CLINICAL CASE

Undetected ureteral injury from a gunshot wound


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KEYWORDS
Ureteral trauma; Wounds; Injuries; Urinoma; Mexico.

Abstract  Less than 1% of all urogenital injuries due to external violence are traumatic injuries of the ureter and 2% of abdominal gunshot wounds cause ureteral injuries. We present herein the case of a patient presenting with undetected ureteral trauma with the complication of urinoma. An 18-year-old male with a past history of a gunshot wound in the abdomen in September 2011 had undergone exploratory laparotomy that revealed a grade III small bowel injury and a grade IV transverse colon wound. Intestinal resection with a small bowel end-to-end anastomosis plus colostomy and Hartmann pouch closure were performed. In February 2012 the patient underwent gastrointestinal tract restitution; a left retroperitoneal tumor was found, and the procedure was suspended. Physical examination revealed a mass in the left hemiabdomen that was painful when palpated and attached to the deep planes. There were no signs of peritoneal irritation. Laboratory workup reported hemoglobin 10.9, hematocrit 34.1%, leukocytes 9.4, platelets 236, glucose 100, BUN 12.8, and creatinine 1.27. A urography scan identified severe left hydronephrosis vs. urinoma. Retrograde pyelography showed contrast medium extravasation. The patient underwent exploratory laparotomy and a 2,000 mL urinoma and a grade IV injury in the upper third of the left ureter were found; the urinoma was drained and a left ureteral end-to-end anastomosis was carried out.

The diagnosis of ureteral injury due to external trauma is difficult due to the presence of multiple organ lesions, as well as the absence of trauma-specific clinical and laboratory findings. Ureteral injury management is based on the general principles of trauma and depends on the extension and anatomical location of the injury in the ureter.

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Lesión inadvertida del uréter por proyectil de arma de fuego

Resumen Las lesiones ureterales traumáticas representan < 1% de todas las lesiones urogenitales por violencia externa. El 2% de las heridas por proyectil de arma de fuego en abdomen, ocasionan lesiones ureterales.

Presentamos el caso de un paciente con trauma ureteral inadvertido complicado con urinoma. Hombre de 18 años de edad, con antecedente de herida por proyectil de arma de fuego en abdomen, ocurrida en septiembre del 2011, sometido a laparotomía exploradora encontrando lesión en intestino delgado grado III y lesión en colon transverso grado IV, realizándose resección intestinal con anastomosis término-terminal de intestino delgado más colostomía y cierre en bolsa de Hartmann. En febrero del 2012, es sometido a restitución del tracto gastrointestinal encontrando tumoración retroperitoneal izquierda, suspendiéndose el procedimiento.

A la exploración física se encuentra masa dolorosa a la palpación en hemicuerpo izquierdo, fija a planos profundos, sin datos de irritación peritoneal. Sus exámenes de laboratorio muestran: hemoglobina 10.9, hematócrito 34.1%, leucocitos 9.4, plaquetas 236,000, glucosa 100 mg, BUN 12.8, creatinina 1.27 mg. La urotomografía evidencia hidroureteronefrosis izquierda severa vs. urinoma. Se realiza pielografía ascendente evidenciando extravasación del medio de contraste, se lleva a laparotomía exploradora encontrando urinoma de 2,000 mL y lesión grado IV de uréter izquierdo en tercio superior; se realiza drenaje de urinoma y anastomosis término-terminal ureteral izquierda.

El diagnóstico de las lesiones ureterales por trauma externo es difícil, debido a la presencia de lesiones en múltiples órganos, así como por la ausencia de hallazgos clínicos y de laboratorio específicos para trauma. El manejo de las lesiones ureterales se basa en los principios generales de trauma, y depende de la extensión y localización anatómica del uréter.
debridement and uretero-ureteral anastomosis; injuries that present in the middle ureter are also well managed through uretero-ureteral anastomosis. Other options for managing injuries in these segments are transuretero-ureteral anastomosis anchored to the psoas muscle with uretero-neocyst anastomosis. In some cases mobilization of the ipsilateral kidney unit may be necessary in order to achieve an anastomosis without tension.

