

# Obstruction of bifid ureter by two calculi

## A case report

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### Abstract

**Rationale:** The duplex ureter is a common anomaly of urinary tract, but preoperative sonography, plain abdominal radiography, or nonenhanced computed tomography (CT) often overlooked it when involved with urinary tract obstruction. In this report, We present a rare case of left Y-shaped bifid ureter and both ureter of upper moiety and common stem were obstructed respectively by 2 calculi.

**Patient concerns:** A 47-year-old woman was admitted due to 3-day history of left-sided loin pain and low-grade fever. The patient was diagnosed with right renal atrophy and 2 calculi of left ureter associated with severe left hydronephroureterosis, and underwent left percutaneous nephrostomy and left ureterolithotomy without identification of the upper calculus in left ureter in another hospital.

**Diagnoses:** After transfer of the patient to our hospital, preoperative contrast-enhanced CT detected the left Y shaped bifid ureter and the calculus in upper moiety ureter.

**Interventions:** The migrated calculus was extracted by left ureterolithotomy.

**Outcomes:** The patient discharged uneventfully.

**Lessons:** Contrast-enhanced CT should be recommended prior to any surgical procedures involved with upper urinary tract to exclude duplex ureter.

**Abbreviations:** CT = computed tomography, KUB = plain film of kidney, ureter, and bladder, MRI = magnetic resonance imaging.

**Keywords:** bifid ureter, computed tomography, ureter obstruction, ureterolithotomy, urinary calculi

## 1. Introduction

A duplex ureter occurs with an incidence of approximately 0.8% and is the most common anomaly, and calculus in the duplicated ureter is also a common entity.<sup>[1]</sup> Although asymptomatic patients with duplex ureter could be found incidentally by excretory urography, ultrasonography, computed tomography (CT), and magnetic resonance imaging (MRI), preoperative assessment of the anatomic variations and function of duplex renal and ureters is often difficult in symptomatic patients with urinary obstruction, vesicoureteral reflux, and urinary tract infection.<sup>[2]</sup> To our knowledge, there are very few case reports in

literature documenting a patient with multiple calculi obstruction in bifid ureter, resulting in severe hydronephrosis of both moieties and urinary tract infection.

## 2. Case report

A 47-year-old woman with a 3-day history of left-sided loin pain and low-grade fever consulted a hospital. Right renal atrophy and 2 calculi of left ureter associated with severe left hydronephroureterosis were detected preoperatively by abdominal plain film of kidney, ureter, and bladder (KUB) and sonography of kidney. The patient underwent percutaneous nephrostomy to improve renal function and general status, and left extraperitoneal ureterolithotomy to relieve the obstruction of left ureter 2 weeks later. In the operation, the lower calculus of left ureter was extracted successfully without identification of the upper one, and surgeons considered that the upper calculus may migrate into the left kidney (Fig. 1A). However, the migrated calculus was found in left ureter, but with lateral movement compared to preoperative place, in the postoperative KUB plain (Fig. 1B). Two weeks later, the patient with low fever was transferred to our hospital. Preoperative contrast-enhanced CT of abdomen showed that the migrated calculus possibly located in the ureter of left upper moiety (Fig. 2B) and consequently resulted to left hydrourteronephrexosis (Fig. 2A).

We informed the patient of surgical procedures and possible complications, and obtained consent from patient with regard to publishing a case report in the future. Percutaneous nephrolithotomy was planned to remove the calculus. Ureteroscopy intraoperatively found the bifurcation of bifid ureter, but failed to access into the ureter of the upper moiety due to small caliber of it. Left ureterolithotomy was then performed through a transperitoneal incision. The calculus measured 2 cm in greatest

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**Figure 1.** (A) Plain film of kidney, ureter, and bladder (KUB) before left percutaneous nephrostomy detected 2 calculi dwelt in the left ureter. (B) KUB after left extraperitoneal ureterolithotomy, in which the upper calculus was not extracted, demonstrated that the upper calculus moved (arrow) laterally.

diameter was found in the ureter of left upper moiety, which proven preoperative speculation of a left duplicated collecting system associated with incomplete ureteric duplication (Y-shape bifid ureter), and was removed by open surgery. The calculus was composed of calcium oxalate. The patient was uneventfully discharged from our hospital. One month postoperatively, CT revealed no residual fragment in the urinary tract.

