RECONSTRUCTIVE UROLOGY

Artificial Urinary Sphincters Placed After Posterior Urethral Distraction Injuries in Children are at Risk for Erosion

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Purpose: Management for posterior urethral disruption and concurrent bladder neck incompetence is controversial. Some groups recommend treatment with a Mitrofanoff catheterizable stoma, while others advocate urethral reconstruction with delayed placement of an artificial urinary sphincter. We report our experience with the latter strategy.
Materials and Methods: We reviewed the records of all patients with the above injury who were treated with end-to-end urethroplasty followed by delayed bladder neck artificial urinary sphincter placement from 1986 to 2006.
Results: Five patients had videourodynamic evidence of bladder neck incompetence coexisting with traumatic posterior urethral disruption. The etiology of bladder neck incompetence in all 5 patients was a known longitudinal tear through the bladder neck that occurred at the time of trauma. Each patient underwent end-to-end urethroplasty. Six to 12 months later the patients had persistent incontinence. Bladder function and urethral patency were documented by urodynamic, radiographic and endoscopic studies. A bladder neck artificial urinary sphincter was subsequently placed. Each operation was technically demanding due to fibrosis in the pelvis and around the bladder neck. All patients were initially continent but erosion of the artificial urinary sphincter into the bladder neck in 4, and the bladder neck and rectum in 1 occurred at a mean of 3 years (range 6 months to 8 years).
Conclusions: Placement of a bladder neck artificial urinary sphincter for managing urinary incontinence due to concurrent posterior urethral disruption and bladder neck incompetence is difficult and it risks delayed erosion. In this patient population we would strongly consider urinary diversion with a Mitrofanoff catheterizable stoma.

Editorial Comment

Stress urinary incontinence as a result of urethral injury occurs in approximately 10% of pelvic trauma cases. Urinary stress incontinence usually only occurs in those boys with posterior urethral disruption and an additional rabdosphincter injury. The primarily reconstructive approach with the placement of a suprapubic catheter secures healing but does not give any guarantee for functionality. Two possibilities occur after the removal of the transurethral catheter: incontinence or stricture. The incidence of urinary stress incontinence is lower compared to stricture development. The two major questions that occur are, when and which surgical approach to offer the pediatric patient, who suffers from stress urinary incontinence. Ashley & Husmann reported in their group of five patients to place an artificial sphincter 6-12 months after the reconstructive approach, which might be still too early regarding the extensive surgical approach and the not ideal position for the cuff of an AMS 800. In addition, the treated males were on average 11-year-old, who are still growing. This is most probably due to a consequence of one or all of the three mentioned arguments' failure.

Because of surgery for the after effects of the injury, the approach is sometimes invasive resulting in scars and poor vascularization. Secondly, especially the cuff around the bladder neck / prostate might cause not only obstruction but – due to the poor tissue quality with reduced vascularization – result in erosion in those patients in the follow-up because they are still growing. This might be an explanation of the average explantation time of 3 years (6 months to 6 years) after the implantation.

If an artificial urinary sphincter is at all considered in children and adults, it should be placed through the penoscrotal approach to the bulbar urethra (1). It is easier to access and the tissue is in most cases untouched, which supports the healing and makes the whole approach less invasive. In the follow-up, an age-adapted cuff size exchange is easier to be performed. Some might argue that the smallest cuff might still be too big for the bulbar urethra, but local tissue or acellular matrices can be placed in-between the urethra and the cuff. This tissue or matrix protects the urethra and the cuff, avoiding erosions. The authors are correct that the approach to perform the Mitrofanoff catheterizable stoma in these patients is a very elegant way, too and an artificial urinary sphincter with an age-adapted cuff size is the second best choice beside the Mitrofanoff catheterizable stoma.

Reference

1. Sievert KD: Fast implantation of an artificial urethral sphincter through a peno-scrotal approach. Eur Urol. 2007; Video Journal, Abst V9, Volume 13.2.

