



## Endourology

## A knotted ureteral stent

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## ABSTRACT

The use of ureteral stent has become an integral part of urological practice. However, its use is not without complications. Stenting knotting represents a rare complication but can be difficult to manage, with less than 30 cases reported in the literature. We report a case in which a complete knot was found in the proximal coil of an indwelling ureteral stent. The knotted stent was untied and removed successfully by ureteroscopy under fluoroscopic guidance.

## Introduction

Ureteral stents have become an indispensable part of modern urological practice since its introduction more than five decades ago. However, as many as 80% of patients with ureteral stent in-situ reported certain degree of discomfort. Moreover, the use of ureteral stents may lead to more serious complications such as stent migration and encrustation.<sup>1</sup> Although knotting of a ureteral stent has been reported previously, it is an extremely rare complication with less than 30 cases in the literature.

## Case report

A 62-year-old man presented to our urology clinic with 1-month history of intermittent macroscopic haematuria. Computerized tomography scans demonstrated 7 mm right proximal ureteric stone and 22 mm left lower calyceal stone. Bilateral flexible ureterorenoscopy and laser lithotripsy was performed. Multilength 22–32cm 6 Fr Bard InLay Versafit double-J stents (C. R. BARD Inc., Covington, GA, USA) were inserted bilaterally at the end of the procedure under fluoroscopic guidance. Plain radiograph after the operation showed proper position and coiling of both ureteral stents (Fig. 1).

Removal of bilateral double-J stents by flexible cystoscopy under intravenous sedation was scheduled 3 weeks after the first operation. The stent over the left side was removed smoothly by grasping forceps. Difficulty in retrieval was noted on the right side and distal tip of the ureteral stent could barely reach the urethral meatus after straightening the distal coil. Plain radiograph revealed a knotted stent lodged at ureteropelvic junction (UPJ) (Fig. 2). After the patient was transferred to an operating theatre, retrieval of the stent by gentle traction again failed

under general anaesthesia. A 0.38 mm straight tip guidewire was passed via the lumen of the stent but unable to untie the knot under fluoroscopic guidance. A 6 Fr semi-rigid ureteroscope was introduced and the knot was seen at UPJ but further manipulation was unsuccessful due to the limited space. The knot was pushed back into renal pelvis. Release of the knot was noted on real-time fluoroscopy with repeated probing by guidewire. The stent was removed without complication. Patient was discharged after overnight observation. Patient remained asymptomatic 3 months after the operation on follow up.

## Discussion

Knotting of an indwelling ureteral stent is a serious but rare complication. Less than 30 cases have been identified in the literature since the first report in 1989.<sup>2</sup> Knotting at the proximal end was noticed in the vast majority of cases. Incidents have been reported in patients ranged from 4 to 86 years. Ureteral stents were mainly inserted for urolithiasis. However, renal transplantation, ileal conduit, ureteric reimplantation, malignant ureteric obstruction, and retroperitoneal fibrosis were among other reported indications.<sup>3</sup>

Exact aetiology of stent knotting was unclear. Stents with smaller diameters and greater manoeuvrability do not seem to increase the risk since stent diameters ranging from 4.7 to 7 Fr have been associated with knotting.<sup>3</sup> Longer duration of stent placement may increase risk of stent encrustation but not knotting. Excessive stent length and coil formation were considered as important predisposing factors for the condition. Redundant stent has been observed as a possible cause of knotting in patients with short ureters after fashioning of ileal conduit, ureteric reimplantation, and renal transplantation.<sup>3,4</sup> The use of multilength stents prevents stent migration, but may associate with higher risk of

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**Fig. 1.** Position and configuration of bilateral double-J stents after flexible ureterorenoscopy.



**Fig. 2.** Appearance of the knotted right double-J stent on plain radiograph.

knottting. The risk may be higher in the presence of abnormal anatomy of

renal pelvis or presence of renal stones which may alter the configuration of the proximal coil.

Unexpected difficulty during removal of the stent was the common presentation and knotting could be detected by plain radiograph. Various techniques have been reported in the management of this challenging condition. Simple traction (or its modification) has demonstrated its success in stent retrieval in approximately half of the reported cases. Although traction could be easily performed, it carries the likelihood of further knot tightening. Transient hydro-ureteronephrosis and renal colic were not uncommon after extraction.<sup>3</sup> Possible major ureteric injury or loss of the renal unit should not be overlooked.<sup>5</sup> If resistance is encountered during traction, alternative intervention should be sought. Ureteroscopy is usually the endourological procedure of choice. Successful removal of knotted stents by holmium laser fragmentation and grasping forceps has been reported. However, retrograde access to proximal knot via a ureter with a stent in-situ may not be straightforward. Further intervention with percutaneous nephrostomy and antegrade removal of stent, and open ureterotomy should be well prepared.

### Conclusion

We present a rare case of knotted ureteral stent. Resistance was experienced during cystoscopic removal of stent and knotting of proximal coil was found on plain radiograph. The knot was untied during the procedure of ureteroscopy under fluoroscopic guidance. Selection of appropriate length with proper positioning and coiling of proximal loop of ureteral stent may best avoid the risk of stent knotting. Surgeons should be aware of the possibility of this condition when difficulty was encountered during stent removal.

### Declaration of competing interest

None.

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### References

1. Ahallal Y, Khallouk A, El Fassi MJ, Farih MH. Risk factor analysis and management of ureteral double-j stent complications. *Rev Urol.* 2010;12(2-3):e147–e151.
2. Groeneveld AE. The role of ESWL in the treatment of large kidney stones. *Singap Med J.* 1989;30(3):249–254.
3. Bradshaw J, Khan A, Adiotomre E, Burbidge S, Biyani CS. Antegrade removal of a knotted ureteric stent: case report and review of literature. *Urol Ann.* 2020;12(1):96–100.
4. Zhou Y, Chu X, Yi Y, Lei J, Huang S, Dai Y. A knotted ureteral stent in patient with renal transplantation: a case report and literature review. *Int J Clin Exp Med.* 2018;11(6):6364–6368.
5. Ahmadi N, Tran M, Elms M, Ko R. Knotted proximal loop of ureteric stents: review of the literature and five case reports. *J Clin Urol.* 2015;8(6):432–437.