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Blunt Trauma Due to an Automobile Accident with Isolated Injury of the Middle Ureter: A Case Report

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Abstract

Ureteral injuries due to blunt abdominal trauma are rare and represent a diagnostic and therapeutic challenge, with significant morbidity if not promptly identified. An 81-year-old male presented with right flank pain following a side-impact car accident. A contrast-enhanced CT scan revealed a partial rupture of the right mid-ureter with contrast extravasation. The patient underwent endoscopic placement of a double-J ureteral stent with favorable clinical evolution. Over a seven-year follow-up, the patient remained asymptomatic, with preserved renal function and no urological complications. This case highlights the importance of early imaging with delayed-phase CT for ureteral trauma evaluation in stable patients. Minimally invasive management proved effective even in an elderly patient, supporting its use in moderate-grade injuries. Prompt recognition and endoscopic treatment of blunt ureteral trauma can lead to excellent long-term outcomes, preserving renal function and avoiding serious complications.

Keywords

Ureter, Urogenital Surgical Procedures, Blunt Trauma, Endourology

1. Introduction

The definition of trauma covers any physical injury or wound in living tissues resulting from the action of external agents. This condition is responsible for approximately 8% of global deaths and disproportionately affects the young population, which has a significant social and economic impact due to prolonged hospitalization and functional sequelae in survivors [1].

Trauma of the urogenital tract is present in about 10% of patients suffering from

severe abdominal or pelvic traumas, usually in association with other intra-abdominal lesions [2]. Ureteral lesions, in turn, represent a minority of these cases, being considered rarer, occurring in approximately 4% of penetrating traumas and in less than 1% of contusions [2] [3].

Although its incidence has decreased in recent decades, iatrogenic lesions remain the main cause of ureteral trauma, especially in pelvic and abdominal surgical procedures [4]. This reduction can be attributed to the improvement of professional training and the incorporation of assistive technologies in surgical procedures [5] [6].

Penetrating lesions continue to be the most frequently implicated mechanism in ureteral involvement, while bruised traumas account for approximately one-third of cases. Such lesions predominate in younger patients, with a mean age of 23.2 years, and are mostly male [2] [7].

A systematic review involving 77 studies and 1021 patients with ureteral trauma showed that most cases result from penetrating mechanisms, with predominance of lesions in the proximal segment of the ureter and with involvement of other associated organs [8].

Although pelvic trauma due to contusions is responsible for a lower proportion of urogenital tract lesions, when present, it tends to have an insidious clinical evolution, often associated with greater severity and increased consumption of hospital resources [9].

The early diagnosis of ureteral lesions is essential and is directly linked to the patient's prognosis. The late identification of these lesions is associated with significant complications, such as retroperitoneal abscesses, urinary fistulas, ureteral stenosis, renal failure, sepsis and death [3]. Considering that these lesions are not always clinically evident, a high level of suspicion by the care team is necessary to ensure timely diagnosis and proper treatment [10].

In the initial care of patients suffering from abdominal or pelvic trauma, especially in polytrauma scenarios, it is essential to apply the contemporary principles of assessment and advanced life support, as established by Advanced Trauma Life Support (2018) [11]. Additionally, strategies such as damage control and the use of imaging methods play a central role in the approach to these patients.

Regarding imaging tests, the speed of performance and the ability to provide comprehensive information about the various organs potentially affected are essential. In these cases, computed tomography (CT) represents the exam of choice. In hemodynamically stable patients suspected of urological injury, a three-phase CT scan is recommended to allow adequate evaluation of the urinary system and its associated structures [11]-[13].

It should be noted that although traumatic ureteral lesions are considered rare, both in terms of incidence and in relation to the immediate risk to life, their diagnosis cannot be neglected. Failure to recognize these lesions early may result in significant clinical complications, such as urinary fistulas, retroperitoneal abscesses, stenosis and impairment of renal function, constituting potential causes of mor-

bimortality.

This study aimed to describe the case of atypical ureteral lesion, notable for its isolated presentation, the involvement of the middle segment of the ureter, the advanced age of the patient and the therapeutic strategy adopted, with clinical follow-up of seven years without evidence of associated complications.

This study followed the guidelines of the CARE Checklist [14].

2. Case Report

Male patient, 81 years old, lawyer in full professional activity, victim of lateral collision between motor vehicles in signposted urban intersection. He was admitted to the emergency room, referring to cervical pain and continuous pain from thoracic-right abdominal transition to the right iliac fossa, associated with nausea and episodes of vomiting. Among the personal history, there was a history of previously treated thyroid neoplasia and chronic constipation. He did not mention other relevant comorbidities.

