Arab Journal of Urology (2012) **10**, 414–417

Arab Journal of Urology
(Official Journal of the Arab Association of Urology)

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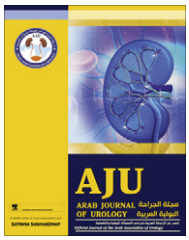

URODYNAMICS/FEMALE UROLOGY

MINI-REVIEW

Minimally invasive treatment of ureterovaginal fistula: A review and report of a new technique

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Received 5 February 2012, Received in revised form 4 April 2012, Accepted 5 April 2012
Available online 9 May 2012

KEYWORDS

Ureterovaginal fistula;
Ureteric injury;
Memokath stent

ABBREVIATION

UVF, ureterovaginal fistula

Abstract ***Background:*** An iatrogenic ureterovaginal fistula (UVF) can be a consequence of difficult pelvic surgery. The patient must endure a long wait before having major surgery to reconstruct the injured ureter. Reports that address the minimally invasive treatment of UVF are limited, and are reviewed here. We introduce the concept of using a Memokath™ 051 stent (PNN A/S, Hornbaek, Denmark) as a promising minimally invasive approach for UVF.

Methods: We used PubMed, Science Direct, Google and the Cochrane Library to assemble appropriate evidence-based reference reports. The keywords used for the search were: 'Memokath', 'stent'; 'ureterovaginal fistula' and 'ureteral injury'. The review showed 42 relevant articles published up to September 2011.

Results: Ureteric stenting consistently stopped the vaginal leak of urine. The long-term results were not encouraging after removing the JJ stents at 3 months after insertion. Most patients had a recurrence of the vaginal leak of urine. The outcome was different with the Memokath stent, that remained *in situ* for a duration far exceeding that of the JJ stent. The Memokath stopped the vaginal leak of urine with no episodes of urinary tract infection and no evidence of stent migration.

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Peer review under responsibility of Arab Association of Urology.

ELSEVIER **Production and hosting by Elsevier**

http://dx.doi.org/10.1016/j.aju.2012.04.001

Conclusion: Long-term ureteric stenting has two advantages, in that it facilitates urine flow through the ureteric strictured segment down to the bladder, and it stops urine leakage along the fistula. It further promotes the resolution of the ureteric stricture and healing of the fistula. A duration of 3 months was inadequate when a JJ stent was used, whereas longer periods are possible with the Memokath stent. The optimum stenting period required for complete healing of a UVF remains to be defined. Long-term Memokath ureteric stenting can be an effective alternative and minimally invasive approach to conventional surgical repair in selected cases.

Introduction

Injury to the ureter with the subsequent development of a ureterovaginal fistula (UVF) occurs in 0.5–2.5% of major gynaecological surgical procedures [1,2]. Ureteric injury is often followed by a partial or complete obstruction of its lumen. Ureteric stricture is a common cause of obstruction and occurs as a sequel to the healing process.

A UVF occurs 1–4 weeks after the injury [3] and is noticed when the normal voiding pattern is coupled with a vaginal leak of urine. For a UVF to develop there is a mechanical or ischaemic insult to both the ureteric and vaginal walls caused by overdue tissue dissection or difficult haemostasis. The resistance to urine flow caused by ureteric obstruction causes urine to extravasate through the damaged ureteric wall proximal to the obstruction. Urine finds its way along a less-resistant pathway to the vagina, forming the fistula.

The presence of a UVF is always associated with an obstructed kidney. Management of the UVF is usually a two-stage procedure in the form of initial emergency drainage of the obstructed kidney [4], followed later by an elective surgical repair of the fistula. The new concept of ureteric stenting with the Memokath™ 051 stent (PNN A/S, Hornbaek, Denmark) as a one-stage minimally invasive procedure for treating a UVF in selected cases is discussed here, with a case report from our experience.

Methods

The databases and search engines PubMed, Science Direct, Google and the Cochrane Library were used to assemble appropriate evidence-based reference reports. The keywords used for the search were 'Memokath', 'stent', 'ureterovaginal fistula' and 'ureteral injury'. The review identified 42 relevant articles published up to September 2011.

