



## An Isolated Ureteropelvic Junction Injury Following a Low-impact Mechanical Fall

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<b>OBJECTIVE</b>	To describe the presentation of a rare isolated ureteropelvic junction injury resulting from a mechanical fall on ice.
<b>MATERIALS AND METHODS</b>	A 71-year-old previously healthy man presented to the emergency department at the University of Massachusetts Medical School 3 hours following falling on ice with complaints of gross hematuria and flank pain. Patient records were accessed via the institution's electronic medical records system between March 22, 2018 and April 22, 2018.
<b>RESULTS</b>	Abdominal imaging revealed urinary extravasation without evidence of accompanying injury to surrounding structures, confirming an isolated left ureteropelvic junction injury.
<b>CONCLUSION</b>	Isolated ureteral injury following low-impact blunt abdominal trauma is exceedingly rare. Furthermore, this patient's presentation challenges the accepted conventions for both mechanism of injury and accompanying clinical factors in ureteral trauma. UROLOGY 125: e1–e3, 2019. © 2018 Elsevier Inc.

Genitourinary injuries occur in 2%-5% of adult trauma cases.<sup>1</sup> Of these, nearly 80% involve the kidneys whereas 10% involve the bladder.<sup>2</sup> Traumatic ureteral injuries are uncommon, accounting for only 1% of all urologic trauma.<sup>3</sup> Alfred Poland reported the first case of ureteral injury secondary to blunt abdominal trauma in 1868, detailing the injuries of a young woman pinned underneath a railway carriage.<sup>4</sup> The majority of ureteral injuries, however, are associated with penetrating abdominal trauma, though the advent of automobile transportation has challenged this trend.<sup>7</sup>

### CASE REPORT

A 71-year-old male slipped on ice in his gym's parking lot, striking his left chest on the ground. He did not suffer any significant pain initially but experienced an episode of gross hematuria while in the gym. He eventually developed left flank and left upper quadrant abdominal pain with persistent gross hematuria. Three hours after the fall, the patient presented to the emergency department for evaluation of his symptoms. Computed tomography (CT) with intravenous contrast demonstrated diffuse fluid in the left retroperitoneum, raising concern for a left ureteral injury (Fig. 1). Imaging showed no evidence of further injury save for a

small mesenteric hematoma. Repeat CT scan without contrast confirmed extravasation from the left collecting system with a focal irregularity noted at the left ureteropelvic junction (Fig. 2).

The patient proceeded to the operating room where a left retrograde pyelogram demonstrated ureteropelvic junction (UPJ) extravasation (Fig. 3). A left double-J stent was successfully placed into the renal pelvis under fluoroscopy. The patient was discharged home that night and a follow-up retrograde pyelogram 8 weeks later demonstrated no evidence of extravasation. Delayed drainage films showed appropriate drainage, confirming resolution of the ureteral injury (Fig. 4).

### DISCUSSION

An analysis of the National Trauma Data Bank entries spanning from 2002 to 2006 estimates that 38.5% of ureteral injuries result from blunt abdominal trauma,<sup>6</sup> up from 5% in 1994.<sup>7</sup> The rise in high-speed motor vehicle collisions, likely responsible for the increasing incidence of ureteral trauma,<sup>7</sup> may also explain the growing proportion of ureteral injuries caused by blunt abdominal injury. Typically, however, ureteral ruptures from high-speed impacts are accompanied by significant nongenitourinary injuries.<sup>8</sup> Pereira et al reviewed 81 articles pertaining to traumatic ureteral injuries, finding significant associated injuries in 90.4% of such cases. Isolated ureteropelvic junction injuries following blunt abdominal traumas are exceedingly rare, with only 2 such cases identified after an exhaustive literature review.<sup>9,10</sup> Additionally, the low-speed impact of