At the physical examination, the patient presented with good general condition, blushing, euphoric, with mild tachycardia and hemodynamically stable with pressure of 130 × 80 mmHg. The patient reported that at the time of the accident, he was wearing a seat belt. No external injury was found in the abdomen, chest, head, cervical region or limbs. He complained of pain on abdominal examination, more intense in the right flank, but without signs of peritoneal irritation.

The patient presented with a body weight of 75 kg, height of 1.60 m, and a body mass index (BMI) of approximately 29.3 kg/m^2. Upon admission, laboratory tests revealed a hemoglobin level of 14.3 g/dL, serum creatinine of 0.9 mg/dL, blood urea nitrogen (BUN) of 14 mg/dL, and an estimated creatinine clearance of 68.29 mL/min. Urinary sediment analysis demonstrated the presence of hemoglobin and 22 red blood cells per high-power field.

Contrast-enhanced computed tomography (CT) of the abdomen and pelvis revealed liver, spleen, pancreas, adrenal glands, large vessels, and hollow viscera without alterations. The kidneys presented good uptake and excretion of contrast, bilaterally and symmetrically. Partial rupture of the right middle ureter was observed, with contrast extravasation and formation of adjacent liquid collection. The distal segment of the right ureter was opaque, even in the presence of the medial ureteral lesion (**Figure 1**).

According to the American Association for the Surgery of Trauma (AAST) classification, the patient sustained a grade II ureteral injury, characterized by a laceration involving less than 50% of the ureteral circumference [2].

The patient was hospitalized for clinical management and underwent endoscopic placement of a double-J ureteral stent. A cystoscopy was performed using a 30˚ optic, followed by the introduction of a guidewire through the right ureteral orifice, with successful advancement to the right renal pelvis without technical difficulty. Subsequently, a 6 Fr, 26 cm double-J stent was inserted over the guidewire under fluoroscopic guidance, without complications.

Figure 1. Abdominal computed tomography (non-contrast phase) of the coronal section.

A Foley catheter was also placed and maintained for 72 hours, and antibiotic prophylaxis was administered. The patient showed satisfactory clinical progress and was discharged on the fifth day after the trauma.

On the eighth day after the traumatic event, the patient returned to the emergency room complaining of abdominal pain and constipation, with no bowel movements. At the physical examination, he maintained good general condition, presenting only abdominal distension, without signs of peritoneal irritation. New CT of abdomen and pelvis with contrast showed the well-positioned Duplo Jota catheter, without evidence of urinary extravasation, and slight blurring of perirenal fat adjacent to the right middle ureter. No changes were observed in other organs, confirming the findings of the previous examination (Figure 2 and Figure 3).

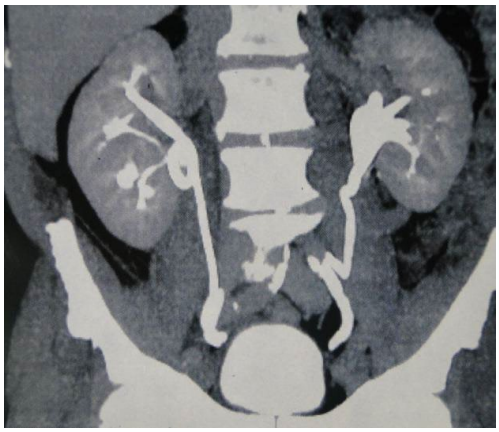

Figure 2. CT with contrast on the 8th day of evolution without contrast extravasation.

Considering the clinical picture and imaging findings, conservative treatment was instituted with prescription of laxatives, with satisfactory clinical evolution in subsequent days.

The outpatient follow-up was maintained with the same medical team. On the 46th day of evolution, the patient had no complaints. The Double Jota catheter was

removed under sedation, followed by retrograde pyelography, which showed slight ureteral dilation without contrast extravasation (Figure 4).

Figure 3. Three-dimensional reconstruction CT of abdomen on the 8th day of evolution without contrast extravasation (posterior view).

