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**Research Article**

# The Role of Urological Conditions in Cases Presenting to the Emergency Department with Acute Abdominal Pain: First Report from Somalia

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**Abstract** **Objective:** This study aimed to investigate the pattern and outcomes of Acute abdominal pain (AAP) in an adult population presented to the Emergency Department (ED) in the only tertiary care center of Somalia by analyzing the role of urological conditions in detail. **Materials and Methods**: Demographic and clinical data of the adult (i.e., age>18) patients who presented to the ED for AAP between December 2021 and June 2022 were retrospectively analyzed. **Results**: During the study period, 600 patients presented to the ED with the chief complaint of AAP. The mean age of the participants was 56.7±12.4(15–93). Most (34.8%) patients were aged between 18 and 30. The most frequent diagnosis was NSAP (24%), followed by appendicitis(11.1%), bowel obstruction(7.2%), renal colic(6.8%), and biliary colic-cholecystitis(6.5%). Appendicitis, renal colic, bowel obstruction, and perforated peptic ulcer were more frequent in males than females. Among the 273(45,5%) patients admitted to the hospital, 168(54.9%) were male, and 105(35,7%) were female. While 24.2% of all admissions were due to appendicitis, 15.4% were due to intestinal obstruction. **Conclusions:** Non-specific abdominal pain is the most common diagnosis in both age and gender groups despite being slightly more frequent in younger and female patients. In addition to NSAP, appendicitis, bowel obstruction, and renal colic are the most common diagnoses in patients who presented to ED with the chief complaint of AAP.

**Keywords** Abdominal pain; Non-specific abdominal pain; Renal colic; Appendicitis; Surgery, Emergency.

**Introduction**

Acute abdominal pain (AAP) is a medical emergency characterized by non-traumatic abdominal discomfort lasting no more than five days (1). It is the chief complaint in 7–10% of all visits to the emergency department (ED) (2,3). The challenging differential diagnosis can lead to medico-legal litigation and unfavorable outcomes (4,5).

Acute abdominal pain can be due to various diseases, ranging from mild, self-limiting illnesses to life-threatening conditions (6). An accurate and timely diagnosis may result in better management and favorable outcomes. It should be considered that AAP can be associated with various medical disciplines, including gynecology, surgery, urology, and internal medicine, and it may necessitate surgical intervention. Appendicitis, peptic ulcer, urinary stones, inflammatory bowel disease, hepatobiliary illnesses, ectopic pregnancy, endometriosis, pelvic inflammatory disease, and other extra-abdominal pathologies should be considered in the differential diagnoses of AAP in adults (7-12). Ultrasound and computed tomography are radiological methods often used in the emergency room to improve diagnostic accuracy (13).

According to published reports, approximately 25% of patients with abdominal pain require surgical procedures (14). On the other hand, it was reported that a quarter of the patients with AAP were discharged from the ED, while 35–41% were admitted (15).

Most studies on AAP originate from high-income countries, where non-specific abdominal pain (NSAP) is the most frequent diagnosis.[9] These studies also noted that the profile of the patients presenting to ED with AAP varied based on geographical region and socioeconomic factors (9,14,15). Nevertheless, there is limited data regarding the characteristics of the patients residing in low- and middle-income countries (16).

To the best of our knowledge, no study related to the sociodemographic and clinical profile of patients presenting to the ED with AAP in Somalia has been reported to date. Therefore, our study demonstrated the profile of the adult patients who presented to the ED of the only tertiary care center in Somalia.

**Materials and Methods**

This study was approved by the ethics committee of Somalia Turkiye Training and Research Hospital (MSTH/6741). Adult (i.e., age>18) patients who presented to the ED of the same hospital with the chief complaint of AAP between December 2021 and June 2022 constituted the target population of this retrospective, cross-sectional study. Patients with AAP due to trauma, patients with multiple ED visits, and those with incomplete data were excluded.

Data, including demographic features (age and gender), primary diagnosis, and the decision to admit or discharge the patient, were retrieved from the electronic patient folders.

Statistical analyses were conducted using the Statistical Package for Social Sciences program (SPSS version 23.0). Data were given as frequencies and percentages. All cases were categorized according to age, gender, and diagnosis. Cross-tabulation was used to examine the relationship between each group.