### 3. Discussion

The ureteric bud, from which the collecting system of kidney will form, arises from the caudal end of the mesonephric duct around the 5th week of development and grows into the nephrogenic cord, meanwhile the metanephric blastema, which will evolve

into nephron, is formed around the tissue from the nephric cord surrounds the ureteric bud. The fact that the ureteric bud divides prematurely before penetrating into metanephric blastema will result in duplex ureter.<sup>[1]</sup> There are 2 types of complete and incomplete duplex ureter. The incidence of incomplete duplex ureter, including 3 subtypes, such as proximal, middle, and distal, depending on the location that bifid ureters join a single unit, is 3 times more than the complete.<sup>[3]</sup>

This anomaly is mostly associated with no clinical abnormality, but stasis and pyelonephritis do occur.<sup>[3]</sup> Reviewing the literature, Bhatia and Biyani reported 8 patients with urolithiasis in duplex system, in which 5 patients had incomplete and 3 had complete duplication.<sup>[4]</sup> Nyanhongo et al initially failed to identify a 6-mm nonobstructing calculus



**Figure 2.** (A) Hydronephrosis (large arrow) of the left upper moiety. (B) The functioning lower moiety excreted contrast into a separate renal pelvis and ureter (arrow head) and calculus (small arrow) was located in the left upper moiety ureter.

in the left distal ureter, and found the calculus located in the lower moiety ureter in repeat ureteroscopy.<sup>[1]</sup> Niwa did not reveal calculus in the distal blind-ending branch of the bifid ureter through preoperative nonenhanced CT, but a rigid ureteroscopy did.<sup>[5]</sup> Bifid ending accessory ureter with calculus on the left side was detected by preoperative excretory urography in a case report.<sup>[6]</sup> Calculus can be more found in the ureterocele than in duplex ureter.<sup>[7-13]</sup>

In our case, a Y-shaped bifid ureter, in which both the ureter of left upper moiety and common stem were obstructed by calculi respectively, was found in a female patient with left hydronephroureterosis and urinary tract infection. The initial surgical procedure with left extraperitoneal ureterolithotomy saw a failure of identification of the upper calculus of left ureter after extracting the lower one due to the fact that preoperative abdominal sonography and KUB did not reveal the anomaly. After transfer of the patient to our hospital, the rare anomaly was detected by contrast-enhanced CT prior to following left ureteroscopy and ureterolithotomy and the migrated calculus was removing successfully. To the best of our knowledge, there are no data in the literature presenting the rare anomaly that the upper moiety ureter and common stem were obstructed respectively by 2 calculi.

Initially, urologist did not brood the possibility of the rare anomaly and did not undergo preoperatively contrast-enhanced CT or intravenous urography. They considered that the patient had only the multiple calculi of left ureter resulting in left hydronephrosis according to findings of preoperative KUB plain and sonography. Ureterolithotomy extraperitoneally was then performed and the rare anomaly was encountered unfortunately. Therefore, it will be kept in mind that duplex ureter should be excluded preoperatively by contrast-enhanced CT or prolonged contrast-enhanced CT prior to any surgical procedures involved with upper urinary tract due to the fact that the anomaly is common.<sup>[1,2]</sup>

#### 4. Conclusion

We reported a rare case of left Y-shaped bifid ureter and the ureter of upper moiety and common stem were respectively obstructed by 2 calculi. Contrast-enhanced CT or prolonged contrast-enhanced CT should be performed to exclude the duplex ureter on account of common prevalence rate of the anomaly prior to any surgical procedures involved with upper urinary tract.

#### Author contributions

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