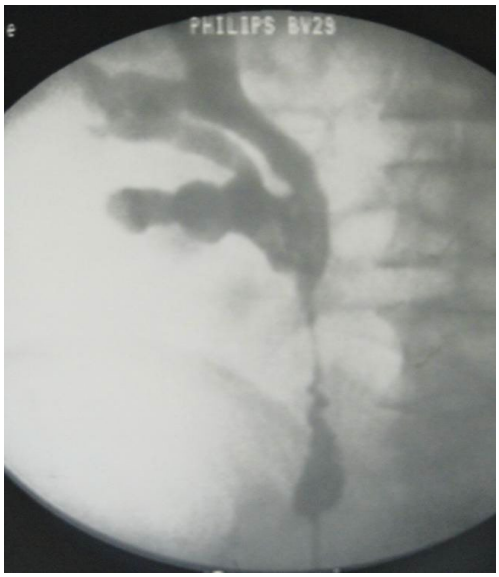

Figure 4. Retrograde pyelography after removal of Double Jota catheter on the 46th day post-trauma.

Three years after the traumatic event, the patient underwent endoscopic resection of the prostate by the same assistant team, without complications. Five years after the trauma, the patient remained asymptomatic, with renal function preserved for the age group (urea: 53 mg/dL; creatinine: 0.8 mg/dL) and urinary tract ultrasonography without evidence of pyelocaliceal dilation or other morphological changes.

In the seventh year of follow-up, at 88 years old, the patient presented only complaints of urge-incontinence, being treated clinically with association of alpha-adrenergic blocker and anticholinergic, with satisfactory response and without additional complications.

3. Discussion

The present report describes a rare case of ureteral lesion in the middle portion of the ureter, secondary to blunt trauma in elderly patients, with early diagnosis by three-phase computed tomography and conservative management by endourological route. The clinical outcome, with outpatient follow-up of seven years, demonstrated preservation of renal function and absence of late urological complications, reinforcing the effectiveness of minimally invasive treatment in these selected cases.

Ureteral injury due to trauma is rare, accounting for approximately 1% to 2.5% of all urinary tract traumas [4]. Among these, only about one-third is due to blunt trauma, usually related to high-energy automobile accidents [7]. The upper segment of the ureter is most often affected in these scenarios [15].

The lesions of the inferior ureter, in turn, are predominantly of iatrogenic origin, associated with gynecological, urological, colorectal and vascular procedures [4]. The screen case differs from the usual pattern in that it is an isolated lesion of the middle segment of the ureter, with no evidence of trauma associated with other organs or adjacent structures.

In victims of high-energy trauma, especially with sudden deceleration mechanisms, the presence of hematuria—whether macroscopic or microscopic—associated with hypotension should motivate investigation with imaging [2].

In cases of lateral deceleration trauma, the kidney continues its movement by inertia while the torso abruptly decelerates, resulting in excessive traction on the mid-ureter. Simultaneously, this segment may be compressed against bony structures, such as the lumbar transverse processes, potentially exceeding its elastic limit and causing focal rupture—even in the absence of associated fractures [16] [17].

Failure to identify a urinary tract injury during the initial assessment of a patient with multiple trauma can lead to serious clinical consequences, such as functional loss of the affected kidney, severe infections, sepsis or death. Less lethal, but equally clinically relevant complications include the formation of intra-abdominal or retroperitoneal urinomas, urinary fistulas, abscesses and ureteral stenosis, with significant impacts on quality of life and treatment costs [4].

Currently, the diagnosis of urinary tract lesions is carried out preferentially by means of computed tomography, an examination widely recommended in the initial evaluation of hemodynamically stable polytraumatized patients. The use of intravenous contrast, associated with late cuts in the excretory phase, considerably increases diagnostic accuracy for urological lesions, especially ureteral [5]. In cases where doubts persist about the presence of ureteral lesion, retrograde or anterograde urography is the method of choice [18].

The choice of treatment for ureteral injuries should consider the extent of the lesion, the classification according to the American Association for the Surgery of Trauma (AAST) scale, the patient's hemodynamic status, and the affected ureteral segment. Therapeutic options range from nephrostomy or double-J catheter placement to more complex procedures, performed via open or laparoscopic approaches [2] [4] [19].

In the reported case, a minimally invasive endoscopic approach was selected, taking into account the patient's advanced age and the partial nature of the ureteral injury, making this method appropriate and potentially definitive.

Injuries located in the proximal or mid-ureter can be repaired with techniques such as ureteroureterostomy or ureteral anastomoses to the renal pelvis or even to the renal calyces when there is significant involvement of the pelvis [4] [19]. Conversely, extensive ureteral segment loss requires more complex interventions, such as downward nephropexy, Boari flap, transureteroureterostomy, intestinal interposition, or autotransplantation, particularly when previous techniques fail or are not feasible [20]-[22].