**Results**

During the study period, 10,774 adult patients presented to the ED. Among these patients, 600 (5.6%) presented with the chief complaint of AAP. The mean age of the participants was 56.7±12.4 [15-93]. While most patients were aged between 18 and 30 (34.8%), 22.7% were in the 31-45 age group, and 13.7% were in the 46-56 age group. Analysis regarding gender distribution revealed that 51% (n=306) of the patients were male, while 49% (n=294) were female (Table 1).

**Table 1:** Age-gender distribution and admission-discharge status of the patients

| Variables | | Frequency | Percentage (%) |
|---|---|---|---|
| **Age group** | 18-30 | 209 | 34.8 |
| | 31-45 | 163 | 27.2 |
| | 46-56 | 82 | 13.7 |
| | 56-65 | 74 | 12.3 |
| | 65-85 | 70 | 11.7 |
| | >85 | 2 | 0.3 |
| | **Total** | 600 | 100.0 |
| **Gender** | Male | 306 | 51.0 |
| | Female | 294 | 49.0 |
| | **Total** | 600 | 100.0 |
| **Admission-discharge status** | Admitted | 273 | 45.5 |
| | Discharged | 327 | 54.5 |
| | **Total** | 600 | 100.0 |

After evaluation in the ED, 273 patients (45.5%) were admitted to the hospital.

The most frequent diagnosis was NSAP (n=139.24%), followed by appendicitis (n=67, 11.1%), bowel obstruction (n=43, 7.2%), renal colic (n=41, 6.8%), biliary colic-cholecystitis (n=39, 6.5%), cystitis and other urologic pain (n=35, 5.8%) and perforated peptic ulcer (n=33, 5.5%) (Table 2).

**Table 2:** Causes of acute abdominal pain

| Variables | Frequency | Percentage (%) |
|---|---|---|
| Nonspecific abdominal pain | 139 | 23.2 |
| Appendicitis | 67 | 11.2 |
| Bowel obstruction | 43 | 7.2 |
| Renal colic | 41 | 6.8 |
| Biliary colic and cholecystitis | 39 | 6.5 |

| | | |
|---|---|---|
| Cystitis and other urologic pain (i.e., testicular or prostatic pathologies) | 35 | 5.8 |
| Perforated peptic ulcer | 33 | 5.5 |
| Pyelonephritis | 24 | 4.0 |
| Gynecologic disease | 23 | 3.8 |
| Liver disease (i.e., liver cirrhosis, hepatitis, hepatobiliary cancers) | 21 | 3.5 |
| Gastroenteritis | 19 | 3.2 |
| Gastric perforation | 18 | 3.0 |
| Gastritis/peptic ulcer | 17 | 2.8 |
| Pancreatitis | 13 | 2.2 |
| Inflammatory bowel disease | 13 | 2.2 |
| Diverticulitis | 11 | 1.8 |
| Abdominal hernias | 11 | 1.8 |
| Intestinal tuberculosis | 8 | 1.3 |
| Myocardial ischemia, | 8 | 1.3 |
| Intrabdominal abscess | 7 | 1.2 |
| Colon cancer/mass | 5 | 0.8 |
| Others | 5 | 0.8 |
| Total | 600 | 100.0 |

The participants were categorized according to their primary diagnoses and age (<56 years and ≥56 years). Categorizing the patients based on age revealed that NSAP was the most common diagnosis in patients younger than 56 (i.e., mean age) and those aged 56 or above. However, its frequency was slightly higher in the former group than in the latter (24.7% vs. 19.4%). Also, appendicitis, renal colic, and gynecological emergencies were more than three-fold more common in the former group than in the latter (14%, 8.6%, and 5.1% vs. 4.1%, 2.4%, and 0.6%). On the

other hand, peptic ulcer, pyelonephritis, and diverticulitis were more than three-fold more common in the latter group than in the former (6.5%, 9.4%, and 4.7% vs. 1.4%, 1.9%, and 0.7%) (Table 3).

