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Renal Trauma in a Child with Infected Perinephric Hematoma Treated by Percutaneous Drainage: A Case Report

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Abstract

Renal injury is one of acute traumatic diseases in children. Surgery may eventually lead to an increased nephrectomy rate, while non-operative management has gained widespread acceptance. However, the treatment of affected children is aimed at weighing the effect against the risk according to their physiological characteristics. This paper reports a pediatric case of serious blunt renal trauma with an infected perirenal hematoma, to demonstrate that percutaneous drainage under the guidance of ultrasound could be performed in the early stage based on accurate assessment of the injury.

Keywords: Interventional ultrasonography; Percutaneous drainage; Perirenal hematoma; Renal trauma

Abbreviations: US: Ultrasound; CT: Computed Tomography; AAST: American Association for the Surgery of Trauma

Introduction

Renal injury is one of the most common traumas in children, second only to neurological injury [1]. Located in the retroperitoneum, fixed with renal fascia, and supplied by abundant blood flow, kidneys are friable and more susceptible to trauma than other organs. Moreover, kidneys in children are more superficial and have less protection from surrounding structures [2], so they have a higher incidence of renal trauma than adults do. Except for cases of hemodynamic instability, most blunt trauma can be managed conservatively [3], and percutaneous drainage under the guidance of Ultrasound (US) has expanded the scope of conservative management. It can quickly alleviate symptoms with high safety, and real time monitor perinephric state. Even better, this method is especially suitable for pediatric patients who are prone to secondary trauma because whose compliance with absolute bedrest is low. A girl was admitted in our apartment for serious blunt renal trauma with an infected perirenal hematoma in November 2019, no complications occurred in 2-month follow-up, and now it is reported as follows.

Case Report

An 8-year-old child with no medical history, sustained left waist pain after falling, and Computed Tomography (CT) from other hospital revealed laceration of the left kidney with a subcapsular hematoma formation. No significant improvement was observed on re-examination CT after anti-infection treatment. Intermittent fever occurred from the 10th day after the trauma, with a highest body-temperature of 40 ℃, and persisted although antibiotics and ibuprofen had been given. Then the child came to our hospital for treatment the 25th day. Urological examination showed a slight swelling, tenderness, and percussion pain on the left waist without local extravasated blood, and no redness or secretions in the outer urethra. Urinary catheter was present and unobstructed after admission, and the child had clear urine output. WBC count was measured as 23.94×10^9/L, and the body temperature remained reiterative after symptomatic and anti-infection treatment. US showed fluid in left kidney and perirenal area, which revealed laceration of the left kidney with perinephric effusion. The kidney CT plain scan indicated contusion and laceration of the left kidney with a "V" cleft in the lower 1/3 of it, and massive perirenal fluid were found. Contrast-enhanced scan indicated the compressed renal hilum and lower pole, and delay scan suggested laceration of the left kidney with urinary extravasation because of the contrast agents were found in the perirenal fluid (Figure 1).