In cases of trauma involving the distal ureter, detailed assessment of luminal patency and local vascularization is essential. Management may include simpler procedures such as foreign body removal or double-J catheter placement; however, ureteral reimplantation is generally the preferred technique due to its high rates of clinical and functional success [23].

Despite the benefits of the minimally invasive endoscopic approach chosen in this case, potential complications—both short- and long-term—must be considered. These include persistent urinary extravasation and, more importantly, late-onset ureteral stricture. Should such complications arise, more invasive surgical interventions, as previously described, may be necessary [24] [25].

In the reported case, the excellent clinical condition of the patient, associated with hemodynamic stability and the absence of associated lesions in other organs, allowed the adoption of a minimally invasive approach. The contrast computed tomography showed ureteral lesion grade II/III in the middle ureter, allowing endoscopic treatment with ureteral double J catheter implantation. This conduct is in accordance with the current literature, indicating that most ureteral lesions from blunt trauma are treated this way.

4. Conclusion

This case reveals a rare finding of ureteral lesion resulting from concussion trauma. A systematic and timely assessment, in conjunction with tomography, plays a crucial role in the effective management of this type of trauma. The minimally invasive procedure adopted in this case proved to be effective and safe, with long-term follow-up without complications.

Informed Consent

Written informed consent was obtained from the patient for the publication of this

case report and accompanying images.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] World Health Organization (2022) Injuries and Violence. https://www.who.int/news-room/fact-sheets/detail/injuries-and-violence

[2] Coccolini, F., Moore, E.E., Kluger, Y., Biffl, W., Leppaniemi, A., Matsumura, Y., *et al.* (2019) Kidney and Uro-Trauma: WSES-AAST Guidelines. *World Journal of Emergency Surgery*, **14**, Article No. 54. https://doi.org/10.1186/s13017-019-0274-x

[3] Javanmard, B., Fallah-Karkan, M., Razzaghi, M., Djafari, A.A., Ghiasy, S., Lotfi, B. and Vafaee, R. (2019) Characteristics of Traumatic Urogenital Injuries in Emergency Department: A 10-Year Cross-Sectional Study. *Archives of Academic Emergency Medicine*, **7**, e63.

[4] Elliott, S.P. and McAninch, J.W. (2006) Ureteral Injuries: External and Iatrogenic. *Urologic Clinics of North America*, **33**, 55-66. https://doi.org/10.1016/j.ucl.2005.11.005

[5] Brandes, S., Coburn, M., Armenakas, N. and McAninch, J. (2004) Diagnosis and Management of Ureteric Injury: An Evidence-Based Analysis. *BJU International*, **94**, 277-289. https://doi.org/10.1111/j.1464-410x.2004.04978.x

[6] Johnson, D.B. and Pearle, M.S. (2004) Complications of Ureteroscopy. *Urologic Clinics of North America*, **31**, 157-171. https://doi.org/10.1016/s0094-0143(03)00089-2

[7] McGeady, J.B. and Breyer, B.N. (2013) Current Epidemiology of Genitourinary Trauma. *Urologic Clinics of North America*, **40**, 323-334. https://doi.org/10.1016/j.ucl.2013.04.001

[8] Pereira, B.M.T., Ogilvie, M.P., Gomez-Rodriguez, J.C., Ryan, M.L., Pena, D., Marttos, A.C., *et al.* (2010) A Review of Ureteral Injuries after External Trauma. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, **18**, Article No. 6. https://doi.org/10.1186/1757-7241-18-6

[9] Velazquez, N., Fantus, R.J., Fantus, R.J., Kingsley, S. and Bjurlin, M.A. (2020) Blunt Trauma Pelvic Fracture-Associated Genitourinary and Concomitant Lower Gastrointestinal Injury: Incidence, Morbidity, and Mortality. *World Journal of Urology*, **38**, 231-238. https://doi.org/10.1007/s00345-019-02725-7

[10] Phillips, B., Holzmer, S., Turco, L., Mirzaie, M., Mause, E., Mause, A., *et al.* (2017) Trauma to the Bladder and Ureter: A Review of Diagnosis, Management, and Prognosis. *European Journal of Trauma and Emergency Surgery*, **43**, 763-773. https://doi.org/10.1007/s00068-017-0817-3

[11] American College of Surgeons, Committee on Trauma (2018) ATLS: Advanced Trauma Life Support-Student Course Manual. 10th Edition, American College of Surgeons.

