

Evaluation And Management Of Twenty Penetrating Ureteric Injuries In Resource-Limited Settings

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Abstract

Objective: to evaluate and discuss the treatment of patients who have sustained penetrating ureteral injuries due to causes other than medical care provider error. **Methods:** All cases of ureteral injury secondary to penetrating trauma was examined a total of 21 ureteral injuries were studied retrospectively which came from 20 patients (one case is bilateral injury and considered as two injuries) . **Results:** Only two of the twenty patients included in this report were female. Seventy-five percent of the injuries were caused by gunfire, while the remaining twenty-five percent were the result of shell explosions. Only 10% of patients with ureteric injury were properly diagnosed. Roughly one in ten patients undergo a nephrectomy, while one in four undergo a uretero-neocystostomy. **Conclusion:** Urinary tract trauma is uncommon, hard to diagnose, and challenging to treat surgically. Many trauma surgeons and urologists lack experience treating these injuries because they are so uncommon. Ureteral injury can cause the loss of an ipsilateral renal unit or significant and delayed complications if it is not diagnosed or treated properly.

Keywords: ureteral, Ureteroneocystostomy, shell explosion .

Introduction

Injury to the ureter from an external source is unusual because of the organ's mobility, narrow diameter, retroperitoneal location (between the spine and major muscle groups), and the overlying peritoneal contents. In addition, the symptoms that present themselves after a ureteric injury are often vague, and the diagnostic tests are frequently specific but not sensitive. External ureteric injuries are extremely uncommon, with annual rates typically falling below 10 cases even in the busiest of trauma centers (Engelsjerd and LaGrange, 2022).

Shootings are the leading cause of external ureteral injuries. Even if the missile's trajectory doesn't quite hit the ureter, it can still cause significant, delayed tissue destruction in that area. It may take some time for such injuries to become apparent, making early diagnosis challenging. Multiple other intra-abdominal organs (such as the intestines, colon, liver, and iliac arteries) are almost always damaged alongside a ureteric injury. The ureteral injury is often overshadowed by other, more visible injuries (Abboudi et al., 2013).

Ureteric injury is not always easy to spot in the emergency room. A high rate of complications, including renal loss and death, is associated with delayed diagnosis of a ureteric injury or a failed primary repair. In order to lessen the likelihood of serious complications and death following a ureteric injury, prompt diagnosis and treatment are mandatory (Raassen et al., 2018). The Centers for Disease Control and Prevention (CDC) reports that trauma is the fifth leading cause of death in the US and the leading cause of death among children and young adults. Trauma is the ninth leading cause of death in the world, according to the World Health Organization (Curry et al., 2011).

Ten percent of all injuries treated in emergency rooms are related to the genitourinary (GU) system. Less than one percent of all urologic traumas are related to the ureter. Ureteral injuries are uncommon, but when they occur, they can cause serious complications (Pereira et al., 2010). Anatomically, the ureter is 22 to 30 cm in length and is divided into three portions: the proximal ureter (upper) is the segment that extends from the ureteropelvic junction to the area where the ureter crosses the sacroiliac joint, the middle ureter courses over the bony pelvis and iliac vessels, and the pelvic or distal ureter (lower) extends from the iliac vessels to the bladder. The terminal portion of the ureter may be subdivided further into the juxta-vesical, intramural, and submucosal portions. The surgeon must pay special attention to the gonadal and iliac vessels, as they cross the ureter at the posterior and anterior levels respectively, descending into the pelvis (Pereira et al., 2010). The aim of the current work to review the evaluation and management of patients with penetrating ureteral injuries not associated with iatrogenic etiology.

Patients and methods

A cross-sectional observational study, in which injuries to the ureter caused by penetration during the period of September 2010 - September 2021 at Al-Mahmodiya general hospital. a total of 20 patients were enrolled in the study (one case is bilateral injury and considered as two injuries). A retrospective analysis of 21 ureteral injuries was performed. The cause of the injury, the method of treatment, any additional injuries, any complications that arose after the initial operation, and the final result were all taken into account.

