



Rupture of the Renal Pelvis of a Ureteropelvic Junction Hydronephrosis After Blunt Abdominal Trauma

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Submitted March 20, 2012 - Accepted for Publication May 7, 2012

ABSTRACT

Blunt abdominal trauma with an isolated abnormal kidney rupture is a rare clinical entity. The correct preoperative diagnosis may be difficult and challenging because of the insidious onset, lack of obvious bleeding, and, frequently, lack of urinary symptoms.

We present a case of a 22-year-old female with isolated pelvic rupture of a hydronephrotic left kidney secondary to a strong punch in the flank. She underwent a computerized tomography that showed a large retroperitoneal collection, with a poor functioning left kidney. Surgical exploration revealed a large rupture of the renal pelvis. She underwent nephrectomy.

Hydronephrosis may be a fortuitous discovery after blunt trauma. The diagnostic features at presentation and the decision-making of surgical management are discussed. The medicolegal aspects of the case are evaluated.

INTRODUCTION

The vast majority of renal injuries are caused by blunt trauma, and more than 90% of renal injuries in the adult population result from blunt trauma [1,2]. Congenital urinary anomalies, found at the time of evaluation and treatment of renal trauma, vary in reported incidence rates. Kidneys with congenital or acquired abnormalities are more susceptible and more prone to injury than a normal kidney [3,4]. Ureteropelvic junction (UPJ) obstruction, a major cause of obstructive uropathy and the most frequently encountered asymptomatic congenital anomaly of the urinary tract [5], is one of the pre-existing abnormalities most found after renal trauma [6]. The diagnosis is usually delayed because of insidious onset, a lack of obvious bleeding, and often a lack of urinary symptoms.

We report such a case of traumatic rupture of a renal pelvis obstructed at the UPJ. We briefly review the published literature and discuss the potential factors responsible for such damage, its management, and medicolegal implications.

CASE REPORT

A 22-year old female patient was admitted to the emergency room reporting that 24 hours earlier she had been aggressed with punches at the left lumbar fossa. She presented intense pain in the left flank with a voluminous mass that occupied a large portion of it. The patient did not present hemodynamic instability, and she denied previous pathologies. A physical examination disclosed tenderness and guarding in the left flank, with a knocking pain. The rest of the abdomen was unremarkable, and there were no external injuries. Her blood pressure was 110/60 mmHg and her pulse was 90/minute. Her respiration was constant at 22 per minute. Her temperature was 38.1°.

Her hemoglobin and hematocrit levels were 10 g/dL and 30.9%, respectively. Her creatinine level was 12 mg/L. The prothrombin time, partial thromboplastin time, and serum amylase were normal. An abdominal sonography revealed a poorly defined left renal outline with thinning of the renal cortex, and large perinephric and retroperitoneal fluid collection. Imaging of the kidneys, ureter, and bladder (KUB) revealed a large stone on the left lumbar area (Figure 1).

KEYWORDS: Kidney, congenital, renal pelvis, rupture, abdominal trauma, hemorrhage, retroperitoneal space

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CITATION: *UroToday Int J.* 2012 October;5(5):art 53. <http://dx.doi.org/10.3834/uij.1944-5784.2012.10.12>

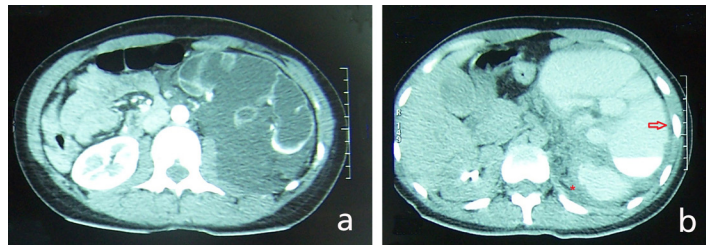
Figure 1. A stone on the left lumbar area.



Computerized tomography (CT) showed a large retroperitoneal collection and unidentifiable left kidney with a thinned cortex suggestive of chronic hydronephrosis (Figure 2). These data were consistent with a ruptured left hydronephrotic kidney with a large uro hematoma. The right kidney, the spleen, and the liver were apparently intact in the CT scan. We chose to perform an exploratory laparotomy.

The left retroperitoneum was opened through a lumbar incision. A large, expanding hematurinoma was found. The left kidney was hydronephrotic, with a very thin cortex and a large pelvic rupture (Figure 3). Thus, a nephrectomy was performed. Radiological investigations indicated a compensatory hypertrophy of the contralateral kidney. Preoperatively, with a very thin renal parenchyma, the operator considered the poorly functioning kidney non-conservable and indicated nephrectomy.

