

## Endourology

Stone induced ureteral rupture: The worst-case scenario. A case report<sup>☆,☆☆</sup>

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## ABSTRACT

Forniceal rupture secondary to acute ureteral obstruction is relatively common. However, spontaneous ureteral rupture is less frequently encountered. Most reported cases were stone related, localized at the ureteropelvic junction and managed in a minimally invasive manner. We present a case of stone induced ureteral rupture below the UPJ, with bacterial and fungal superinfections, that failed conservative management and lead eventually to nephrectomy. No such scenario has ever been reported in the literature. As rupture of the ureter can cause serious complications, including urinoma, sepsis and sometimes kidney loss, prompt recognition, treatment and follow-up of the condition is therefore necessary.

## Introduction

A rupture of the calyceal fornix and subsequent extravasation of urine during acute ureteral obstruction is somehow common, typically in response to ureteral stones. Clinically, it is characterized by a spontaneous resolution of the pain.<sup>1</sup>

However, spontaneous ureteral rupture is less frequently encountered. Schwartz et al. were the first to define the term 'spontaneous' when there was no external trauma, no cystoscopic ureteral manipulation, no external compression, an absence of destructive kidney disease and no history of any previous urologic surgery.<sup>2</sup> Most of the reported cases were stone related, localized at the UPJ and managed conservatively or minimally invasively. The novelty of our case report is that it presents a 62 year-old female patient with a stone-related ureteral rupture below the UPJ in whom conservative management failed leading eventually to the loss of the renal unit. The possible causes of the ureteral rupture and those of the conservative treatment failure are presented. To our knowledge, no such case scenario has ever been reported.

## Case presentation

A 62 year-old female patient known to have an aortobifemoral bypass for an abdominal aortic aneurysm presented to our emergency

department, around 10 days after coronary artery stenting for an unstable angina. She was complaining of a new onset fatigue with myalgia and left flank pain irradiating to the left thigh. Her pain started few days prior to presentation and was acute and severe at first, then partially and temporarily relieved later on. She had no fever or urinary symptoms. Her abdomen was soft. Her laboratory tests were significant for a severe leukocytosis (27,000 cells/mm<sup>3</sup>), elevated CRP (300 mg/L), altered liver function test and a positive urinalysis (leukocyturia, microscopic hematuria and bacteriuria). A CT-urography was performed showing a large well-formed 11 × 9 × 12 cm left retroperitoneal hemato-urinoma resulting from a 6 mm left proximal ureteral stone inducing a ureteral rupture with urinary extravasation on the delayed phase and numerous renal pelvis and calyceal blood clots (Figs. 1 and 2). Medical and supportive treatment (intravenous hydration, antibiotics, and analgesics) was initiated and an urgent endoscopic drainage with a JJ stent insertion was performed successfully. A Foley urinary catheter was kept in place. Urine culture showed a multi-sensitive Escherichia Coli. The patient recovered well and was discharged home with her Foley catheter for 10 days, an adequate antibiotherapy (ciprofloxacin) and a follow-up meeting scheduled in 3 weeks with a scanographic control. The patient returned to the emergency department 1 week after her Foley catheter removal for a septic shock requiring an intensive care unit admission. Imaging showed the same previous findings with the JJ stent correctly in place. A CT-guided left 8F nephrostomy was inserted as well

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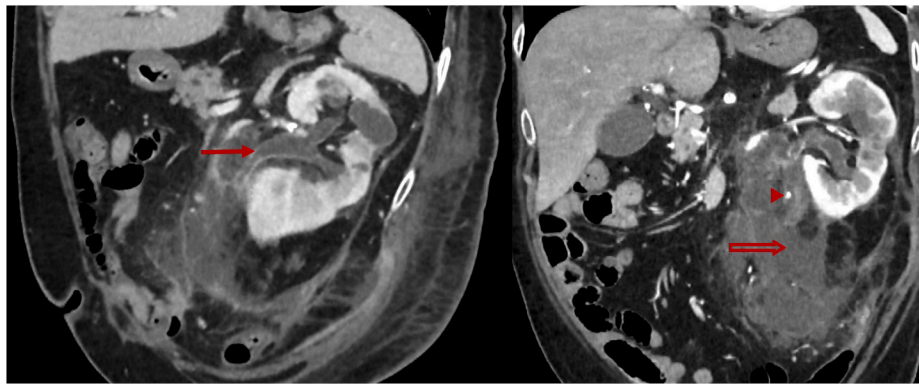
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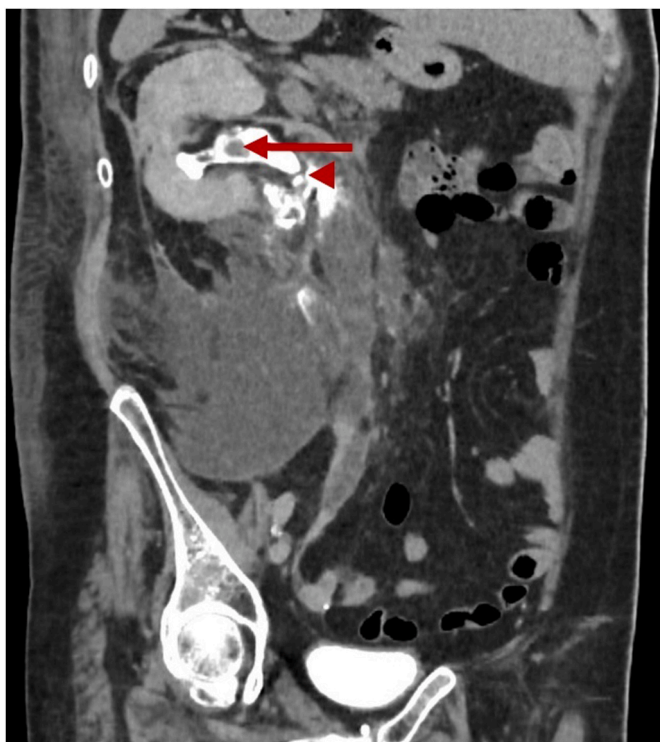
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**Fig. 1.** CT-urography showing a large left retroperitoneal hemato-urinoma (empty arrow), a 6 mm left proximal ureteral stone (arrow head) with an intact renal pelvis (arrow).

