



Analysis of the patients admitted to emergency department due to urogenital trauma and investigation of factors that affect mortality

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ABSTRACT

Objective: To determine the general characteristics of urogenital trauma, and the factors that impact on mortality.

Methods: Patients who were over 18 years of age admitted to the emergency service with urogenital injury between 1 January 2010 and 31 December 2014 were evaluated retrospectively. Age, gender, type of trauma, injured urogenital organs, vital parameters, additional organ injuries and mortality rate were investigated. Categorical variables were compared by using *Chi*-square test and comparing to groups data were performed with the Mann-Whitney and Kruskal-Wallis tests. $P < 0.05$ was considered statistically significant.

Results: The median age of 174 patients was 35 years (interquartile range: 22), and 150 patients (86.2%) were males. It was determined that the incidence of urogenital trauma increased in August and September. The kidney was the most frequently injured organ (41.4%) and the most common cause of injury was traffic accidents (49.4%). Mean arterial pressure and revised trauma score were the lowest while pulse rate was the highest in renal trauma patients ($P < 0.05$). Mean arterial pressure, revised trauma score and respiratory rate were low in mortal group while pulse rate and Glasgow coma scale scores were significantly higher ($P < 0.05$).

Conclusions: It is determined that the most common injured organs in trauma patients are kidneys and bladder and also no single factor is effective on mortality.

1. Introduction

Trauma is the most common cause of deaths under 40 year old and responsible for 14% of all deaths[1]. Genitourinary injuries are present in almost 10% of trauma patients admitted to the emergency department[2]. Although the majority of urogenital injuries occur due to blunt trauma, penetrating injuries have a fairly high incidence in urogenital injuries[3,4]. Urinary tract injuries are generally evaluated

and diagnosed in the hospital emergency rooms[5]. It sometimes makes difficult to diagnose that the majority of the patients have multi trauma[5,6].

Detection and appropriate treatment of urogenital injury are important to minimize the complications such as mortality rate, as well as kidney dysfunction, the incontinence and sexual dysfunction[3,4].

In this study we aimed to investigate the general characteristics of patients admitted to our emergency department because of urogenital trauma and the factors affecting mortality.

2. Materials and methods

The study was performed at Sivas State Hospital Emergency Department. The study protocol was performed according to the Helsinki declaration and approved by Cumhuriyet University ethics

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The study protocol was performed according to the Helsinki declaration and approved by Cumhuriyet University ethics committee.

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committee (16th October, 2015) retrospectively. Informed written consent was not obtained because this study was retrospective. Patients over the age of 18 who presented to the emergency department due to trauma and detected urogenital injury between the dates of January 1, 2010–December 31, 2014 were evaluated by using hospital automation system. Patients younger than 18 years old and missing data entry were excluded from the study.

Age, gender, type of trauma, injured urogenital organs, vital parameters, Glasgow coma scale (GCS) scores, revised trauma scores (RTS), additional organ injuries and mortality rate of the patients were investigated.

Data analysis was performed with SPSS for Windows 17.00 software package. Kolmogorov-Smirnov test was used to determine normal distribution of continuous variable. Descriptive statistics were shown in the form of median [interquartile range (IQR)] and the categorical variables were shown as number of cases and percentage. Categorical variables were evaluated by using *Chi-square* (Pearson vs. Fisher) test and the analysis of the non-parametric datas was compared with the Mann-Whitney and Kruskal-Wallis tests. Logistic regression analysis was performed to determine the factors influencing mortality. $P < 0.05$ was considered statistically significant.

3. Results

A total of 174 patients met the criteria were included in the study. The median age of patients was 35 (IQR: 22) years, and 150 (86.2%) patients were males. It was defined that the incidence of urogenital trauma increased each year and the most often traumas occurred on August/September (Figures 1 and 2).

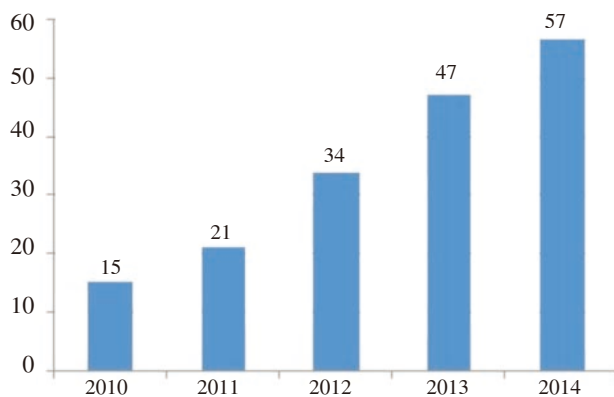


Figure 1. The distribution of urogenital trauma patients by years.

