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## Analysis of genitourinary trauma patients admitted to the emergency department

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### Abstract

**Background and objective:** Genitourinary injuries are commonly encountered in the emergency department but may be overlooked in case of multi-trauma. Determining the clinical features of genitourinary injuries will help physicians in the management of genitourinary trauma.

**Methods:** The study was conducted in a tertiary hospital. Patients of all ages, admitted in the emergency department, with trauma between 2015 and 2020 were included and analyzed. The cause of genitourinary trauma, affected organs, any accompanying injury, treatments, mortality status, and laboratory tests related to mortality were obtained from the hospital records and analyzed.

**Results:** During the study period, 87 patients admitted to the emergency department with genitourinary trauma were included in the study. The majority of these patients (n=79) were male. Of the patients, 9.2% died. All the patients in the mortality group had additional injuries. The most frequently injured organ was determined as the kidney (51.7%), followed by the scrotum (25.3%) and penis (8.1%). Additional injuries were observed in 81.6% of the patients. Intra-abdominal organ injuries (19.5%) were the most common accompanying injuries. White blood cell count (WBC), aspartate aminotransferase (AST), alanine aminotransferase (ALT), blood glucose and creatinine values measured at the time of admission to the emergency department were found to be higher in the non-survivor group. The majority of the patients (81%) were discharged with conservative treatment and follow-up.

**Conclusion:** It was determined that genitourinary injuries were frequently seen with additional injuries. Genitourinary injury should be evaluated carefully, especially in the presence of intra-abdominal organ injuries.

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### Introduction

Traumas constitute a general public health problem and an important cause of mortality and morbidity. Genitourinary injuries occur in approximately 10-20% of multi-trauma cases and are more common in young men. They usually occur with other life-threatening injuries that require immediate intervention [1]. The most common causes of genitourinary injuries are traffic accidents, falls, sexual assaults, gunshot wounds, and penetrating stab wounds. Pelvic fractures and abdominal organ damage are the most common injuries accompanied by genitourinary injuries. The most

frequently injured organ in genitourinary injuries is the kidney [2].

Evaluation of genital organ damage in trauma patients is performed in a secondary examination. Genitourinary injuries can sometimes be asymptomatic or of secondary importance in case of multi-trauma. Although the mortality rate is low in genitourinary trauma, they are important in terms of their possibility to cause sexual dysfunction and permanent kidney damage. Early diagnosis and treatment of genitourinary injuries are important in preventing or minimizing complications, such as mortality and renal

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dysfunction, urinary incontinence and sexual dysfunction [3]. As in all trauma cases, in patients with genitourinary injuries, the airway should be protected first, and then external bleeding and hemodynamic shock should be controlled. After evaluating possible causes of fatal trauma, a genitourinary evaluation should be performed in the early period [4]. Therefore, the main purpose of this study was to evaluate genitourinary injuries in trauma patients, discuss them in light of the literature, and draw the attention of emergency physicians to these injuries.

## Methods

**Study design and study population:** The study was initiated after obtaining approval from the Clinical Research Ethics Committee of Adiyaman university (ethics committee number: 2020/07-34). Informed consent was waived due to the retrospective nature of the study.

In this study, patients from all age groups who presented to our emergency department due to trauma between 2015 and 2020 were examined. Patients with injuries caused by traffic accidents, falls, battery, and sports activities were identified from the hospital archive. The epicrisis reports of these patients were examined, and the patients with genitourinary trauma were recorded. The patients' age, gender, cause of trauma, time of trauma, injured organ, accompanying additional injury, conclusion time of consultation, length of hospital stay, clinical outcomes, and the values of laboratory investigations/tests at the time of admission to the emergency department were recorded in prepared forms. The obtained values were analyzed and compared between the non-survivor and survivor groups. Patients without genitourinary trauma and those with missing data in the hospital archive were not included in the study.

**Statistical Analysis:** SPSS software package version 17 was used in the study. The suitability of continuous data to normal distribution was investigated with the Kolmogorov-Smirnov test. Data conforming to normal distribution were analyzed using Student's t-test, and those that were not normally distributed were analyzed with

the Mann-Whitney U test. The chi-square test was used to compare qualitative data. Numerical data conforming to normal distribution were shown as mean  $\pm$  standard deviation, and those that were not normally distributed were presented as median (minimum-maximum) values. Categorical variables were expressed as numbers and percentages. P values of  $<0.05$  were considered statistically significant.

## Results

During the study period, a total of 87 patients, 79 (90.8 %) male and 8 (9.2%) female, presented to the emergency department with genitourinary injuries (Table-1). Concerning age, 36.7% of the patients consisted of young males aged 21-40 years. The injuries most frequently occurred in the time zone between 16:00 and 23:59 (49.4%), and when the trauma type was considered, it was most frequently related to traffic accidents (48.3%).

