



Original Research

Etiology, Patterns and Short-Term Outcomes of Lower Urinary Tract Trauma in Male Patients Admitted at Mbarara Regional Referral Hospital, Uganda

Oscar Atwine, MBChB, MMED Surgery, FCS Urology^{1a},
Marvin Mutakooha Mwesigwa, MBChB, MMED Surgery, MCS, FCS Urology²,
Edson Tayebwa, MBChB, MMED Surgery², Joshua Muhumuza, MBChB, MMED Surgery³

¹ Department of Surgery, Mbarara University of Science and Technology, ² Surgery, Mbarara University of Science and Technology, ³ Surgery, Kampala International University

Keywords: Urology, lower urinary tract trauma, etiology, patterns, outcomes

<https://doi.org/10.4314/ecajs.v30i2.4>

East and Central African Journal of Surgery

Vol. 30, Issue 2, 2025

Abstract

Background

Trauma is a major public health challenge in Africa. This study was conducted to establish the etiology, patterns and short-term outcomes of patients with lower urinary tract trauma in males admitted at Mbarara Regional Referral Hospital.

Methods

This was a hospital based prospective cohort study done on participants with lower urinary tract trauma admitted at MRRH for a period of eight months from August 2023 to April 2024. A total of 38 male participants were consecutively selected and enrolled into the study. The overall median age was 25, interquartile range (5-37) years.

Results

A total of 50 lower urinary tract injuries were recorded. The urethra was the most injured organ at 70% (35/50). Motor vehicle crash was the most common cause seen in 52% (26/50). The urethral complete tear was the most common pattern of urethral injury seen in 62.9% (22/35) while bladder contusion was the most common bladder injury pattern at 60% (9/15). The anterior urethra was the most injured part at 60.0% (21/35). Overall, complications were seen in 57.9% of the participants (22/38) with urethral bleeding being the most common seen in 36.8 % (14/38) of the participants. Most patients stayed in the hospital for longer than one week 65.8% (25/38). Mortality was seen in 5.3% (2/38).

Conclusion

Motor vehicle crash is the commonest cause of lower urinary tract trauma. Among pediatric population, circumcision was the commonest cause of urethra injury, hence laws should be put in place for pediatric circumcision to be done by a qualified health personnel.

Background

Lower urinary tract trauma (LUTT) includes injury to the urinary bladder and urethra.¹ Anatomically, the whole urinary tract system is usually protected from external forces; however, its diagnosis remains a challenge, especially in a poorly resourced setting, where radiological imaging is costly.² In the United States, the urinary system is a signifi-

cant contributor to trauma-induced morbidity and mortality, accounting for 10% of the 2.8 million people hospitalized annually due to trauma.³

A study done in Sub-Saharan Africa indicated that, of the patients admitted with urological emergencies, LUTT accounted for 88.4%.⁴ In children, lower urinary tract injuries accounted for 7% of all injuries, and most of them



This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CCBY-4.0). View this license's legal deed at <http://creativecommons.org/licenses/by/4.0> and legal code at <http://creativecommons.org/licenses/by/4.0/legalcode> for more information.

were accompanied by potentially fatal conditions such as brain, chest, and abdominal injuries.⁵

In Nigeria, blunt trauma due to motor vehicle crash (MVC) was the most common cause seen in 50% of lower urinary tract injuries while gunshot injuries accounted for most penetrating injuries.³ In the pediatric population, circumcision was the most common cause of urological injuries, followed by MVC.⁶

These injuries usually occur in the background of poly-trauma and may easily be overlooked, leading to under-reporting, mismanagement, and complications if not well treated.⁷ Therefore, this study aimed to describe the etiology, patterns, and short-term outcomes of male patients with LUTT admitted at Mbarara Regional Referral Hospital (MRRH). The objectives of this study are to describe the: (1) etiology of LUTT in male patients admitted at MRRH, (2) injury patterns of LUTT in male patients admitted at MRRH, and (3) short-term outcomes of LUTT in male patients admitted at MRRH.

Methods

Study design

This was a prospective cohort study.

Study setting and period

MRRH is a government referral and teaching hospital. The hospital is situated along the Kampala-Kabale highway. MRRH serves a population of approximately 4 million people. This hospital has a division of urology under the department of surgery. The department is headed by one urologist, who works with residents and medical officers. Patients who present with injuries of the lower urinary tract are initially evaluated at the accidents and emergency department from where a consultation with the urology team is made for specialized evaluation and management.

