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Transurethral guidewire loop for manipulation and extraction of stent: A novel, innovative, video-endoscopic technique in ureteral stent removal

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Abstract

Background: Ureteral stent removal is one of the most common procedures performed in urology. Herein, we describe a novel technique for stent removal using transurethral guidewire loop for manipulation and extraction of stents method. We aimed to evaluate the role, feasibility, cost, operative time, and complications of the method. A review of the literature outlining the innovations in ureteral stent removal was also performed.

Materials and methods: Cystoscopic stent removal was performed using transurethral guidewire loop for manipulation and extraction of stents in all sequential cases. Variables including sex, age, stent type, duration, reason for stent insertion, type of anesthesia (general/local), cystoscopic stent removal time, and documentation of postprocedural complications were tabulated. In addition, using the search term "novel innovation in ureteral stent removal," various databases (PubMed, EMBASE, Cochrane Library, SCOPUS, and Web of Science) were searched.

Results: Transurethral guidewire loop for manipulation and extraction of stents was successfully performed in all patients assessed on the first attempt. The patients comprised both sexes. The procedure was well tolerated under local anesthesia (4 of 5 cases), whereas general anesthesia was used in 1 case as the patient was booked for subsequent ureteroscopy under the same anesthetic. The procedure time was <27 seconds in all the cases assessed. No significant complications were noted. Fifteen studies involving novel innovations were included in the critical appraisal.

Conclusions: Transurethral guidewire loop for manipulation and extraction of stents is a simple, cost-effective, and innovative alternative for removing ureteral stents. It may be easily applied instead of a conventional ureteral stent grasper. Published innovative trends in ureteral stent removal have evolved over time, including advancements in stent design, retrieval devices, and the use of fluoroscope-free and cystoscope-free techniques.

Keywords: Novel innovation; Endourology; Stent removal; Transurethral loop; Transurethral guidewire loop for manipulation and extraction of stents

1. Introduction

Since the inception of the "ureteral stent" in 1978, its insertion and removal remain one of the most frequent interventions performed in modern-day urology.[1,2] The concept of a biodegradable stent will allow ureteral stent removal to become an obsolete practice in the future. However, because "biodegradable" stents have not gained widespread clinical acceptance,[3] advancements in ureteral stent removal techniques have expanded.[2]

The concept of using a snare or lasso entrapment has been used in many instances before. It has been applied in the previously described extraction of the prostate[4] and even for the removal of an unwanted suture segment from the anterior chamber of the eye.[5]

We have also previously described this concept with the use of a cautery loop in the successful *en Bloc* resection of papillary bladder tumors.[6] This is also seen in cases of periureteric edema with stent encrustation where, subsequent cannulation of the ureteric orifice is a potential challenge.[7]

In this study, we propose a novel, simplified method to perform ureteral stent removal using a standard guidewire as an extraction loop via a standard cystoscope. This is referred to as the transurethral guidewire loop for manipulation and extraction of stents (TUG-ME) method. We also reviewed published methods of novel innovative techniques for ureteral stent removal.

2. Materials and methods

2.1. TUG-ME technique: loop construction

Only the standard cystoscope and the nonkink 0.025-inch guidewire (Allwin Cobra Nitinol Guidewire 150 cm, 0.025-inch-diameter interventional radiology [endovascular] guidewire [Allwin Medical

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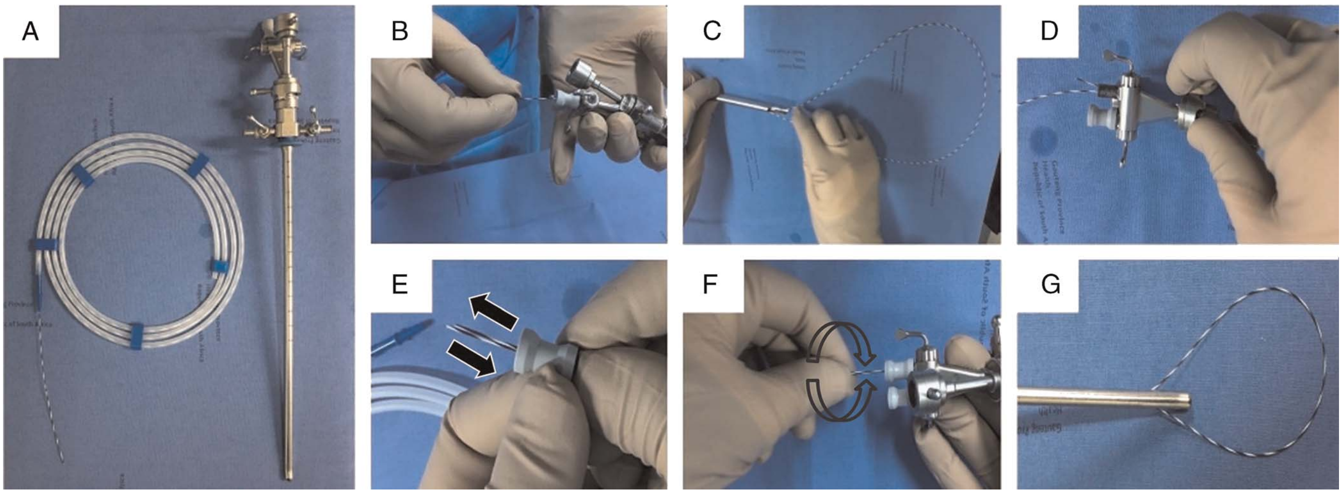

