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Delayed Management of High-Grade Renal Trauma in a Child with Bilateral Lower Polar Artery: A Case Report

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Abstract

High-grade renal trauma rarely occurs due to low-velocity mechanisms. With its clinical presentation, delayed diagnosis rarely happens. We report the case of a 12-year-old girl diagnosed seven days post-trauma with grade IV renal trauma complicated with infected urinoma and bilateral lower polar vessels. She was non-operatively managed with ultrasound-guided percutaneous drainage of the urinoma, which resolved, and had unremarkable six months follow-up. We discuss the role of preexistent hydronephrosis in low-velocity impact, pitfalls of diagnosis in resource-constrained settings, and management of high-grade trauma.

Keywords

Renal Trauma, Lower Polar Artery, Urinoma, Delayed Diagnosis, Case Report

1. Introduction

In children, renal trauma due to blunt abdominal trauma (BAT) happens in a fifth [1]. The American Association of Surgery for Trauma (AAST) classifies it into five grades, with grades IV and V categorized as high-grade renal trauma [2]. The latter is not rare, accounting for 20% of pediatric renal trauma [2]. It mainly happens with high-velocity impacts (HVIs) that may be indirect, like motor vehicle accidents, pedestrian accidents, falls from heights, or direct such as a blow on the homolateral flank [3]. In such cases, the richness of symptomatology, including homolateral flank pain, hematuria, and flank bruising, eases the diagnosis, which is rapidly made [3]. In rare cases, high-grade renal trauma

can be secondary to low-velocity impact (LVI), such as a fall from own height. In this circumstance, a renal anomaly is a factor increasing susceptibility to injury [4]. In that condition, a lack of history of HVI and poor experience with pediatric blunt abdominal trauma can mislead the diagnosis. In a hemodynamically stable patient, after clinical suspicion, the first-line investigation is abdominopelvic ultrasonography (US), followed by abdominal computed tomography (CT) scan, which determines the AAST grade [2]. In a resource-constrained setting, the lack of readily available ultrasonography makes the diagnosis more difficult [5]. Management of high-grade renal trauma is still controversial, with some reports favoring non-operative management (NOM) over operative one [2]. We report the case of a twelve-year-old female patient with grade IV right renal trauma, diagnosed seven days post-trauma.

2. Case Presentation

A twelve-year-old girl was admitted to our department for management BAT. History revealed that the patient had fallen from her height seven days earlier during Ramadan fasting, with the right lumbar region hunting the rim of stairs. Soon after, she experienced right lumbar pain that was not revealed to her parents for 24 hours. Forty-eight hours post-trauma, increasing pain and occurrence of hematuria led parents to reach a medical center, where painkillers were given without requiring any hospitalization. On day four post-trauma, symptoms worsened, with additional fever and alimentary vomiting, which led parents to attend the same medical center, where the patient was prescribed antimalarial drugs, with no improvement, which led parents to travel to Dakar. In this capital city, they reached our hospital a week post-trauma.

The patient was born premature (35th week of gestation) and weighed 1950 grams. She had no history of urinary tract congenital malformation nor intermittent lumbar pain. Her parents were not consanguineous. She lived with her grandmother, with whom no habit or suspicion of child abuse was reported.

On admission, she complained of right intense right flank pain, migrating to the right inguinal region, which increased with mobilization. Additionally, she presented vomiting foody. She weighed 28 kg, was febrile (38.5˚C), hand d polypnea (30 cycles per minute), and had tachycardia (117 beats per minute). Her blood pressure was within normal ranges (105/65 mmHg). The right lumbar region had no stigmata of trauma and no bulging. However, this region was painful to careful palpation, with no mass palpated. No stigmata of old trauma were noted on examination of the whole patient. Assumed diagnoses were: Blunt renal trauma, acute pyelonephritis, or iliopsoas abscess. The patient was admitted to our department, and parenteral paracetamol and an empiric antibiotic (amoxicillin plus clavulanic acid) were administered.

The full blood count (FBC) noted microcytic hypochromic anemia, hyperleukocytosis with a neutrophilic predominance, and thrombocytosis, as shown in Table 1. The C-reactive protein was elevated (129 mg/l). Renal function was normal as well as blood electrolytes.

The same-day abdominopelvic US noted, on the right kidney, poor visualization of the lower right inferior pole, with a subcapsular echoic collection, in which volume was estimated to be 112.2 ml (Figure 1). However, renal vessels were not damaged.

The abdominal CT scan was ordered, which noted a lower pole trauma on the right kidney, a collected urinomad and intact renal capsule. The urinoma estimated volume was 762.9 ml. Two persistent lower polar vessels were identified, with interruption of the right one. During the excretion time, a rupture of the inferior calyx was noted. All these features led to classify the trauma grade IV right renal trauma (Figure 2), according to the AAST.

The patient was hospitalized, and bed rest was required, along with paracetamol and amoxicillin plus clavulanic acid. Twenty-four hours after admission, the patient underwent percutaneous US-guided urinoma drainage under local anesthesia using Lidocaine (0.2 mg/kg). This evacuated approximately 350 ml of trouble urine as the drain was left. The culture of urine issued from the urinoma showed *Staphylococcus aureus*, sensitive to some antibiotics, including amoxicillin

Table 1. Full blood count results.