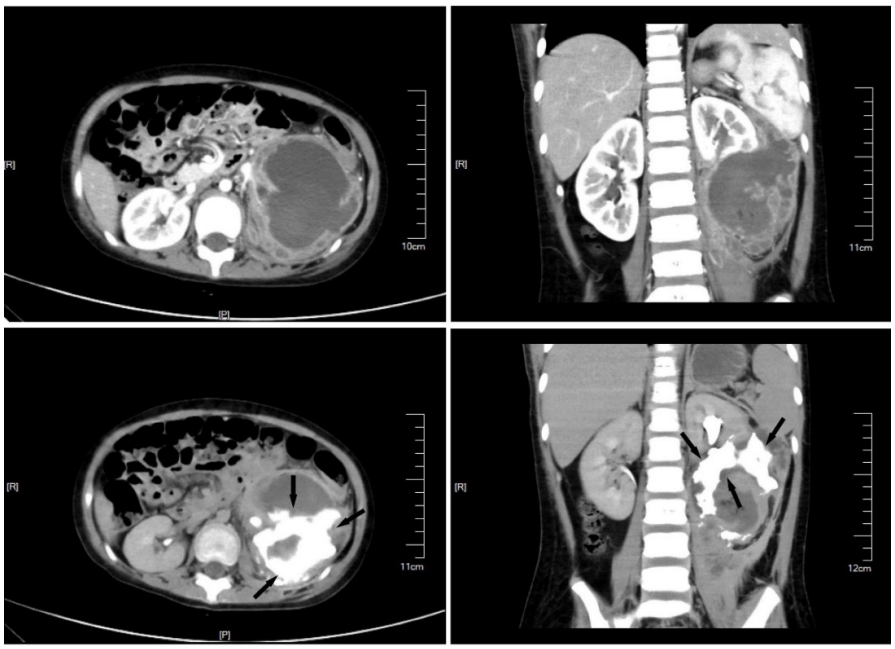

Figure 1: The kidney CT scan before ultrasound-guided interventional therapy. Massive perirenal fluid was found, and renal hilum and lower pole were compressed. The arrow indicates contrast agents found in the perirenal fluid.

Because of the poor clinical outcome of conservative management, US-guided percutaneous drainage was operated under tracheal intubation general anesthesia. The 11th intercostal on left posterior axillary line was taken as the puncture point. Removing the inner core after the needle was successfully inserted into perinephric space, Zebra Guidewire was inserted while puncture needle had been withdrawn when hemorrhagic pus was present, and drainage tube was placed along the Zebra Guidewire. The guidewire was then withdrawn and the drainage bag was connected and fixed on the skin (Figure 2). No obvious bleeding was found during the process. The amount of hemorrhagic pus was about 500ml, 120ml, and 300ml within 3 days after the operation respectively, of which the bacteria culture indicated Escherichia coli, and the susceptible antibiotic drug was used while symptomatic treatment was given. White blood cell count turned normal and creatinine was measured as 29μmol/L at day 9 postoperatively. In the meanwhile, US showed that perinephric anechoic area was significantly reduced, and CT scan revealed dwindling peripheral exudation and hematoma. Symptomatic treatment had been continued until day 12 postoperatively while fluid drainage was of 34 ml. The child was discharged, being enjoined from strenuous exercises and to observe the volume and color of the drainage fluid.

Figure 2: Ultrasound-guided percutaneous drainage was operated successfully, and hemorrhagic pus was drained.

CT plain scan in follow up after 2 months showed that left kidney structure was basically restored without obvious exudation around the kidney, and soft tissue density was seen in the lower pole of the left kidney, considering a small amount of residual old hematoma and some adhesion with adjacent tissue (Figure 3). The drainage tube was then removed and the child recovered well.