Figure 1. Constructing the snare loop using the endovascular guidewire. (A) Standard cystoscope and the 0.025-inch guidewire. (B) The guidewire is passed in the conventional manner. (C) The distal guidewire end was looped and reinserted into the cystoscope channel, thus creating a snare loop. (D) They are observed exiting of the same instrument channel. (E) The rubber nipple was placed over both the "in" and "out" segments (black arrows) of the guidewire. (F) Using the fingers around both ends of the guidewire, the guidewire-snare loop is easily manipulated by rotating the fingers and pulling and pushing the guidewire ends in and out of the cystoscope. Rotating the fingers in a clockwise motion over the guidewire has the same rotational effect on the loop. The same is possible with an anticlockwise motion (see the curved arrows). (G) The guidewire-snare loop exiting from the cystoscope sheath.

Devices, Anaheim, CA]) were used (Fig. 1). First, the rubber nipple tip was removed from the instrument port of the cystoscope. The guidewire was then inserted into the instrument port in a conventional manner. The distal guidewire end was looped outside the scope sheath and reinserted into the ipsilateral cystoscope channel, thus creating a snare loop. The rubber nipple tip was placed over both the "in" and "out" segments of the guidewire. The loop was easily manipulated by rotating the surgeon's fingers at the end of the instrument port using the surgeon's fingers around both ends of the guidewire. The loop was easily advanced and retrieved by pulling and pushing the guidewire ends in and out of the cystoscope (Supplementary Video 1, http://links.lww.com/CURRUROL/A31).

2.2. Model simulation

The TUG-ME technique was initially performed in a simulation setting using a prestented synthetic bladder box model (**Fig. 2**). Various guidewires have been used for this purpose. Flexibility, length, diameter, and nonkink properties were assessed using conventional and commercially available guidewires available for use in urology, cardiology, and interventional radiology practice. After comparison and review in simulation, an endovascular guidewire (Allwin Cobra Nitinol Guidewire 150 cm, 0.025-inch diameter—Interventional Radiology Guidewire [Allwin Medical Devices]) was identified as the most suitable for this purpose.

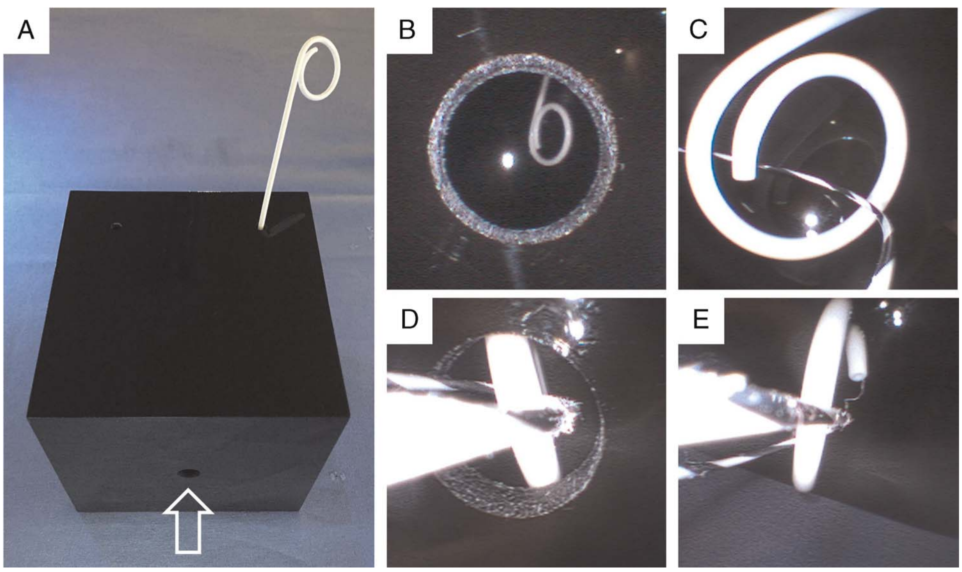

Figure 2. Simulation of the stent removal procedure using the bladder box. (A) Simulation model for ureteral sent removal in the bladder box. (B) Endoscopic view of the lumen demonstrating the distal stent coil. (C) Guidewire loop applied and observed encircling the distal stent loop. (D) The distal stent loop was removed from the bladder box using the guidewire loop. (E) Ureteral stent is observed outside the bladder box.

