

ALTERNATIVE TECHNIQUE FOR DOUBLE J STENT REMOVAL IN PEDIATRIC PATIENTS: CASE SERIES

TÉCNICA ALTERNATIVA PARA A REMOÇÃO DE STENT DUPLO J EM DOENTES PEDIÁTRICOS: SÉRIE DE 3 CASOS

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ABSTRACT

Introduction: Double-J (DJ) ureteral stents are widely used in urological practice for the management of ureteral obstructions. As traditional techniques for ureteral stent removal, such as cystoscopy, may have limitations and associated risks, the development of more cost-effective alternative methods is relevant. In this study, we describe a novel technique for the removal of ureteral stents in three pediatric patients with the diagnosis of ureteropelvic junction (UPJ) stenosis. **Case presentation:** The surgical technique involves using a Nelaton urethral catheter with a polypropylene 3.0 wire attached. After bladder catheterization, the wire is fixed with two loops, and the bladder catheter is gently rotated and removed, enabling the extraction of the stent connected to the wire loop. **Discussion:** The described technique was successfully employed in all cases. The surgical procedure was quick, easy to perform, and required minimal sedation. Although other cost-effective methods have been described, there is a lack of larger studies comparing these techniques. **Conclusions:** Among the different modalities described, the decision regarding the best DJ removal procedure is still controversial and should be individualized, and further comparison between techniques is warranted.

Keywords: surgical technique; paediatrics; urology; double-J.

RESUMO

Introdução: Os stents ureterais Duplo-J (DJ) são amplamente utilizados na prática urológica para o tratamento de obstruções ureterais. Como as técnicas tradicionais de remoção de stents ureterais, como a cistoscopia, podem ter limitações e riscos associados, o desenvolvimento de métodos alternativos mais económicos é relevante. Neste estudo, descrevemos uma nova técnica para a remoção de stents ureterais em três doentes pediátricos com diagnóstico de estenose da junção ureteropélvica (JUP). **Apresentação dos casos:** A técnica cirúrgica envolve o uso de um cateter uretral de Nelaton com um fio de polipropileno 3.0 anexado. Após a cateterização da bexiga, o fio é fixado com dois laços, e o cateter vesical é suavemente rodado e removido, permitindo a extração do stent conectado ao laço do fio.



Discussão: A técnica descrita foi utilizada com sucesso em todos os casos. O procedimento cirúrgico foi rápido, fácil de realizar e exigiu sedação mínima. Embora outros métodos económicos tenham sido descritos, há uma falta de estudos mais amplos comparando essas técnicas. **Conclusões:** Entre as diferentes modalidades descritas, a decisão sobre o melhor procedimento de remoção de DJ ainda é controversa e deve ser individualizada, sendo necessária uma comparação adicional entre as técnicas.

Palavras-chave: *técnica cirúrgica; pediatria; urologia, duplo J.*

BACKGROUND

The use of ureteral stents in clinical practice, first described by Zimskind et al. in 1967, represents the mainstay of ureteral obstruction treatment¹. In 1978, Finney introduced the double-J (DJ) stent model to reduce the complications of stent migration². Afterwards, the device became widely used for urinary tract drainage, not requiring an external catheter^{3,4}.

After reaching its therapeutic goal, catheter withdrawal is indicated since complications may occur if it remains for longer periods. Common DJ removal procedures include retrograde cystoscopy using endoscopic grasping forceps, which may be impossible in cases of migration or altered ureteral anatomy, and antegrade retrieval under fluoroscopic or cystoscopic guidance^{5,6}.

In recent years, alternative methods for removing DJ catheters have been developed due to the financial burden and additional anaesthetic risk associated with traditional methods. Most procedures described as possible replacements for cystoscopy require fluoroscopic control, which also has detrimental stochastic effects, compromising its applicability⁷.

To our knowledge, reports of removal methods that are carried out quickly and without the use of contrast materials are rare. We describe a simple, fast and low-cost alternative technique for the removal of DJ stents, with satisfactory outcomes in three pediatric patients.

