

# Retrograde migration of a vesicoureteric junction calculus: A potential pitfall of the noncontrast limited pelvic computerized tomography

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## Abstract

Retrograde ureteric calculus migration is a rare phenomenon. Herein, we report two such cases where each patient presented with a calculus, measured at 5 mm and 6 mm, respectively, at the vesicoureteric junction (VUJ) on noncontrast computerized tomography kidneys, ureters, and bladder (CTKUB). Following acute presentation with renal colic, each patient opted for conservative management of their ureteric stone and became asymptomatic when undergoing their follow-up imaging. The first patient underwent a follow-up noncontrast limited pelvic computerized tomography (CT) where it had appeared that the radiolucent VUJ calculus had passed. This stone was then discovered incidentally 3 months later in the upper ureter when the patient had undergone a CT colonography. The other patient underwent a follow-up X-ray KUB where the stone was shown to have migrated to the lower renal pole calyx which was confirmed with noncontrast CTKUB imaging. In all reported cases of retrograde VUJ calculus migration, the use of a noncontrast limited pelvic CT scan either missed or would have missed this phenomenon. This potential pitfall of the noncontrast limited pelvic CT scan should be appreciated and the use of full upper renal tract imaging should be considered for the follow-up of radiolucent VUJ calculus cases whereby there is no clear history of calculus passage.

**Keywords:** Noncontrast limited pelvic computerized tomography scan, renal colic, ureteric stone, urolithiasis

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## INTRODUCTION

Conservative management of a lower ureteric stone is a recognized management modality for small-to-moderate size stones. Herein, we present two separate cases in which ureteric retrograde migration of such stones has occurred. Further, we propose practice-changing radiological follow-up strategies to ensure early recognition of this unique clinical scenario.

## CASE REPORTS

### Case 1

A 73-year-old man presented with acute right-sided renal colic and was suspected to have an acute ureteric calculus. Noncontrast computerized tomography of

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his kidneys, ureters, and bladder (CTKUB) revealed a 5-mm right-sided stone situated at the vesicoureteric junction (VUJ) with associated hydronephrosis and no other renal tract calculi [Figure 1a]. The patient opted for conservative (nonsurgical) management of the identified ureteric calculus. The patient's pain resolved, and at day 16 postpresentation, a follow-up noncontrast limited pelvic computerized tomography (CT) scan was performed. This reported that the previously identified VUJ calculus had presumed to have passed [Figure 1b]. Three months postpresentation, the same renal calculus was visualized during a diagnostic CT colonography for unexplained weight loss. This reported a 5-mm calculus in the right upper ureter with associated hydronephrosis [Figure 1c]. The patient opted for three sessions of extracorporeal shockwave lithotripsy (ESWL) with full stone clearance, confirmed by noncontrast CTKUB evaluation.

### Case 2

A 67-year-old male presented with acute left-sided renal colic and was suspected to have an acute ureteric calculus. Noncontrast CTKUB revealed a 6-mm left-sided solitary calculus situated at the VUJ with associated hydronephrosis and dilatation of the ureter proximal to the stone [Figure 2a]. This radiopaque calculus was also clearly visible on X-ray KUB. The patient opted for conservative management of the identified calculus. The patient's pain resolved, and at day 12, a follow-up X-ray KUB performed reported the retrograde migration of the previously ureter stone to the lower pole of the left kidney. This unexpected finding was subsequently confirmed with

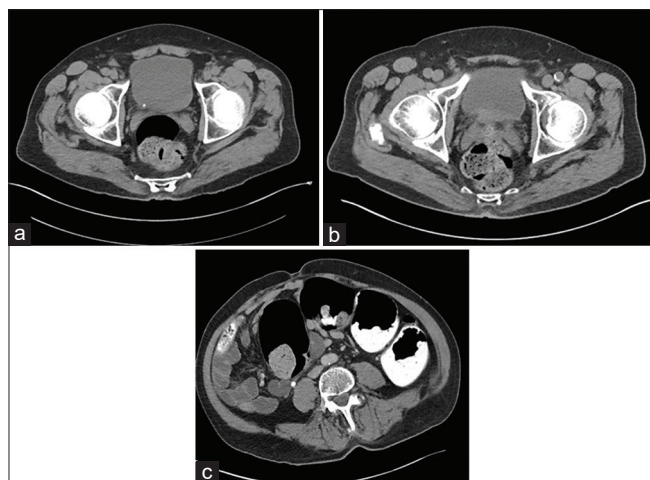
noncontrast CT imaging [Figure 2b and c]. The patient opted for ESWL where two sessions resulted in full stone clearance, confirmed by X-ray KUB evaluation.