Results

The 20 patients included in this report ranged in age from 20 to 60 years old, with 16 (80%) being male (mean 31). Gunshot wounds accounted for 15 (75%) of the injuries, while explosion shell wounds were responsible for 5 injuries (25 percent). Only 5% of patients had bilateral ureteral injuries; of those, 13 (65%) had injuries on the left side and 6 (30%) on the right. 9 (45%) of the injuries were located in the ureter's proximal section, 7% in the ureter's middle section, and 20% in the ureter's distal section.

All of the patients had associated injuries, including 10 (50 percent) with liver damage, 2 (10 percent) with gallbladder damage, 5 (25 percent) with spleen damage, 6 (30 percent) with stomach damage, 15 (75 percent) with small bowel damage, 7 (35 percent) with large bowel damage, 1 (5 percent) with diaphragm damage, 5 (25 percent) with vascular damage, 1 (5 percent) with pelvic fracture, and 1 (5 percent) with lung damage.

One in the upper ureter (who died from a missed vascular injury) and one in the middle portion were the two (10 percent) patients with missed ureteric injuries (treated by double j stent). Nephrectomy was performed on 2 (10%) patients, both of whom later died from a missed vascular injury.

Three (15%) patients had uretero-neocystostomies, and one (5%) patient had uretero-neocystostomies plus psoas hitches. One patient (5%) had bilateral ureteric injury, which was treated with a uretero-pyelostomy on the right and a uretero-ureterostomy on the left. For one patient (5%) who suffered an upper ureteric injury, a uretero-pyelostomy was performed. For upper and mid ureteric injury, 7 (or 35% of patients) underwent uretero-ureterostomy surgery rather than a double-J stent. One patient (5%), who underwent uretero-ureterostomy surgery without a double-J stent because it was unavailable at the time of the procedure, had a persistent urinary leak that was successfully treated with a double-J stent.

Discussion

Less than 1% of all genitourinary injuries are to the ureter, and these are almost always caused by iatrogenic trauma. Shots to the abdomen rarely cause ureteral injury, accounting for only 2% to 3% of such cases. The ureter is anatomically shielded from harm by the psoas muscle and the bony pelvis, so these injuries are extremely rare. These injuries can be challenging to diagnose initially because of how they present. Other than blood in the urine, there are no outward signs or laboratory tests that can help trauma surgeons or urologists suspect a ureteral injury. So, it's important to be suspicious of everyone, all the time, regardless of how the injuries happened or where they are. Urinoma, abscess, ureteral stricture, urinary fistula, and even the loss of the ipsilateral renal unit can result from a ureteral injury that is either misdiagnosed or improperly treated (Park and Kim, 2019).

The ureteral artery, which supplies the ureter with blood, is a longitudinal artery, meaning that in 80% of patients it does not receive collateral flow. Branches of the iliac, lumbar, and vesicular arteries supply the ureter's middle and lower thirds, while the aorta and renal artery supply the ureter's upper third. The pelvic ureter receives the richest blood supply of any pelvic organ and is located on the lateral side of the pelvis, in contrast to the medial side of the abdomen. The ureter's blood supply must be identified before it can be manipulated or repaired surgically (Lescay et al., 2022).

The bullet can damage the ureter via direct transection or the blast injury caused by the missile may disrupt the intramural blood supply, resulting in ureteral necrosis. However, the blast contusion can seriously damage the small ureteral blood vessels producing thrombosis and ischemia, which eventually results in delayed necrosis and complications (i.e. urine leakage and ureteral fistula). Therefore, the surgeon must be aware that the integrity of the ureter may be in jeopardy for several days post-injury (Reynard et al., 2008).

The early diagnosis of ureteric injury is preferred. Delayed diagnosis results in higher complication (fistula, urinoma, infection, etc.), renal unit loss and death rate (Taqi et al., 2017).

Investigate all retroperitoneal haematomas and periureteral wounds found during laparotomy. Diagnosing a penetrating ureteric injury with surgical exploration is a surefire and precise method. Inspection of the ureter by sight is trustworthy, whether done with or without the use of intravenous or intraureteral dye. Injuries to the ureter from high-velocity sources like gunshots or shrapnel increase the risk of complications (such as delayed urinary leak, dehiscence after repair, urinoma, renal unit loss, and so on) and a later presentation (Campbell et al., 1992).