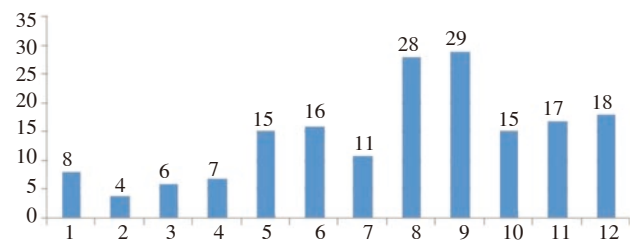


Figure 2. The distribution of urogenital trauma patients by months.

A total of 86.8% patients have been injured with blunt trauma and 13.2% with penetrating trauma. The most common type of injury was traffic accidents (49.4%) (Table 1). The most frequently injured organ was kidney (41.4%), followed by bladder (27.6%) (Table 1). Additional injuries were detected in 63.8% of patients and the most frequently injured regions were pelvis 54 (31%) and thorax 30 (17.2%).

The most frequently injured organ was kidney in the patients with traffic accidents, and penetrating traumas, while the most frequently injured organ was external genitalia in patients with assault ($P < 0.05$) (Table 1). Kidneys were found to be the most common affected organ in additional injury ($P < 0.05$) (Table 1). While there was an increased incidence of renal injury in abdomen, chest and spine injuries, ($P < 0.05$), and the incidence of bladder injury was found to be increased in pelvic fractures ($P > 0.05$) (Table 1). Four (2.3%) patients have died (Table 1). Despite the detection of kidney injury in all patients who died, there was no correlation between mortality rates and injured urogenital organs in terms of statistic ($P > 0.05$) (Table 1).

Median value of mean arterial pressure (MAP) of the patients was 87.3 (28.8) mmHg. Median value of pulse was 88 (24.5) beats/min. Median respiratory rate was 16 (6.0). Median GCS score was 15 (0.0) and median RTS score was 7.84 (0.0). While MAP and RTS were the lowest in renal trauma, and pulse rate was the highest ($P < 0.05$). While MAP and RTS were the highest in urethral trauma, and pulse rate was the lowest ($P < 0.05$). There was no significant relationship between respiratory rate and GCS score with affected urogenital organs ($P > 0.05$) (Table 2).

Though the GCS scores, MAP and RTS of patients who died were low, pulse rate and respiratory rate were significantly higher ($P < 0.05$). There was no relationship between age, gender, mechanism of injury, the injured urogenital organs, additional trauma with mortality rates. We found that there was any unique factor which effects the mortality of genitourinary injuries (Table 3).

Table 1

The relationship among urogenital organ injury, mechanism of injury, additional injury and results.

Parameters		Kidney (n = 72)	Urinary bladder (n = 48)	Urethra (n = 24)	External genitalia (n = 54)	P	
Mechanism (n = 174)	Traffic accident	86	35 (40.7)	27 (31.4)	18 (20.9)	< 0.001	
	Assault	33	11 (33.3)	3 (9.1)	2 (6.1)		
	Occupational accident/falls	32	14 (43.8)	9 (28.1)	4 (12.5)		
	Penetrant trauma	23	12 (52.2)	9 (39.1)	0 (0.0)		
Additional injury	111	50 (45.0)	39 (35.1)	18 (16.2)	4 (3.6)	0.001	
Regions	Head	14	8 (57.1)	2 (14.3)	2 (14.3)	0.579	
	Thorax	30	22 (73.3)	4 (13.3)	4 (13.3)	0.000	
	Abdomen	17	11 (64.7)	6 (35.3)	0 (0.0)	0.033	
	Pelvis	54	18 (33.3)	20 (37.0)	14 (25.9)	6 (3.7)	0.000
	Vertebrae	26	18 (69.2)	8 (30.8)	0 (0.0)	0 (0.0)	0.002
	Extremity	19	9 (47.4)	6 (31.6)	2 (10.5)	2 (10.5)	0.794
Result	Discharged	170	68 (40.0)	48 (28.2)	24 (14.1)	30 (17.6)	0.122
	Exitus	4	4 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	

Table 2

Relationship between vital parameters and injured organs.