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Autologous Myoblasts and Fibroblasts versus Collagen for Treatment of Stress Urinary Incontinence in Women: A Randomised Controlled Trial

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Background: Preclinical studies have suggested that transurethral injections of autologous myoblasts can aid in regeneration of the rhabdosphincter, and fibroblasts in reconstruction of the urethral submucosa. We aimed to compare the effectiveness and tolerability of ultrasonography-guided injections of autologous cells with those of endoscopic injections of collagen for stress incontinence.
Methods: Between 2002 and 2004, we recruited 63 eligible women with urinary stress incontinence. 42 of these women were randomly assigned to receive transurethral ultrasonography-guided injections of autologous myoblasts and fibroblasts, and 21 to receive conventional endoscopic injections of collagen. The first primary outcome measure was an incontinence score (range 0-6) based on a 24-hour voiding diary, a 24-hour pad test, and a patient questionnaire. The other primary outcome measures were contractility of the rhabdosphincter and thickness of both the urethra and rhabdosphincter. Analysis was by intention to treat. This trial is registered with Controlled-Trials.com, number CCT-NAPN-16630.
Findings: At 12-months' follow-up, 38 of the 42 women injected with autologous cells were completely continent, compared with two of the 21 patients given conventional treatment with collagen. The median incontinence score decreased from a baseline of 6.0 (IQR 6.0-6.0; where 6 represents complete incontinence), to 0 (0-0) for patients treated with autologous cells, and 6.0 (3.5-6.0) for patients treated with collagen ($p<0.0001$). Ultrasonographic measurements showed that the mean thickness of the rhabdosphincter increased from a baseline of 2.13 mm (SD 0.39) for all patients to 3.38 mm (0.26) for patients treated with autologous cells and 2.32 mm (0.44) for patients treated with collagen ($p<0.0001$). Contractility of the rhabdosphincter increased from a baseline of 0.58 mm (SD 0.32) to 1.56 mm (0.28) for patients treated with autologous cells and 0.67 mm (0.51) for

controls (p<0.0001). The change in the thickness of the urethra after treatment was not significantly different between treatment groups. No adverse effects were recorded in any of the 63 patients.
Interpretation: Long-term postoperative results and data from multicentre trials with larger numbers of patients are needed to assess whether injection of autologous cells into the rhabdosphincter and the urethra could become a standard treatment for urinary incontinence.

Editorial Comment

In recent years, the knowledge and awareness for female stress urinary incontinence has grown with the result that a wide range of different treatment options has become available. Treatment options improved with the increased knowledge of pelvic floor dysfunction and surgical options became less invasive by the year.

Obtaining autologous myoblasts of skeletal muscle-biopsies, cultivating them and transplanting them after differentiation into the external urethral sphincter herald a new era of incontinence therapy. In the current study of Strasser et al., 42 patients were treated by a transurethral, ultrasound-guided injection of myoblasts and fibroblasts. The control group of 21 patients received collagen in the conventional method.

After a mean follow-up of 12 months, urinary continence and improvement of the urethral rhabdosphincter was evaluated with questionnaires, voiding diaries, pad tests, transurethral ultrasonograpy and electromyography. Out of those treated with autologous myoblasts and fibroblasts, over 90% were completely dry, whereas in the control group, a success rate of only 9% was recorded.

Currently, experience with this new incontinence treatment comes from a single center, which has started to collaborate with others in order to verify the presented striking results. In addition to some doubts about the allocation concealment and ascertainment bias, it might be important which way the “material” is injected. The ultrasound-guided application might be more precise and effective than the classic visual-judged injections. The number of deposits needed to ensure good filling as well as coaptation of the urethral wall and thus compression of the urethral lumen, which must still be proven.

The presented results, the development of the clinical pathways of this procedure and new sources of stem cells to be transplanted might be one of the most important achievements in reconstructive urology of the last decade. By presenting a minimal invasive technique with a precise application into the location for a physiological function, a treatment option to regenerate sphincter function and to prevent urinary incontinence at an early stage becomes feasible.

Additional stem cell sources (1), which can be harvested easier and may be even true omnipotent stem cells in order to better reconstruct a rhabdosphincter are currently tested experimentally and might offer the possibility to treat high grade stress urinary incontinence.

Reference

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