Variable	Results	Unit	Normal value
Hemoglobin	10.1	g/dl	11.5 - 17.0
Mean corpuscular volume	77	fl	80 - 100
Mean corpuscular hemoglobin	24.5	pg	27 - 32
White blood cells	14,400	elements/µl	4000 - 10,000
Neutrophils	10,330	elements/µl	2000 - 7500
Thrombocytes	45,1000	elements/µl	200,000 - 400,000

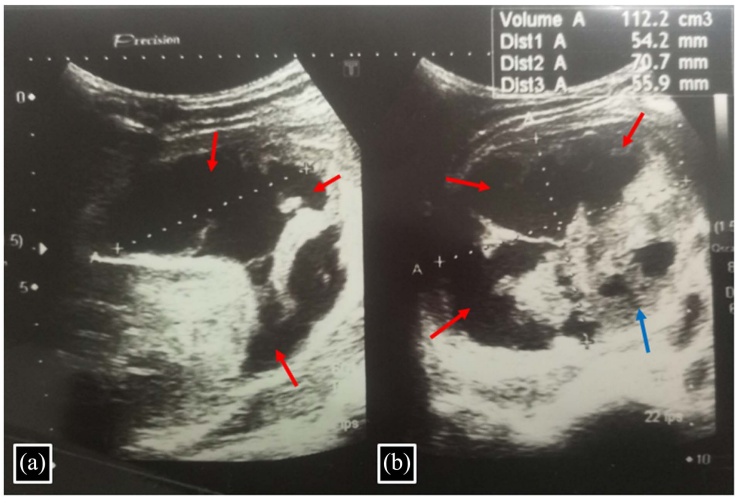

Figure 1. Initial abdominal US. On the axial view (a), the urine collection (red arrows) is identified in the right subcapsular renal space. On the sagittal view (b), the same collection is identified (red arrows) and the right kidney (blue arrow) is compressed by the urinoma, whose volume was 112.2 ml.

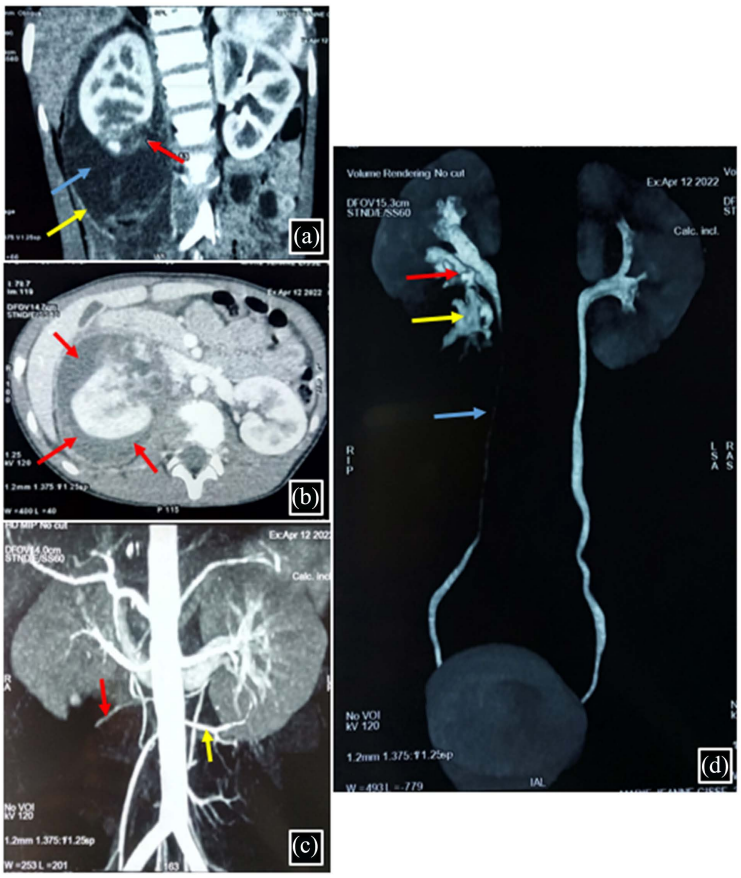

Figure 2. Urinary tract injected computed tomography. On the frontal view (a), note lower pole trauma on the right kidney (red arrow), along with collected urinoma (blue arrow) and intact renal capsule (yellow arrow). The urinoma is also visualized on the axial view (b) (red arrows). At the vascular time (c), the persistent lower polar vessels are seen, with the integrity of the left one (yellow arrow) when the right one is interrupted, no longer supplying the lower pole (red arrow). During the excretion time, rupture of the inferior calyx (red arrow), with extravasation of the contrast product (yellow arrow). Remark compression of the right ureter (blue arrow), but allowing urinary flow to the bladder indicates its integrity.

plus acid clavulanic, which was continued for 14 days. The drain's production progressively decreased to less than 5 ml on day 14 post drainage, which leading to drain ablation as ultrasound showed noidual collection. Biology controls on days five and ten post drainage noted progressive normalization: from 13,400 to 11,100/µl WBCs, 10.3 to 11.4 g/dl for hemoglobin, from 432,000 to 404,000/µl for platelets, and from 70 to 25 mg/l for CRP. On day 15, post drainage, the patient was discharged, with the eviction of sport and carrying heavy objects, per oral paracetamol as prescribed for seven days.