Possible approaches to reconstruction depending on geography: Procedures include ureterostomy (psoas hitch), ureteroneocystostomy (direct reimplantation), uretero-ureterostomy (upper third), uretero-ureterostomy (middle third), transuretero-ureterostomy (Boari), and uretero-ureterostomy (lower third) (2). Surgical principles for successful repair of acute ureteric transactions include the following: (a) adequate ureteric debridement and careful mobilization; (b) spatulated, tension-free, watertight anastomosis over a ureteric stent; (c) isolation of the ureteric repair from associated injuries and placement of a retroperitoneal drain; and (d) proximal urinary diversion is usually unnecessary (Png and Chapple, 2000).

Records of 40 patients with ureteral injuries were reviewed retrospectively by David A. Kunkle et al. Only 40% and 60% of patients sustained injuries to the right and left ureters, respectively; no patients sustained injuries to both ureters or more than one ureter. In 34.3%, 31.4%, and 33.3% of cases, ureteral injuries occurred at the most distal third, middle third, and most proximal third, respectively (34.3 percent) (Kunkle et al., 2006).

Thirty-eight ureteral injuries were recorded between 1977 and 2003 by Sean P. Elliott et al., with 71% occurring in the proximal segment, compared to 8% in the intermediate, and 21% in the distal. This is because the bony pelvis provides extra protection for the ureter at its mid and distal segments. In the case of a gunshot wound, the assailant may have been attempting to target additional body parts by raising the weapon (Elliott and McAninch, 2003).

From 2005-2008, 5.5% of all GU operative procedures involved injuries to the ureter, as shown by a study by Steven J. Hudak et al. Thirteen patients underwent successful primary reconstruction, while seven others needed temporary ureteral externalization (Hudak and Hakim, 2009).

A total of 57 patients with ureteral injury were admitted to our hospital during the 120-month study conducted by Charles D. Best et al. Injury to the left ureter occurred in (58%) of cases, while injury to the right ureter occurred in (40 percent). When broken down by where in the ureter they were found, 26.4% were found in the proximal ureter, 38% in the mid ureter, and the remaining 38.2% were found in the distal ureter (Best et al., 2005).

Researchers Marcos R. Perez-brayfield, et al. From 1960 to 1999, Grady Memorial Hospital cared for a total of 118 patients who had sustained ureteral injuries as a result of gunshot wounds. Variables such as defect location and severity necessitated a variety of surgical techniques for repair, including observation in 2 cases, stent placement in 6, ureteroureterostomy in 76, ureteroneocystostomy and a psoas hitch in 31, nephrectomy in 2, and ureteral ligation in 1. Ureteral margins were adequately debrided, spatulated, and re-approximated with 4 or 5 0 absorbable sutures in all primary repairs. After surgery, a catheter was used to drain the bladders of all patients (Perez-Brayfield et al., 2001).

Bullet and knife wounds are the most common types of penetrating injuries, and their prevalence rises as social disorder and access to firearms worsen. Urine analysis and imaging studies are not always accurate, so a high index of suspicion is necessary for the early diagnosis of ureteric injuries. A primary repair is usually sufficient to restore function after such an injury. One of the leading causes of ureteral injury-related mortality is a failure to diagnose the condition in a timely fashion. Appropriate radiographic and intraoperative evaluations performed at the right times can help ease the diagnostic process (Dobrowolski et al., 2002).

Conclusion

Urinary tract trauma is uncommon, hard to diagnose, and challenging to treat surgically. Many trauma surgeons and urologists lack experience treating these injuries because they are so uncommon. Ureteral injury can cause the loss of an ipsilateral renal unit or significant and delayed complications if it is not diagnosed or treated properly.

Author Contributions

Author Saif Nabeel Akram has conceptualized the study and played primary role in compiling, analyzing and interpretation of the data.

Author Hayder Adnan Fawzi reviewed the results and contributed to the preparation and review of drafts and writing of the final article.

All the authors take complete responsibility for the content of the manuscript.

Ethical approval

The study was approved by the ethics committee of the Ministry of Health gave their clearance with 123N, 2021

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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