**Table-1:** Characteristics of the study patients with genitourinary injuries (N=87)

Variable	n	(%)
<b>Gender</b>		
Male	79	90.8
Female	8	9.2
<b>Age, years</b>		
$\leq 20$	25	28.7
21-40	32	36.7
41-60	20	22.9
$\geq 61$	10	11.4
<b>Time of injury</b>		
08:00-15:59	34	39.1
16:00-23:59	43	49.4
24:00-07:59	10	11.5
<b>Trauma type</b>		
Traffic accident	42	48.3
Fall from a height	19	21.8
Penetrating wound	11	12.6
Battery	5	5.7
Gunshot wound	7	8.1
Blunt abdominal trauma	2	2.3
Trapped in wreckage	1	1.1

The most common injury type (51.7%) was kidney injury, followed by scrotal injury (25.3%) and penile injury (8.1%). When accompanying injuries were examined, an additional pathology was observed in 81.6% of the patients. It was determined that intra-abdominal organ injury (19.5%) was the most common accompanying injury, followed by pelvis fractures (17.2%), extremity fractures (13.8%), and thoracic injury (12.6%). All the patients in the non-survivor group had additional pathologies. The majority (72.4%) of urology consultations requested from the emergency department were completed within the first hour. Almost half (49.4%) of the patient had to stay in hospital for 5 to 20 days. The mortality rate of patients with urogenital trauma was found to be 9.2% (Table-2).

The values of serum aspartate amino transferase (AST), alanine amino transferase (ALT), creatinine and blood glucose in the patients who died were higher than the values of the patients who survived according to the tests taken at the time of admission to the emergency department. Hemoglobin (Hb), hematocrit (HTC) and urea levels were found to be lower in patients who died, and all of these results were statistically significant ( $p < 0.05$ ). There was no significant difference between deceased and surviving patients in terms of white blood cells (WBC), platelet (PLT) and creatinine kinase (CK) values ( $p > 0.05$ ) (Table- 3).

**Table-2:** Pattern of genitourinary injuries, hospital stay and outcome

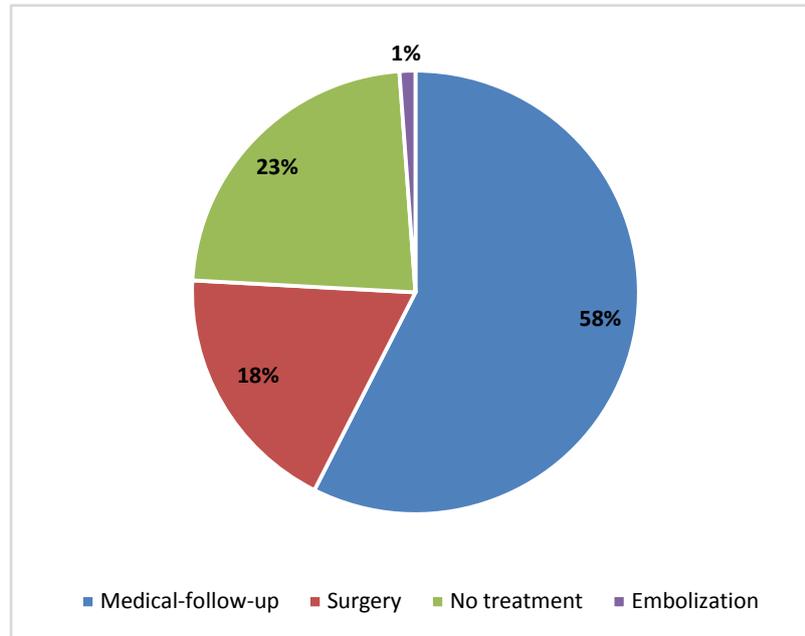
Variables	n	%
<b>Injured organ</b>		
Kidney	45	51.7
Scrotum	22	25.3
Penis	7	8.1
Bladder	5	5.7
Hematuria	4	4.6
Adrenal hematoma	3	3.4
Ureter	1	1.1
<b>Accompanying injury</b>		
Abdominal organ injury	17	19.5
Pelvic fracture	15	17.2
Extremity fracture	12	13.8
Thoracic injury	11	12.6
Cranial injury	9	10.3
Vertebral fracture	7	8.1
None	16	18.4
<b>Time to complete consultation</b>		
<1hour	63	72.4
1-4hours	17	19.5
>4hours	7	8
<b>Length of hospital stay</b>		
<5 days	36	41.4
5-20 days	43	49.4
>20 days	8	9.2
<b>Outcome</b>		
Discharged	79	90.8
Non-survivor (Expired)	8	9.2

