Somalia Turkiye Medical Journal (STMJ)
V. 03, No. 01, 2024
doi: 10.58322/stmj.v3i1.42
http://www.stmedj.com
ISSN 2958-2849

Research Article

Assessment of the Characteristics of Traumatic Urogenital Injuries at a Tertiary Care Center: First Report from Somalia

Asir Eraslan[1*], Abdikarim Hussein Mohamed[1], Abdulkadir Isse Mohamed[1], Metin Gur[1], Ahmet Emin Dogan[2], Asli Sen Basaran[2], Fatih Sandikci[2], Ahmed Muhammad Bashir[3], Hasan Nedim Goksel Goktug[2]

[1]Department of Urology, Mogadishu Somalia Turkiye Training and Research Hospital, Mogadishu, Somalia.

[2]Department of Urology, Health Sciences University, Diskapi Training and Research Hospital, Department of Urology, Ankara, Turkiye.

[3]Department of Internal Medicine, Mogadishu Somalia Turkiye Training and Research Hospital, Mogadishu, Somalia.

Corresponding Author Asir Eraslan. **Email:** asireraslan@gmail.com

Received December 5th, 2023
Accepted January 5th, 2024

Abstract **Objective:** Urogenital injuries (UGIs) are present in approximately 10% of adult and less than 3% of pediatric trauma patients. To date, no reports have been published regarding urogenital injuries in Somalia, a sub-Saharan African country. We aimed to analyze the data of urogenital trauma patients who presented to the emergency department of the only tertiary care center in Somalia. **Materials and Methods:** Patients who presented to the emergency department of our institution following trauma between January 2019 and December 2022 and were admitted with the diagnosis of UGI constituted the target population. The collected data included demographic characteristics, type of trauma, involved urogenital organ, admission site, patient management type, and survival. **Results:** Overall, 2426 trauma patients presented to the emergency department. Among these patients, 116 (4.8%) had UGI. The mean patient age was 28.31±5.2 [1-73]. Most (83.6%, n=97) patients were male. Kidneys were the most commonly injured organs (41.4%, n=48), followed by the urinary bladder (17.2%, n=20) and testis (13.7%, n=16). Nine patients with renal trauma underwent nephrectomy. Among 20 patients with bladder injury, half underwent surgical repair. Ten of 16 patients with testicular trauma underwent orchiectomy due to severe rupture. All 12 patients with penile injuries underwent primary repair. Among 10 (8.6%) patients with urethral injuries, 4 underwent immediate primary repair, 3 underwent endoscopic realignment, while the remaining 3 needed cystostomy and delayed urethroplasty. The mortality rate was 10.3% (n=12). **Conclusions:** Surgical exploration was commonly performed due to the severity of the traumas and the presence of adjacent organ injuries. This finding arises from the fact that Somalia is a country affected by terrorism and low-density war.

Keywords Urogenital Injury; Trauma; Somalia.

Introduction

Trauma is a substantial public health problem, accounting for around 10% of all deaths worldwide (1). Moreover, it is the leading cause of death among those aged between 15 and 45.

Urogenital injuries (UGIs) are present in approximately 10% of adult patients and less than 3% of children who have experienced lower abdominal or pelvic trauma (2-4). Although UGIs are rarely fatal, they can result in serious complications such as renal failure, sexual dysfunction, and urethral stricture (5-7). More than 90% of UGIs are caused by blunt trauma, and sports and accidents are among the most common causes of such injuries (8,9). On the other hand, stab wounds and gunshots comprise the highest percentage of penetrating UGIs (9). In addition, males are affected three times more than females.

While kidneys are the most commonly injured organs in the genitourinary system, ureteral injuries are the least common among all genitourinary traumas (10,11). However, regardless of the organ injured, non-operative management is always considered; thus, the rate of this approach has significantly increased in the last decades. To date, no reports have been published regarding urogenital injuries in Somalia, a horn Africa country of around 15 million people, where gunshot injuries are prevalent.

This study aimed to analyze the mechanism and site of injury, and management characteristics in the patients who presented to the emergency department of the only tertiary care center in Somalia and were diagnosed with urogenital trauma.

