Intraurethral stent prosthesis in spinal cord injured patients with sphincter dyssynergia

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This study is an analysis of the Memotherm[®] prosthesis in spinal cord injured patients with Detrusor-external sphincter dyssynergia (DESD). Twenty-four patients were evaluated urodynamically before and after placement of the intraurethral stent prosthesis. All the patients had been chronically managed with an indwelling urinary catheter, intermittent catheterization or condom catheters. Sixty-six per cent had history of recurrent urinary tract infection, 37% had symptoms of autonomic dysreflexia. Nine patients had previous external sphincterotomy.

Follow-up ranged from 3–39 months (mean 15.4 months). After stent insertion all patients were able to achieve spontaneous reflex voiding with the use of condom catheter. Postoperative urodynamics parameters bladder leak point pressure and residual urine volume decreased significantly after stent insertion. Stent insertion was accomplished without any operative complications. In four patients stent migration (16%) required telescoping a new system over the migrated stent. In two patients the stent was removed because of problems of infection and calculus formation.

In conclusion, this system (Memotherm[®]) is an attractive, and potentially reversible treatment for DESD in SCI patients.

Keywords: sphincter dyssynergia; intraurethral stent prosthesis; spinal cord injury; neurogenic bladder

Introduction

Detrusor-external sphincter dyssynergia (DESD) is a common problem in the voiding disorders of spinal cord injured patients (Figure 1).^{1–3}

Unless steps to decrease intravesical pressure are taken, 50% or more of patients afflicted with DESD suffer a long-term urological complication. Complications associated with DESD include not only recurrent urinary tract infection, but also vesicoureteral reflux, hydronephrosis, urinary calculus formation and renal insufficiency or renal failure.

Patients suffering DESD may choose treatment with chronic indwelling catheterization or the use of oral pharmacologic agents, such as dantrolene or baclofen,^{4,5} to relax the skeletal muscle of the external urinary sphincter. In the relaxation of bladder neck, the use of alpha adrenergic blockade has also given good results. A very successful option for patients with DESD and enough manual dexterity is anticholinergic agents to eliminate detrusor contraction and intermittent self-catheterization to accomplish urinary drainage.⁶

Due to difficulties with instituting an intermittent self-catheterization program⁷ many quadriplegic and paraplegic patients with DESD are treated with surgical external sphincterotomy to reduce bladder outlet resistance. The principal objective of these therapies is the eradication of detrimental increases in urinary tract pressures.

The use of intraurethral prosthesis has been recorded for the treatment of recurrent bulbous urethral strictures⁸ and more recently for obstruction caused by prostatic enlargement and urinary sphincter dyssynergia (DESD).^{9–15} The placement of sphincter prosthesis provides a large urethral lumen which easily permits cystoscopy and catheterization. Both voiding pressures and residual urine volume and total hospitalization cost and length of stay decreased.^{16,17}

This paper records our experience with a thermosensitive stent (Memotherm[®])[†] in the treatment of DESD.

Methods and patients

The wall of this thermosensitive stent (Memotherm[®]) is a thermoreactive mesh made of nitinol which reaches its maximum force of expansion at body temperature. Its high degree of flexibility allows the Memotherm[®] stent to fit the natural course of the prostatic urethra

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(Figure 2). This stent is available in different sizes between 2–8 cm and different diameters (36–42 ch) to meet the demand for different lengths of prostatic urethra. Furthermore, the meshed structure allows its atraumatic removal.

Twenty-four consecutive patients with detrusor-external sphincter dyssynergia (DESD) and spinal cord injury (SCI) were evaluated, from May 1993 to July 1996. Eighteen patients had a cervical spinal cord injury. Urodynamic evaluation was performed before and after the insertion of the stent confirming

detrusor-external sphincter dyssynergia (DESD) in all patients by EMG and pre-stent reflex detrusor contractions voiding pressure >60 cm H₂O. The bladder leak point pressure also was determined in urodynamic evaluation (defined as the maximum vesical pressure required to overcome bladder outlet resistance, resulting in passage of urine beyond the bladder outlet).

