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# Calculus-related ureteral intussusception: A case report and literature review



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## ABSTRACT

**INTRODUCTION:** Ureteral intussusception is a rarely reported condition, primarily as a complication of ureteric tumours. Fewer than 30 case reports have been made. This case represents the first reported case, to our knowledge, of ureteral intussusception caused by a ureteric calculus.

**PRESENTATION OF CASE:** We present the case of a 70 year old man with a history of conservatively managed renal calculi, in whom obstructive ureterolithiasis was incidentally detected. Retrograde pyelography and ureteroscopy revealed intussusception of the ureter around a calculus. Extensive biopsies revealed no evidence of tumour, and the intussusception resolved following stone clearance.

**DISCUSSION:** Literature review of previously reported cases of ureteral intussusception revealed 26 cases, of which 22 were secondary to tumour and 4 were secondary to surgical procedures. We propose a mechanism by which calculus-related ureteral intussusception may occur, and suggest treatment for this condition.

**CONCLUSION:** Calculus-related ureteral intussusception is a rare condition, of which this represents the only case report. Management of the condition should involve excluding the presence of tumour, and then clearing the stone, avoiding the use of a basket for retrieval of fragments.

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## 1. Case report

### 1.1. Introduction

Intussusception of the ureter is a rarely reported complication of ureteric tumours and occasionally of surgery. It involves the telescoping of a section of ureter (the intussusciens), due to a combination of peristaltic activity, urinary flow, and gravity pulling a section of the ureter (the intussusceptum) distally [1–3]. Here we present the first case, to our knowledge, of ureteral intussusception in the absence of tumour or ureteric instrumentation.

### 1.2. Presentation of case

A 70 year old man was investigated by his family doctor for hypertension. He had a past history of bilateral renal calculi for which he had been managed conservatively, having noted per urethral passage of stones. No confirmatory imaging had been per-

formed. He had no recent history of haematuria or dysuria, nor renal colic.

Ultrasound (performed to exclude renal artery stenosis, which was not seen) revealed moderate left hydronephrosis. Non-contrast CT scan showed a 4 mm non-obstructing ureteric calculus and slightly more proximally an 8 mm calculus over the left sacroiliac joint with associated significant proximal left hydronephroureterosis. (Figs. 1 and 2). There was no hydroureterosis distal to the 8 mm calculus. Small non-obstructing intrarenal calculi were seen on the right.

Electively, this man was taken to theatre for a left ureteroscopy and insertion of ureteric stent. Retrograde pyelography revealed what was thought to be a ‘goblet’ sign with a central small radiopaque calculus (Fig 3). Ureteroscopy confirmed the intussusception with the stone just visible in the inflamed/oedematous lumen of the intussusceptum (Fig 4). A wire was passed through the lumen under direct vision and a ureteric stent was placed.

Follow up ureteroscopy 2 weeks later revealed an area of inflammation and oedema associated with the stone; several biopsies were taken. The stone was partially fragmented as it was thought that the inflammatory changes represented a tumour (Fig 5). Histology revealed inflammatory changes only.

Repeat ureteroscopy 2 weeks later revealed a reduction in the inflammation. The remaining stone was fragmented, with a residual fragment of stone embedded in the wall of the ureter (Fig 6). A

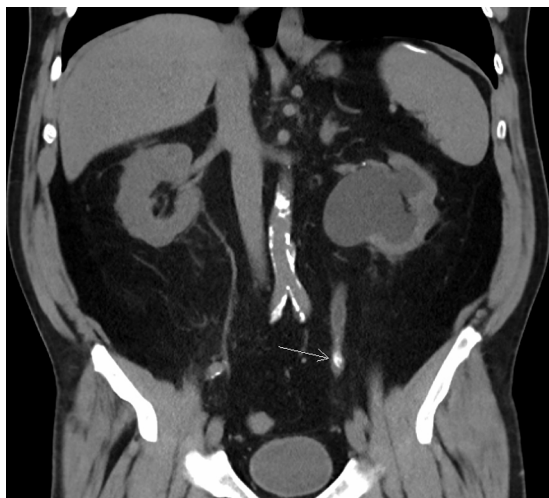
Abbreviation: TCC, transitional cell carcinoma.