[12] Zaid, U.B., Bayne, D.B., Harris, C.R., Alwaal, A., McAninch, J.W. and Breyer, B.N. (2015) Penetrating Trauma to the Ureter, Bladder, and Urethra. *Current Trauma Reports*, **1**, 119-124. https://doi.org/10.1007/s40719-015-0015-x

[13] Fischer, W., Ali, M., Yee, D.S., *et al.* (2015) Incidence of Urinary Leak and Diagnostic Yield of Excretory Phase CT in the Setting of Renal Trauma. *AJR American Journal of Roentgenology*, **204**, 1168-1173.

[14] Gagnier, J.J., Kienle, G., Altman, D.G., Moher, D., Sox, H. and Riley, D. (2014) The CARE Guidelines: Consensus-Based Clinical Case Report Guideline Development.

Journal of Clinical Epidemiology, **67**, 46-51. https://doi.org/10.1016/j.jclinepi.2013.08.003

[15] Heyns, C.F. (2004) Renal Trauma: Indications for Imaging and Surgical Exploration. *BJU International*, **93**, 1165-1170. https://doi.org/10.1111/j.1464-410x.2004.04868.x

[16] M Ravindranath, T. (2024) Trauma to the Ureter and the Urinary Bladder: The Conductor and the Collector. *Journal of Surgical Case Reports and Images*, **7**, 1-5. https://doi.org/10.31579/2690-1897/206

[17] Morey, A.F., Brandes, S., Dorfman, R., Hendrix, G.H., Marshall, F.F. and Wolfe, J.A. (2021) Urotrauma: AUA guideline. *Journal of Urology*, **205**, 30-35.

[18] Khan, F., Ahmed, K., Lee, N., Challacombe, B., Khan, M.S. and Dasgupta, P. (2014) Management of Ureteropelvic Junction Obstruction in Adults. *Nature Reviews Urology*, **11**, 629-638. https://doi.org/10.1038/nrurol.2014.240

[19] Burks, F.N. and Santucci, R.A. (2014) Management of Iatrogenic Ureteral Injury. *Therapeutic Advances in Urology*, **6**, 115-124. https://doi.org/10.1177/1756287214526767

[20] Chung, B.I., Hamawy, K.J., Zinman, L.N. and Libertino, J.A. (2006) The Use of Bowel for Ureteral Replacement for Complex Ureteral Reconstruction: Long-Term Results. *Journal of Urology*, **175**, 179-183. https://doi.org/10.1016/s0022-5347(05)00061-3

[21] Meng, M.V., Freise, C.E. and Stoller, M.L. (2003) Expanded Experience with Laparoscopic Nephrectomy and Autotransplantation for Severe Ureteral Injury. *Journal of Urology*, **169**, 1363-1367. https://doi.org/10.1097/01.ju.0000054927.18678.5e

[22] Wenske, S., Olsson, C.A. and Benson, M.C. (2013) Outcomes of Distal Ureteral Reconstruction through Reimplantation with Psoas Hitch, Boari Flap, or Ureteroneocystostomy for Benign or Malignant Ureteral Obstruction or Injury. *Urology*, **82**, 231-236. https://doi.org/10.1016/j.urology.2013.02.046

[23] Mendonca, S.J., Jessica Pan, S., Li, G. and Brandes, S.B. (2021) Real-World Practice Patterns Favor Minimally Invasive Methods over Ureteral Reconstruction in the Initial Treatment of Severe Blunt Ureteral Trauma: A National Trauma Data Bank Analysis. *Journal of Urology*, **205**, 470-476. https://doi.org/10.1097/ju.0000000000001347

[24] De Coninck, V., Keller, E.X., Somani, B., Giusti, G., Proietti, S., Rodriguez-Socarras, M., *et al.* (2020) Complications of Ureteroscopy: A Complete Overview. *World Journal of Urology*, **38**, 2147-2166. https://doi.org/10.1007/s00345-019-03012-1

[25] Zaghbib, S., Saadi, A., Boussaffa, H., Ayed, H. and Slama, M.R.B. (2023) Management Strategies and Root Causes of Missed Iatrogenic Intraoperative Ureteral Injuries with Delayed Diagnosis: A Retrospective Cohort Study of 40 Cases. *Patient Safety in Surgery*, **17**, Article No. 21. https://doi.org/10.1186/s13037-023-00372-x