A Review on Surgical Treatment of Detrusor Instability

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ABSTRACT

The first-line treatment of detrusor instability (DI) is medical. However, when a combination of pelvic floor exercises, bladder re-training, and pharmacologic intervention has been attempted and failed, then surgical options to control chronic, intractable symptoms could be explored. The current surgical options are reviewed. The long-term results are uncertain. Patient would need to be carefully selected and properly counselled for these procedures.

Keywords: Surgical treatment, detrusor instability

INTRODUCTION

The first-line treatment of detrusor instability (DI) is medical. However, when a combination of pelvic floor exercises, bladder re-training, and pharmacologic intervention, and electrical stimulation has been attempted and failed, then surgical options to control chronic, intractable symptoms could be explored especially for those with severe symptoms and a resultant poor quality of life.

Surgical approach for DI includes both endoscopic and open procedures. The aim of management is to create a low-pressure, high-volume storage within the bladder, which would improve the urinary incontinence.

ENDOSCOPIC SURGICAL TREATMENT

Hydrostatic bladder distension

Cystoscopic hydrostatic bladder distension had been used for treatment of urge incontinence since 1976¹⁻³. It is thought that the overdistension causes degeneration of unmyelinated motor and sensory nerve fibres.

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Correspondence: Dr Tan Thiam Chye Urogynaecology Unit KK Women's and Children's hospital 100 Bukit Timah Road Singapore Success rates vary from 18% to 77%¹⁻³. Complications include bladder perforation and rupture, urinary tract infection and urinary retention. The relief of symptoms is usually temporary. However, hydrostatic could be an option if further definitive surgery is planned subsequently.

OPEN SURGICAL TREATMENT

Sacral rhizotomy

Complete transection of anterior and posterior S2-4 nerve roots would ablate the detrusor reflex. However, innervation of the external anal and urethral sphincter would be truncated as well. There is loss of female lubrication and sensation in the perineum and buttocks. Partial rhizotomy allows selective transection of roots, which can alleviate the DI but preserve other important functions.

Tranvesical Phenol injection

Transvesical injection of the pelvic plexuses with phenol is another option. Injection of phenol into the trigone causes neurolysis of the pelvic nerves and would thus ablate the detrusor reflex⁴. This method is best used for DI due to multiple sclerosis. Complication includes vesico-vaginal fistula⁴ and sciatic nerve injury.

Sacral nerve stimulation

Sacral nerve stimulation (SNS) involves the stimulation of the sacral nerves to modulate the neural reflexes that influence the bladder, sphincter and the pelvic floor. This is a non-destructive and reversible therapy for the treatment of voiding dysfunction in patients with failed conservative treatments. The mechanism of action is unknown although it is thought that electrical sacral neuro-modulation cause inhibition of the afferent control mechanisms at the sacral reflex and higher control centres⁵. The pelvic floor muscles and the external urethral sphincter muscle are mediated primarilythrough S3 nerves. Stimulation of the myelinated A fibres of S3 has been shown to decrease

the spastic activity of the pelvic floor and enhance the tone of the urethral sphincter. This would then supress the detrusor activity. Neuro-modulation using the InterStim Continence Control System (Medtronic, Minneapolis, Minn) is available in Europe, Australia and Canada since 1994. The Food and Drug Administration approved of its use in United States for refractory urge incontinence in 1997. SNS involves electrical stimulation of the sacral nerves via a totally implanted system that includes an electrode placed close to S3 and an implantable pulse generator. To select patients for permanent implantation, patients first undergo percutaneous test stimulation for 3 to 7 days. Those who respond to the test stimulation will then undergo a permanent implant⁶.

The number of implants worldwide is just nearing 5000^7 . 63% of urge incontinent patients showed at least a 50% reduction in voids per day^{8,9}. In a recent study involving an older, urge-incontinent population, all twelve patients who had permanent implantation obtained a >50% reduction in their incontinent episodes, with 2 patient achieving total dryness¹⁰. A staged implant technique has also shown to improve the success rate, with a more careful patient selection¹¹.

indeed, SSN is a promising treatment for DI although more studies need to be done to validate the outcome.