**Table-3:** Comparative values of laboratory investigations of survivor and non-survivors cases with genitourinary injuries

Investigations	Non-survivor group (Mean $\pm$ SD)	Survivor group (Mean $\pm$ SD)	p value
Total WBC ( $\times 10^9$ /L)	16,86 $\pm$ 10.1	15.04 $\pm$ 5.9	0.877
Hemoglobin (g/dL)	10,54 $\pm$ 3.6	14,22 $\pm$ 2.1	<b>0.002</b>
Hematocrit (%)	32,29 $\pm$ 11.7	42,8 $\pm$ 6.2	<b>0.012</b>
Total platelet ( $\times 10^9$ /L)	238,6 $\pm$ 95.7	253,4 $\pm$ 60.1	0.831
S. Urea (mg/dL)	25,88 $\pm$ 6.6	33,66 $\pm$ 10.2	<b>0.026</b>
S. Creatinine (mg/dL)	1,13 $\pm$ 0.34	0,92 $\pm$ 0.19	<b>0.049</b>
S. AST (U/L)	426 $\pm$ 726.9	98 $\pm$ 149.6	<b>0.005</b>
S. ALT (U/L)	255 $\pm$ 301.5	87 $\pm$ 154.6	<b>0.002</b>
Blood glucose (mg/dL)	233.8 $\pm$ 131.3	132.9 $\pm$ 41.1	<b>0.002</b>
S. Creatinine kinase (U/L)	678 $\pm$ 276.9	891 $\pm$ 685	0.338

Note: WBC - white blood cell; AST - aspartate aminotransferase; ALT - alanine aminotransferase; S- serum.

Considering the interventions performed on the patients, 58% of the patients were hospitalized with medical treatment, 23% were followed up on an outpatient basis, 18% received surgical treatment, and one underwent arterial embolization (Figure-1).



**Figure-1:** Interventions performed on patients with genitourinary injuries

## Discussion

The first place to which most trauma patients are referred is the emergency department. Genitourinary injuries accompanying multiple traumas may be overlooked during the first examination [5]. Genitourinary injuries can cause significant morbidity and mortality [6]. Although genitourinary injuries can be seen in both genders, their incidence is higher in young men [7]. The majority of the patients in our study consisted of males aged 21-40 years. This could be due to the greater exposure of young males to trauma. Trauma is the cause of 10% of all mortality. The mortality rate is lower in isolated genitourinary injuries [8]. In our study, the mortality rate was found to be 9.2%, and additional pathologies were found in all of these patients. None of the patients with isolated genitourinary trauma died. Multiple organ injuries involving more than one system were found to increase the mortality.

Traffic accidents are one of the most important causes of multi-trauma and have an increasing global incidence [9]. Buyukcam et al. [10] reported that the most common cause of genitourinary traumas was traffic accidents at a rate of 52%. Similarly, in our study, traffic accidents constituted the most common cause of genitourinary traumas at a rate of 54%. Although the kidney is a well-protected organ, it is the most frequently injured organ in genitourinary trauma [11]. The most common injury is due to blunt trauma. Previous studies found that 80-90% of kidney traumas were accompanied by additional pathologies [12.13]. In the current study, the most frequently injured organ was the kidney (51.7%). The rate of pathologies accompanying the genitourinary traumas was 81.4%, which was in agreement with other studies. However, contrary to our study, Bagga et al. [14] found that external genital organ injuries were the most common. We believe that more studies are needed on this subject.

Recently, the recommended management approach in kidney trauma is conservative treatment. Arterial embolization is recommended in patients with active bleeding. Büyükcam et al. [10] reported that only 21 of 153 patients underwent surgery. In our study, 16 of the patients were treated in the operating room. Arterial embolization was applied to only one patient. Genitourinary injuries should be followed up closely in terms of hemodynamics.

In trauma patients, changes in laboratory values can be seen due to coagulopathy and organ damage. Coagulopathy is seen in 25% of severe traumas [15]. In our study, lower hemoglobin and platelet and higher WBC values were observed among the cases in the non-survivor group, which might be due to bleeding and coagulopathy. In addition, higher AST and ALT levels among the non-survivors indicate the presence of accompanying intra-abdominal organ injuries.

### Conclusion

Genitourinary trauma is often seen together with additional pathologies. Genitourinary injuries should be carefully examined, especially when there are intra-abdominal organ injuries. In patients with genitourinary injuries, laboratory values evaluated at the time of admission to the emergency department can provide clues about the possibility of fatal outcome. Further research is needed in this area.

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