

Ureter Transection and Associated Iliac Vein Laceration in Pediatric Blunt Trauma

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Abstract

Iliac vascular and ureteral injuries from blunt trauma are infrequently seen in children, unless associated with major blunt or penetrating trauma. Combined injury to both structures is even rarer and to our knowledge has not yet been reported. We describe a case of significant iliac vascular and ureteral injuries in a relatively minor, blunt trauma setting. A 9-year-old boy fell off a bicycle and sustained traumatic transection of his left ureter, and injury to the left common/external iliac and hypogastric veins. Computed tomography findings were inconclusive for an etiology. However, we suspected a ureteral and/or a vascular injury around the left iliac vessels with urinoma and/or intra-abdominal hemorrhage, as a large amount of intra-abdominal fluid was present. A definitive diagnosis was made during surgical exploration. Primary repair of the vascular injuries and ureter re-anastomosis were performed. Good recovery was achieved with uneventful follow-up. Attention to secondary injuries often results in delayed diagnosis of subtle blunt vascular injuries in the absence of gross hemorrhage or ischemia. Mortality after iliac vascular injuries ranges from 25–40%. Therefore, prompt operative repair of vascular injuries is needed. However, challenges still exist in diagnosing these injuries.

Keywords

ureter transection; pediatric trauma; iliac vein laceration; blunt trauma; case reports; ureter; wounds and injuries

Introduction

Unintentional injury remains the leading cause of death in children [1]. Most internal injuries result from penetrating blows, leading to a lower index of suspicion in blunt trauma. Vascular and ureteral injuries are increasing in children; however, they are often overlooked during trauma resuscitations, because these structures are rarely injured and are usually accompanied by serious damage to other body structures [2-3]. In the past few decades, ureteral lacerations have accounted for only 1% of the total genitourinary injuries; yet, these have increased to 2.5% since more severely injured patients are surviving because of improved stabilization and faster transportation to trauma centers [4-7]. Since trauma resuscitations are improving, the ability to recognize these injuries will aid in patient care and survival. We describe an unusual pediatric case of ureter transection and iliac vein laceration due to blunt trauma.

Case Presentation

A 9-year-old boy presented to the emergency room after sustaining an unwitnessed bicycle crash. He reported hitting a pole, flipping over the handlebars, and losing consciousness for an unknown period. He had no pertinent medical history. On physical examination, there was a laceration above the left inguinal ligament (10 cm × 2 cm × 1 cm) with exposed subcutaneous tissue and a small abrasion to the left knee. He complained of pain in the left lower quadrant of his abdomen and tingling in the left foot and toes. Abdominal distention was also noted. As the patient was hemodynamically and neurologically stable in the trauma bay, a focused assessment with sonography for trauma exam was not performed.

An abdominal computed tomography (CT) scan showed a soft tissue defect passing anteriorly to the distal left external iliac vein and extending into the left retroperitoneal region, without pelvic fracture (Figures 1–2). We highly suspected a ureteral and/or vascular injury around the left iliac vessels with urinoma and/or intra-abdominal hemorrhage, as a large amount of intra-abdominal fluid was present. While at the CT scanner, the patient became increasingly hypotensive and tachycardic. Considering the CT findings and increased hemodynamic instability, he underwent exploratory laparotomy, and he was found to have transection of the left ureter with injury to the left common iliac, external iliac, and hypogastric veins. After colonic deflection and ureter exposure, active bleeding from the iliac vein was detected. Primary repair of the left common and external iliac veins was performed. Additionally, repair of the middle-third ureter was performed over a stent through uretero-ureteral anastomosis. The estimated operative blood loss was 1,500 mL; 3 units of blood were transfused intraoperatively. Post-operatively, he complained of left lower extremity paresthesia, swelling, and severe pain with ambulation, which improved over his hospital course. He also complained of painful urination, and this resolved before discharge. After 5 days in the intensive care unit, he was discharged home on hospital day 13 with outpatient physical and occupational therapy.