Materials and Methods

Adult and pediatric patients who presented to the emergency department of Somalia Turkiye Training and Research Hospital following urogenital trauma (i.e., kidney, ureter, bladder, urethra, or external genitalia) between January 2019 and December 2022 and admitted after the initial assessment constituted the target population of this study. It was approved by the ethical review committee of the same institution (MSTH/10173-09.05.2022). Patients with incomplete medical data and those who were discharged home from the emergency department were excluded. All patients or caregivers consented to the use of the medical records for research purposes.

Electronic patient folders were used as the primary data source. The collected data included demographic characteristics, type of trauma (i.e., penetrating, blunt), involved urogenital organ,

admission site (inpatient floor or intensive care unit), and patient management type. Data regarding mortality were also retrieved from the electronic folders. All patients underwent initial triage. The grade of injury was based on the American Association for the Surgery of Trauma (AAST) injury scale (11). Hemodynamically stable patients underwent investigations including blood tests and radiological imaging such as abdominopelvic computerized tomography (CT) scan. In contrast, unstable patients were immediately referred to the operating room or intensive care unit.

The Statistical Package for Social Sciences (SPSS-v25.0., IBM SPSS Statistics for Windows, Armonk, NY, US) was used for all statistical analyses. Continuous variables were presented as means±standard deviations, and categorical variables were given as numbers and percentages (%). Continuous variables were compared using Student's t-test, whereas categorical variables were compared using Pearson's chi-square ($\chi 2$) or Fisher's exact test. The differences were considered significant when the calculated p-value was less than 0.05.

Results

Overall, 2426 trauma patients presented to the emergency department during the study period. Among these patients, 116 (4.8%) had urogenital injuries. The mean patient age was 28.31±5.2 [1-73]. Most (n=63, 54.3%) patients were aged between 19 and 39, while patients aged in the range of 40-59 years accounted for 27.6% (n=32) of all patients (Table 1).

Among all patients with UGI, 13.8% (n=16) were pediatric patients (i.e., age<18). Of note, most (83.6%, n=97) of the UGI patients were male. Our analysis revealed that approximately two third (n=70, 60.3%) of the cases were due to penetrating traumas (46 gunshot and 26 stab wound injuries). In contrast, blunt trauma accounted for 39.7% (n=46) of the cases. Twenty-six patients were injured due to an explosion, while the remaining patients were wounded due to assault (n=6), traffic accidents (n=6), and falls (n=5).

Kidneys were the most commonly injured organs (41.4%, n=48), followed by the urinary bladder (17.2%, n=20) and testis (13.7%, n=16) (Figure 1).

Table 1. Baseline demographic and clinical characteristics of the patients

Variables	Number of patients (n)	Percentage (%)
Age (year)		
<18	16	13.8%
19-39	63	54.3%
40-59	32	27.6%
>60	5	4.3%
Gender		
Male	97	83.6%
Female	19	16.4%
Mechanism of injury		
Penetrating	70	60.3%
Gunshot	46	
Stab wound	24	
Blunt	46	39.7%
Explosion	26	
Assault	9	
Traffic accident	6	
Fall	5	
Hemodynamics		
Stable	47	40.5%
Unstable	69	59.5%
Accompanying injuries		
Abdominopelvic	58	50%
Thoracic	22	19%
Extremity	17	14.7%
Head	10	8.6%
Length of hospital stay (days)		
<4	47	40.5%
5-10	55	47.4%