**Table 3:** Causes of acute abdominal pain based on age group

| Etiology | <56 years (%) | >56year (%) |
|---|---|---|
| Gastritis/peptic ulcer | 1.4 | 6.5 |
| Urinary tract infection and other urologic pain (i.e., testicular or prostatic pathologies) | 6.3 | 4.7 |
| Biliary colic and cholecystitis | 6.3 | 7.1 |
| Gastric perforation | 3.5 | 1.8 |
| Perforated peptic ulcer | 5.3 | 5.9 |
| Pancreatitis | 0.7 | 5.9 |
| Appendicitis | 14.0 | 4.1 |
| Renal colic | 8.6 | 2.4 |
| Bowel obstruction | 6.7 | 8.2 |
| Pyelonephritis | 1.9 | 9.4 |
| Inflammatory bowel disease | 2.1 | 2.4 |
| Diverticulitis | 0.7 | 4.7 |
| Gastroenteritis | 3.3 | 2.9 |
| Gynecologic disease | 5.1 | 0.6 |
| Abdominal hernias | 1.2 | 3.5 |
| Liver disease (i.e., liver cirrhosis, hepatitis, hepatobiliary cancers) | 2.6 | 5.9 |
| Nonspecific abdominal pain | 24.7 | 19.4 |
| Intestinal tuberculosis | 1.9 | 0.0 |
| Myocardial ischemia, | 0.9 | 2.4 |
| Colon masses | 0.7 | 1.2 |
| Intra-abdominal abscess | 1.4 | 0.6 |
| Others | 0 | 2.9 |

Analyses based on gender distribution revealed that appendicitis, renal colic, bowel obstruction, perforated peptic ulcer, liver disease, and perforated peptic ulcer were more frequent in males than females (Table 4). On the other hand, biliary colic/cholecystitis, cystitis, other urologic pain, and gastroenteritis were significantly higher in females than in males.

**Table 4:** Causes of acute abdominal pain based on gender

| **Diagnosis** | **Male (%)** | **Female (%)** |
|---|---|---|
| Nonspecific abdominal pain | 19.0 | 27.6 |
| Appendicitis | 14.1 | 8.2 |
| Renal colic | 10.1 | 3.4 |
| Bowel obstruction | 9.2 | 5.1 |
| Perforated peptic ulcer | 7.8 | 3.1 |
| Liver disease (i.e., liver cirrhosis, hepatitis, hepatobiliary cancers) | 5.6 | 1.4 |
| Pyelonephritis | 5.2 | 2.7 |
| Gastric perforation | 4.2 | 1.7 |
| Urinary tract infection and other urologic pain (i.e., testicular or prostatic pathologies) | 3.3 | 8.5 |
| Biliary colic and cholecystitis | 3.3 | 9.9 |
| Gastritis/peptic ulcer | 2.6 | 3.1 |
| Intestinal tuberculosis | 2.6 | 0.0 |
| Diverticulitis | 2.0 | 1.7 |
| Pancreatitis | 2.0 | 2.4 |
| Inflammatory bowel disease | 1.6 | 2.7 |
| Gastroenteritis | 1.3 | 5.1 |
| Abdominal hernias | 1.3 | 2.4 |
| Intra-abdominal abscess | 1 | 1.4 |
| Gynecologic disease | 0.0 | 7.8 |
| Colon cancer/mass | 1 | 0.7 |
| Myocardial ischemia, | 0.3 | 2.4 |

| | | |
|---|---|---|
| Others | 0 | 1.7 |

Among the 273 patients admitted to the hospital, 168 (54.9%) were male, and 105 (35.7%) were female. While 24.2% of all admissions were due to appendicitis, 15.4%, 11.4%, and 6.6% were secondary to intestinal obstruction, perforated peptic ulcer, and gastric perforation, respectively. These four diagnoses accounted for approximately half of all hospitalizations related to AAP. On the other hand, NSAP (40.7%) was the most common diagnosis among the patients discharged home. It was followed by renal colic (11.6%), cystitis, and other entities (10.1%), as depicted in the table (Table 5).