Cystolysis

It was thought that denervation of the bladder would ablate the detrusor reflex and thus, treat the DI. Hindmarsh (1997) reported a cure or improvement in 53% of patients by transection but the results are poor if the passive bladder capacity was less than 400 ml¹². However, other studies show that transection has unreliable results and even when improvement does occur, it seldom lasts for more than a few months¹³. Indeed, bladder transection and reattachment is no longer employed now.

Augmentation cystoplasty

The aim of augmentation cystoplasty is to create a lowpressure, good-compliant reservoir, which will protect the upper urinary tract from high intravesical pressure¹⁴. Bladder augmentation will make any unstable detrusor contractions ineffectual and raise the volume threshold at which DI occurs.

However, a simple patch augmentation would result in a diverticulum, since the unstable detrusor muscle tends to evacuate the high pressure vesical element into a separate low pressure compartment. The clam, cystoplasty which completely bissects the bladder, overcomes this problem. It is performed by transecting the bladder in the coronal or sagittal plane to within 1.5 cm of the internal urethral meatus¹⁴. A length of pre-terminal ileum is then mobilised and opened along its antimesenteric border. This ileal segment is then sutured into the bladder defect.

Bivalving the bladder splits the circular continuity of the detrusor fibers and thus abolishes unstable activity. The interposition of an intestinal segment, which has been detubularised to abolish its own contractile activity, tends to absorb any residual destrusor activity. In fact, the total and functional volume of the bladder is also increased.

Indeed this original technique described by Bramble has stood the test of time^{14,15}. 86% (13/15) in his original study was voiding spontaneously and was continent at the mean follow-up of 30 months. The remaining 2 patients were also continent but required clean intermittent self-catheterisation. The mean bladder capacity increased from 230 to 554 mls.

Subsequent studies of augmentation cystoplasty yielded good results¹⁶⁻¹⁹. Continence and stable renal function in the short term have been reported in 80-100% of the cases¹⁷. Patients reported 78% success at a mean follow-up of 5 years¹⁸. Success was defined as patient's satisfaction with their symptoms. However, further studies of the long-term outcome would be needed.

The complications include: metabolic and electrolyte imbalance (usually hyperchloremic acidosis); urinary tract infection; mucus production causing voiding dyfunction; voiding difficulty: stone formation; spontaneous perforation of the neobladder at the site of suture line and rarely, malignancy.

Detrusor myomectomy

The surgery involves incising the detrusor muscles and thus, creating a diverticulum; large portions of the detrusor muscles are subsequenty excised. This procedure seems to yield good results with neurogenic DI.

Urinary Diversion

Urinary diversion is a last option for treatment of DI and is rarely necessary. However, it may be a better option than enterocystoplasty when severe pelvic pain is associated with intractable DI.

CONCLUSION

Intractable destrusor instability unresponsive to medical treatment remains a challenge to urogynecologists and urologists. Although there are several surgical options available, the long-term results are certain. Patients would need to be carefully selected and properly counselled for these procedures.

REFERENCES:

- 1. Sehn JR. Anatomic effect of distention therapy in unstable bladder: a new approach. Urology 1978;11:581-7
- 2. Ramsden PD, Smith JC, Dunn M, and Ardan GM. Br J Urol 1976;48:623-9