Participants with LUTT were admitted to the Department of Surgery of MRRH between December 1, 2022 and July 31, 2023. Follow-up was done until the time of discharge, for a maximum period of 30 days. Data collection was done from time of recruitment up to the participant's discharge.

Study population

This study targeted male patients with LUTT admitted at MRRH during the study period. We included male patients with confirmed LUTT who consented to participate in the study. Patients who came after receiving definitive treatment from another facility were excluded because it was not possible for the study team to fully evaluate the injury. Following treatment, participants were followed up daily by taking history, clinical examination, and vitals observation until the patient's discharge.

Recruitment, data collection procedures, and variables

Sampling was conducted consecutively for all patients who met the inclusion criteria for the study. Participants were enrolled in the order that they arrived at the hospital. Those found eligible were recruited following informed consent. For patients under 18 years, the parent or guardian gave consent. Assent was sought in addition for those between ages of 7 and 18 years. An interviewer-administered pre-coded questionnaire was used for data collection. A review of patient's medical records, such as the referral form, was done where necessary. For all patients who underwent surgery, details were obtained from operation notes in liaison with surgical team. Participants underwent a full physical examination including a general physical examination, a local examination of the injury, and a thorough systemic examination. The findings were documented. The participants were followed up with until they were discharged.

The data obtained included age, mechanism and etiology of injury, organ injury, anatomic site of injury, patterns of injury, treatment modalities, and short-term outcomes of treatment. Data on etiology were collected through history taking. Social demographics of the patient were also recorded in the questionnaire. Data on injury patterns were collected through clinical examination, imaging, and intraoperative findings. Associated injuries were also documented. Short-term outcomes were collected through daily clinical evaluations done until the time of discharge.

Quality control

To determine whether the questionnaire could successfully extract the needed data on relevant variables, it underwent preliminary testing for validity and reliability at the hospital. The data collection was carried out by the principal investigator in conjunction with qualified research assistants (resident doctors) attached to the unit. The research assistants were trained on how to use the data tools. The lead investigator or his assistant doublechecked the data collection materials every day to ensure accuracy and correctness. Only those who met the inclusion criteria were recruited, which ensured the quality of the data. To ensure consistency of information when administered, the data tool/checklist was translated into local language for participants who did not speak English. Participants were selected consecutively.

Sample size

We used the formula proposed by Yamane in 1967

$$n = \frac{N}{1 + Ne^2}$$

From MRRH records, N = 38 (there were 38 patients with lower urinary tract injuries in the year preceding the study), e = 0.05 for a 95% level of confidence. On substitution, n = 34.7.

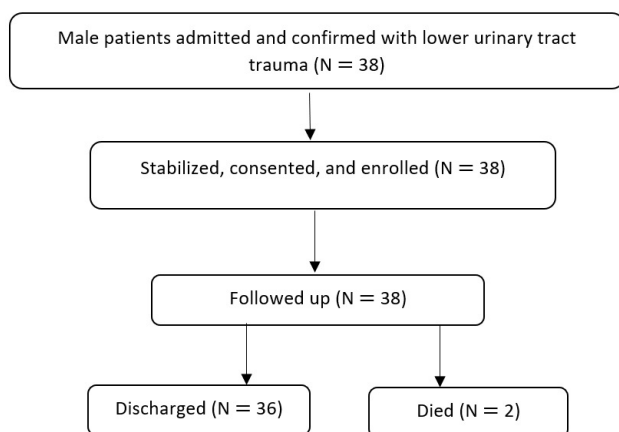


Figure 1. Study flow diagram.

To improve internal validity and cater to those who could have been lost to follow-up, 10% was added, hence requiring 38 participants.

Data analysis plan

Data from retrieved questionnaires were coded appropriately into the Microsoft 2016 Excel spreadsheet and later transferred into the Stata version 15 for statistical analysis. Numerical data were summarized using medians and interquartile ranges for continuous skewed variables. Nominal data were summarized using proportions. Tables, a bar graph, and a pie chart were used to present the data. Chi-square test for categorical variables or student *t* tests for continuous variables were performed to determine significant differences between individual injured lower urinary tract organs. The significant level was at <5% for a 95% confidence interval. Data on etiology of LUTT were described in a pie chart and table as frequencies and percentages. The patterns of injury were described and summarized in a table as frequency and percentages. Short-term outcomes were summarized in tables with frequencies and percentages using χ^2 test.