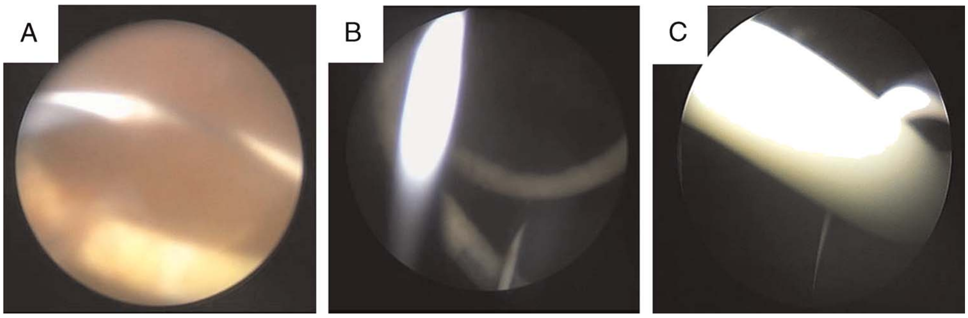

Figure 3. Cystoscopic view depicting the step-by-step of the transurethral guidewire loop for manipulation and extraction ureteral stent removal technique. (A) The distal guidewire-snare loop is observed in the bladder. (B) The guidewire-snare loop is encircled around the ureteral stent. (C) The distal ureteral stent is removed from the bladder.

The black and white stripes on this guidewire also facilitate better visual contrast during endoscopic removal, whereas the smaller diameter allows the guidewire to be looped and removed from the same instrument port channel within the cystoscope. Furthermore, the nonkink guidewire properties allow the loop to be adjusted and reused for subsequent ureteroscopy, if needed.

2.3. Study participants

Cystoscopic stent removal was performed using the novel TUG-ME technique in sequential cases. An endoscopic video recording was performed during the procedure. Although an international collaboration was sought for the conceptualization, design, and preparation of the manuscript, a single center in South Africa was where the procedures were performed.

Variables including sex, age, stent type, duration, reason for ureteral stent insertion, type of anesthesia (general/local), cystoscopic stent removal time (in seconds), and documentation of postprocedural complications were tabulated (Table 1).

2.4. Cost feasibility

The cost feasibility of the selected guidewire was assessed, and upfront costs were compared using currently available commercial endoscopic graspers used for ureteral stent removal.

2.5. TUG-ME technique

Once the guidewire loop was prepared for insertion, cystoscopy was performed (standard lithotomy position), and the distal ureteral stent coil was snared using the guidewire loop (**Figs. 2 and 3**). Rotation and direction of the loop were possible because both guidewires exit from the same cystoscopic instrument port (Supplementary Video 1, http://links.lww.com/CURRUROL/A31).

2.6. Ethics approval

Local institutional ethics committee approval was obtained, with a Human Research Ethics Committee (Medical) Clearance Certificate (M200595—18/06/2020). Written informed consent was obtained from all participants in this study.

2.7. Review: Literature search strategy

Using the search term "novel innovation in ureteral stent removal," the PubMed, EMBASE, Cochrane Library, SCOPUS, and Web of Science databases were searched at the time of study commencement (May 2020). Abstracts were reviewed for relatedness and relevance, and references were reviewed for any relevant cited (pearl) publications.

2.8. Study inclusion criteria for the review

All articles describing a novel technique used in stent removal obtained using these screened terms were included in this article. Both preclinical and clinical studies were assessed and critically appraised without language restrictions. Language, age, and sex restrictions were not included.

2.9. Data extraction and methodical evaluation within the scoping review

Using the PRISMA guidelines,[8] articles were screened and sifted for relatedness, relevance, duplicates, and the presence of a novel,

Table 1

Demographic distribution of patient data and results from the TUG-ME method.