CASE PRESENTATION

Patient 1

A 9-year-old male child with abdominal pain, nausea and vomiting since the age of 4, when ultrasonography (USG) of the kidneys and urinary tract showed moderate right hydronephrosis and ureteropelvic junction (UPJ) stenosis. Technetium-99 m diethylenetriamine penta-acetic acid (Tc-99 m DTPA) dynamic scintigraphy demonstrated delayed urinary excretion into the bladder in the right kidney and technetium-99 m dimercaptosuccinic acid (Tc-99 m DMSA) static scintigraphy revealed a relative renal function index (RRFI) of 49.6% in the right kidney. The patient remained under irregular follow-up in subsequent years and, after approximately 3 years, a new USG showed bilateral hydronephrosis (grade 3 in the right kidney and grade 2 in the left kidney), and the surgical placement of a DJ catheter was indicated.

Technique description

A Nelaton n° 8 urethral catheter was inserted with a polypropylene 3.0 wire connected to the extremity so that it could be fixed with two loops after bladder catheterization. Then, the bladder catheter was gently rotated and subsequently removed, and extraction of the DJ stent connected to the wire loop was performed. During the procedure, the patient was



under general inhalational anaesthesia (Figure 1). The same procedure was carried out on all the patients described.

Patient 2

A female infant, 8 months old, had unilateral congenital hydronephrosis and underwent medical follow-up with a nephrologist. Renal scintigraphy with 99 m-Tc-DTPA showed an indeterminate pattern of obstruction. USG of the kidneys and urinary tract demonstrated no evidence of ureteral dilatation. Subsequently, urological evaluation indicated pyeloplasty. She underwent pyeloplasty on the right side and placement of a DJ stent the following year, presenting a postoperative diagnosis of stenosis of the right UPJ.

Patient 3

A 2-year-old male child with a previous presentation of left-sided renal dilatation since gestation.

After birth, he started clinical follow-up with urology, and ultrasonography of the kidneys and urinary tract identified dilatation of the collecting system, compatible with grade 4 hydronephrosis, and left UPJ stenosis. Continuous antibiotic prophylaxis with cephalexin was indicated to prevent urinary tract infections. Ureteroplasty and pyeloplasty with double-J catheter insertion were performed.

DISCUSSION

The DJ stent is named after the similarity of its ends with the letter “J” and features lateral perforations that allow urine drainage through its central and lateral orifices⁸. DJ placement is a common procedure in urology and enables the permeability of the urinary tract by connecting the renal pelvis to the bladder⁹. Over the years, the original model has been optimized, with a current preference for the use of thin and radiopaque materials⁹.