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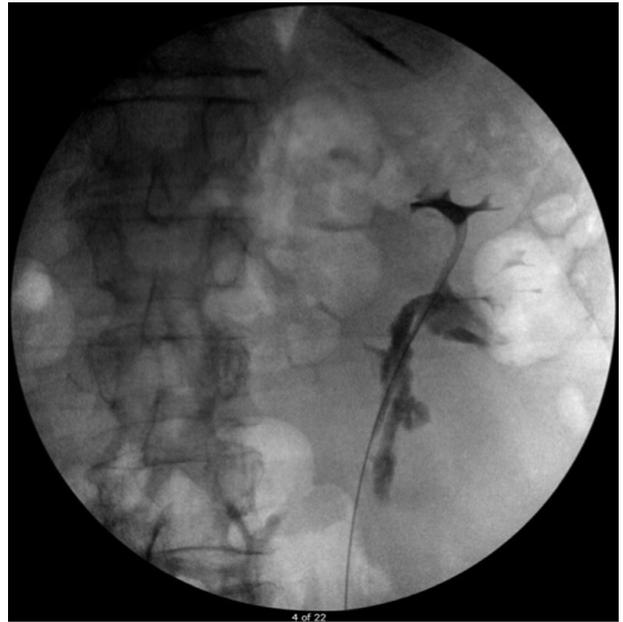
**Figure 1.** Initial CT abdomen and pelvis with IV contrast. Axial image demonstrates perinephric fluid collection at level inferior to left lower renal pole.

a ground level fall accompanied with no other significant injury makes our case an extraordinarily rare presentation for a ureteral injury.

Typical symptoms associated with ureteral injury include flank pain, gross hematuria, inguinal pain, and retroperitoneal hematoma. However, ureteral injuries are commonly missed on initial examination as the classic symptomatology is often absent. Literature review found gross hematuria, considered a characteristic finding of ureteral injury, to be present in only 44.4% of patients on admission.<sup>11</sup> Radiographic findings suspicious for ureteral injury include lumbar transverse process fracture, perinephric stranding, hematomas, and low-density retroperitoneal fluid.<sup>6</sup> Though CT with intravenous contrast and delayed imaging is likely to reveal extravasation of contrast, retrograde pyelogram remains the gold standard for assessing ureteral damage.<sup>12</sup>



**Figure 2.** Delayed (8 h) CT abdomen and pelvis without IV contrast. Axial image demonstrates perinephric fluid enhancement at level inferior to left lower renal pole.



**Figure 3.** Left retrograde pyelogram demonstrates extravasation of contrast just distal to ureteropelvic junction with sensor wire in the left ureter, bypassing the injury, and entering the left upper pole calyx.

Blauel first proposed a mechanism for blunt ureteral trauma in the early 20th century, employing cadaveric abdomens in his experiments to posit that the ureters were crushed against the lumbar spine.<sup>5</sup> This hypothesis was further deconstructed to separate blunt ureteral injuries into 2 distinct events—lumbar hyperextension causing the ureters to tense and ureteral impact with the lumbar spine.<sup>13</sup> As lumbar transverse process fractures are commonly associated with blunt ureteral trauma,<sup>6</sup> the



**Figure 4.** Left retrograde pyelogram 8 weeks after initial stenting demonstrates resolution of previously identified ureteropelvic junction injury without ureteral narrowing.

ureter likely sustains injury by hitting against these jagged fracture sites. However, such a mechanism does not account for our case, as multiple imaging studies found no evidence of spinal trauma. As such, a clear mechanism of injury is not evident in our case of an isolated ureteral injury from blunt abdominal trauma.

Ureteral stenting appears to be the most commonly employed treatment modality for proximal ureteral lacerations.<sup>5,7,9,14-16</sup> Stenting aims to provide adequate urinary drainage through the injured ureter while simultaneously preventing strictures. Although the risk of strictures decreases considerably with excision of the injured segment of ureter, stenting alone appears sufficient to prevent strictures when surgical intervention occurs soon after injury.<sup>14</sup> Delayed recognition and repair of ureteral injuries lead to significantly higher rates of nephrectomy<sup>17</sup> and mortality.<sup>11</sup>

## CONCLUSION

Isolated ureteropelvic junction injuries resulting from low-impact blunt abdominal trauma are exceptionally rare. Though normally associated with high-speed collisions and spinal fractures, the absence of these accompanying factors should not rule out ureteral injury. However, clinical detection of such injuries is further complicated by the vague and variable constellation of presenting symptoms. As such, imaging studies, particularly delayed phase CT and retrograde pyelogram, should be employed when clinical suspicion for ureteral trauma is high, as early detection and intervention are paramount to restoring normal function and reducing the risk of long-term sequelae.

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