Sex and age, yr	Stent type size	Stent duration, d	Reason for ureteral stent insertion	Anesthesia (general/local)	Cystoscopic stent removal time, s	Left/right ureter	Clavien Dindo at 24 hr	Dysuria/urgency/ frequency/hematuria
1 F/58	26 cm/6 Fr Porges stent	56	Ureteric stone Left kidney 7 mm	Local	16	Left	Grade 0	Mild dysuria
2 F/43	26 cm/6 Fr Porges stent	14	Ureteric stone Ureter 6 mm	Local	15	Left	Grade 0	-
3 M/50	26 cm/6 Fr Porges stent	70	Ureteric stone Passed	Local	26	Left	Grade 0	-
4 F/72	26 cm/6 Fr Porges stent	62	Ureteric stone Left proximal/right distal (passed)	General	17 (removed simultaneously)	Right and left	Grade 0	Mild dysuria
5 F/48	26 cm/6 Fr Porges stent	46	Ureteric injury from gynae injury	General	21	Left	Grade 0	-

F = female; M = male; TUG-ME = transurethral guidewire loop for manipulation and extraction.

Table 2

Literature (narrative) review of previously published innovative methods in stent removal.

		Study region	Patients assessed, n	Materials needed	Cost	Cystoscopy required	Fluoroscopy required	Analgesia	Operative time, min	Described method/ innovation (retrieval success)	Authors conclusions and limitations
1	Wetton and Gedroyc [9]	London, UK	n = 15 (9F, 6M)	F: Amplatz gooseneck snare (Microvena, Vadnais Heights, MN) M: Cobra Angio-Graphic Catheter (Cordis, Middlesex, UK)	NL	No	Yes: 15	1 GA, 14 LA	<30	Stent removed under fluoroscopy guidance (retrieval success: 35/36)	Successfully performed in an outpatient basis. Unable to retrieve stent due to contracted bladder
2	Taylor and McDougall [10]	Vancouver, Canada	n = 30	Magnetic Bead Stent 6 Fr Complex—Retrieval via 16 Fr Retrieval Magnet Catheter	NL	No	Yes: 3, no: 27	3 GA, 27 LA	NL	Office procedure, magnetic beaded stent removed with a magnet ended catheter (retrieval success: 29/30)	A simple, reliable, alternative proposed. One failure due to median lobe presence
3	Park et al.[11]	Seoul, Republic of Korea	n = 17 (only 4 had removal without replacement)	Four different methods described: 1. Lasso method (Nelaton 7 Fr catheter and 0.032-inch guidewire) (Terumo 0.032-inch guidewire [Terumo]) 2. Simple snare (Amplatz Gooseneck, Bard) 3. Grasping forceps (Boston Scientific/ Alligator; Cook, Ind. USA). 4. Modified snare (additional 0.032-inch guidewire [Terumo])	NL	No	Yes	LA, GA	3.8–35.7	All performed under fluoroscopy guidance only (retrieval success [38 occasions]: Lasso 8%/ simple snare 50%/modified snare 34%/ grasping forceps 8%)	All patients reported self-limiting microscopic hematuria
4	López-Huertas et al. [12]	Illinois, USA	n = 7 (5F, 2M)	Using a suture and a ureteric access sheath	NL	Yes	Yes	NL	NL	Successfully applied in 6/7 cases	Only applied in cases where the stent can be brought out to the urethral meatus
5	Söylemez et al. [13]	Diyarbakir, Turkey	n = 32 (17M, 15F)	Removal via ureteroscopy	10.516 USD (maintenance 1035 USD)	Yes	NL	LA	1.2 ± 1	(Retrieval success: 32/32)	Ureteroscopic stent removal is a feasible and minimally painful procedure. Patients were all discharged within an hour
6	Kawahara et al. [14]	Kanagawa, Japan	n = 56 stents (40F)	Metal crochet hook (No. 4, 5) was used to remove the stent (5–10 passes)	NL	No	No	GA 33, LA with sedation 23	NL	(Retrieval success: 47/56)	Safe and easy to perform; however, success rate less than standard cystoscopy