**Table 5:** Rates of admissions based on the cause of acute abdominal pain

| **Diagnosis** | **Admission-discharge status** | | | |
|---|---|---|---|---|
| | Hospital admissions | | Hospital discharges | |
| | Frequency | Percentage (%) | Frequency | Percentage (%) |
| Appendicitis | 66 | 24.2 | 1 | 0.3 |
| Bowel obstruction | 42 | 15.4 | 1 | 0.3 |
| Perforated peptic ulcer | 31 | 11.4 | 2 | 0.6 |
| Gastric perforation | 18 | 6.6 | 0 | 0.0 |
| Pyelonephritis | 15 | 5.5 | 9 | 2.8 |
| Gynecologic pain | 13 | 4.8 | 10 | 3.1 |
| Liver disease (i.e., liver cirrhosis, hepatitis, cancers) | 12 | 4.4 | 9 | 2.8 |
| Biliary colic and cholecystitis | 11 | 4.0 | 28 | 8.6 |
| Abdominal hernias | 11 | 4.0 | 0 | 0.0 |
| Diverticulitis | 8 | 2.9 | 3 | 0.9 |
| Pancreatitis | 6 | 2.2 | 7 | 2.1 |
| Nonspecific abdominal pain | 6 | 2.2 | 133 | 40.7 |
| Intra-abdominal abscess | 5 | 1.8 | 2 | 0.6 |

| | | | | |
|---|---|---|---|---|
| Intestinal tuberculosis | 3 | 1.1 | 5 | 1.5 |
| Renal colic | 3 | 1.1 | 38 | 11.6 |
| Gastritis/peptic ulcer | 2 | 0.7 | 15 | 4.6 |
| Urinary tract infection and other urologic pain (i.e., testicular or prostatic pathologies) | 2 | 0.7 | 33 | 10.1 |
| Myocardial ischemia | 6 | 2.2 | 2 | 0.6 |
| Colon cancer/colonic mass | 2 | 0.7 | 3 | 0.9 |
| Gastroenteritis | 1 | 0.4 | 18 | 5.5 |
| Inflammatory bowel disease | 0 | 0.0 | 13 | 4.0 |
| Other | 1 | 0.4 | 4 | 1.2 |

**Discussion**

Acute abdominal pain of non-traumatic origin has been proven to be one of the most common complaints bringing patients to the emergency department. Our findings indicated that AAP constituted 5.6% of ED visits. This rate is lower than those reported in the studies from Tanzania (8.5%), Nigeria (9.6%), India (16.66%), and Kenya (16.7%) (16-19). However, an Italian study reported a rate of 5.8%, close to the rate we found in our cohort (20).

The gender distribution in our study is different from other reports.[15,16,18,20,21] For example, a national population-based cohort study from Australia found that the number of female patients (63.3%) tended to be higher than that of males (15). In contrast, other studies conducted by Mjema et al. (36.7%), Bhagat et al. (45%), and Semal et al. (47.4%) reported that males presented with AAP more frequently than females (16,18,21). In addition, a national population-based cohort study from Italia also detected that the rate of female patients (52%) tended to be higher than that of males (20).

In our cohort, most patients were aged between 18 and 30 (34.8%). Similarly, a retrospective study from Nepal found that presentation to ED with the chief complaint of AAP was most prevalent

(44.6%) in patients aged between 18 and 30 (21). However, in sharp contrast to our study, patients who presented to ED with AAP in Europe were mainly over 70 years (22).

In our cohort, 45.5% of the patients with AAP were admitted after evaluation at the ED. This finding contrasts with a study conducted in Tanzania, which found that two-thirds of the patients were admitted (16).

The most common (23.2%) diagnosis was NSAP in our cohort. This finding is in line with the study published by Irvin et al., which was conducted in Europe (35%), and Cervellin et al., which was conducted in Italy (36.1%) (22,23). Appendicitis, bowel obstruction, renal colic, biliary colic-cholecystitis, cystitis, and other urologic pain followed NSAP in terms of frequency in our study. However, in studies from Nigeria and Kenya, appendicitis and ectopic pregnancy were the most common causes of AAP in ED (17,19). Interestingly, a study from Tanzania reported that the most frequent diagnoses were intra-abdominal malignancy and intestinal obstruction among a series of patients who were evaluated in ED with the chief complaint of AAP (16). In contrast, intra-abdominal malignancy was a rare diagnosis in our cohort. It also contrasts the findings of Cervellin et al., who reported renal colic as the most frequent cause of acute abdominal pain in ED (23).

