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The Memokath™ stent

'The Memokath is easy to place and easy to remove if needed. It prevents tissue ingrowth between the coils and shows a low rate of encrustation. These properties make it an attractive alternative in cases where a stent is needed temporarily or even for a more prolonged use.'

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Obstruction of the urinary tract can occur in a variety of benign and malignant conditions. Typically, upper tract obstruction is overcome by insertion of a nephrostomy catheter or a ureteric stent, whereas urethral or suprapubic catheterization is commonly used to manage lower urinary tract obstruction. Surgical correction of either type of obstruction is often complicated and invasive. Therefore, there is a demand for minimally invasive techniques, especially in patients with significant comorbidity. One of these recent developments is the Memokath™ stent (Engineers and Doctors A/S, Hornbaek, Denmark), which can be used in upper and lower urinary tract obstruction.

'Moreover, although metallic, the Memokath is compatible with magnetic resonance imaging.'

The Memokath stent is a thermo-expandable nickel–titanium alloy stent. The alloy has two forms, namely martensite and austenite. As the structure of one of these components is floppy and the other one is rigid, this combination gives the Memokath stent a 'shape memory'. This means that it softens at 10°C or more but returns to a preformed shape when warmed to over 50°C. This feature allows its easy insertion and removal. In addition, the stent has a closed tight spiral structure that prevents urothelial ingrowth and, thus, again facilitates easy removal if required. These are important advantages compared with other types of stent. Moreover, although metallic, the Memokath is compatible with magnetic resonance imaging [1]. Its spiral structure allows it to conform and adapt to the natural curves of the ureter and the resulting lack of outward pressure against the ureteric wall preserves peristalsis and lessens the risk of secondary ischemic damage to the ureteric wall. Its titanium component has been reported to resist corrosion in the urinary tract [2]. All of these features offer the potential for these stents to be adopted for long-term use as an attractive minimally invasive option. They will be cost effective if factors, such as 3–6-monthly changes of double-J stents with associated comorbidities, are taken into consideration.

The Memokath 028™ stent has been designed for long-term treatment of patients with prostatic enlargement and obstruction. It can be placed by both flexible and rigid cystoscopy. It comes in lengths from 30 to 70 mm and expands from F22 at insertion to a final diameter of F44 [101]. The Memokath 044™ has been designed for treatment of recurrent urethral strictures. It can be inserted by means of both flexible and rigid cystoscopy. It varies in length from 30 to 90 mm and expands from F24 at insertion to a final diameter of F44 [101]. The Memokath 045™ has also been designed for the treatment of patients with recurrent urethral stricture but can also be used for treatment of detrusor-sphincter-dysynergia (DSD) by splinting the external urethral sphincter. It is available in two types that can be placed with a rigid cystoscope only: the 045TW expands both ends to F44 and the shaft to F24, the 045TTW expands to F34 at the distal end and to F44 at the proximal end. Both are available in various lengths from 20 to 70 mm [101].

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The Memokath 051™ has been designed for the treatment of malignant or benign ureter strictures. It can be placed in a retrograde or anterograde fashion. It expands from F10.5 to F20 and varies in length from 30 to 200 mm [101].

For insertion of a urethral stent, a flexible or rigid urethrocystoscopy is performed to measure the stent length required, as well as to exclude complicating comorbidities, such as urethral stricture and bladder stones. The cystoscope is withdrawn from the level of the bladder neck to the verumontanum and both points are marked with special clamps on the instrument, thus indicating this distance. The stent should be 10 mm longer than the measured distance. Once the stent is in a satisfactory position, 150 ml of normal saline prewarmed to 50°C is flushed through the stent, which causes its expansion within the urethra/prostate/sphincter. The patient is discharged home on the same day after ensuring spontaneous bladder emptying without evidence of any immediate complications, such as urethral bleeding. If desired, intraoperative transrectal ultrasound guidance or fluoroscopy can be used to verify the stent position [1].

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With regards to ureteric stenting, the length and position of the ureter stricture is determined through either retrograde or antegrade ureterography. The stricture is then marked between two metallic markers on the skin of the patient's abdomen. The distance between markers is measured and a stent of suitable length is chosen. Having passed a guidewire across the stricture, balloon catheters or graduated dilators can be used to dilate the stricture to at least F12. The Memokath, mounted on its introducer, is aligned across the stricture and the guidewire is removed. Sterile water preheated to 50°C is then flushed through the catheter, thus allowing the alloy to expand. The proximal end opens to a funnel shape that then rests on the stricture anchoring the stent.

The Memokath was first used in the prostatic urethra to treat bladder outflow obstruction [3]. Subsequently, it has been utilized in the short-term treatment of DSD [4] and, more recently, Memokath stents have been developed for use in the ureter [5]. To date, there are 14 studies on the use of Memokath in prostate hyperplasia. It appears that the overall conclusions are that the use of Memokath for acute urinary retention in high-risk patients is a safe and minimally invasive alternative with a mean indwelling time in those studies being just over 1 year [6]. The use of Memokath for DSD is, however, not as effective and is associated with more complications, such as stent migration, infection and encrustation [7–10]. To date, three studies on ureteric Memokath 051 [11–13] have come to the unanimous conclusion that the use of Memokath for benign and malignant strictures of the ureter is a minimally invasive treatment alternative with low rates of encrustation (<10%) and stent migration (<20%). In these studies, the mean indwelling time was again just over 1 year.

The Memokath is easy to place and easy to remove if needed. It prevents tissue ingrowth between the coils and shows a low rate of encrustation. These properties make it an attractive alternative in cases where a stent is needed temporarily or even for a more prolonged use. Studies so far have shown that it can be used with good results in prostatic obstruction and ureteric strictures, whereas in DSD it may be problematic and should be regarded as a temporary measure. The Memokath appears to be a new and useful tool for the minimally invasive surgeon and endourologist. Although it has its inherent problems, it is here to stay for the moment. Much will depend on future long-term results after prolonged indwelling time to decide about its usefulness as a permanent treatment option.

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