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Table 2 *(Continued)*

		Study region	Patients assessed, n	Materials needed	Cost	Cystoscopy required	Fluoroscopy required	Analgesia	Operative time, min	Described method/ innovation (retrieval success)	Authors conclusions and limitations
7	Kawahara et al. [15]	Yokohoma, Japan	n = 21 stents (18F)	Metal crochet hook (No. 4, 5) was used to remove the stent (5–10 passes) and reinsert the new stent	NL	No	No	Conscious sedation 21/21	6.5 (2–21)	(Stent exchange success: 20/21)	Stent removal and exchange easy to learn
8	Mistry et al. [16]	London, UK	n = 5	A second ureteral stent is inserted in cases of an encrusted stent	NL	Yes	Yes	GA 5/5	NL	(Retrieval success: 5/5 cases)	Readmission was performed in 4- to 6-wk interval
9	Wang et al.[17]	Chongqing, China	Preclinical only	Novel ureteral stent design using a stent body with a coated suture net, and a magnetic retrieval catheter	NL	No	No	Preclinical only	NA	(Retrieval success: only preclinical scenario)	This novel stent is easily removed and the technique feasible
10	Kajbafzadeh et al.[18]	Tehran, Iran	378 stents (n = 325 patients) – children: mean age of 3.97 yr	Noninvasive retrieval method using an extraction string sutured externally to the labia majora/ subcoronal skin	NL	No	No	No	NL	(Retrieval success: 375/ 378, 3 failures due to early stent protrusion)	Time and cost saving alternative
11	Lin et al. [19]	Shanghai, China	n = 97	Self-made device: 5 Fr feeding tube and nylon suture	Boys: 463.71 ± 14.53¥; girls: 477.56 ± 27.64¥	No	No	Mild sedation only	Boys: 5.05 ± 1.20; girls: 4.63 ± 1.13	(Retrieval success: 137/ 138 cases)	The study has demonstrated that noncystoscopic stent retrieval is feasible in children
12	Rassweiler et al. [20]	Mannheim, Germany	n = 40	Use of the innovative magnetic ureteral stent Urotech (Achenmuhle, Germany): distal coil replaced with small magnetic cube	€80; cost difference from standard removal €101.41	No	No	No	9.55 (7–14)	(Retrieval success: 39/40)	Limitation: MRI contraindicated, difficult in cases with prostate midlobe
13	Shao et al.[21]	Zhejiang, China	n = 47	5 Fr feeding tube and 3.0 Monofilament suture to create a snare loop	618.23 ± 110.31 USD	No	No	Minimal sedation	8.04 ± 4.82	(Retrieval success: 45/47) 20% cases required >1 trial to remove the stent	An affordable, feasible method is described
14	Jing et al.[22]	Hangzhou, China	n = 56 Male patients (23–65 yr)	Ultrasound-guided retrieval with a retrieval device using a modified 24 Fr 3-way catheter, and a looped guidewire	NL	No	No	No	7.35 ± 2.59	(Retrieval success: 28/32)	The first study depicting success with ultrasound retrieval in male patients

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Table 2 *(Continued)*

		Study region	Patients assessed, n	Materials needed	Cost	Cystoscopy required	Fluoroscopy required	Analgesia	Operative time, min	Described method/ innovation (retrieval success)	Authors conclusions and limitations
15	Sundaramurthy et al.[23]	Vellore, India	n = 30	Vellore Catheter Snare constructed with an infant feeding tube (6 or 8 Fr) and a 3.0 polypropylene suture	5636.50 INR	No	No	Midaz (22), ketamine (8) with lignocaine jelly (2%)	41.3 (interquartile range, 11.8)	(Retrieval success: 26/30)	A low-cost alternative to standard cystoscopic stent removal is presented

GA = general anesthesia; INR = Indian rupee; LA = local anesthesia; MRI = magnetic resonance imaging; NA = not available; NL = not listed; USD = US dollar.

innovative, described concept, technique, instrument, or stent design. The selected articles were searched for the following preset data variables: author, study region, patients (*n*) assessed, materials needed, cost, cystoscopy required, fluoroscopy required, type of analgesia used, reported operative time (in minutes), described method/innovation (retrieval success), and a segment outlining the respective authors' conclusions and study limitations.

3. Results

3.1. Demographic data, outcomes, results, and complications

The TUG-ME technique was successfully performed in all patients on the first attempt. The patients included both sexes. The procedure was well tolerated under local anesthesia (4 of 5 cases), whereas general anesthesia was used in 1 case as the patient was scheduled for subsequent ureteroscopy under the same anesthetic. The procedure time was <27 seconds in all cases assessed. No significant complications were observed (Table 1).

3.2. Cost feasibility

A quotation was obtained (March 2020) from an international supplier (Karl Storz SE & Co. KG, Tuttlingen, Germany) for conventional grasping instruments. The price (in US dollars [USD]) per grasping instrument was as follows: cystoscopic port grasping forceps 7 Fr (USD 1465.43), flexible ureteric grasping forceps 3 Fr (USD 1451.47), rigid ureteric grasping forceps 5 Fr (USD 1346.77), standard optical grasping forceps (USD 1297.00), and standard optical biopsy forceps (USD 1297.00). In comparison, the guidewire used in all study cases had an estimated cost (USD 81.64) only.

3.3. Literature search results

In total, 193 publications were identified, and the breakdown is as follows: PubMed (70), Embase (76), Cochrane Library (3), Scopus (28), and Web of Science (16). After removing nonrelevant and nonrelated articles and including the cited relevant references, studies involving novel innovations (15) were included for critical appraisal in this literature review (Table 2 and Fig. 4).