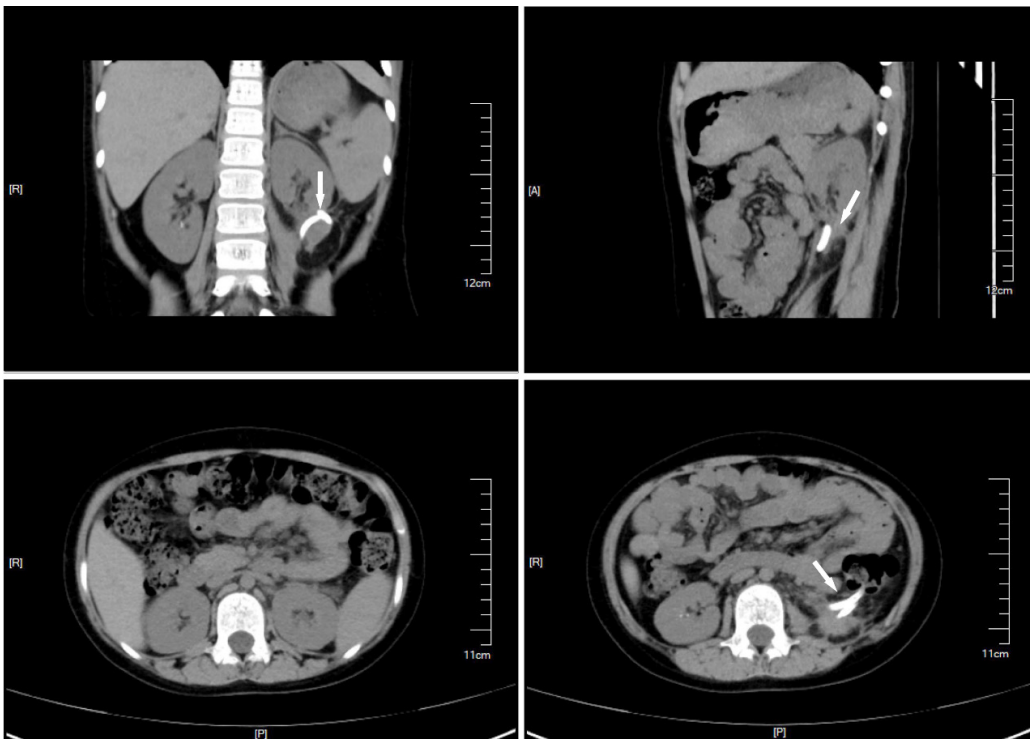

Figure 3: The kidney CT scan in follow up after 2 months. The structure was basically restored, and soft tissue density was seen in the lower pole of the left kidney. The arrow indicates the drainage tube.

Discussion

Renal injury is one of common acute diseases in urology. Although there are dense muscle and fat around it for protection [4], kidneys are friable and susceptible to contusion. Early complications of renal trauma include perirenal hematoma, urinary extravasation, and urinoma [5], can both cause secondary infection or renal functions decline due to compression. Hydronephrosis, perirenal and intrarenal calcification, atrophic segments and hypertension would occur if renal injuries were not treated in time [3]. US imaging is a suitable method for rapidly detecting renal injuries while dynamic observation of perirenal hematoma or urinoma, which makes it the first choice of imaging in trauma cases [1]. CT imaging is the gold standard for correctly diagnosing renal injuries with 100 per cent accuracy, and grading based on detailed images of the renal parenchyma, collecting system and vasculature [1,6]. Clinical situations (trauma history, signs and symptoms, urinary specialist tests), comprehensive laboratory examinations, and imaging studies provide valuable information for clinical decision making, and the accurate assessment and staging of the injury must be prerequisites for non-operative management.

Non-operative management has gained widespread acceptance in hemodynamically stable patients without trauma of renal pedicle or associated injuries to other organs. Blind surgical may result in uncontrolled rebleeding and unclear operative field, which may eventually lead to an increased nephrectomy rate [3], however, preservation of adequate renal function remains the fundamental goal in the treatment [7]. Traditional conservative plan usually includes bed rest for at least 2 weeks, hemostasis, anti-infection, other supportive care, and regular observation, by which, good therapeutic effect can be achieved in most cases. The author believes that low-grade (American Association for the Surgery of Trauma, AAST grade I-III) renal injuries, even some high-grade cases, are recommended to be managed conservatively. Nevertheless, when it comes to pediatric patient, the treatment team must give due consideration to the specificity, because children are more prone to hemodynamic instability after blood volume loss than adults [8].

US-guided percutaneous drainage is an effective method in the diagnosis and treatment of urinary diseases. Urinary extravasation and perirenal hematoma, the two most common

complications after renal trauma, can be effectively treated through percutaneous drainage. In this paper, we reported a pediatric case that under traditional conservative therapy for nearly 4 weeks without apparent perinephric exudation or hematoma absorption, and sustained prolonged low fever since trauma. We chose US-guided interventional management since concerns about the child's safety. US-guided percutaneous puncture is conducive to the drainage of perirenal fluid collection, as well as close observation of the urine volume, specific gravity, and local infection degree, so that the adjustments could be made timely in the treatments of the disease to fully ensure the safety. Adequate drainage can greatly shorten the healing time of the renal collection system. US-guided percutaneous drainage is security with tiny incision, beneficial for reducing secondary infections, improving kidney functions, and preventing complications at early time. This interventional management could alleviate symptoms quickly and obviate the need for open renal exploration.

The detection and treatment of renal trauma require accurately delineating the injuries by imaging tests, handling the right opportunity of therapy, and remembering safety first, especially for pediatric patients. US-guided interventional therapy has extended the field of non-operative approaches. During the initial conservative therapy, vital signs must be closely monitored. When the child is diagnosed with severe renal trauma with infected perinephric hematoma, percutaneous puncture could be performed as soon as possible.

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