- 3. Jorgensen L, Mortensen SO, Colstrup H, and Andersen JR. Bladder distension in the management of detrusor instability. Scand J Urol Nephrol 1985; 19: 101-4
- 4. Blackford HN. Murray K, Stephensen TP et al. Result of transvesical infiltration of the pelvic plexuses with phenol in 116 patients. Br J Urol 1982;56:647-9
- 5. Paul D.M. Pettit, Jason R. Thompson and Antia H. Chen. Sacral neuromodulation: new applications in the treatment of female pelvic floor dysfunction. Curr Opin Obstet Gynecol 2002;14:521-5
- 6. Bosch JLHR. Sacral neuromodulation in the treatment of the unstable bladder. Curr Opin Urol 1998;8:287-91
- 7. Schmit RA. Urodynamic features of the pelvic pain patient and the impact of neurostimulation on these features. World J Urol 2001;19:186-193
- 8. Siegel SW, Catanzaro F, Dijkema HE. Long-term results of a multicenter study on sacral nerve stimulation for the treatment of urinary urge incontinence, urgency-frequency, and retention, Urology 2000;56:87-91
- 9. Spinelli M, Bertapelle P, Cappellano F, Chronic sacral neuromodulation in patients with lower urinary tract symptoms: results from a national register. J Urol 2001;166:541-5
- 10. Amundsen CL, Webster GD. Sacral neuromodulation in an older, urge-incontinent population. Am J Obstet Gynecol 2002;187:1462-5
- 11. Scheepens WA, Van Koeveringe GA, De Bie RA, Weil EHJ, Van Kerrebroeck. Long-term efficacy and safety results of the two-staged implantation technique in sacral neuromodulation. BJU Int 2002;90:840-5
- 12. Hindmarsh JR, Essenhigh DM and Yeates WK. Bladder transection for adult enuresis. Br J Urol 1977;49:515-21
- 13. Lucas MG and Thomas DM. Endoscopic bladder transection for detrusor instability. Br J Urol 1987;59:526-8
- 14.FJ Bramble. The Clam Cystoplasty. Br J Urol 1990;66:337-41
- 15. Bramble FJ. Treament of adult enuresis and urge

incontinence by enterocystoplasty. J Urol 1982;54:693-6

- 16. Turner-Warwick RT and Ashken MH. The functional results of partial, subtotal cystoplasty with special reference to ureterocaecocystoplasty, selective sphincterotomy and cystocystoplasty. B J Urol 1967;39:3-12
- 17. Greenwell TJ, Venn SN, Mundy AR. Augmentation cystoplasty. BJU Int 2001;88:511-25
- 18. Edlund C, Peeker R, Fall M. Clam ileocystoplasty: successful treatment of severe bladder overactivity. Scand J Urol Nephrol 2001;35:190-5
- 19. Hasan ST, Marshall C, Robson WA, and Neal DE. Clinical outcome and quality of life following enterocystoplasty for idiopathic detrusor instability and neurogenic bladder dysfunction. Br J Uro 1995;76: 551-7
- 20. Cartwright PC and Snow BW. Bladder autoaugmentation. Adv Urol 1995;8:273
- 21. Rodney A Appell. Surgery for the treatment of overactive bladder. Urol 1998;51:27-9
- 22. Scott R Serels, Raymond R. Rackley and Rodney A Appell. Surgical treatment for stress urinary incontinence associated with valsavia induced detrusor instability. J Urol 2000;163:884-7
- 23. FJ Bramble. The clam cystoplasty. J Urol 1990;66: 337-41
- 24. Suzie Venn and Tony Mundy. Bladder reconstruction: urothelial augmentation, trauma, fistula. Curr Opin Urol 2002;12:201-3
- 25. A.R.B. Smith and V. Lawton. Surgical procedures in urogynaecology. Curr Obst Gynecol 2000;10: 79-85
- 26. Bosch, Groen, Essink-Bot Krabbe, Seerden, van Hout. Sacral segmental (S3) nerve stimulation as a treatment for urge incontinence due to detrusor instability: Quality of life analysis and cost-effectiveness. J Urol 1996;155:594A
- 27. Hedlund H, Schultz A, Talseth T, Tonseth K, van der Hagan A. Sacral neuromodulation in Norway: clinical experience of the first three years. Scan J Urol Nephrol Suppl 2002;210:87-95