>10	14	12.1%
Outcome		
Survived	104	89.7%
Died	12	10.3%

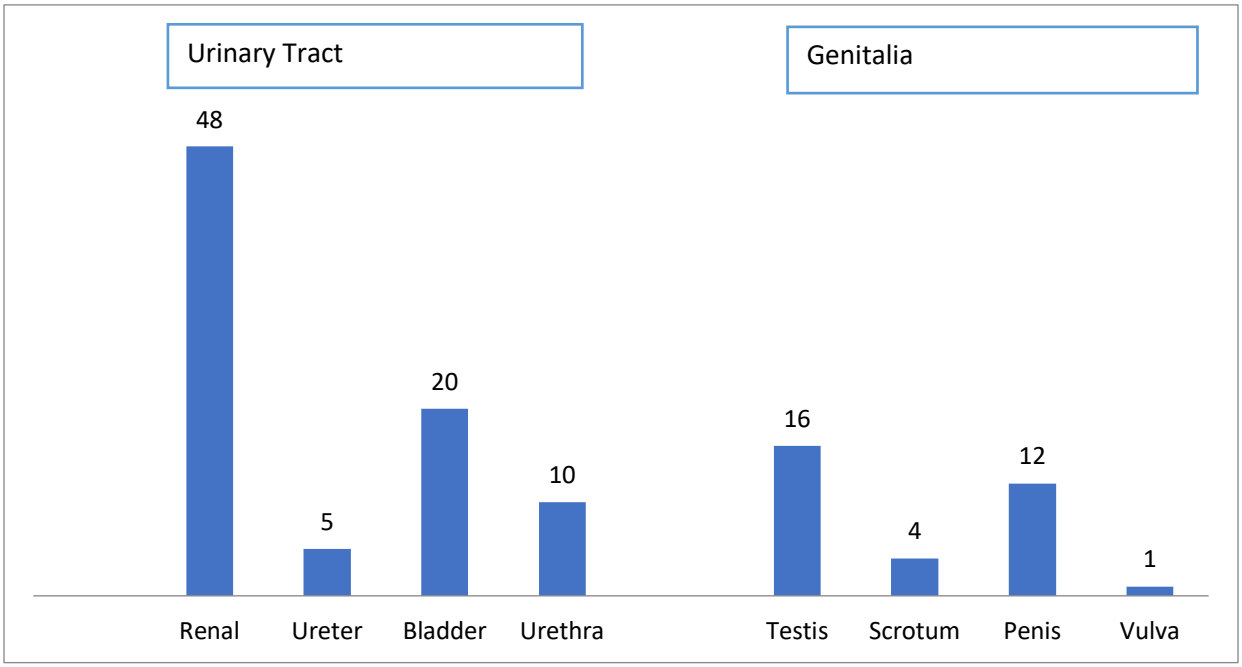

Figure 1. Distribution of urogenital injuries

Notably, 79.1% (n=38) of the renal injuries were due to penetrating trauma (Table 2). According to the AAST grading of renal trauma, most patients had high-grade renal injuries. While 15 patients had Grade 4 renal trauma, Grade 3 and Grade 5 injuries were detected in 10 patients each. Small bowel (n=14), colon (n=12), liver (n=10), and spleen (n=8) injuries were the most common accompanying injuries. Approximately two-thirds of the patients (n=32, 66.7%) were managed conservatively with bed rest, hydration, antibiotherapy, close vital sign monitoring with serial blood investigations, and clinical and radiological follow-up. Of note, 9 patients with high-grade renal trauma (i.e., Grade 4 or Grade 5), accompanying injuries, and hemodynamic instability underwent emergency nephrectomy.

Table 2. Renal trauma and management characteristics

Mechanism of injury	Number (n)
Penetrating	38
Blunt	10
AAST grade	
Grade 1	7
Grade 2	6
Grade 3	10
Grade 4	15
Grade 5	10
Laterality	
Right	20
Left	24
Bilateral	4
Accompying injuries	
Liver	10
Spleen	8
Colon	14
Small intestine	12
Diagphram	7
IVC	3
Management	
Conservative	32
Nephrectomy	9
Repair	7
Outcome	
Survived	39
Died	9

AAST: American Association for the Surgery of Trauma, IVC: Inferior vena cava

Among 20 patients with urinary bladder injury, 12 had an extraperitoneal rupture, while the remaining 8 were diagnosed with an intraperitoneal rupture (Table 3). The primary mechanism of injury was penetrating injury in 11 of these 20 patients. Half of the patients with urinary bladder trauma underwent conservative management with urinary catheterization, while the other half underwent urinary bladder repair.

In total, 16 patients had testicular trauma. Among these patients, 10 underwent orchiectomy due to severe rupture, while six underwent surgical repair of the testis. The primary mechanism of injury was an explosion in 13 patients, while three cases were due to gunshots.