Although a novel, disposable, sterile, single-use flexible cystoscope has become a recent alternative option in the ambulatory removal of ureteric stents,[24] the upfront screen and purchase costs still imply that various previously published innovations will still be used. Published innovative trends in ureteral stent removal have evolved over time, including advancements in stent design, retrieval devices, and the use of fluoroscopy-free and cystoscope-free techniques. These techniques have made their way into operating rooms or consulting suites. Consumables used in some of these published innovations include the use of a suture thread, feeding tube, magnetic retractors, 3-way catheter, crochet hook, or suture segment anchored outside the urethral meatus.[9–23]

4. Discussion

We successfully described a novel, simple TUG-ME technique for the removal of ureteral stents under cystoscopic guidance using an easily attainable endovascular guidewire. This technique was performed within an acceptable time frame without any adverse complications. Moreover, the importance of theatre time usage and the cost implication have become more relevant than ever before, with an operative minute costing an estimated USD 37.00.[25]

To facilitate easier stent removal, another recent innovation involved the development of a tethered ureteral stent (stent-on-string), which allowed for simple ureteral stent extraction, using the attached string to the distal coil of the ureteral stent. Although this facilitated simple outpatient stent extraction, these stents have limited use in cases of pyelonephritis, ureteric perforation, extrinsic ureteral compression, and in instances where a longer-term ureteral stent is required.[26]

An additional benefit favoring snare loop removal of the ureteral stent is the fact that the physical tensile forces have been proven to be significantly stronger using stent encasement (1.9 kg) versus the stent forcep grasp (0.4 kg).[27] Another proven benefit of using snare encasement is the absence of potentially harmful forceps jaws, which may cause iatrogenic injury to the surrounding urothelium during the actual grasp or even during stent extraction.[7]

The portability and availability of this endovascular guidewire make the TUG-ME method an attractive alternative to the use of grasping forceps, and its role is appealing in resource-poor settings. Moreover, it also has an evident upfront cost-benefit. The future potential benefit lies in the expansion of the newer single-use channeled cystoscope sets, because looping this 0.025-inch-diameter guidewire is easily possible within all standard working channels.

This loop technique can be applied to nephroscopes and flexible cystoscopic devices, which can facilitate the insertion of a standard guidewire. The simplicity of instruction and performance also makes this an easily reproducible method.

Various previous loop innovations in ureteral stent removal used a suture thread segment to perform the loop, where mobility, rigidity, and rotational control are far greater when a guidewire is used. All of these previous reports precluded any clinical data in the form of an original study or a formal comparison in their discussion.[28–30] The other benefit of this novel TUG-ME method is that both ends of the endovascular guidewire are accessed from

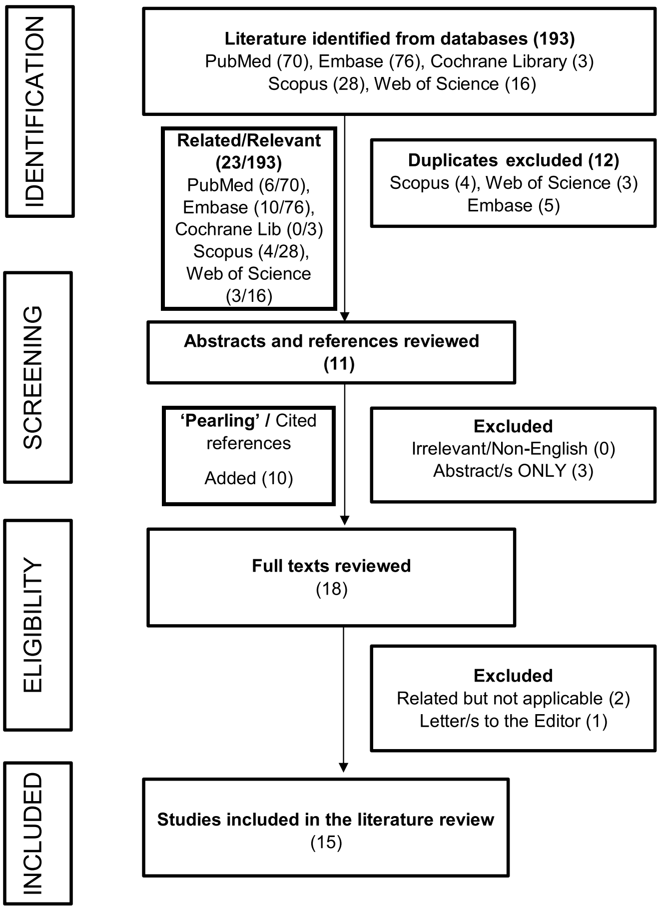

Figure 4. Flow diagram outlining the search results within this study.

the same instrument port, thus allowing for better control, dexterity, and rotation ability with the fingers of the attending urologist.

