



## Nonoperative treatment of blunt renal trauma with urinary extravasation in a child

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**Abstract** The goal of renal trauma management is preservation of functional renal parenchyma with minimal morbidity. In children with grade IV renal injury, the role and timing of surgical or endourologic intervention is less established and remains controversial. We report a case of a urinary extravasation after blunt renal trauma treated by internal ureteral stenting

**Key Words** Renal injury, internal stenting, urinoma, nonoperative, trauma

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### Introduction

Almost 50% of genitourinary tract injuries involve the kidney, and blunt trauma accounts for roughly 90% of these injuries. The ultimate goal of management in renal injury is to maximize functional renal parenchyma and minimize patient morbidity. Advances in

radiographic staging, improvements in hemodynamic monitoring, validated renal injury scoring systems, and essential details about the mechanisms of injury allow successful nonoperative management strategies for renal preservation. Nonoperative treatment is also considered in patients without continuing hemorrhage and hemodynamic instability. When blunt trauma is accompanied by significant urinary extravasation, percutaneous drainage, internal stenting, can result in the complete resolution of persistent urine leakage [1-5].

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In this presentation, we aimed to report a case of renal injury treated by the retrograde ureteral stenting.

### Case Report

A 4-year-old girl fell from second floor, and had echimosis in her right flank region causing severe abdominal pain. A Computed Tomography (CT) scan of the abdomen showed a grade IV renal injury with a minimally perinephric hematoma and/or extravasation of urine from the pelvicaliceal area on right side (Fig. 1).



**Fig. 1.** Initial CT scan display right renal parenchymal injury and perinephric hematoma. Follow-up CT scan reveals resolution of urinoma leak 6 months postinjury.

The patient remained hemodynamically stable, but she continued to have persistent severe flank and abdominal pain. Serial ultrasonographies (USG) showed a gradually increasing

hemourinoma. Because of the patient's complaints persisted, she was taken to the operating room on the 10th day where she underwent cystoscopy with placement of a double-J ureteral stent (Fig. 2).



**Fig. 2.** A plain film after internal stenting. Urinary extravasation is seen.

Postoperatively, her pain decreased, urinoma resolved, and she was discharged from hospital on 20th post-traumatic day. The stent was removed at postoperative second month on outpatient basis. The dimercapto-succinic acid renal scintigraphy (DMSA) was performed 6 months after injury, and we noted no definitive loss in the calculated renal activity fraction on the side of the lesion. No hypertension

developed in the patient after renal injury during the 18-month follow-up.

### **Discussion**

Children are considered to be at increased risk for genitourinary tract trauma owing to unique anatomic differences between children and adults. In children, some anatomic properties making them more exposed and vulnerable to injury, such as that the kidneys are larger relative to the size of the child's body, are positioned lower in the abdomen, and are also less protected because of decreased perirenal fat, weaker abdominal wall musculature, and a poorly ossified thoracic rib cage. Additionally, because many pediatric kidneys retain their fetal lobulations, the risk for renal parenchymal disruption and lower pole amputation is increased. Furthermore, the renal capsule and Gerota fascia are less developed than in adults, creating a greater potential for laceration, nonconfined bleeding, and urinary extravasation. Lastly, because of the relative mobility of a child's kidney, rapid deceleration is more likely to result in renal pedicle injury and UPJ disruption. Mechanisms of blunt renal injury include pedestrian/motor vehicle crashes (60%), falls (22.5%), sports injuries (10%), assault (3.5%), and other causes (4%) [2]. Our patient

was a girl of four years old, and was admitted to our hospital due to a fall from the second floor.

Renal injuries are graded on a scale from I to V ranging from the most minor injury (grade I) to the most complex (grade V). Traditionally, grade I to grade III injuries have been successfully managed nonoperatively while grade V injuries usually always undergo surgical exploration and repair [6]. In the present case, a grade IV renal injury was detected on CT. For patients with grade IV renal injury, the role and timing of surgical, endourologic, and radiographic intervention is less established and remains controversial [3]. However, retrospective studies suggest that conservative management for even high-grade (IV to V) pediatric blunt renal trauma is also reliable and safe, and successful expectant management rates range from 40% to 84% [7]. Though the mechanism of injury, associated injuries, hemodynamic stability, and severity of injury all play a role in determining management, it is usually injury severity as based on CT findings that primarily dictates the optimal approach to management [6]. Although our patient had high-grade renal injury, she was hemodynamically stable. Thus, we managed the patient nonoperatively.

Urinomas are perinephric collections that form as urine extravasations through major parenchymal disruptions or ureteropelvic junction (UPJ) lacerations in kidneys with continuing renal function and an element of distal ureteral obstruction [8]. Umbreit et al. [4] have proposed that most urinomas after renal injury are asymptomatic, will spontaneously resolve in 76%-87% of their patients. On the other hand, Philkott et al. [8] stated that the urinomas frequently are symptomatic, and have been associated with intense abdominal pain, nausea, vomiting, and anorexia. Minimally hemourinoma was detected in our patient when she admitted. The patient has remained symptomatic since that time, and urinoma had gradually increased over the time.

The goal of renal trauma surgery is preservation of functional renal parenchyma with minimal morbidity. Surgical intervention may require in high-grade renal injury and unfortunately, often results in significant ipsilateral renal functional loss or an inevitable nephrectomy [5]. Patients with persistent urinoma from a grade IV or V injury can benefit from endoscopic or minimally invasive techniques in controlling the urinary leak [9]. Many trauma centers have good outcomes with circumvention of surgery using

percutaneous drains and internal stents for persistent or symptomatic urinomas [7]. Under general anesthesia, a double-J stent was placed as internal stenting through the working channel of the cystoscope under vision in our patient, and urinoma resolved progressively. Control images showed complete resolution of the right urinoma, the double-J stent was removed after a period of 2 months.

Internal ureteral stenting was the most successful single intervention in the patients with urinoma and offers some advantages over percutaneous approaches, include improvements in quality of life during convalescence owing to increased patient comfort, avoidance of catheter care, avoidance of urine collecting bags, reduction of dislodgment potential, and psychologically the avoidance of an external catheter. These potential advantages are particularly important in children who may be less cooperative or compliant. The stents typically are left in place for 6 weeks to facilitate healing or until image-documented resolution of the urinoma. In addition, for pediatric patient populations, internal drainage is more cosmetically appealing and less of a social burden [4]. The major disadvantage of internal drainage is that catheter removal requires a second intervention (and in

most pediatric cases, general anesthesia). The most noteworthy complications of internal ureteral stenting include infection, ureteral obstruction, or perforation. These complications are uncommon and are balanced against the long-term goal of renal preservation [4,8].

Although hypertension from Goldblatt kidney (compressive hematoma causing hypertension) may develop in renal trauma managed conservatively, it is rare. The reported incidence of post-traumatic hypertension, ranging from 0% to 6.6% in the pediatric literature, should not deter practitioners from depending on conservative protocols [5,7]. Our patient remained asymptomatic during 18 months follow-up. Renal function was assessed six months after trauma using DMSA, and no function loss was detected.

In conclusion, symptomatic urinoma is one of complications in grade IV renal injury, and will be amenable to ureteral stent placement in selected cases.

#### **CONFLICT OF INTEREST**

**None declared.**

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