### DISCUSSION

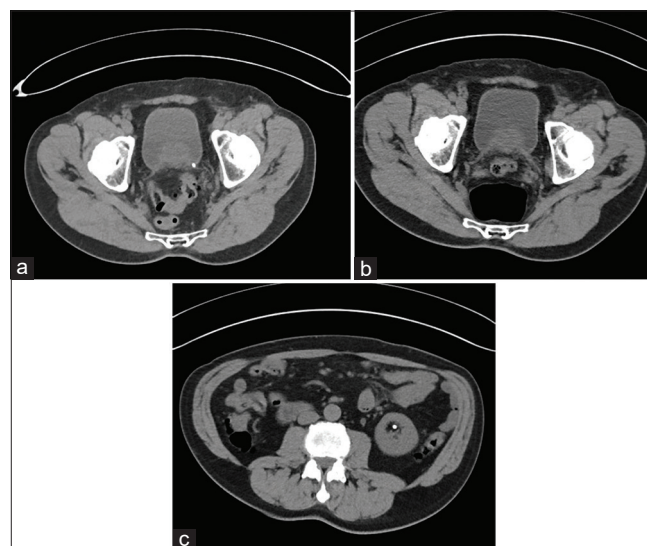
The incidence of urolithiasis has been dramatically increasing worldwide. A paradigm shift in dietary habits of the global population such as increased protein, salt, and carbonated fructose-rich drinks has been attributed to this increased incidence of urinary calculus disease. Conservative management for small-to-moderate lower ureteric calculi, similar to the aforementioned cases presented here, is a recognized management option. Such approaches have spontaneous passage rates reported between 49% and 83%.<sup>[1]</sup>

Full-length retrograde solitary ureteric stone migration from the VUJ to the renal pelvis is a rare phenomenon and has only been reported in the literature on two previous occasions in the literature.<sup>[2]</sup> Our tertiary endourology unit has now identified two cases of retrograde solitary VUJ stone migration within a short 7-month period. As such, we believe that urologists should be aware of this potential scenario in the follow-up of such patients.

It is interesting to note that in canine and feline populations, retrograde stone passage appears to be a common occurrence.<sup>[3]</sup> It could be hypothesized that such migration exists in human at similar rates but remains either under-



**Figure 1:** (a) Case 1 with axial image of noncontrast computerized tomography kidneys, ureters, and bladder demonstrates a 5-mm right-sided vesicoureteric junction calculus. (b) Case 1 with axial image taken from a noncontrast limited pelvic computerized tomography where appearances are in keeping with stone passage. (c) Case 1 with a computerized tomography colonography 3 months following initial presentation with renal colic showing a 5-mm right upper ureteric stone



**Figure 2:** (a) Case 2 with axial image of noncontrast computerized tomography kidneys, ureters, and bladder demonstrates a 6-mm left-sided vesicoureteric junction calculus. (b) Case 2 where axial image of noncontrast computerized tomography kidneys, ureters, and bladder does not demonstrate a calculus at the left vesicoureteric junction. (c) Case 2 where the axial image of the noncontrast computerized tomography at the renal pelvis demonstrates full-length retrograde migration of the 6-mm calculus

reported or unidentified due to inherent limitations in the follow-up methods of such patients.

The spontaneous expulsion of a ureteric stone can be assessed (i) clinically, (ii) visually by the patient, or (iii) radiologically. (i) Clinically symptomatic acute ureteric stone has been described as the most intense lifetime pain experienced by their sufferers with reports of it being more painful than childbirth for the majority of female patients who have experienced both forms of pain.<sup>[4]</sup> Thus, the reliance of clinical history with symptom assessment will not necessarily rule out retrograde migration of the calculi into the renal pelvis or indicate the passage of the stone. As with spontaneous antegrade passage of the ureteric calculi where the patient will become pain free, retrograde migration of the stone into the renal pelvis may also achieve relief of their clinical symptoms. (ii) Unfortunately, the reliance on the visual expulsion of the ureteric stone has inherent limitations as visualizing its passage is not always possible even when using a sieve and affected by many patient factors. (iii) Thus, many institutions now utilize radiological assessment, commonly a noncontrast limited pelvic CT scan, for follow-up to confirm the passage of a lower ureteric calculus. Such limited CT imaging has advantages of reducing radiation exposure to the patient. However, this imaging modality will not assess the patient for retrograde migration of their ureteric calculus due to the omission of the proximal upper urinary tract. In all previously reported cases of retrograde stone migration, including our two cases, the reliance of a noncontrast limited pelvic CT would have or did fail to recognize these unconventional stone movement. We now propose the use of a follow-up imaging modality that will visualize the entire urinary tract to ensure that retrograde stone migration has not occurred.

In both our cases, the calculi were of a solitary nature in the entire renal tract and of identical size at presentation and on subsequent CT follow-up. This would make it extremely unlikely for a *de novo* stone to have formed in the proximal upper urinary tract coupled with the stones being measured at the exact same size on the follow-up imaging.

Noncontrast limited pelvic CT scans for renal stone disease should be interpreted with caution. Patients with a lower ureteric calculus undergoing conservative management should be considered for a follow-up imaging modality that will visualize the entire urinary tract to exclude retrograde migration of their stone.

#### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

#### Conflicts of interest

There are no conflicts of interest.

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