

### The long-term results of sphincterotomy in spinally injured patients

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**Introduction:** Sphincterotomy has a long history in the spinally injured patient, but with CISC and implantable electrical stimulators, its role has been questioned. We report on the long-term results of 91 patients undergoing sphincterotomy over an 18-year period (mean follow-up after surgery 8 years).

**Patients and methods:** Of the 91 patients, 56 were tetraplegics and 35 paraplegics; 75 patients had detrusor sphincter dyssynergia and 56 had autonomic dysreflexia, both associated with large residuals and recurrent UTIs. Twelve had gross hydronephrosis, six with associated reflux. Although 10 were hyper-reflexic, two (tetraplegics) were acontractile. Fifty-six patients had a single sphincterotomy at the 12 o'clock position, preserving the bladder neck. Fifteen patients required repeated or multiple sphincterotomies and 20 patients with recurrent or persistent symptoms after at least two sphincterotomies had urolume 'springs' implanted.

**Results:** Fifty-six patients obtained objective and subjective relief of symptoms after one procedure; 35 (43%) required further procedures. Autonomic dysreflexia was resolved in 88% of the paraplegics, but only 66% of the tetraplegics. Hydronephrosis was resolved in 14 (66%) in a single procedure and the remainder cured or improved by subsequent procedures. Bacteriuria and persistent UTIs were the main residual problems and 12 (14%) developed calculi, related to large residuals (mean 203 mL) and the use of the urolume (five patients).

**Conclusion:** Sphincterotomy remains a valuable tool in the management of urinary tract dysfunction in patients with spinal injuries. It is extremely effective in controlling autonomic dysreflexia induced by detrusor sphincter dyssynergia, and in resolving hydronephrosis. It is less effective in achieving complete voiding and resolution of bacteriuria and UTIs.

### The 'urolume' for detrusor-sphincter dyssynergia – do the longer term results justify its continued use?

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**Introduction:** The early results of the use of the urolume were extremely encouraging but a high complication rate in the longer term has tempered our enthusiasm. The longer term results have been assessed in the light of these complications.

**Patients and methods:** Thirty-one patients with detrusor sphincter dyssynergia, mostly spinal injuries (28), underwent implantation of a 3 cm Medivent 'Urolume' at the site of the rhabdosphincter. The majority (20) of the spinally injured patients had undergone one to seven previous sphincterotomies, and all but six had a follow-up of more than 5 years.

**Results:** Only eight patients had an excellent result after implantation, but this included two patients who had had persistent hydronephrosis with reflux. Twelve others were improved after further surgery, i.e. bladder neck incision (7), litholapaxy (4), resection of overgrowth within the spring (2) and sphincterotomy below the spring. Autonomic dysreflexia was significantly improved in seven patients; 11 patients had poor results, including five with springs which were removed (with difficulty).

**Conclusion:** Most of the patients had been resistant to previous therapy, usually sphincterotomy, and were thus a difficult group. The urolume remains an option in patients with persistent hydronephrosis, autonomic dysreflexia and large residuals after previous sphincterotomy. Bladder neck incision should be performed at the same procedure.

### Emptying the neurogenic bladder – the use of a new device

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**Introduction:** Incomplete bladder emptying is a major factor contributing to poor bladder control of patients with neurological disease, and intermittent catheterization has proved immensely valuable in their management. However, it is not a technique that all patients are either able or willing to do, and so the introduction of an alternative means of bladder emptying would be a significant advance.

**Patients and methods:** A hand-held battery-operated bladder stimulator which produces a vibrating stimulus of 50 Hz was applied to the suprapubic region of 13 patients (10 with multiple sclerosis, one radiation myelitis and two with neurological disease of uncertain aetiology). Flow rates and residuals were measured before and after the use of the device and repeated twice. The patients also answered a questionnaire regarding their urinary symptoms.

**Results:** In nine patients the flow rate improved from a mean (SD) of 13.4 (5.6) mL/s to 17.3 (7.1) mL/s and the post-micturition residuals reduced from 193 (86) mL to 67 (27) mL. These patients also noticed a significant reduction in urinary frequency and sensation of incomplete emptying and have continued to use the technique three to four times per day. The device worked well on the patients who were still mobile but failed in four patients who were wheel-chair bound and had residuals over 400 mL. We also discovered that vibration eased bowel movements in four of seven patients with severe constipation due to multiple sclerosis. No side-effects were reported and patient compliance was excellent.

**Conclusion:** A vibrating stimulus applied to the suprapubic region facilitates bladder emptying and improves urinary symptoms in some patients with neurogenic bladder dysfunction. This may provide a useful alternative to intermittent self-catheterization.

### A survey of urinary retention in 100 young women

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**Introduction:** Over the last 10 years, 100 women who were referred for investigation of urinary retention were found on sphincter EMG to have abnormal myotonic-like activity in the muscle which, it has been hypothesized, prevents sphincter relaxation.

**Patients:** The age range of women in whom this EMG abnormality was found was between 15 and 45 with a peak incidence between 20 and 24 years (31 patients).