Results

Case report

A 33-year-old woman developed a right UVF at 2 weeks after a complicated vaginal labour that ended in abdominal hysterectomy. IVU showed a right hydronephrosis and hydroureter caused by a stricture in the pelvic ureter (Fig. 1). The stricture was patent, thus allowing JJ stenting. The vaginal leak of urine immediately stopped, but recurred after removing the stent 3 months later. A second JJ stent was placed for another 3 months, with the same events repeated. The patient was accordingly scheduled for a formal surgical repair. During the procedure the difficult dissection from extensive adhesions resulted in an accidental vascular injury. Significant bleeding was controlled with difficulty by a vascular team, and the procedure was aborted because of disturbed vital signs.

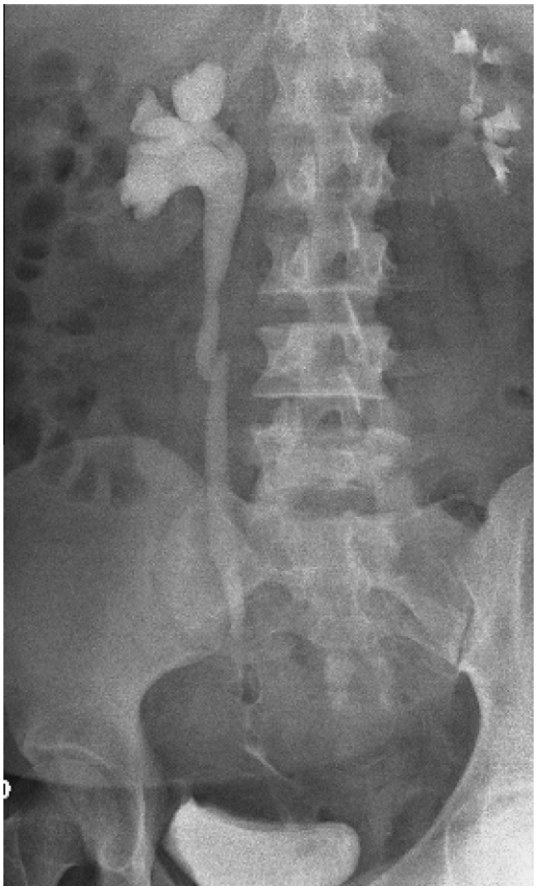

Figure 1 IVU showing right hydronephrosis and hydroureter before inserting the Memokath stent.

Two weeks later a Memokath stent was placed in the right ureter. There was a 3-cm long tight ureteric stricture with a patent lumen. Balloon dilatation of the strictured segment at 15 cm H_2O did not produce adequate dilatation. It was further dilated to 14 F using PTFE dilators. A 5-cm long Memokath ureteric stent was then inserted, as described in other studies [5,6].

The patient was dry immediately after inserting the Memokath stent and she was discharged 2 days later. Ultrasonography at 2-monthly intervals showed progressive recovery of the right kidney. The right hydronephrosis disappeared, as assessed by IVU 10 months later (Fig. 2). Peristaltic waves were apparent in the right ureter proximal to the stent, with free drainage of urine to the bladder. The improvement was significant when compared to the IVU that was done before inserting the Memokath stent. There was no evidence of stent migration and the patient had no episodes of infection or urine leak. These findings encouraged us to leave the Memokath stent indwelling and to keep the patient under a periodic follow-up.

Figure 2 IVU showing a normal right kidney and the presence of peristaltic waves in the right ureter at 10 months after inserting the Memokath stent.

Discussion

The initial drainage of the obstructed kidney is either external, using a percutaneous nephrostomy, or internal by placing a JJ stent [3,4,7–9]. Internal drainage has the advantage of limiting the risk of secondary infection that is common with percutaneous nephrostomy. Both methods of drainage should not exceed 3 months because there is a possibility of infection, or encrustation with secondary stone formation [10].

