fatal abdominal trauma.[2,12] Furthermore, patients with anemia were reported to have five times higher mortality risk.[2] In the present study, hemoglobin levels of the patients with mortality were lower than the patients without mortality. Hemoglobin is an indirect determinant of the amount of blood loss of the patients. Therefore, lower hemoglobin levels suggest more severe hemorrhagic shock in the patients. Although we did not find a significant difference in the hemoglobin levels between the patients with and without mortality, we found higher transfusion rates in patients with mortality mean 8.8 units of ES versus 3.3 units of ES). Similarly, Baygeldi et al.[19] have found four times more erythrocyte transfusion in patents with morbidity following management of solid organ injuries following blunt and penetrating abdominal trauma.

Consumption coagulopathy and platelet dysfunction are prominent features of severe hemorrhagic shock.[20] In the present study, we found lower mean platelet counts and increased INR in abdominal trauma patients with mortality when compared to patients without mortality. This is a reflection of the degree of blood loss that resulted in platelet dysfunction and coagulopathy due to consumption. However, the results of the present study should be evaluated with caution. The limitations of the present study are its retrospective design and lack of trauma severity score data. Furthermore, we are a tertiary referral center; therefore, more critical patients admitted to our emergency department, which may cause higher mortality rates in our patients. However, this is a high volume study from a single institution, and the results contribute to the general literature.

In conclusion, the results of the present study suggest that upon admission patients with anemia, low mean arterial pressure elevated AST, ALT, ALP, LDH, thrombocytopenia and retroperitoneal injury have a higher risk of mortality. Among these parameters, ALT over 519 IU/mL and the presence of retroperitoneal injury were independent risk factors for mortality in patients with abdominal trauma. The results of the present study can be confirmed with multi-institutional studies and a trauma score can be developed for the patients.

Ethics Committee Approval: Retrospective study.

Peer-review: Internally peer-reviewed.

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ORİJİNAL ÇALIŞMA - *ÖZET*

Abdominal travmada mortaliteyi etkileyen risk faktörlerinin analizi

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AMAÇ: Bu çalışmanın amacı, acil servisimizde değerlendirilen künt ve penetran karın travmaları ve bunlara yönelik gerçekleştirilen tedavi yaklaşımları ile mortalite için risk faktörlerini incelemektir.
GEREÇ VE YÖNTEM: Ocak 2009–Nisan 2019 tarihleri arasında acil servisimize başvuran ve travma nedeniyle cerrahi konsültasyonu yapılan 664 hasta çalışma için değerlendirildi. Başvuru anında gerçekleşen ölümler, verileri eksik olan hastalar ve karın travması saptanmayan hastalar çalışmaya dahil edilmedi. Çalışmaya abdominal travmalı 113 hasta alındı. Demografik, klinik, prognostik ve mortalite ile ilişkili faktörler geriye dönük olarak incelendi.
BULGULAR: Hastalardaki yaş ortalaması 36.08±16.1 yıldı. Bunlardan 90'ı erkekti. Seksen hastada (%70.8) künt karın travmasının (KKT) mevcut olduğu gözlendi. Yimi sekiz hastada (%24.7) izole karaciğer ve iki hastada (%1.7) dalak yaralanması vardı. Kombine karaciğer ve dalak yaralanmasının iki hastada (%1.7) görüldü. Yirmi iki (%19.4) hastada mortalite gelişti. Mortalite nedenlerini geri dönüşümsüz hemorajik şok (%40.9) ve merkezi sinir sistemi (%13.6) yaralanmaları oluşturmaktaydı. KKT mortal seyreden grupta ana yaralanma mekanizmasını oluşturmaktaydı (%86.4 ve %67, p<0.001). Retroperitoneal yaralanma sıklığı mortal seyreden hastalarda anlamlı olarak daha yüksekti (%50 ve %50, %16, p<0.001). Mortal seyreden hastalarda ekstra abdominal yaralanma sıklığı daha yüksekti (%49 ve %68.1; p=0.047). Yatış sırasındaki ortalama arter basıncı mortal seyreden hastalarında anlamlı olarak düşük bulundu (67±26.8 mmHg ve 84.3±17 mmHg; p=0.02). Mortal seyreden hastalarda transfüze edilen eritrosit miktarı daha fazlaydı (8.8±8.6 ve 3.3±5.9 ünite; p=0.047). Ortalama uluslararası normalleştirilmiş oranı (INR) mortal seyreden hastalarda anlamlı derecede yüksekti (4.3±7.1 ve 2.7±4; p=0.016). Mortal seyreden hastalarda ortalama laktat dehidrogenaz daha yüksekti (1685.7±333.82 ve 675.8±565.3 IU/mL; p<0.001). Ortalama alanin amino transferaz (ALT) düzeyi mortal seyreden hastalarda anlamlı olarak daha yüksekti (430±619 ve 244±448 IU/mL; p<0.001). Mortal seyreden hastalarda ortalama alkalen fosfataz (ALP) düzeyi daha yüksekti (76.9±72.8 ve 67.3±27.8 IU/mL; p=0.003). Retroperitoneal yaralanma ve ALT >519 IU/mL varlığının mortalite açısından bağımsız risk faktörleri oldukları bulundu.
TARTIŞMA: Mortal seyreden hasta grubunda bazı laboratuvar değişkenlerinin arttığını ve bunların travmanın ciddiyeti ile ilgili olduğu görüldü. Retroperitoneal yaralanma ve artmış ALT düzeyleri mortalite açısından bağımsız risk faktörü olup, bu bulgu çalışmanın en önemli bulgusu olarak karşımıza çıkmaktadır. Mevcut çalışma bulgularımız travma hastalarının değerlendirilmesinde diğer merkezlere rehberlik edebileceği ve yüksek riskli grupları tanımlamada da kullanılabilir.
Anahtar sözcükler: Abdominal travma; künt karın tarvmaları; mortalite; penetran karın yaralanmaları.

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