The patient was successively reviewed on week 1, week 4, month two, and month five post-discharge. No complication was noted during the follow-up. Physical examination was unremarkable, and controls US on month three post-discharged showed poor vascularization of the lower pole of the right kidney, without any residual collection (**Figure 3**).

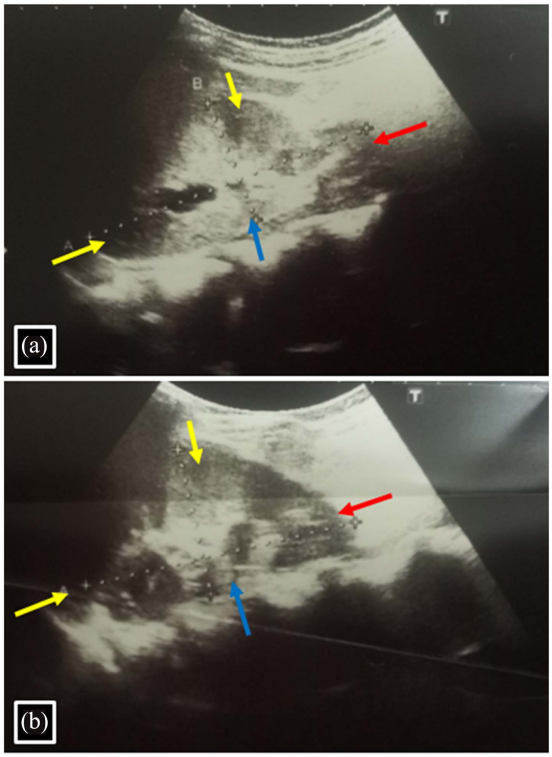

Figure 3. Ultrasound comparison of the right (a) and left (b) kidneys three months post-trauma. Note the absence of residual collection on the right kidney, with a structure comparable to the left kidney with the normal cortex (yellow arrows) and renal pyramids (blue arrows). Due to the previous trauma, the right lower pole (red arrow) is smaller.

3. Discussion

High-grade renal trauma occurs in children secondarily to HVI. However, preexistent congenital malformation increases susceptibility to high-grade injuries with LVI [4]. In children, renal anomalies are mainly dominated by hydronephrosis, cysts, renal ectopy, and tumors [4]. Hydronephrosis can be secondary to ureteropelvic junction obstruction (UPJO) and secondary to lower polar vessels in 25% of cases [6]. In our patient, the CT scan documented bilateral inferior lower polar vessels. Despite the presence of these vessels, the left kidney was normal, with no hydronephrosis noted. Due to the caliceal rupture, we cannot be formal on the presence or absence of preexistent hydronephrosis on the right kidney. Polar vessels are an anatomic variation found in 30% of cases [7]. Their presence does not necessarily lead to a clinical implication. However, the LVI in our patient does not formally exclude the possibility of a preexistent UPJO of the right side.

Our patient was diagnosed seven days after the trauma. This is not rare in our setting, as authors reported delayed BAT presentation, occurring three weeks post-trauma [1]. Despite the absence of a history of HVI, our patient presented classical symptomatology with right flank pain and, secondarily, macroscopic hematuria, which should lead the clinician to make additional investigations, including ultrasound as the first line imaging [3]. However, in a resource-constrained

setting, this was not available. The presence of fever and vomiting, which testify of possible urinoma [3], was misinterpreted as a symptom of malaria, which further misled the diagnosis. In a region with endemic malaria, the patient was treated as such, which shows a lack of experience with blunt abdominal trauma among some general practitioners in our setting [1]. Proper history taking and detailed physical examination would avoid such a delay, resulting in complications, urinoma, and infection.

Management of renal trauma in children has progressed, with NOM being the gold standard for low and some high-grade injuries, with some controversies for the latter [3]. Formal indications of operative management for high-grade injuries include hemodynamically unstable patients or expanding/pulsatile hematoma. Relative indications include urinoma, non-viable tissue (20%), arterial injury, or incomplete staging [3]. Our patient had a grade IV renal trauma complicated by a secondarily infected urinoma. In such cases, as conducted in our patient, NOM with percutaneous drainage is recommended with bed rest, antibiotics and analgesics (3). In grade IV renal trauma, NOM was proven efficient in 70% to 89% [2] [8]. Our patient has a successful NOM, which shows its efficiency even in complications such as an infected urinoma.

4. Conclusion

High-grade renal trauma may occur secondarily to a low-velocity mechanism as an associated complication may alter the clinical presentation. In resource-constrained settings, a high clinical index of suspicion should allow the diagnosis and lead to timely referral of such patients. Non-operative management is efficient in the large majority of cases.

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Consent for Publication

A written consent for publication was obtained from the patient's parents.

Conflicts of Interest

The authors declare that they have no competing interests.

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