In the presence of complete ureteric obstruction a nephrostomy insertion is the only available option. If imaging studies show a patent ureter, then placing a JJ stent is preferred. Assisted ureteroscopy is sometimes needed to facilitate guidewire advancement under vision before placing the JJ stent [11].

When a JJ stent or a nephrostomy tube is inserted the urine usually stops leaking from the ureter, and the patient no longer has a vaginal escape of urine. There are few reports of the complete resolution of a ureteric stricture and permanent healing of the UVF with JJ stenting alone [7,9]. In one study, Hulse et al. [12] reported the spontaneous resolution of a UVF in four of their patients, even with no stenting. These encouraging outcomes probably reflect mild degrees of ureteric stricture. However, unfortunately most ureteric strictures that follow major gynaecological surgery are not mild. The recurrence of vaginal leakage of urine is a common finding after removing a nephrostomy or JJ stent.

Surgical repair is the classic treatment for a UVF and most surgeons repair the UVF at least 3 months after the injury, when tissue healing is complete [12,13]. More recent studies advise an early repair, as it is not associated with an increase in morbidity or failure rate [14–17]. An early repair using robotic and laparoscopic surgery has been reported with the purpose of shorter hospitalisation and quicker convalescence [18].

Surgery targets the healthy ends of the ureter proximal and distal to the injured segment. Both ends are either anastomosed together, or the proximal healthy ureteric end is anastomosed to a Boari bladder flap. Even though a transperitoneal approach is preferred to avoid the dense scar tissue at the site of the fistula, dissection is invariably difficult, and accidental vascular injury can be a challenging problem.

The Memokath 051 stent represents a major advance in the technology of urinary tract stenting. Its thermoexpandable nickel-titanium alloy content and the closed tight spiral structure allow it to adapt within the ureter for long periods, with a minimal risk of crystal deposition, urothelial in-growth, ischaemic damage or corrosion of the ureteric wall [19].

Memokath stenting was first reported for ureteric strictures in 1999 [5]. It can be placed in the ureter for several years and has rapidly gained popularity for man-

aging ureteric obstruction caused by various benign and malignant lesions [20–26].

Unlike the JJ stent, the Memokath stent neither hinders ureteric peristalsis nor causes VUR. Its long-term use does not increase the risk of stent encrustation, except in patients known to be stone-formers [6,20,24–26].

Memokath stent migration has been the most frequently reported long-term complication [19–21]. However, in the presence of a ureteric stricture the fibrotic segment tightens the grasp of the stent to the ureteric wall, preventing its dislodgement [21]. In fact, if the stricture is resolved the grasp of the stent is weakened, with reports of dislodgement and migration to the bladder, or even its passage with urination [6].

The Memokath stent maintains a wide calibre of the strictured segment, provides adequate urinary drainage, and prevents the escape of urine to a coexisting UVF. Furthermore, long-term Memokath drainage increases the chance of a complete resolution of the stricture. Papatsoris and Buchholz [6] reported the spontaneous resolution of the stricture in 12 of 86 cases after 9 months of Memokath stenting. The longer the duration of ureteric stenting the more likely is the spontaneous resolution of more advanced strictures.

We propose an extended period of Memokath ureteric stenting as a valid and definitive treatment for UVF. This can be achieved by two mechanisms. First, it maintains a wide-calibre ureter, thus promoting the spontaneous resolution of the stricture. Second, it prevents the vaginal leakage of urine, thus promoting healing of the fistulous tract. The optimum stenting period is yet to be defined in future studies with a follow-up of a large series of cases.

In conclusion, once a UVF is diagnosed the injured ureter is assessed by imaging studies. If both the continuity and patency have not been compromised, we advise inserting a Memokath ureteric stent instead of a JJ stent. The induced wide-calibre ureteric lumen will hinder the progression of the stricture. Long-term stenting will later enhance both the resolution of the stricture and healing of the UVF. Further studies on a large series of patients are required to determine the optimum duration of Memokath stenting needed for complete tissue healing. This minimally invasive technique can be an effective alternative to major conventional surgical repair, provided the ureteric obstruction was not complete at the time of injury.

Conflict of interest

The authors have no conflict of interest to declare.

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