Injured organs	MAP (mmHg)	Pulse rate (/min)	Respiratory rate (/min)	GCS	RTS
Median (IQR)	87.3 (28.8)	88.0 (24.5)	16.0 (6.0)	15.0 (0.0)	7.84 (0.0)
Kidneys, median (n = 72)	80.6	91.0	16.0	15.0	7.84
Urinary bladder, median (n = 48)	85.3	94.0	18.0	15.0	7.84
Urethra, median (n = 24)	90.6	83.0	16.0	15.0	7.84
External genitalia, median (n = 54)	101.6	86.0	16.0	15.0	7.84
P	< 0.001	0.012	0.524	0.092	< 0.001

Table 3

Factors that affect mortality.

Factors	Odds ratio	P
Age	-0.648	0.932
Gender	34.318	1.000
Injury mechanism	-15.492	0.230
Pulse rate	1.536	0.009*
Respiratory rate	1.506	0.020*
MAP	1.285	0.011*
GCS score	-23.252	< 0.001*
RTS	35.141	< 0.001*
Injured urogenital organ	-17.010	0.122
Additional trauma	-22.068	0.298

*: Significantly difference.

4. Discussion

In our study, it was determined that factors such as pulse rate, respiratory rate, MAP and RTS are effective on mortality rates, but no factor was found to be effective on mortality alone.

In our study, the median age of patients was 35.5 years and 86.2% of the patients were males. A study conducted by Büyükcım et al. showed that the median age of the patients was 41 years, and 70.6% of patients were males[4]. The study of Gülođlu et al. stated that the average age of 29 years and 80% of patients were men[7]. Durdu et al. have reported that trauma occurs commonly in young men[8]. These data were consistent with literature. We suggested that young men are more active in business life and they drive more than women. As a result, urogenital trauma is more common in this age of group.

In our country, increased vehicle traffic, increased usage of technological devices in home and work life, increasing violence between individuals increase the number of patients exposed to trauma[4]. In our study, we determined that the number of patients who exposed to urogenital trauma increased in each passing year and there was an increased incidence of urogenital trauma in August and September. Büyükcım et al. reported that the most common traumatic injuries were seen in July, August and September[4]. Atherton et al.[9] reported that the number of trauma patients has increased in the summer months. Bhattacharyya and Millham[10] reported that traumas have been mostly seen in July and August. We believe that increasing the frequency of work-related accidents every year with increasing industrialization and traffic accident frequency that has increased over the years due to the increasing number of motor vehicles and increasing frequency of violence in the community raise the rate of trauma. Especially due to the high-risk categories jobs such as construction sector and the increased traffic during the summer period, we believe that the incidence of trauma increases in this period.

In our study, it was revealed that the most common causes of urogenital injuries are traffic accidents. Afolayan et al. stated that

the most common mechanism causing urogenital trauma is traffic accidents (58%)[11]. Büyükcım et al. expressed that the most common cause leading to urogenital trauma is traffic accidents, followed by fall[4]. Gülođlu et al. reported that the most common cause of urogenital injury is traffic accidents[7]. Arslan et al. in their study stated that the most frequently injuries are seen due to traffic accidents[12]. Our results are consistent with the literature. We believe that the most important causes of traffic accidents are the increasing vehicle number each passing day, lack of traffic fines, also receiving an indispensable tool in everyday life of the motor vehicles. There is an increased incidence of urogenital injury rates.

In our study, we have determined that the most common injury was kidney injury, followed by bladder injury. Urethral injury was detected the least injury and ureter injury was not detected. In other studies, it was defined that the most frequently injured urinary organ was kidney and ureter trauma was rare[2,7,11,13-15]. The study of Schmidlin stated that kidney injury due to a external force has the highest probability of genitourinary organ injury[14]. Our findings are consistent with the literature. We believe that kidneys exposed to more trauma than other reproductive organs due to their vulnerable structures in the urogenital tract and their bigger volume. In addition, when it is also considered that fractures of the pelvis is a high risk factor for bladder injury, it is logical that the second most injured urogenital organ is bladder. The reason for not detecting any ureter injury in our study could be that ureters are not completely fixed and they have small volume compared to other urogenital organs. The reason of urethral injury stated on the third place could be that though it is protected by the pelvis, it can also be susceptible to a pelvic fracture and the part of the penis in men is not protected by any structure[16].