This technique can also be applied in cases in which subsequent ureteroscopy is planned. This will save consumable costs because the same guidewire will be used. The primary purpose of this article is proof of concept, highlighting the safety of such a technique for stent removal. In principle, this technique has multiple roles. First, in the case of a subsequent ureteroscopy, this technique may avoid the use of a reusable grasper. Second, in regions of low resources where rigid cystoscopy is the standard for stent removal, this technique may save on the upfront and resterilization costs required for graspers. We have also recently demonstrated the feasibility of this technique in the simulation setting using a flexible reusable cystoscopy device (**Fig. 5**); however, assessment of the variable clinical response and outcome is still pending. Its role via the semirigid ureteroscope is another potential application for grasping within the ureteric lumen.

This study had some limitations. First, the patient data set described in this study is relatively small. Second, reusable costs and equipment shelf-life factors were not considered in the comparison of this technique with standard ureteral stent removal. However, with each use of stent removers, sterilization is required before reuse. The cost and environmental impact of resterilization, storage, carbon dioxide emissions, power source mix, and water costs are likely to approach those of the guidewire. Considering that the same guidewire would be used to gain access to the ureter if a subsequent ureteroscopy was planned, the cost factor was not relevant in such cases.

5. Conclusions

We successfully described a simple, innovative TUG-ME method as an acceptable alternative to remove ureteral stents using a standard interventional radiology/endovascular guidewire during cystoscopy, which allows for easy stent extraction.

This simple technique has an evident upfront cost benefit, may be easily applied instead of the conventional ureteral stent grasper, and may be used in cost-restrained centers, regional environments, and outreach programs, or in cases where a stent grasper may malfunction or may not be available at all.

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Statement of ethics

Local institutional ethics committee approval was obtained, with a Human Research Ethics Committee (Medical) Clearance Certificate (M200595—18/06/2020). Written informed consent was obtained from all participants in this study. All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Conflict of interest statement

No conflict of interest has been declared by the author.

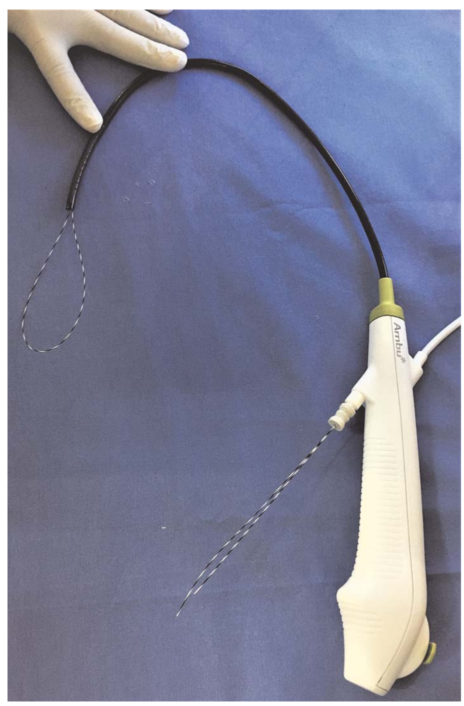

Figure 5. Flexible cystoscope Ambu® aScope™ 4 Cysto: Single-use flexible cystoscope with a guidewire loop applied.

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Author contributions

AA: Participated in research design, performance of the research, data analysis, writing of the manuscript, and final review and editing of the manuscript for publication;
MP: Participated in data analysis, writing of the manuscript, research design, writing of the manuscript, and final review and editing of the manuscript for publication.

Data availability

The datasets generated during and/or analyzed during the current study are not publicly available, but are available from the corresponding author on reasonable request.