These patients had been chronically prescribed an indwelling urinary catheter or used intermittent catheterization. Some patients were diagnosed with simultaneous concomitant bladder neck or prostatic urethral obstructions.

Prosthesis insertion technique was performed in all patients by the same physician (Dr Sánchez) using a specialized stent deployment device with an optical system. The device is simultaneously withdrawn and the stent is gradually released, in its final position from verum montanum to external sphincter. It is important that the distal end of the prosthesis should be in the bulbous urethral at least 5 mm beyond the end of the external sphincter. Prophylactic antibiotics are initiated preoperatively and continued for at least 2 weeks. Due to its shape memory (the stent is expandable with different temperatures), if the prosthesis is not properly placed it may be displaced or removed endoscopically, using cold or hot solutions to alter thermoreactive capacity. The thermoreactive feature of stent is what makes this stent unique.

Figure 1 Hypertonia of the external sphincter

Figure 2 Intraurethral stent prosthesis has just been placed in the external sphincter

Results

Follow-up ranged from 3–39 months (mean 15.4 months). The longest follow-up period was 42 months.

Preoperative complications

Preoperatively, 17 patients had a history of symptomatic urinary tract infections (70%), eight patients had symptoms of autonomic dysreflexia (33%), seven patients had developed vesicoureteral reflux, two patients bladder calculi, two bulbous urethral strictures, nine patients had previous external sphincterotomy and three patients benign prostatic hyperplasia.

These patients were preoperatively managed with different methods. Thirteen patients had been managed with indwelling catheter, five patients with sufficient manual dexterity by using intermittent catheterization and six patients were managed with condom catheter.

After stent insertion all patients were able to achieve spontaneous reflex voiding with the use of condom catheter. No patients needed intermittent catheterization. Five patients needed, after insertion, oral pharmacologic alpha adrenergic blockade in order to open the internal sphincter or avoid autonomic dysreflexia. The prosthesis itself did not aggravate autonomic dysreflexia post-insertion (8%). The incidence of symptomatic urinary tract infection after insertion decreased: five patients (22%). In the 18 patients with the stent properly placed, preoperative and postoperative urodynamics parameters bladder leak point pressure and residual urine volume decreased significantly after stent insertion (Table 1). The postoperative urodynamic study was performed 6 months after insertion.

Stent insertion was achieved without any operative problem and complications with the system. Complications after insertion were limited to: six patients with bleeding not requiring treatment, one intra-operative sepsis, four patients with early stent migration (displacement or migration in the first 24 h) which required telescoping a new system over the migrated stent (16% of stent migration), one case of obstructive neopithelial growth which had to be removed, and one stent had to be removed because infection and calculus formation.

Discussion

Common complications attributed to indwelling catheter are: infection, squamous cell metaplasia, urethral

diverticules or fistula, urethral stricture and bladder calculi and predisposition to bladder cancer.^{18–22} Consequently most spinal cord units attempt to render patients free of indwelling catheters. The complications associated with external sphincterotomy eg reoperation rate 12–26%, erectile dysfunction, irreversible nature, blood transfusion or sepsis have encouraged the development of a potentially reversible treatment: sphincter stent.

The advantage of this prosthesis is its large luminal diameter which allows for the catheterization and cystoscopy after epithelization. Sphincter prosthesis placement reduces significantly voiding pressure and residual urine volume without adverse effect on bladder capacity.²³ In our clinical experience many SCI patients with DESD prefer the stent because it is potentially reversible. Renal and erectile function were not negatively altered after prosthesis and hydronephrosis may be resolved or stabilized in all patients.

We feel that it is essential for patients considering sphincter procedures to experience and to accept condom catheter before stent. Serial urodynamics evaluation after stent placement is necessary to avoid the possibility of bladder neck obstruction.

In conclusion the memotherm[®] stent is an attractive, potentially reversible treatment option for DESD in men with an indwelling catheter including those on whom an external sphincterotomy has been performed previously.

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Table 1 Values of mean bladder leak point pressure

	Mean bladder leak point pressure (cm H ₂ O)
Preoperative	93.7 (range 60–130)
Postoperative	35 (range (5–75)

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