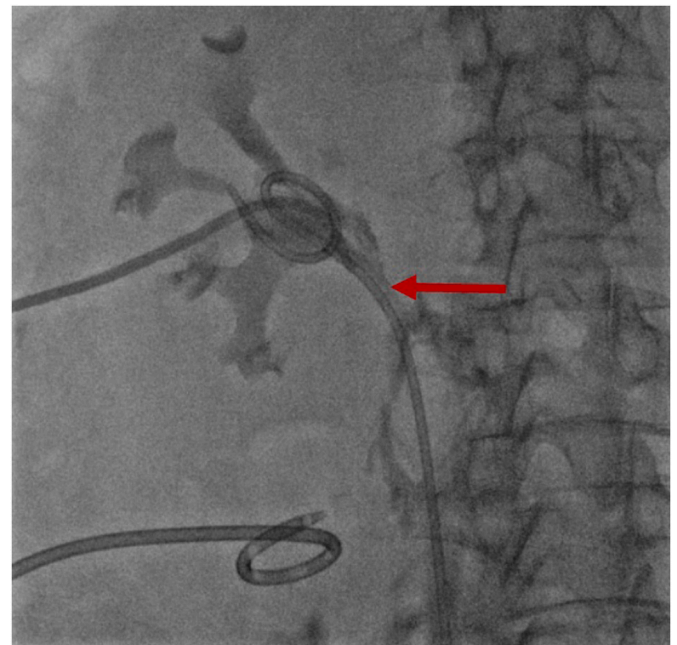


**Fig. 2.** Ureteral rupture with urinary extravasation (arrow head) on the delayed phase of the CT-urography with renal pelvis blood clots (arrow).

as a 10F left percutaneous drain into the retroperitoneal collection (Fig. 3). A fungal infection with a *Candida Kefyr* of the urinoma was revealed and adequately treated. The patient recovered well from her infectious process, however, the percutaneous catheter drained continuously a large amount of urine and a persistent ureteral fistula developed despite adequate and prompt long-term quadruple drainage (Foley catheter, JJ stent, nephrostomy tube and percutaneous drain). Two months after her complicated renal colic episode leading to a ureteral rupture and failure of conservative and minimally invasive management, the patient underwent a successful laparoscopic nephrectomy. A subtotal ureterectomy was performed as well in order to extract the necrotic and inflamed ureter along with the stone.

**Discussion**

The underlying mechanism leading to the rupture of the ureter is



**Fig. 3.** Antegrade pyelogram showing persistent ureteral extravasation (arrow) despite adequate drainage.

multifactorial. First, the stone migration and impaction lead to ureteral wall injury and erosion with subsequent weakening and possible rupture. Second, the obstruction-induced elevation of the intrarenal and intraureteric pressure lead to ureteral dilatation which subsequently lead to ureteral rupture at the weakest point. In the absence of any known risk factor aside from the aortobifemoral bypass and its unknown effect on ureteral fragility, these seems to be the causative factors in this case.

Clinical manifestation can vary widely and includes acute renal colic and flank pain, lower abdominal pain, ileus secondary to peritoneal irritation and sepsis in case of superinfection. Our patient particularly reported a pain irradiating to the ipsilateral thigh, this is probably related to the irritation of the psoas muscle and the overlying genitofemoral nerve.

The diagnosis is best established using a CT-urography with urinary extravasation visualized at the level of the ureteral rupture during the delayed phase.<sup>3,4</sup>

When it comes to treatment, the literature is relatively sparse and heterogenous. However, most cases and reviews agree on the efficacy of an adequate early endoscopic ureteral (ureteral stent) and bladder (foley

catheter) drainage. The average duration of ureteral catheter stenting was 21 days. Additional interventions (percutaneous nephrostomy or collection drainage ...) and treatments (antibiotics, antifungals ...) are sometimes necessary in case of complications such as a persistent or superinfected urinoma, which is the case in our patient.<sup>3,4</sup>

Unfortunately, in the presented case, the failure of the conservative kidney sparing management might be related to multiple factors.

First, if an extrapolation can be made from external ureteral trauma and contusions, these can commonly heal with stricture or breakdown if microvascular injury results in ureteral necrosis,<sup>1</sup> which was eventually found during our laparoscopic exploration. Second, the presence of a bacterial then a fungal infection, along with the severe inflammatory process, within the retroperitoneum plays definitely an important role in the failure of tissue healing. There is no data in the literature on the particular effect of fungal infections on ureteral healing. Third, the relative delay (around 7 days) in the presentation to the emergency unit and thus the delay in urinary drainage might have also played an important role.

A renal autotransplantation and a ureteral reconstructive approach were also discussed prior to nephrectomy; however, these were considered risky due to the adherent and fibrotic retroperitoneum related to the previous aortobifemoral bypass and the current infectious process, as well as the friable ureteral tissue.

In conclusion, rupture of the ureter can cause serious complications, including urinoma, sepsis and sometimes kidney loss, thus prompt recognition, treatment and follow-up of the condition is necessary.

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