Results

This study admitted and confirmed 38 participants with LUTT. All participants provided consent, enrolled into the study, and were followed up with until they were discharged from the hospital, for a maximum period of 30 days. Thirty-six participants were followed up to discharge; however, 2 participants died on follow-up. There was no participant lost on follow-up (see [Figure 1](#)).

The total number of lower urinary tract injuries was 50 because some participants had more than one injury. The median age of the participants was 25 years, with interquartile range 5–37 years. The majority of the participants were peasant farmers ($n = 25$, 65.8%). Most participants attained primary education ($n = 20$, 52.6%; see [Table 1](#)).

Table 1. Distribution of participants by social demographics

Variable	Frequency (n)	Percentage (%)
Age (median/IQR) 25 (5–37)		
Occupation		
Peasant farmer	25	65.8
Not working	9	23.7
Student	4	10.5
Level of education		
Not of age	9	23.7
Primary	20	52.6
Secondary	6	15.8
Tertiary	3	7.9
Marital status		
Not of age	7	18.4
Single	25	65.8
Married	4	10.5
Divorced	3	7.9

Abbreviations: IQR, interquartile range.

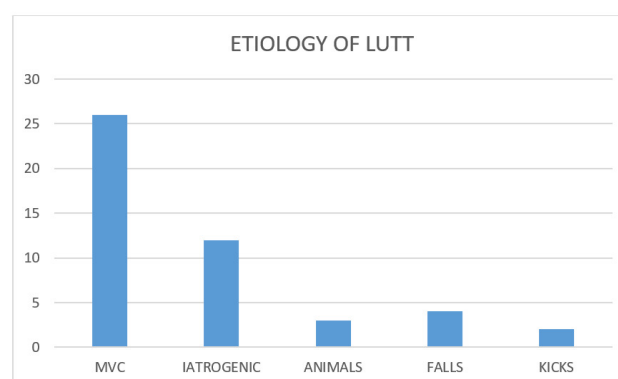


Figure 2. Bar graph showing etiology of lower urinary tract trauma in 38 participants.

MVC was the most common etiology of LUTT (52%), due to motorcycle transport system, followed by iatrogenic injuries (24%; see [Figure 2](#)). The urethra was the most injured organ (70%; see [Figure 3](#)). Urethra complete tear was the most common urethra injury pattern (62.9%; see [Table 2](#)).

Mortality occurred in 2 of the participants (5.3%); these participants were also associated with head injuries. A majority of the participants with LUTT stayed in the hospital longer, for a period of over 1 week (65.8%). Generally, the complication rate following treatment was high (64.1%), and urethral bleeding was the most common complication (36.8%; see [Table 3](#)).

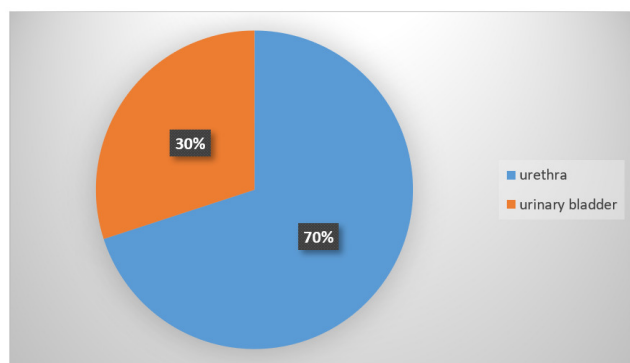


Figure 3. Pie chart showing lower urinary tract organs injured as percentages.

Table 2. Injury patterns of genital organs

Organ	Frequency (n)	Percentage (%)
Urinary bladder		
Intraperitoneal rupture	6	40.0
Bladder contusion	9	60.0
Urethra		
Complete tear	22	62.9
Partial tear	9	25.7
Contusion	4	11.4
Location of urethra injury		19.1
Anterior	21	60.0
Posterior	14	40.0

Table 3. Outcomes of treatment of lower urinary tract trauma

Variable	Frequency (n)	Percentage (%)
Patient disposition		
Discharge	36	94.7
Died	2	5.3
Length of hospital stay		
<1 wk	13	34.2
<2 wk	20	52.6
>2 wk	5	13.2
Complications		
Infection	2	5.3
Urethral bleeding	14	36.8
Urine retention	6	15.8
No complication	16	42.1

Discussion

LUTT is a significant contributor to trauma-induced morbidity and mortality by posing a significant public health challenge once it happens. It rarely occurs in isolation and is always associated with injuries to other vital organs. We prospectively recruited participants to describe the etiology, patterns, and short-term outcomes of LUTT in male patients admitted at MRRH.