References

[1] Finney RP. Experience with new double J ureteral catheter stent. *J Urol* 1978;120(6):678–681.
[2] Sali GM, Joshi HB. Ureteric stents: Overview of current clinical applications and economic implications. *Int J Urol* 2020;27(1):7–15.
[3] Hadaschik BA, Paterson RF, Fazli L, Clinkscales KW, Shalaby SW, Chew BH. Investigation of a novel degradable ureteral stent in a porcine model. *J Urol* 2008;180(3):1161–1166.
[4] Goddard JC. Open prostatectomy. *Urol NEWS* 2012;16(6).
[5] Chee SP, Chan NS. Suture snare technique for scleral fixation of intraocular lenses and capsular tension devices. *Br J Ophthalmol* 2018; 102(10):1317–1319.
[6] Adam A, Sookram J, Bhattu AS, Wadee R, Perera M, Lawrentschuk N. Trans-urethral snare of bladder tumor (TUSnBT) with stone basket retrieval: A novel time-saving technique in the endoscopic management of papillary bladder lesions. *Curr Urol* 2018;11(4):189–195.
[7] Adam A, Bhattu AS, Lawrentschuk N. Trans-urethral snare stent removal: A novel, self-constructed innovation for simultaneous ureteral stent removal and safety guidewire insertion. *ANZ J Surg* 2021;91(4):571–577.
[8] Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Med* 2009;6(7):e1000097.
[9] Wetton CW, Gedroyc WM. Retrograde radiological retrieval and replacement of double-J ureteric stents. *Clin Radiol* 1995;50(8):562–565.
[10] Taylor WN, McDougall IT. Minimally invasive ureteral stent retrieval. *J Urol* 2002;168(5):2020–2023.
[11] Park SW, Cha IH, Hong SJ, et al. Fluoroscopy-guided transurethral removal and exchange of ureteral stents in female patients: Technical notes. *J Vasc Interv Radiol* 2007;18(2):251–256.
[12] López-Huertas HL, Polcari AJ, Hugen CM, Farooq AV, Turk TM. A novel technique for the removal of minimally encrusted ureteral stents. *J Endourol* 2010;24(1):9–11.
[13] Söylemez H, Sancaktutar AA, Bozkurt Y, Atar M, Penbegül N, Yildirim K. A cheap minimally painful and widely usable alternative for retrieving ureteral stents. *Urol Int* 2011;87(2):199–204.
[14] Kawahara T, Ito H, Terao H, et al. Ureteral stent retrieval using the crochet hook technique in females. *PLoS One* 2012;7(1):e29292.
[15] Kawahara T, Ito H, Terao H, et al. Ureteral stent exchange under fluoroscopic guidance using the crochet hook technique in women. *Urol Int* 2012;88(3):322–325.
[16] Mistry K, Pal P, Chitale S. A simple two-stage "bailout" technique for the removal of an unyielding ureteric stent. *Urology* 2013;82(1):242–244.
[17] Wang J, Feng J, Hu W, et al. Preclinical evaluation of a newly designed ureteral stent and magnetic retrieval catheter for minimally invasive stent removal. *Urology* 2014;84(4):960–966.
[18] Kajbafzadeh AM, Nabavizadeh B, Keihani S, Hosseini Sharifi SH. Revisiting the tethered ureteral stents in children: A novel modification. *Int Urol Nephrol* 2015;47(6):881–885.
[19] Lin H, Xu M, Jiang D, et al. Non-cystoscopic removal of retained ureteral stents with mild sedation in children. *Urology* 2016;94:255–258.
[20] Rassweiler MC, Michel MS, Ritter M, Honeck P. Magnetic ureteral stent removal without cystoscopy: A randomized controlled trial. *J Endourol* 2017;31(8):762–766.
[21] Shao H, Liu P, Zhang H, Chen C, Lin X. Noncystoscopic removal of retained ureteral stents in children: A retrospective study from a single-center. *Medicine (Baltimore)* 2018;97(1):e9540.
[22] Jing T, Zhang C, Jiang L. A novel retrieval technique for ureteral stents under ultrasound guidance in male patients. *Urology* 2017;106:226–230.
[23] Sundaramurthy S, Joseph Thomas R, Herle K, Jeyaseelan, Mathai J, Jacob Kurian J. Double J stent removal in paediatric patients by Vellore Catheter Snare technique: A randomised control trial. *J Pediatr Urol* 2019;15(6):661.e1–661.e8.
[24] Adam A, Lawrentschuk N, Bhattu AS, Nagdee J. Efficacy of the novel, innovative, single-use grasper integrated flexible cystoscope for ureteral stent removal: A systematic review. *ANZ J Surg* 2021;91(12):2599–2605.
[25] Childers CP, Maggard-Gibbons M. Understanding costs of care in the operating room. *JAMA Surg* 2018;153(4):e176233.
[26] Oliver R, Wells H, Traxer O, et al. Ureteric stents on extraction strings: A systematic review of literature. *Urolithiasis* 2018;46(2):129–136.
[27] Nagele U, Praetorius M, Schilling D, Stenzl A, Anastasiadis AG. Comparison of flexible grasping forceps and stone basket for removal of retracted ureteral stents. *J Endourol* 2006;20(6):418–422.
[28] Murthi GV, Cuckow P. Cystoscopic removal of a JJ stent using a suture 'lasso'. *BJU Int* 2005;96(3):439.
[29] Patki P. Cystoscopic removal of a JJ stent using a suture 'lasso'. *BJU Int* 2006;97(2):414.
[30] Hutton KA, Sau I. Cystoscopic removal of a JJ stent using a suture 'lasso'. *BJU Int* 2005;96(9):1424.

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