Figure 2. a) The right kidney is normal. b) Contrast-enhanced CT scan at the level of the left mid-kidney shows gross left ureteropelvic hydronephrosis with thinning of the renal cortex (arrow), pelvis laceration, contrast and urine extravasation from the renal pelvis, and fluid collection in the retroperitoneum (asterisk).



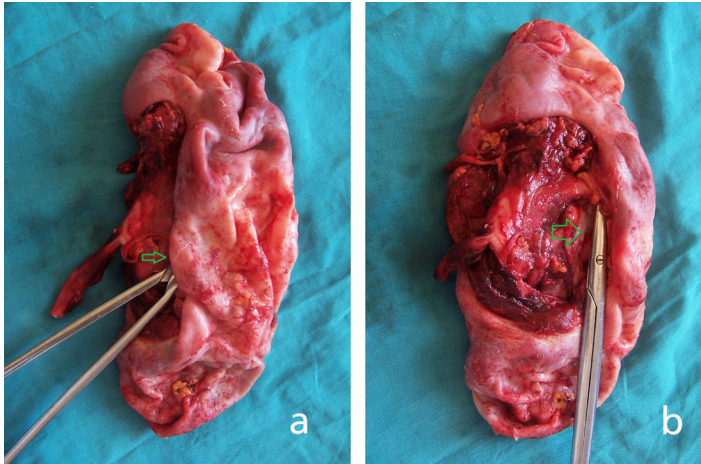
The pathological study showed a hydronephrosis secondary to ureteropelvic junction stenosis with chronic nephritis. The postoperative course was uneventful, and the patient was discharged 2 days postoperatively. Criminal judges have sought advice from a forensic expert to evaluate the permanent/partial disability in this patient. Given the circumstances of the incident, the underlying abnormality, and the therapeutic implications, this inability was set at 7% by the expert. This does not indicate a recovery in the Tunisian law, and the aggressor was judged on his act of aggression without really taking into consideration the consequences.

COMMENTS

The kidney is affected in 8 to 10% of all blunt abdominal trauma [7,8]. It is the most frequent urinary organ to suffer injury in blunt trauma [7]. Renal injury caused by blunt abdominal trauma is predominant in males and approximately twice as common in children as opposed to adults [9,10]. The most common external sources of injury are motor vehicle accidents and primarily falls [10]. Aggression is rarely the cause. There is a predisposition for different types of injuries on each side. The left kidney is not covered by the liver, is less mobile due to its additional ligamentous attachments (splenorenal and phrenocolic), and has fewer bare areas [11].

Pre-existing renal lesions (PERLs), found incidentally during evaluation for suspected renal injury, are uncommon [12]. However, they may complicate an otherwise negligible renal trauma. Thus, when a minor trauma results in renal injury, one should suspect an occult PERL [12,13]. PERLs seem to be commonly associated with renal injuries in children rather than in adults. Their incidence is reported to be 4.4 to 19% in adults [14,15] and as high as 12.6 to 35% in children [13,14,16]. Hydronephrosis as a result of ureteropelvic junction (UPJ)

Figure 3. a) The specimen. b) The large ruptured renal pelvis (arrow).



obstruction is the most frequently encountered congenital abnormality of the urinary tract [5]. As in the present case, it most commonly involves the left kidney [17]. Other common PERLs include cyst and tumor, horseshoe or ectopic kidney, and hydronephrosis as a result of stones or reflux [9,12]. Although it is the most frequent PERL found after renal trauma [6], isolated injury to the renal pelvis after blunt trauma is very rare [5,6,18,19].

PERLs increase the vulnerability of kidneys in blunt renal trauma (BRT) [15]. This predisposition has been attributed to decreased tissue strength in hydronephrotic kidneys and altered tissue deformation of the renal cortex in the presence of a fluid-filled lesions (cysts, hydronephrosis) [12]. Congenital UPJ obstruction is thought to rupture with blunt trauma due to acceleration-deceleration injuries or disruption of the ureter from the UPJ by stretching the proximal ureter at the time of sudden and extreme hyperextension of the trunk [20]. A dilated, non-compressible renal pelvis, characteristic of UPJ obstruction, is prone to rupture after a sudden increase in intra-abdominal pressure [21]. Parenchymal laceration from direct impact may extend into the dilated intrarenal collecting system. The hydronephrotic kidney is more susceptible to injury, even after relatively minor trauma [22,23]. Moreover, patients with PERLs sustain higher grades of renal injury with lower energy trauma and are more likely to require surgery than those without [9].