In our study, it is defined that while the kidney is the most frequently injured organ due to industrial injuries, penetrant traumas and traffic accidents, external genital organs are the most injured organs due to assault. Büyükcım et al. have stated that kidneys are the most frequently injured organs due to traffic accidents and external genitalia are the most frequently injured organs due to assault[4]. Danuser et al. stated that almost half of the traumatic kidney injuries are related to traffic accidents[17]. The study of Paparel et al. stated that the most frequently injured urogenital organs due to the traffic accident were kidneys (43%)[18]. Osterberg et al. reported that the most frequently injured urogenital organs due to the bicycle accident were kidneys[19]. We believe that kidneys are the most frequently injured body parts because they are more unprotected compared to other urogenital organs and have larger volume in the situations of traffic accidents and occupational accidents. In the assault cases, in order to eliminate the opponent as soon as possible, they attack to the external genitalia.

We found no studies that assess the vital signs and trauma score of patients with urogenital trauma in the literature. In our study, while

the MAP and RTS were the lowest, and pulse rate was the highest in renal traumas. When you consider that the blood supply to the kidney as well and there is no space like retroperitoneal space which will allow limitation of lack of blood. It can be said that a kidney injury would be a serious risk for bleeding and could create a tendency toward hypotensive shock. We believe that due to this bleeding, hypercapnia developed in order to overcome hypoxia and decreased in blood pressure result fallen in RTS. Better outcomes of vital signs and scores of patients with isolated urogenital injury may be related to lower energy trauma and further deterioration in the clinic of the patients due to pathology in other systems. Additionally it should be noted that GCS score can be reduced due to most of the urogenital injuries related to high-energy blunt trauma and it has the negative effects on RTS.

In our study, it was determined that 63.8% of patients have additional injury and the most frequently injured organ was pelvis. Other organs and systems injuries are seen in more than 90% of the urogenital injuries due to traffic accident[14]. A total of 80% of the penetrating kidney injuries are accompanied by abdominal visceral injuries[2]. The study of Büyükcım et al. stated that there were additional injuries in majority of the patients and the most common fractures were the pelvis fractures[4]. Gülođlu et al. stated that the most common additional injuries were head and pelvis fractures[7]. In the additional injuries, while the most commonly affected organ was kidneys, and the least affected organ was external genitals. We believe that addition injuries are indicator of the severity of trauma injuries and it will increase the likelihood of kidney injury in high-energy trauma. We believe that assault cases contain external genitalia that are unrelated to include additional trauma because of relatively low-powered and more localized areas.

About 80%–85% of renal trauma occur as a result of blunt traumas to abdomen, flank region or back[2]. Kidney injury is seen in about 10% of abdominal trauma[4,20]. Bladder injury usually occurs with pelvic fractures and pelvic fractures are seen in 5%–10% of bladder injuries[6,20]. Büyükcım et al. detected pelvis injury in half of patients with bladder injury in their study[4]. In our study, we detected that while there was an increased frequency of chest, abdomen and kidney injury in spine trauma, the incidence of bladder injury was found to increase in pelvic fracture. Additionally, the location of injured area is associated with injured urogenital organs. Indeed, fractured lumbar vertebra or rib damages the kidney and fractured pelvis damages the bladder and urethra. It supports our thesis.

About 15% of the hospitalized patients are considered as serious trauma, and the mortality rate in these patients is almost 3%[5,16]. In our study, the mortality rate (2.3%) was high. While GCS scores, MAP and RTS values of patients who died were low, and pulse rate and respiratory rate were significantly higher in the same population. We believe that difference in vital parameters and trauma scores in this mortal group is related to both injury in urogenital system and other organs. We think that it takes a picture similar to clinic of shock.

The most common injured organs in urogenital trauma are kidneys and bladder. None of the factors are effective on mortality alone. It can reduce mortality rates the evaluation of patients with high trauma score in terms of urogenital injury.

Conflict of interest statement

The authors report no conflict of interest.

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