In the case of localized injuries in the inferior third of the ureter the best management is through uretero-neocyst anastomosis. The principles of ureteral repair are a complete evaluation and staging of the urologic injuries, mobilization of the ureter being careful to preserve the adventitia, debridement of the non-viable tissue, and the performance of a spatulated and tension-free anastomosis over a catheter, making sure to bring together mucosa with mucosa.

An unrecognized or poorly managed ureteral injury can lead to important complications such as urinoma, abscess, ureteral stricture, urinary fistula, and potential loss of the ipsilateral kidney unit.

**Case presentation**

An 18-year-old male with a past history of an abdominal gunshot wound occurring in September 2011 underwent exploratory laparotomy outside our Institution that found a grade III small bowel injury and a grade IV transverse colon injury. In February 2012 the patient underwent gastrointestinal tract restitution, revealing a left retroperitoneal tumor for which the procedure was suspended. One day later he was referred to our Service with the diagnosis of retroperitoneal mass. Physical examination revealed vital signs within normal parameters, good hydration, skin and tegument pallor, no cardiopulmonary alterations, a soft and depressible abdomen, normal peristaltic noises, pain upon superficial and deep palpation of the left hemiabdomen, the presence of a painful mass fixed to the deep layers, no data of peritoneal irritation, and no motor or sensitive disturbances in the extremities. Laboratory work-up reported hemoglobin 10.9, hematocrit 34.1%, leukocytes 9.4, platelets 236,000, glucose 100 mg, BUN 12.8, and creatinine 1.27 mg.

A urotomography scan showed severe left hydrureteronephrosis vs. urinoma (fig. 1); additionally, in the nephrographic phase there was a delay in contrast medium elimination in the left kidney (fig. 2). Retrograde pyelography revealed contrast medium extravasation into the retroperitoneum, and so exploratory laparotomy was carried out that found a 2,000 mL urinoma and a grade III injury in the

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**Figure 1** Preoperative tomography scan showing left severe hydrureteronephrosis.

**Figure 2** Preoperative tomography scan, elimination phase, with left-side elimination delay.
left upper third portion of the ureter (figs. 3 and 4). The urinoma was drained, the necrotized tissue was debrided, left double-J catheter was placed, and an end-to-end anastomosis of the left ureter with separated Monocryl™ 4-0 sutures was performed. The double-J catheter was removed one month and a half after surgery and a urotomography scan (figs. 5 and 6) showed adequate contrast medium passage at the ureteral anastomosis site, with no leakage and no evidence of ureteral stricture. Intestinal transit restitution was carried out 2 months later, with no complications.

Discussion

The medical literature reports that only 1% to 2% of gunshot wounds cause ureteral injuries. If these injuries are not identified or managed adequately, they can lead to significant complications such as: urinoma, abscess, ureteral stricture, urinary fistula, and potential loss of the kidney unit. Delayed diagnosis is associated with the multiple injuries produced by firearms. The wound site often varies, but nevertheless, the upper third portion of the ureter is the site that is most frequently affected. Ureteral injury management is guided by the grade of the lesion at hand; some can be managed conservatively, while others require surgical treatment with primary closure of injuries or debridement and end-to-end anastomosis of the affected segment.
Conclusions

Ureteral injuries are rare and the presence of hematuria and certain radiologic studies are poor indicators of injury; a high index of suspicion is needed when these injuries present. The majority of injuries have a minimum of tissue loss and are usually repaired through debridement and anastomosis.

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Conflict of interest

The authors declare that there is no conflict of interest.

References


Fe de erratas

En el Artículo original: “Uso de la espectroscopía del infrarrojo para detectar isquemia vesical en pacientes con obstrucción parcial al vaciamiento, secundario a hiperplasia prostática benigna” de la Rev Mex Urol 2013;73(1):9-16, en la página 14 dice: “Figura 1. Representación esquemática de los componentes principales y demostración del uso del aparato URO-NIRS-2000. A) Esquema del emisor/sensor NIRS y su modo de actuar en la superficie de la piel. B) Fotografía demostrativa que muestra en dónde y cómo se coloca el emisor/sensor NIRS en un paciente, para realizar la detección de los diversos metabolitos cromóforos. C) Gráfica demostrativa de las variaciones en la concentración de HHb, O2HB y tHb a lo largo del tiempo, cuando existe un proceso de oclusión vascular, que es indicativo de hipoxia originado por un proceso de isquemia.”