BRT may disclose occult renal anomalies. Our patient was a young woman who had sustained blunt trauma to the left flank. She had no previous symptoms referable to the renal tract.

Gross hematuria, flank pain, and a palpable mass were the most helpful findings on admission; they are more common and more severe in patients with a PERL. Trauma to patients with a PERL produces more symptoms than expected due to the extent of the injury [12]. However, hematuria may be absent in patients with an injured, obstructed kidney or with a complete ureteral avulsion, as in the present case.

In BRT, the decision to image should be based on history, the mechanism of injury, physical findings, laboratory studies, and clinical status [12]. There is now a general consensus regarding the indications for imaging these patients [24]. On the whole, patients with blunt abdominal trauma who have gross hematuria, microscopic hematuria with shock, or microscopic hematuria with flank bruising and lower rib or lumbar vertebral transverse process fracture should undergo imaging. But these guidelines must be tempered by good clinical judgement in individual cases [25].

Ultrasonography could be used as a simple screening tool but is not accurate enough. Contrast-enhanced helical CT is reported as the "gold standard" in hemodynamically stable renal trauma [26]. It can identify parenchymal lacerations, urinary extravasation, perirenal hematoma, and vascular injuries. In addition, it helps to stage the injury and pre-existing pathologies of the injured kidney, and also to document the state of the opposite kidney [8,14,27]. The finding of a dilated pelvis, cortical thinning, collapsed ureter, contrast extravasation anterior to the dilated renal pelvis, and perinephric and retroperitoneal fluid collection is suggestive of a pre-existing UPJ obstruction [6,28].

The aim of management is to prevent mortality, conserve the kidney, and reduce immediate and long-term morbidity [11]. The management of patients with BRT has become increasingly conservative, and surgical intervention is uncommon [12]. Actually, the overall exploration rate for BRT is less than 10% [29]. The management of major renal injuries, particularly in patients with a PERL and in clinically stable patients, remains controversial.

The management of abnormal kidneys unmasked by trauma is, to a large extent, dependent on the type of pathology and the severity of the urinary tract injury [30]. In a stable patient, the trend should initially be toward conservative treatment, even though most of the time surgery will be needed electively at a later stage [12].

Primary pyeloplasty at initial presentation has been performed [6,19]. However, different reports show that immediate surgery after BRT had a high nephrectomy rate [31,32].

Currently, and in stable patients, an injured kidney with pre-existing obstruction requires percutaneous nephrostomy

or retrograde stenting for decompression and subsequent endoscopic or open surgical reversal of obstruction [9,33]. Temporary percutaneous nephrostomy is useful in estimating the split function of the traumatized kidney, which helps in deciding to conserve the kidney [34]. If quantitative radionuclide scintigraphy shows minimal function in the injured hydronephrotic kidney after 4 to 6 weeks of decompression, nephrectomy may be warranted.

The presence of incidental PERLs in renal trauma does not seem to have an impact on recovery from the injury itself. No consensus exists regarding the follow-up schedule. Based on an observed healing pattern on CT, one particular protocol recommends CT and radioisotope scans to detect any complications and to determine residual renal function [11].

A review of the legal aspects recalls the principles of imputability in cases of trauma. Several questions need the appropriate answers: Does the malformation really weaken the kidney? Was the trauma the only or the major cause of this damage? Will a trauma of the same nature and same intensity cause such severe damage on a normal kidney? In the absence of clear documentation on previous urinary malformation, is it still possible to make an accurate diagnosis?

Before fixing the rate of permanent partial disability, it is essential to practice all necessary clinical, biological, and radiological investigations. These will account for all possible renal or urinary sequelae or for secondary blood hypertension. The aggravation by trauma to pre-existing renal disease will be assessed in light of functional sequelae or the need for subsequent surgery, as in our case.

As in the Tunisian and the French legal systems, nephrectomy doesn't offer practical consequences in terms of renal function, and the incapacity will be evaluated based on residual pain, the quality of the surgical scar (possible existence of hernia, sensory disturbances, etc.), and the quality of compensation by the remaining kidney. In the case of late complications without renal failure, the permanent disability varies from 15 to 20%. In cases of late complications without significant renal failure, but with a large lumbar hernia, it varies from 30 to 40% [35].

CONCLUSION

Traumatic rupture of the renal pelvis junction has been reported very rarely in the literature. Surgical exploration is often indicated. Medicolegal implications should be considered and thoroughly evaluated.

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