Table 3. Characteristics of the management of other urogenital injuries

Injury	Number of patients (n)	Management	Number of patients (n)
Intraperitoneal bladder injury	8	Surgical repair	8
Extraperitoneal bladder injury	12	Surgical repair	2
Partial ureteral rupture	2	Percutaneous nephrostomy and/or ureteral stenting	2
Total ureteral rupture	3	Ureteroureterostomy	2
		Ureteroneocystostomy	1
Testis injury	16	Orchiectomy	10
		Surgical repair	6
Scrotal/Vulvar injury	5	Surgical repair	5
Penile injury	12	Surgical repair	12
Urethral injury	10	Endoscopic realignment	3
		Primary repair	4
		Cystostomy and delayed urethroplasty	3

All 12 patients with penile injuries underwent primary repair. The main primary mechanism of injury in genitalia was explosions followed by penetrating injuries. None of the penile fractures were due to sexual intercourse. Among 10 patients (8.6%) with urethral injuries, 4 underwent immediate primary repair due to combined penile and urethral injury. Three patients underwent endoscopic realignment, while the remaining 3 needed cystostomy and delayed urethroplasty.

More than half of the cases (n=69, 59.5%) were hemodynamically unstable when presented to the emergency department. However, the mortality rate was 10.3% (n=12). Nine patients who had renal trauma associated with solid intraabdominal organ and major vascular injuries and 3 patients with intraperitoneal bladder rupture accompanied by massive pelvic and retroperitoneal hematoma died. While 8 of these patients died during surgery, the remaining 4 died in the intensive care unit.

Discussion

Although isolated UGIs are rarely fatal, they can result in serious long-term complications such as renal failure, sexual dysfunction, and urethral stricture (5-7). Therefore, UGIs continue to remain a significant health problem. Furthermore, these injuries are frequently accompanied by injuries of other organs, which can lead to a fatal course. In our cohort, most patients who died during the inpatient stay had associated solid intraabdominal organ or major vessel injuries. This finding aligns with the literature (5-7).

In our study, the mean patient age was 28.3 years. Sarvestani et al. analyzed the data of UGI patients in Iran and reported that their patient population had a mean age of 23±12 years (12). In line with this result, Ofoha and coworkers who investigated the data of the patients with UGIs in a tertiary care center in Nigeria noted that their patients had a mean age of 32.1±15.5 years (13).

Our results also align with the literature regarding the gender distribution of the patients (14-16). It is known that, in general, there is a preponderance of males in trauma (14). As such, 83.6% of our patients were male. The predilection can explain this finding to violence, higher rate of driving, and other risk-bearing behaviors in males. In line with our study, Barman et al. reported that 83.3% of their patients with UGI were males (15). In addition to this study from India, researchers from Nigeria and Iran also found similar gender distribution patterns (14,16).

In our study, we calculated the rate of UGI as 4.8%. In a report from Iran, Salimi and colleagues noted that the rate of UGI was 0.5% based on their general trauma registry (16). In another study by Bariol et al., the incidence of genitourinary trauma was reported as 1.5% (17). It can be

suggested that the difference between the rates of UGI may be due to differences in the definition of UGI, sociocultural features of the study populations, and geopolitical characteristics of the study regions. In our study, we did not exclude the patients with associated injuries. Besides, our study region was Somalia, an African country afflicted by a low-density war and terrorism.

In our study, approximately two third (60.3%) of the UGI patients had penetrating trauma. Most of these patients had a UGI due to a gunshot. In contrast, Malay et al., who worked on UGI patients from India, reported that 90% of the patients were injured due to a motor vehicle accident (15). On the other hand, in line with our study, Eke et al. showed that gunshot was the primary mechanism of injury in Nigerian patients with genitourinary trauma (13).

In our cohort, the kidney was the most (41.4%) common site of urogenital injury, followed by the urinary bladder (17.2%) and testis (13.7%). In accordance with this result, Paparel et al. denoted that most of their patients had renal injuries (43%) (18). Hurtuk et al. worked on the American College of Surgeons National Trauma Data Bank and investigated the injury sites of the registered patients (19). Their analysis also revealed that the kidney was the most commonly injured urogenital organ in patients with UGI. In contrast, Eke et al. reported that the urethra was most frequently (49%) injured in their series (20). The urinary bladder was the second most common (24%) injury site in this study.

In general, non-operative management is the current trend for kidney injuries (21,22). According to this approach, conservative management is acceptable in all grades of renal injury as long as the patient is hemodynamically stable. In line with this strategy, we managed more than two third (66.7%) of our patients conservatively with bed rest, hydration, antibiotherapy, and close monitoring. However, 9 patients who were hemodynamically unstable due to high-grade kidney and accompanying intraabdominal organ injuries underwent emergency nephrectomy. Therefore, our approach aligned with the current recommendations (21,22).