During his follow-up with the urology department, he had no problems with voiding or flank pain. At 1-month follow-up, the previously reported left leg paresthesia, swelling, and pain had resolved. His ureteral stent was removed uneventfully 42 days post-insertion. He had complete return to function and extra-curricular activities.

Discussion

The ureters are very well protected in the retroperitoneum and are bounded by the bony pelvis, vertebrae, and psoas muscle [7]. Blunt injuries are usually associated with significant ancillary damage, including hemodynamic instability, which often goes unrecognized and delays the treatment of vascular and urologic injuries [2,8-13]. The lack of recognizing ureteral injuries poses a major detriment to effective resuscitation.

Most ureteral injuries in children are due to penetrating injuries from motor vehicle crashes—blunt injuries very rarely lead to vascular and ureter lacerations [2,7,11,13-15]. In two recent studies exploring pediatric venous injuries that included almost 9,000 patients, only 1 iliac vein injury was reported [12-13]. A PubMed search for pediatric ureteral injuries only yielded a single case series of 5 pediatric patients in whom injuries were overlooked and presentations were delayed [11].

Blunt injuries lead to ureteral transections through acceleration and deceleration along with hyperextension of the ureter [5,7]. This was likely the mechanism of injury in our case, because the child suddenly hit a pole while riding a bicycle (i.e., acceleration and deceleration). Therefore, his body would have been hyperextended as he fell over the handlebars.

The cardinal step for diagnosing ureteral trauma is to always have a high index of suspicion [7,11]. However, usually more attention is paid to the more obvious traumatic injuries, which delays the diagnosis of more subtle internal injuries. Particularly in our patient with a co-existing iliac injury, a missed injury can significantly increase mortality [11,16]. Depending on the severity, iliac injuries are associated with a high mortality rate due to exsanguinating hemorrhage or complications related to massive blood loss [12-13,17]. Therefore, the prompt operative repair of vascular injuries is needed. In our case, the diagnosis was made using CT and performing an exploratory operation; thus, CT imaging and urography can have complementary roles in diagnosing ureter and pelvic injuries [7,18]. However, the imaging modality is not as important as prompt treatment once physicians suspect an iliac or ureter injury.

The American Urological Association has published guidelines for managing genitourinary trauma, which include but are not limited to: performing CT with contrast enhancement, inspecting the ureters during laparotomy, and repairing ureteral injuries proximal to the iliac vessels with primary repair over a ureteral stent [19]. These steps were followed in the reported case. There are no published guidelines regarding the management of blunt vascular trauma; however, the Eastern Association for the Surgery of Trauma (EAST) published guidelines for managing blunt abdominal trauma [20]. Its report includes figures illustrating diagnostic approaches to blunt abdominal trauma. In addition, EAST confirms that CT enables physicians to detect unanticipated or rare injuries, as it did in the current case. Following known practice management guidelines could unveil rare or unsuspected injuries, as in the current case of combined iliac vein and ureter injuries.

Although ureteral and iliac vascular injuries are uncommon after blunt abdominal injuries, it is always important to consider them. They are associated with a high rate of mortality and can often be easily missed.

Figures



Figure 1: Computed tomography image showing the left ureter injury. This soft tissue injury passes anteriorly to the distal left external iliac through the left retroperitoneal region.

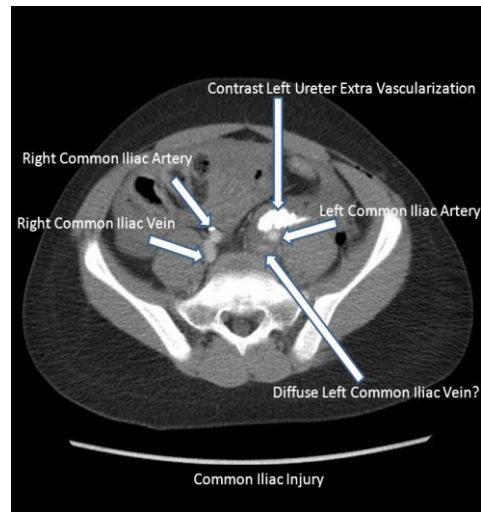


Figure 2: Computed tomography image showing the left common/external iliac injury.

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