Analysis regarding the distribution of the different diagnoses based on patient age revealed that appendicitis and renal colic were 3-fold more common in patients younger than 56. In contrast, pyelonephritis and liver diseases were 3-fold more frequent in patients older than 56. These findings are consistent with studies from Italy and Sweden.[23,24] In a study including 5340 patients who presented to ED with AAP, Cervellin and coworkers found that NSAP was the most common cause of AAP in patients younger or older than 65 (23). Another study from Iran showed that cholecystitis and intestinal obstruction were more common causes of AAP in women than men (25). In our study, NSAP was the most common cause in both age groups despite being slightly

more frequent in younger patients (24.7%) than in older patients (19.4%). In addition, our study revealed that biliary colic-cholecystitis and hernias were more common causes of AAP in males than females.

To our knowledge, this is the first study to determine the profile of the patients presenting to the ED with non-traumatic AAP in Somalia. Nevertheless, it has some limitations that must be considered while evaluating its findings. First, it is a single-center-based retrospective study. Second, the sample size is relatively small, and the study duration is relatively short. Third, our analysis did not include data regarding comorbidities and outpatient follow-up.

**Conclusions**

Despite the above-mentioned limitations, we conclude that acute abdominal pain is a common complaint among adult patients presenting to the ED and is relatively more common in young patients. Of note, NSAP is the most common diagnosis in both age and gender groups despite being slightly more frequent in younger and female patients. In addition to NSAP, appendicitis, bowel obstruction, and renal colic are the most common diagnoses in patients who presented to ED with the chief complaint of AAP.

**Ethics Approval**

This study was approved by the institutional ethical review board of Somalia Turkiye Training and Research Hospital (MSTH/6741).

**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.

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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

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**Research Article**

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

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**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% |

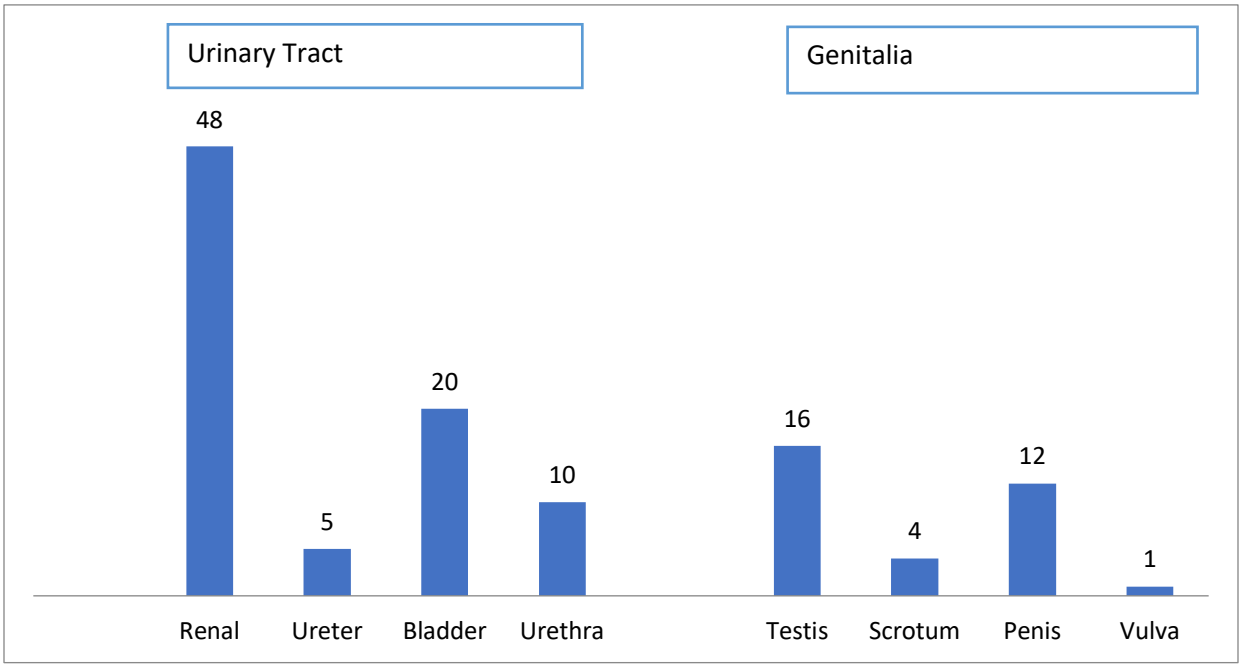


**Figure 1.** Distribution of urogenital injuries

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.