Urine bladder rupture can be treated either non-operatively by providing bladder drainage or surgically, depending on the rupture site (extraperitoneal vs. intraperitoneal) and the presence or absence of associated organ injuries (23). Most of these cases are extraperitoneal (24). In line with this, 60% (n=12) of our bladder rupture patients had an extraperitoneal rupture. While 10 of these patients underwent conservative management with urethral catheterization, two patients with extraperitoneal rupture underwent surgical repair due to accompanying organ injuries that necessitated intraabdominal exploration.

In our study, among 14 patients with urethral injury, 4 underwent primary repair, 3 went through endoscopic realignment, and another three were managed with cystostomy and delayed urethroplasty. In accordance with our approach, Javanmard et al. stated that they treated their urethral trauma patients mainly with endoscopic realignment and cystostomy followed by delayed urethroplasty (25).

In our series, 16 patients had testicular trauma, and 6 (37.5%) of these cases underwent surgical repair. In line with this finding, it was previously reported in large patient series that 35–50% of the injured testicles could be salvaged by reconstructive surgery (26,27).

This study has certain limitations. First, it is a retrospective single-center study with a small sample size. Second, long-term functional outcomes were not included since most patients did not present for follow-up due to socioeconomic restrictions and war and terrorism-related safety concerns. However, as a strength, it is the first study to examine the characteristics of UGIs in Somalia.

Conclusions

Our study findings revealed that UGIs were mainly encountered in young male patients. Surgical exploration was commonly performed due to the severity of the traumas and the presence of adjacent organ injuries. This finding arises from the fact that Somalia is a country affected by terrorism and low-density war.

Ethics Approval

This study was approved by the institutional ethical review board of Somalia Turkiye Training and Research Hospital (MSTH 09.05.2022/10173).

Informed consent

The research objective was explained to the participants; all patients were given oral and written informed consent for participation in this study.

Conflicts of interest

The authors declared no competing interest.

Funding

The authors declare that this study has not received any funding.

Availability of data and materials

All study data and materials can be obtained from the corresponding author.

References

1. Coccolini F, Moore EE, Kluger Y, Biffl W, Leppaniemi A, Matsumura Y, Kim F, Peitzman AB, Fraga GP, Sartelli M, Ansaloni L. Kidney and uro-trauma: WSES-AAST guidelines. World J Emerg Surg 2019; 14:1-25.
2. Morey AF, Broghammer JA, Hollowell CM, McKibben MJ, Souter L. Urotrauma guideline 2020: AUA guideline. J Urol 2021; 205:30-35.
3. Hagedorn JC, Fox N, Ellison JS, Russell R, Witt CE, Zeller K, Ferrada P, Draus Jr JM. Pediatric blunt renal trauma practice management guidelines: Collaboration between the Eastern Association for the Surgery of Trauma and the Pediatric Trauma Society. J Trauma Acute Care Surg 2019; 86:916-925.
4. Erlich T, Kitrey ND. Renal trauma: the current best practice. Ther Adv Urol 2018; 10:295-303.
5. Schmidt J, Loftus CJ, Skokan A, Hagedorn JC. Routine repeat imaging may be avoidable for asymptomatic pediatric patients with renal trauma. J Ped Urol 2022; 18:76. e1-76.e8
6. Mirzazadeh M, Fallahkarkan M, Hosseini J. Penile fracture epidemiology, diagnosis and management in Iran: a narrative review. Transl Androl Urol 2017; 6:158-166.
7. Koch GE, Huang JJ, Zwaschka TA, Walton WJ, Guillamondegui OD, Johnsen NV. A 15-Year Experience with High-Grade Renal Trauma: Factors Associated with Obtaining Delayed-Phase Imaging and Subsequent Outcomes. J Am Coll Surg 233: pS308.
8. Azmi YA, Renaldo J. Management and Outcome of Urogenital Trauma in Tertiary Hospital: The 8-Year's Experience in Indonesia. Open Access Maced J Med Sci 2022; 10:1502-1508.
9. Čapka D, Klézl P, Fric M, Grill R. Urogenital Injury in Polytrauma Patients: a Five-year Epidemiological Study. Acta Chir Orthop Traumatol Cech 2021; 88:307-312.
10. Tae BS, Jang HA, Yu J, Oh KJ, Moon KH, Park JY. Epidemiology and Management Trend of Renal Trauma: Results of a Nationwide Population-Based Study. J Korean Med Sci 2022;37(47). e333.