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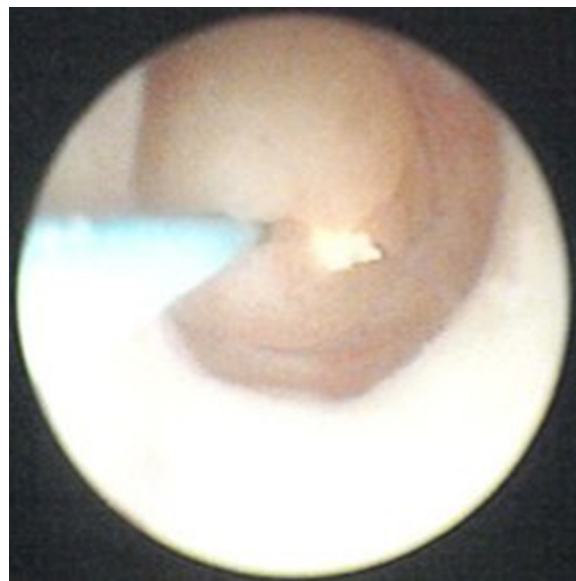
**Fig. 1.** Coronal non-contrast CT scan showing 8 mm obstructive left ureteric calculus and gross left hydronephrosis. (Arrow indicates calculus).



**Fig. 2.** Axial non-contrast CT scan showing obstructive ureteric calculus. (Arrow indicates calculus).



**Fig. 3.** 'Goblet sign' seen on retrograde pyelography.



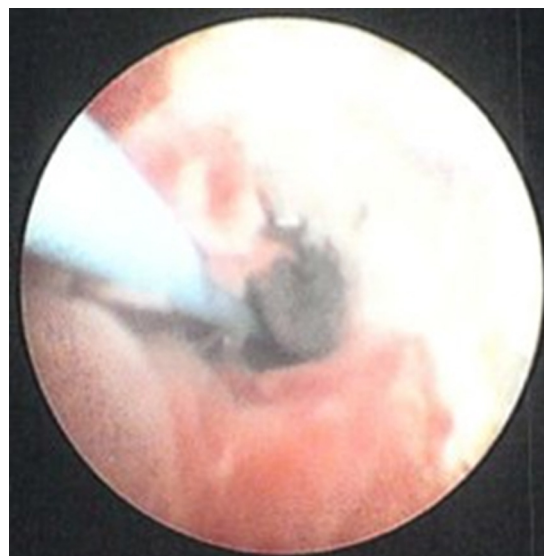
**Fig. 4.** Ureteroscopy showing intussuscepted ureter with calculus protruding into the lumen of the intussusceptum. Wire is passing to renal pelvis in the ureteric lumen.

ureteric stent was left in situ, and removed two weeks later without recurrence of the ureteric obstruction.

**2. Literature review**

*2.1. Methods*

A search of the Pubmed database was undertaken on 23/6/14 with the search terms (“ureter”[MeSH Terms] OR “ureter”[All Fields] OR “ureteral”[All Fields]) AND (“intussusception”[MeSH Terms] OR “intussusception”[All Fields]). Non-English papers were included in the search. 95 results were returned, of which 27 papers were identified as case reports or discussion of ureteral intussusception. Of these, 3 were unable to be accessed [4–6]. The remaining 24 papers included 4 case reports (4 cases) of unintended iatrogenic intussusception, and 20 case reports (22 cases) of tumour-mediated intussusception, with a mix of benign and malignant tumours.



**Fig. 5.** Inflamed ureter around calculus seen during partial LASER fragmentation of the ureteric calculus.



**Fig. 6.** Residual calculus embedded in wall of ureter (arrow) following completion of LASER fragmentation of stone.

2.2. Results

Of the 26 cases of ureteral intussusception identified on review (Table 1), 22 cases were secondary to tumour. These included 12 cases caused by a polyp/papilloma, and 10 cases caused by transitional cell carcinoma (TCC). The remaining 4 reported cases were related to surgical procedures. The intussusceptions occurred as a complication of; ureteric catheter exchange in one case, and percutaneous endopyelotomy in two cases.