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**Research Article**

# Isolated Tubercular Epididymitis: A 10-Year Series

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**Abstract** **Introduction:** Genitourinary tuberculosis (TB) is considered a common form of extrapulmonary TB, being second only to lymph node tuberculosis, which is the most common site. Isolated TB of the epididymis is rare, and diagnosis of epididymal TB can be challenging. In this study, we report our series of isolated TB of the epididymis. **Materials & Methods:** We retrospectively collected the outpatient and inpatient records of histologically confirmed epididymal tuberculosis. Data including age, clinical presentation, examination findings, and diagnostic tests were reviewed and analyzed. **Results:** A total of 56 patients were diagnosed to have isolated tuberculosis of the epididymis during the 10-year study period. The mean age was 33 years. The clinical presentation included a hard nodule in the epididymis (100%), hydrocele in 16 (28.5%), posterior scrotal sinus in 6 (10.7%), and sensitivity in 14 (25%) and fever in 3 (5.3%). Four (7.1%) patients had bilateral epididymal nodules, 30 (53.5%) had left-sided, and 22 (39.2%) had right-sided involvement. Scrotal exploration and epididymal biopsy were performed in 16 (28.5%), and unilateral epididymectomy was performed in 40 (71.4%). The histopathological examination revealed a typical tubercular granuloma in all these patients. All patients were put on anti-TB drugs. **Conclusions:** Isolated TB of the epididymis is a rare disease. Treatment with anti-TB drugs remains the first-line intervention in all cases. Surgery is indicated in cases of failure of pharmacological treatment or the development of complications.

**Keywords** Genitourinary tuberculosis; Epididymis; Tuberculosis; Anti-tubercular drugs

## Introduction

Tuberculosis (TB) has been known well since ancient times. References to TB in India have been known since 2000 BC, and indications of lung scarring identical to that of modern-day TB sufferers have been found in preserved bodies. Bayle described genitourinary tuberculosis (GUTB) involving the kidneys, prostate, and testis in 1810. In 1937, Hans Wildbolz (1873-1940) was the

first to use the term ‘genitourinary tuberculosis (1). GUTB has been known to be one of the most common late manifestations of either an earlier symptomatic or asymptomatic pulmonary TB infection. Genitourinary TB is usually secondary to the spread of mycobacteria through the bloodstream during the primary infection. Genitourinary TB frequently occurs five to 40 years after the primary infection.

Extrapulmonary sites account for 10% of TB cases. In India, the incidence of GUTB is nearly about 18% (1,2). Prolonged steroid use and immunosuppressive therapy may increase the risk of reactivation of dormant foci (3). GUTB forms nearly 30% to 40% of all extrapulmonary cases and is second only to lymph node involvement (2,3). Tuberculosis affecting the reproductive system in males can occur at any age; however, it is common in men aged 30–50 years. It is uncommon to see GUTB affecting children as the incubation period is extended. The most commonly involved organs are the epididymis, followed by the seminal vesicle, prostate, testis, and vas deferens (4). Tuberculosis affecting the epididymis alone is very rare (2,5). However, there have been reports that isolated epididymal tuberculosis may be the first or only manifestation of early genitourinary tuberculosis (2,6). In this study, we reviewed our series of isolated epididymis tuberculosis cases.

**Patients and Methods**

With consent from the University/Institutional ethical committee, the outpatient and inpatient records of histologically confirmed epididymal tuberculosis were collected, reviewed, and analyzed. Age, clinical presentation, examination findings, and diagnostic tests were reviewed and analyzed. The data regarding treatment and outcomes were also noted.

Isolated tubercular epididymitis was confirmed by performing a good clinical examination, imaging, and biopsies.

**Results**

During the study period (January 2012-December 2021), 56 patients were diagnosed to have isolated tuberculosis of the epididymis. The mean age was 33 years. The clinical presentation included a firm nodule in the epididymis (100%), hydrocele in 16 (28.5%), posterior scrotal sinus in 6 (10.7%), sensitivity in 14 (25%), and fever in 3 (5.3%). Four (7.1%) patients had bilateral epididymal nodules, 30 (53.5%) had left-sided affection, and 22 (39.2%) had right-sided involvement. None of the patients had lesions in the prostate on examination. The duration of nodules was 3-11 months. All patients were treated with antibiotics before further evaluation.