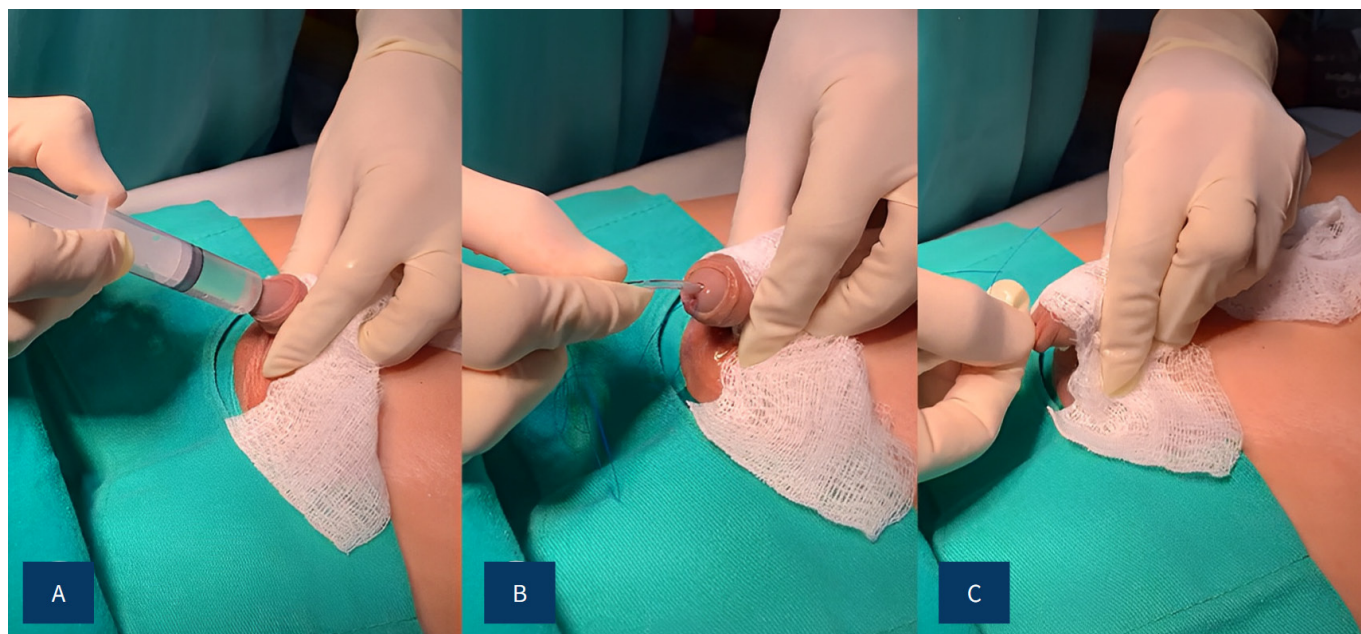


FIG. 1 – Step-by-step DJ removal procedure. 1-a: Application of topical anesthesia with 5 millilitres of 2% lidocaine gel through the urethra; 1-b: Catheterization of the bladder using a size 3.0 polypropylene thread attached to the distal extremity of the urethral catheter; 1-c: After insertion, the bladder catheter was rotated slowly and synchronously and the DJ stent connected to the urethral catheter frame was removed



If not timely removed or replaced, ureteral stents are associated with complications, including infection and encrustation⁷. Routine cystoscopic stent retrieval requires anesthesia or sedation, which is detrimental, specifically in pediatric patients¹⁰. Therefore, it is important to consider new methods to simplify DJ withdrawal in urological practice.

Sundaramurthy et al. described the applicability of the Vellore Catheter Snare Technique (VeCS) for DJ stent removal using an infant feeding tube (6 Fr or 8 Fr) and a 3-0 polypropylene suture through the urethra¹¹. Other alternative methods of DJ catheter removal include extraction strings, flexible cystoscopy, internal kidney splints, and the use of magnetic stents^{12,13,14,15,16}. Non-cystoscopic DJ removal with snaring devices can have satisfactory outcomes, although increasing age can be a potential factor for failure¹⁷.

The crochet hook technique, which does not require endoscopic or fluoroscopic guidance, demonstrated an efficacy of 83.9% in women¹⁸. Nunes et al. reported a method of DJ removal that uses a looped guidewire through percutaneous access and antegrade pyelography or transurethral access under fluoroscopic visualization⁵.

Kim et al. described a model of DJ retrieval using a snare and a guidewire, with a 94.9% success rate⁶. Yadav et al. outlined a technique for removing bilateral DJ stents at once with stent-removal forceps⁹. Gadzhiev et al. described a method under ultrasound guidance in women with a spiral retrieval device, without the need for endoscopic or fluoroscopic guidance⁷.

In most cases, hydronephrosis is secondary to congenital uropathies, especially stenosis of the UPJ¹⁹. Due to the cranial narrowing of the ureter, UPJ stenosis can lead to reduction or paralysis of the urinary flow²⁰. If left untreated, it can lead to progressive loss of renal function²¹.

CONCLUSIONS

In all the patients described, the DJ removal procedure was successful and uneventful. The technique was quick and easy to perform, with the advantage of requiring a shorter anaesthetic duration. In the surgical urology scenario, it may represent a future alternative with broad applicability, considering the need to evaluate possible limiting factors in larger groups of patients.

Among the different modalities described, the decision regarding the best DJ removal procedure should be individualized. It is essential to consider the availability of resources in the health service and the financial burden involved. Future studies with larger numbers of patients are needed to better assess the effectiveness and cost-benefit of our technique.

Abbreviations

Double-J (DJ); Ultrasonography (USG); Ureteropelvic junction (UPJ); Technetium-99 m diethylenetriamine penta-acetic acid (Tc-99 m DTPA); Technetium-99 m dimercaptosuccinic acid (Tc-99 m DMSA); Relative renal function index (RRFI); Vellore Catheter Snare Technique (VeCS).

Ethics approval and consent to participate

Written informed consent was obtained from all the patients's legal guardians for the publication of this case series and all accompanying images.

Consent for publication

The patient's legal guardians and all authors consented to the publication of this case report.

Authors' contribution

C.P.D. participated in the design of the study; M.C.R.M and R.V.L drafted the manuscript; R.C.S accompanied the patients and performed the surgical procedures. All the authors reviewed and approved the final manuscript.



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