In this study, 38 participants were enrolled. The median age was 25 years; this was similar to studies done in Kenya by Oluoch, in which their median age was 28 years.⁷ This is explained by similar environmental and participant characteristics in which both countries are still developing. Most of our population is characterized by youth who usually get involved in aggressive sports, the motorcycle transport business without obeying traffic rules, and other risky behaviors (eg, substance use). Similar findings were also observed by Furr et al in Nigeria.⁸

Injuries to the lower urinary tract organs occur as a result of blunt, penetrating, or iatrogenic trauma. In this study, most of the lower urinary tract injuries happened as a result of MVC. Similar findings were reported by Oluoch⁷ at Kenyatta National Hospital and in Nigeria by Ahmed et al⁹ where motor vehicle accidents were the most common cause, accounting for 47.5% and 68%, respectively. This could be explained by similar environmental characteristics where the majority of the population in Sub-Saharan Africa gets involved in the commercial motorcycle transport business, in which most of the traffic regulations are not observed. Iatrogenic injuries due to circumcision (20.5%) were observed to be the most common cause of urethra injuries in our setting, similar to a report in Nigeria by Osuigwe et al.⁶ This could be explained by the fact that some people in our communities still have circumcision done by cultural and religious groups of people. These people are not surgically trained and are not supervised throughout their practice, leading to genital injuries. A similar issue has been observed in low cadre health workers practicing at lower health facilities with no experience in pediatric circumcision. Similar findings were observed by Barry Mi et al in Guinea.¹

LUTT includes injuries to the urinary bladder and the urethra. In this study, the urethra was the most injured organ. This is similar to the studies done in Kenya in which urethral injury accounted for 51.9%.⁷ This could be explained by a similar etiology (MVC).

In this study, extraperitoneal bladder contusion with hematoma was the most common injury pattern. This is in agreement with studies done in the United States by Phillips et al, which showed that extraperitoneal bladder injuries were the most common (63%) compared to intraperitoneal bladder injuries.¹⁰ This could have been explained by similar etiologies of bladder injuries in which MVC was the most common cause

In our study, complete tear of either the anterior or posterior part of the urethra was the most common injury pattern. This was similar to the studies done in the United States by Patel et al, in which 65% of urethra injuries were complete tear.¹¹ This could be explained by similar etiology of injuries in which most of urethra injuries were due to blunt trauma as a result of motor vehicle crash.

Following treatment of LUTT, a majority of participants stayed in the hospital for more than 1 week (25, 65.8%), which could be explained by associated injuries and high complication rate in our participants. Similar studies were observed in the United States where their average length of hospital stay was 9 days due to concomitant associated injuries (Abel, 2012).⁽¹⁷⁾ In this study, mortality was 5.3% (n = 2), all of whom had intraperitoneal bladder ruptures and also associated severe injuries, which could have explained death in our setting. This is different from studies done in the United States, where mortality was at 16%.¹² This could be explained by differences in etiology where most of their injuries were due to penetrating injuries as a result of gunshot. An overall complication was (22, 57.9%). Similar studies were documented at a teaching hospital of Treichville, Abidjan, Cote d'Ivoire at 34%.¹³

Bleeding per urethra was the most common complication following treatment (14, 36.8%). This could be explained by the robust blood supply of the urethra and other pelvic organ system, which is worsened by associated unstable pelvic fractures despite urinary diversion. Different studies were documented in United States, where the complication rate was lower at 15%¹⁴ and 32%.¹⁵ This could be explained by a better US health care system where most of the LUTT is diagnosed early and endoscopic procedures are done such as urethral realignment.

Study limitation

The follow-up in this study stopped at discharge; therefore, any complications that occurred later, such as strictures, were not considered in this study. However, the findings in this study will be used to design a study with a longer follow-up.

Conclusion

MVC due to motorcycle transport system is the leading cause of LUTT. The urethra is the most injured organ, and urethral bleeding is the most common complication following treatment. Among the pediatric population, circumcision was the most common cause of urethra injury, hence laws should be put in place for pediatric circumcision to be done by a trained and qualified health personnel.

Acknowledgments

I take this opportunity to acknowledge my wife RA and my daughter AAC.

Ethical Approval

All methods were carried out in accordance with relevant guidelines and regulations. Ethical approval was granted by the Research and Ethics committee of Mbarara University of Science and Technology (Ref No: MUST-2023-770).