However, none of the nodules responded to routine antibiotics, including roxithromycin, doxycycline, ciprofloxacin, and norfloxacin. None of these patients was diagnosed to have active tuberculosis in the past or had received anti-TB treatment. Eleven (19.6%) patients gave a history of tuberculosis to a family member. All the patients were married, 51 (91%) had children, and three (5.3%) were being evaluated for infertility.

Routine ultrasonography of the kidney, ureter, and bladder regions was performed in all cases. Six (10.7%) patients showed small non-significant renal calculi. The rest of the examination was unremarkable. Computed tomography was done in 38 (67.8%) patients, revealing a normal urinary tract (Figure 1 a, b, c).

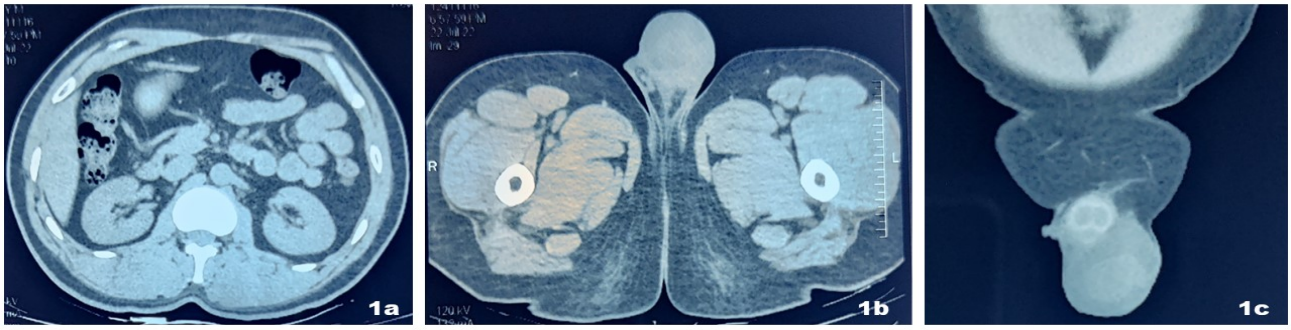


**Figure 1.** CT scan of a patient with isolated epididymal tuberculosis showing **a.** Normal appearing kidneys. **b.** Hydrocele of the left testis with turbid contents. **c.** Hydrocele showing thickened tunica vaginalis.

Scrotal exploration and epididymal biopsy were performed in 16 (28.5%), and unilateral epididymectomy was performed in 40 (71.4%) (Figure 2). The histopathological examination revealed a typical tubercular granuloma in all these patients. All patients were put on anti-TB drugs that consisted of isoniazid, rifampicin, pyrazinamide, and ethambutol for 3 months, followed by isoniazid and rifampicin for 6 more months. The patients tolerated the drugs well.

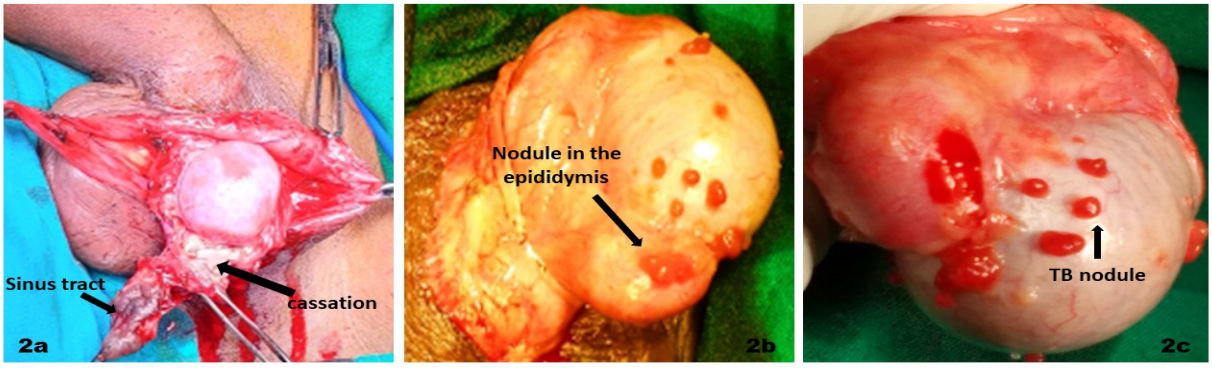


**Figure 2. a.** Exploration of the left epididymitis shows caseation within the epididymis and the scrotal sinus tract. **b.** Nodule seen on the epididymis. **c.** small tubercular nodules are seen on the surface of the testis.