**Results:** Urinary retention was an isolated symptom, the woman presenting with a bladder volume in excess of 1000 mL with little or no urgency, although with pain on extreme distension. The onset of retention was gradual in 37 patients and was sudden in 55, although in some of these women gross retention was an incidental finding. In 57 patients there was no recognizable event preceding the onset of retention but in the remaining 43 there was a variety of factors which appeared to precipitate it – a gynaecological or non-gynaecological operation immediately preceded retention in 14 and eight women, respectively, in nine retention came on following childbirth, in five its onset was soon after starting antidepressant medication, and in seven there were various other events thought to be related, including an accident or trauma. Acute onset of retention with no precipitating cause seemed to become less common with increasing age. Despite a suggested diagnosis of multiple sclerosis at the onset of retention in a high proportion of these young women (73 were seen by a neurologist) there was no laboratory evidence to support this diagnosis and none of the women have subsequently developed any other convinc-

ing neurological symptoms. A recent postal survey of this group of women found that most have persisted in complete or partial retention and the majority continue to manage their problem by intermittent self-catheterization. The only factor reported as altering their condition either for the worse (10) or better (6) was the change in sex-hormone levels either during the menstrual cycle, following parturition or as the result of medication given for gynaecological indications. Unfortunately, none of the women had otherwise discovered any other treatment that improves their condition.

**Conclusion:** Urinary retention in young women due to abnormal EMG activity in the striated sphincter is a neurologically benign condition, although persistent and symptomatically troublesome.

## 101

### The effect of capsaicin on nerve densities in the human urinary bladder

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**Introduction:** Intravesical capsaicin has been used effectively to treat detrusor hyper-reflexia. The purpose of this study was to identify its effects on human bladder innervation and to correlate this with the clinical and urodynamic outcome. These are the first results of the nerve changes to be reported and thus provide an insight into the possible mode of action of capsaicin on the human bladder.

**Patients and methods:** Eighty-one bladder biopsies were taken using a flexible cystoscope and 21SX biopsy forceps (Olympus) from 12 patients (eight multiple sclerosis, three tropical spastic paraparesis, one cervical cord ischaemia) before and 6 weeks after intravesical capsaicin instillations, and from three control patients with microscopic haematuria but no other bladder pathology or outlet obstruction. A mean of three samples per patient was taken from the posterior wall of the bladder 2 cm above the ureteric orifices, using lignocaine jelly as topical anaesthetic urethrally. Sections (10 µm) were stained for S100 and PGP 9.5 and the nerve densities in the lamina propria evaluated using the 'Minimop' technique for S100 (nerves/mm<sup>2</sup>) and computerized image analysis (Seescan) for PGP (expressed as 'red in frame' and 'red %'). Counts were performed by two independent observers and concordance was good.

#### Results:

Stain	Nerve density	Controls	Responders (10 patients)		Non-responders (2 patients)	
			pre-capsaicin	post-capsaicin	pre-capsaicin	post-capsaicin
S100	nerves/mm <sup>2</sup>					
	mean (range)	78 (76-80)	104 (60-250)	67 (49-133)	80 (58-102)	118 (104-133)
PGP9.5	red in frame					
	mean (range)	779 (683-921)	1144 (450-2688)	656 (64-2433)	1600 (1400-1800)	1600 (1450-1750)
	red %					
	mean (range)	3 (2.7-3.57)	4.54 (1.4-10.31)	2.56 (0.25-9.34)	6.23 (5.5-6.95)	6.22 (5.6-6.8)

**Conclusions:** Capsaicin causes a reduction in nerve density in the lamina propria of the bladder in patients who respond clinically, while causing no significant difference in non-responders. In the latter group, it is possible that it induces some Schwann cell hyperplasia, as shown by the results from S100 staining.

## 102

### Neuromodulation of detrusor hyper-reflexia using functional magnetic stimulation

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**Introduction:** Intact somato-visceral sacral reflexes are essential for micturition and they are controlled predominantly by inhibitory pathways. Damage to these pathways can lead to detrusor hyper-reflexia. Electrical stimulation of pudendal afferents can inhibit such contractions. Non-invasive multi-pulse magnetic stimulation of the sacral roots has been shown to elicit functional responses of striated muscle, including the pelvic sphincters in man. The aim of this study was to investigate the acute effects of functional magnetic stimulation (FMS) on detrusor hyper-reflexia using a multi-pulse magnetic stimulator.

**Patients and methods:** Seven male patients with established detrusor hyper-reflexia following spinal cord injury were studied. No patient was on medication and none had previously been treated by surgery for detrusor hyper-reflexia. The first step involved mapping and optimization of magnetic stimulation of S2-S4 sacral anterior roots by recording toe flexor EMGs to supramaximal single pulses. Unstable detrusor activity was provoked during cystometry by rapid infusion of fluid into the bladder. On some provocations, supramaximal FMS at 20 pulses/s for 5 s was applied at detrusor pressures of 20 cmH<sub>2</sub>O.

**Results:** The provocation test produced consistent and predictable detrusor hyper-reflexia. Following FMS, there was an obvious acute suppression of detrusor hyper-reflexia. Analysis revealed a profound reduction in detrusor contraction as measured by the area under the curves.

**Conclusions:** Functional magnetic stimulation applied over the sacrum can profoundly suppress detrusor hyper-reflexia in man. It could provide a non-invasive method for assessing patients for implantable electrical neuromodulation devices and as a therapeutic device in its own right.