Original Article

Gore-Tex Sling Urethral Suspension in Type III Female Urinary Incontinence: Clinical Results and Urodynamic Changes

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Abstract: The authors prospectively evaluated 24 consecutive female patients with type III stress urinary incontinence, ranging in age from 36 to 70 years (mean 55 years). All patients were operated upon and had a vesicourethral suspension by a Gore-Tex suburethral sling. All were evaluated urodynamically 6 and 30 months after surgery. In this group of patients clinical cure of incontinence was observed in 83.3% (20) and in the remaining 4 patients it was significantly improved. In 2 patients there was an erosion of the urethra and the sling had to be removed 3.5 years later. Five other women remained dry but complained of occasional irritative symptoms, and several urinary tract infections were recorded (2–3 per year), which were documented by positive urine cultures. In the remaining 17 patients no erosion was observed and no irritative symptoms were reported. The urodynamic evaluation revealed an excellent postoperative result both 6 months and 30 months after surgery.

Keywords: Allogenic graft; Gore-Tex sling; Suburethral slings; Type III stress urinary incontinence; Urodynamic evaluation

Introduction

When confronting female stress urinary incontinence (SUI) various operative techniques can be selected. These are vaginal repair, suprapubic colposuspension, endoscopic suspension of the urethra, suspension of the bladder neck and the proximal urethra with the ‘sling’ procedure, periurethral injection of different materials such as Teflon, Silicone etc., and the insertion of artificial sphincters. All the above procedures have utilized different methodologies to serve the same purpose, which is to reposition the urethra and the bladder neck intra-abdominally, where the ability of the urethra to maintain positive pressure transmission during stress (urethral pressure > bladder pressure) is restored [1,2].

In type III SUI, which is characterized by loss of the intrinsic urethral component, it was found that procedures such as Marshall–Marchetti–Krantz (MMK) and Stamey were not accompanied by satisfactory results [3,4]. These patients have an incompetent bladder neck, which gapes even with minimal to moderate bladder distension, and urodynamically are characterized by loss of the proximal urethral pressure response. In such cases a urethral sling procedure has been proposed by various authors, or the use of injectables (fat, collagen), artificial sphincters etc. Indigenous or allogenic grafts can be used to form various suburethral slings [5–14].

The results of the sling procedures are variable according to different authors, and especially when the postoperative outcome is evaluated either close to the time of the operation or at longer follow-ups. When the same patients are evaluated 2 years later there is a significant drop in the success rate of the anti-incontinence surgery [15–17]. Horbach et al. [12] introduced the use of polytetrafluoroethylene Gore-Tex graft in suburethral sling procedures, reporting an 85% subjective and objective cure rate 3 months post-operatively.

The purpose of this study was to evaluate the use of Gore-Tex suburethral slings, which are designed to give permanent support to the urethra.
Materials and Methods

We prospectively evaluated 24 consecutive female patients with type III SUI, ranging in age from 36 to 70 years (mean 55 years) (Table 1). All patients were operated upon and had a vesicourethral suspension using a Gore-Tex pubovaginal sling. All patients were evaluated urodynamically 6 and 30 months after surgery.

The past medical history was taken with special reference to the patient's history, the presence of neurologic disease or a family history of diabetes mellitus; an obligatory negative urine culture prior to the urodynamic investigation, which was performed 1 day prior to the operation; investigation of biochemical and hematological indices; and a recorded history of previous urinary tract infections either by symptoms or, more importantly, by positive urine cultures.

All patients were subjected to videourodynamics with intravesical, detrusor and intraurethral pressure measurements both at rest and with minimal bladder filling, and during voiding in those patients who were able to void during the evaluation. The urethral pressure profilometry was studied both at rest and also during coughing and straining. Urinary flowmetry (free flow) was studied in all patients both preoperatively and postoperatively, and the change in the flow pattern after surgery, if any, was recorded. Electromyographic (EMG) evaluation of the pelvic floor musculature was also a part of our protocol.

The diagnosis of type III stress urinary incontinence was primarily videourodynamic, with the vesical neck and the proximal urethra open at rest in the absence of a detrusor contraction. When performing a static urethral pressure profile the proximal urethra is isobaric with the bladder, and minimal increases in intravesical pressure result in obvious urinary leakage.

The urodynamic parameters studied both preoperatively and postoperatively were as follows: residual urine (ml), maximum flow rate (ml/s), functional urethral length (cm), maximum urethral closure pressure (cmH\textsubscript{2}O), first sensation of bladder filling (ml), bladder functional capacity (ml), detrusor pressure at maximum flow (cmH\textsubscript{2}O), and maximum detrusor pressure (cmH\textsubscript{2}O). All terminology conforms to the standards proposed by the International Continence Society. The statistical analysis of the preoperative and postoperative urodynamic parameters was performed by Student's t-test.

Cystourethroscopy was performed and the urethral length measured using a specially graded cystoscopic sheath, immediately after the urodynamic evaluation. The following day the patient was taken to the operating room and prophylactic antibiotics were given. A suprapubic catheter was inserted and remained indwelling until the patient was able to void postoperatively and the residual urine remained consistently less than 150 ml, or until the patient did not strain significantly to void.

Technique

A combined abdominovaginal approach was used. A low transverse skin incision was made 1.5 cm above the upper edge of the symphysis pubis. A 1.5 x 12 cm sling was constructed by cutting from a larger piece of Gore-Tex material and four stay sutures were placed, one in each corner of the flap (Fig. 1). A median incision was made in the anterior vaginal wall and two vaginal mucosal flaps were developed to expose the posterior urethra and the area of the bladder neck. An opening was created by alternating sharp and blunt dissection on either side of the bladder neck to join the retropubic and the vaginal spaces. The Gore-Tex flap was placed in an unwrinkled fashion under the urethra, with care taken not to angulate the urethra but merely to support it (Fig. 2a). After placement of the sling below the urethra the free ends of the flap were sutured to the anterior rectus sheath, but also special care was taken to immobilize the flap by suturing its free edges to fascial tissue in the vicinity of the puboligament bone. If necessary a few stitches can include the periosteum of the pubic symphysis or the puboligament bone, but not Cooper's ligament, which is a deeper structure and undue graft tension may be caused (Fig. 2b). Urethroscopic verification followed to ascertain the lack of mucosal protrusion into the urethral lumen owing to increased periurethral tension, and to rule out possible urethral perforation.

Results

In this group of patients treated with the Gore-Tex sling suspension clinical cure of incontinence was observed in 83.3% (20 patients), and in the remaining 4 it was significantly improved. Cure was defined as a complete absence of incontinence. Improvement was considered as persistence or recurrence of incontinence which was less severe than that observed preoperatively. Persistence