## Discussion

TB spreads to the epididymis either through the hematogenous route or through retrograde extension from the prostate and seminal vesicles (7,8). Infection usually begins in the tail of the epididymis, as it has a higher blood supply and is the first part to be involved in urinary reflux. Isolated epididymal involvement may occur secondary to hematogenous spread. Patients suspected of epididymal TB present with clinical signs and symptoms of scrotal swelling with or without pain, mass, and a discharging scrotal sinus (7,9).

The definitive diagnosis of tuberculosis of the epididymis is by isolating the bacillus from the epididymis. Histopathological examination of the epididymal biopsy may reveal a typical tubercular granuloma. Another way to diagnose TB is by performing the polymerase chain reaction (PCR) test, a fast molecular test with high sensitivity and specificity rates. The treatment of urogenital TB (10) involves a combination of drugs aimed at avoiding bacillary resistance and should be initiated immediately after histological or microbiological diagnosis. At times, one may need to start anti-TB treatment empirically based on clinical, radiological, and laboratory suspect tests (11).

In their study regarding isolated epididymal TB, Viswaroop et al. [6] performed 156 fine needle aspiration cytology specimens, and 108 epididymal biopsies were carried out in 187 men to evaluate chronic epididymal nodules. Fifty-four of the 187 men (median age 32 years) had

tuberculous epididymitis. However, 14 of these were excluded as they had urinary TB as well. None of the 40 men with isolated tuberculous epididymitis had urinary symptoms. Bilateral involvement was seen in five (12.5%) cases. The salient presenting features included painful swelling (16 subjects, 40%), scrotal sinus (4, 20%), and acute epididymitis (2, 10%). The history or concomitant presence of tuberculosis was noted in three subjects each. Anti-TB treatment resulted in a complete response in 10 and a partial response in 18. Five subjects underwent epididymectomy.

Man et al. (12) analyzed the clinical manifestations, diagnosis, and treatment outcomes in 47 patients with epididymal tuberculosis. The average age of the patients was approximately 42 years. The epididymal lesion was seen on the left side in 15 patients (31.9%), right-sided in 22 patients (46.8%), and bilateral in 10 patients (21.3%). The main symptoms were painless swelling of the scrotum in 21 cases (44.7%) and scrotal drop pain in 21 cases (44.7%). Scrotal physical examination revealed epididymal beaded enlargement in 12 patients (25.5%), testicular mass in one patient (2.1%), scrotal tenderness alone in seven patients (14.9%), ill-defined epididymal-testicular border in 21 patients (44.7%) and sinus formation in six patients (12.8%). All patients with anti-TB chemotherapy for 3–6 months. Postoperative follow-up showed an excellent response to treatment.

Isolated TB of the epididymis may be confusing to diagnose at times. Kho et al. (13) reported on a 20-year-old man who presented with a slow-growing painless scrotal tumor for 2 months, with the initial workup suspicious for a right para-testicular tumor. The frozen section of the lesion confirmed the diagnosis of epididymal TB. The patient was put on anti-TB therapy postoperatively for 6 months and had an excellent outcome.

**Conclusions**

Isolated TB of the epididymis is a rare disease and is often difficult to diagnose. It should be considered as a differential diagnosis in cases presenting with testicular mass. An epididymal infection failing to respond to routine antibiotics should make one suspicious of TB. Treatment with anti-TB drugs remains the first line intervention in all cases of genitourinary TB, and surgery is indicated in cases of failure of pharmacological treatment or development of complications such as abscesses, cutaneous fistulas, or extensive involvement of the epididymis and testis.

**Conflict of interest**

The authors declare a conflict of interest as None.

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