11. du Plessis WM, du Plessis DE, Bruce JL, Smith MT, Clarke DL. High grade renal trauma: Does the mechanism of penetrating injury influence renal salvage rate? Injury 2022; 53:76-80.
12. Sarvestani AS, Zamiri M. Assessment of genitourinary trauma in Southeastern Iran. Trauma mon 2013; 18:113-116.
13. Ofoha CG, Shu'aibu SI, Onowa VE, Galam ZZ. Contemporary management of genitourinary injuries in a tertiary trauma centre in Nigeria. Int J Res Med Sci 2018; 6:1134-1138.
14. Bardenheuer M, Obertacke U, Waydhas C, Nast-Kolb D. Epidemiologie des Schwerverletzten. Eine prospektive Erfassung der präklinischen und klinischen Versorgung. AG Polytrauma der DGU [Epidemiology of the severely injured patient. A prospective assessment of preclinical and clinical management. AG Polytrauma of DGU]. Unfallchirurg 2000; 103:355-363.
15. Barman MK, Maitra T, Biswas A, Mukherjee K, Venugopal PN. Epidemiology and Management of Urogenital Trauma: The 7-Years' Experience at West Bengal, India**.** Inter J Public Health 2014; 1:66-69.
16. Salimi J, Nikoobakht MR, Zareei MR. Epidemiologic study of 284 patients with urogenital trauma in three trauma center in Tehran. Urol J 2004; 1:117-120.
17. Bariol SV, Stewart GD, Smith RD, McKeown DW, Tolley DA. An analysis of urinary tract trauma in Scotland: imnpact on management and resource needs. Surgeon 2005; 3:27-30.
18. Paparel P, N'Diaye A, Laumon B, Caillot JL, Perrin P, Ruffion A. The epidemiology of trauma of the genitourinary system after traffic accidents: analysis of a register of over 43,000 victims. BJU Int 2006; 97:338-341.
19. Hurtuk M, Reed RL 2nd, Esposito TJ, Davis KA, Luchette FA. Trauma surgeons practice what they preach: The NTDB story on solid organ injury management. J Trauma 2006; 61:243-254.
20. Eke N. Urogenital tract trauma in Port Harcourt. Acta Chir Belg 2001; 101:240-242.
21. Santucci RA, Fisher MB. The literature increasingly supports expectant (conservative) management of renal trauma--a systematic review. J Trauma 2005;59(:493-503.
22. Bruce LM, Croce MA, Santaniello JM, Miller PR, Lyden SP, Fabian TC. Blunt renal artery injury: incidence, diagnosis, and management. Am Surg 2001; 67:550-554.

23. Santucci RA, Mcaninch JW. Bladder injuries: evaluation and management. Braz J Urol 2000; 26:408-414.
24. Kong JP, Bultitude MF, Royce P, Gruen RL, Cato A, Corcoran NM. Lower urinary tract injuries following blunt trauma: a review of contemporary management. Rev Urol 2011; 13:119-130.
25. Javanmard B, Fallah-Karkan M, Razzaghi M, Ansari Djafari A, Ghiasy S, Lotfi B, Vafaee R. Characteristics of Traumatic Urogenital Injuries in Emergency Department; a 10-year Cross-sectional Study. Arch Acad Emerg Med 2019;7(1): e63.
26. Churukanti GR, Kim A, Rich DD, Schuyler KG, Lavien GD, Stein DM, Siddiqui MM. Role of Ultrasonography for Testicular Injuries in Penetrating Scrotal Trauma. Urology 2016;95:208-212.
27. Demetriades D, Karaiskakis M, Velmahos G, Alo K, Newton E, Murray J, Asensio J, Belzberg H, Berne T, Shoemaker W. Effect on outcome of early intensive management of geriatric trauma patients. Br J Surg 2002;89(10):1319-1322.