3. Discussion

Ureteral intussusception is a rare complication of ureteral tumours. Current thinking suggests that the intussusception is related to a slow-growing mass which becomes drawn down the ureter by a combination of the peristaltic activity of the ureter, urine

flow, and gravity [1–3]. Typically, patients present with flank pain and haematuria, though this is not universal [7].

This case, to our knowledge, represents the first reported case of ureteral intussusception in the presence of a ureteric calculus. This is interesting as it is typically the attachment of the ureteric mass which serves as the focus of the intussusception, and calculi are typically without focal attachment to the ureter.

3.1. Proposed mechanism for intussusception

The proposed mechanism for intussusception in the presence of a ureteric calculus is as follows: a non-obstructive ureteric calculus remains in the ureter for an extended period of time, causing ureteric inflammation. The calculus becomes adherent to the wall of the ureter, and the combination of the antegrade flow of urine, ureteric peristalsis, and gravity pulls the stone in an antegrade direction. As the calculus moves antegrade, it pulls on the adherent inflamed ureter causing intussusception of the ureter, with the intussusceptum containing the calculus and inflamed ureter.

3.2. Suggested treatment

Treatment of ureteral intussusception as a complication of chronic ureterolithiasis differs from treatment in the presence of a tumour. Many of the previously reported cases have been treated with nephroureterectomy. Those benign tumours that were definitively identified prior to resection were mostly treated by partial resection of the ureter with careful reanastomosis. Management of the intussuscepted ureter in the presence of a calculus requires exclusion of TCC. Biopsies of the intussuscepted ureter should be taken. The ureter should be stented prior to an attempt at lithotripsy. Use of a basket for retrieval of stone fragments should definitely be avoided, given the risk of exacerbating the intussusception.

4. Conclusion

This case represents, to our knowledge, the first reported case of ureteral intussusception in the absence of tumour or surgical instrumentation. We show here that in this case, intussusception with a ureteric calculus shows the typical radiological picture of intussusception on retrograde pyelography. As tumour is the most commonly identified cause of intussusception, we suggest that in the case of suspected calculus-mediated ureteral intussusception, extensive biopsies should first be taken to exclude the presence of a tumour. Once tumour has been excluded, careful fragmentation of the calculus may be performed, avoiding the use of the basket for fragment retrieval.

Conflict of interest

No actual or potential conflicts of interest for any authors.

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Ethical approval

Informed consent was obtained from the patient for publication of clinical information and images.

**Table 1**  
Previously published cases of ureteral intussusception.

Author	Year	Number of cases	Aetiology
Bernhard et al. [8]	1996	1	Iatrogenic
Bonomini et al. [9]	1963	1	Polyp
Chao et al. [7]	2012	1	TCC
Chiong et Consigliere [10]	2004	1	Iatrogenic
Compton et al. [11]	1986	1	TCC
de La Taille et al. [2]	1998	1	TCC
Dix [12]	1937	1	Papilloma
Duchek et al. [12]	1987	1	Papilloma
el Khader et al. [13]	1997	1	Iatrogenic
Fiorelli et al. [1]	1981	1	Polyp
Fukushi et al. [3]	1983	1	Polyp
Gabriel et al. [14]	1986	1	TCC
Gerdes et al. [15]	1966	1	Polyp
Hauptert et al. [16]	1985	1	Polyp
Jin et al. [17]	2011	1	Polyp
Liu et al. [18]	2000	1	Iatrogenic
Mazer et al. [19]	1979	1	TCC
Moretti et Jose [20]	1987	1	TCC
Morley et al [21]	1952	1	Polyp
Png et Tung [22]	1995	1	Polyp
Radhi [23]	1992	1	TCC
Takeuchi et al. [24]	1984	3	TCC (×3)
Vogelzang et al. [25]	1981	1	Polyp
Xu et al. [26]	2007	1	Polyp

## Consent

Written informed consent for the publication of their clinical details and clinical images was obtained from the patient. A copy of the consent form is available for review by the Editor of this journal.

## Author contribution

JS – Study design, data collection, literature review, preparation of manuscript.

GB – Study concept, data collection, manuscript review.

KT–Data collection.

CB – Study concept, Manuscript review.

## Guarantor

Dr. James Sewell.

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