Informed Consent

All participants gave written, informed consent as evidenced by the participants'/guardian's signature. Informed consent to participate was obtained from the parents or legal guardians of any participants under the age of 18.

Data Availability

Data is available upon request. Requests should be sent to 0785011339a@gmail.com.

Conflict of Interest

The authors declare that they have no conflict of interest

Funding

None.

Submitted: October 23, 2024 EAT. Accepted: June 03, 2025 EAT. Published: July 01, 2025 EAT.

References

1. Tullington JE, Blecker N. *Lower Genitourinary Trauma*.; 2020.
2. Javanmard B, Fallah-Karkan M, Razzaghi M, et al. Characteristics of traumatic urogenital injuries in emergency department; a 10-year cross-sectional study. *Arch Acad Emerg Med*. 2019;7(1):e63.
3. Zinman LN, Vanni AJ. Surgical management of urologic trauma and iatrogenic injuries. *Surgical Clinics of North America*. 2016;96(3):425-439. doi:[10.1016/j.suc.2016.02.002](https://doi.org/10.1016/j.suc.2016.02.002)
4. Cassell AK III, Manobah B. Management of genitourinary trauma—current evaluation from the Sub-Saharan region: A systematic review. *World J Crit Care Med*. 2021;10(6):377-389. doi:[10.5492/wjccm.v10.i6.377](https://doi.org/10.5492/wjccm.v10.i6.377)
5. Appiah KAA, Gyasi-Sarpong CK, Azorliade R, et al. Circumcision-related tragedies seen in children at the Komfo Anokye Teaching Hospital, Kumasi, Ghana. *BMC Urol*. 2016;16:1-8. doi:[10.1186/s12894-016-0183-1](https://doi.org/10.1186/s12894-016-0183-1). PMID:27825332
6. Osuigwe A, Ekwunife C, Ndukuwu C, Edokwe E. Paediatric urological trauma at Nnewi, south eastern Nigeria: A two-year experience. *Afr J Urol*. 2003;9(2):102-105.
7. Oluoch CO. *Pattern of Genitourinary Tract Injuries in Patients with Multiple Trauma at the Kenyatta National Hospital*. UON; 2021.
8. Furr J, Culkin D. Injury to the male external genitalia: a comprehensive review. *Int Urol Nephrol*. 2017;49(4):553-561. doi:[10.1007/s11255-017-1526-x](https://doi.org/10.1007/s11255-017-1526-x)
9. Ahmed A, Mbibu NH. Aetiology and management of injuries to male external genitalia in Nigeria. *Injury*. 2008;39(1):128-133. doi:[10.1016/j.injury.2007.02.039](https://doi.org/10.1016/j.injury.2007.02.039)
10. Phillips B, Holzmer S, Turco L, et al. Trauma to the bladder and ureter: a review of diagnosis, management, and prognosis. *Eur J Trauma Emerg Surg*. 2017;43(6):763-773. doi:[10.1007/s00068-017-0817-3](https://doi.org/10.1007/s00068-017-0817-3)
11. Patel AB, Osterberg EC, Satarasinghe PN, et al. Urethral injuries: diagnostic and management strategies for critical care and trauma clinicians. *Journal of Clinical Medicine*. 2023;12(4):1495. doi:[10.3390/jcm12041495](https://doi.org/10.3390/jcm12041495)
12. Balzano FL, Hudak SJ. Military genitourinary injuries: past, present, and future. *Translational Andrology and Urology*. 2018;7(4):646-652. doi:[10.21037/tau.2018.04.05](https://doi.org/10.21037/tau.2018.04.05)
13. Djè K, Yao B, Sanou B, Kokoua A, Gnananzan K. Genitourinary complications of pelvic traumaLes complications uro-génitales des traumatismes du bassin: a propos de 41 cas. *Afr J Urol*. 2006;12(1):37-43.
14. McCormick CS, Dumais MG, Johnsen NV, Voelzke BB, Hagedorn JC. Male genital trauma at a level 1 trauma center. *World J Urol*. 2020;38(12):3283-3289. doi:[10.1007/s00345-020-03115-0](https://doi.org/10.1007/s00345-020-03115-0)
15. Phillips EA, Esposito AJ, Munarriz R. Acute penile trauma and associated morbidity: 9-year experience at a tertiary care center. *Andrology*. 2015;3(3):632-636. doi:[10.1111/andr.12043](https://doi.org/10.1111/andr.12043)