European Journal of Obstetrics & Gynecology and Reproductive Biology 163 (2012) 113–116

Contents lists available at SciVerse ScienceDirect

European Journal of Obstetrics & Gynecology and Reproductive Biology

journal homepage: www.elsevier.com/locate/ejogrb

Functional outcomes for surgical revision of synthetic slings performed for voiding dysfunction: a retrospective study

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ARTICLE INFO

Article history:
Received 17 January 2012
Received in revised form 20 March 2012
Accepted 2 April 2012

Keywords:
Synthetic slings
Surgical revision
Voiding dysfunction
Stress urinary Incontinence

ABSTRACT

Objective: To determine the functional outcomes after synthetic sling revision surgery performed for voiding dysfunction.
Study design: A retrospective review of 63 women who underwent surgical revision of a synthetic sling (SS) over an 11 year period between 2000 and 2010 inclusive, for the treatment of voiding dysfunction. Voiding dysfunction was defined as a persistently raised post-void residual of >150 ml. Patient review included demographics, a comprehensive medical history, all surgical reports and a detailed proforma with details of lower urinary tract symptoms, physical findings and bladder diaries. Variables were compared between methods of sling revision using the Fisher exact test (Freeman–Halton extension) with a 2 by 3 contingency table. Statistical significance is defined as $P \leq 0.05$.
Results: Sixty-three women underwent SS revision for voiding dysfunction with an overall success rate of 87%. Three types of surgical revision were performed; simple SS division (46/63, 73%), partial excision of SS material (13/63, 21%) and either division or excision but with a concomitant procedure to prevent recurrent SUI (4/63, 6%). Persistent voiding dysfunction following revision in each of the three groups was 5/46 (10.9%), 1/13 (7.7%) and 2/4 (50%) respectively ($P = 0.09$). Subsequent surgery for recurrent SUI in each of the groups was 1/46 (2.2%), 3/13 (23.1%) and 0/4 (0%) respectively ($P = 0.04$).
Conclusions: Surgical revision of a SS is an effective treatment for postoperative voiding dysfunction. Both simple division and partial excision of the SS are successful, but simple division carries a lower risk of recurrent SUI. A concomitant SUI procedure at the time of revision may prevent recurrence but may increase the risk of persistent voiding dysfunction.

1. Introduction

Stress urinary incontinence (SUI) is a common condition affecting up to 30% of women [1]. The minimally invasive synthetic sling (SS), based on the tension-free vaginal tape (TVT®, Gynecare, Somerville, NJ, USA) has rapidly become the first-line surgical treatment for female stress urinary incontinence (SUI) in the developed world [2]. The popularity of this procedure is supported by current evidence, which suggests these operations are as effective as traditional suburethral slings or colposuspension in the short term, but with fewer postoperative complications [1].

Voiding dysfunction, with or without irritative storage symptoms such as urgency, is a troublesome complication which may occur subsequent to SS placement. Voiding dysfunction rates have been reported to be between 2.8% and 38% [3] following a retropubic sling, and from 0% to 15.6% with the transobturator approach [4,5].

Management of postoperative voiding dysfunction presents a diagnostic and therapeutic challenge. There is a lack of clear reporting on when and how such complications should be treated. The purpose of this study was to evaluate the functional outcomes after synthetic sling revision for the indication of voiding dysfunction.

2. Materials and methods

We conducted a retrospective review of those women who underwent revision surgery of a SS at our two university hospitals between 2000 and 2010 inclusive, for the indication of voiding dysfunction. We defined voiding dysfunction as a persistently raised (immediate) post void residual of >150 ml. These women all reported troublesome changes in voiding habit, including prolonged voiding, positional voiding, hesitancy and straining. Many also reported a subjective increase in urinary frequency and/or

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0301-2115/$ – see front matter © 2012 Published by Elsevier Ireland Ltd.
http://dx.doi.org/10.1016/j.ejogrb.2012.04.005

urgency. Women whose symptoms resolved with simple loosening of their sling in either the outpatient or theatre setting were excluded from the study.

Three different approaches to surgical revision for voiding dysfunction were used. Firstly, simple sling division (either under or lateral to the urethra), secondly; partial sling excision and finally; SS revision (either division or excision) with an immediate concomitant procedure to prevent recurrent SUI. The choice was at the discretion of the operating surgeon.

Following revision surgery some patients continued to report irritative storage symptoms but success of surgical revision was defined as persistent post-void residual volumes of <150 ml. Those women who reported a recurrence of their SUI symptoms following revision were offered a further anti-incontinence procedure.

Patient review included demographics, a comprehensive medical history, all surgical reports and a detailed proforma with details of lower urinary tract symptoms, physical findings and bladder diaries. We evaluated functional lower urinary tract outcomes following sling revision, which included symptoms of stress urinary incontinence, de novo urgency, persistence of urgency, voiding dysfunction as defined earlier and subsequent need for (repeat) SUI surgery. The presence or absence of the above-mentioned variables was compared between methods of sling revision using the Fisher exact test (Freeman–Halton extension) with a 2 by 3 contingency table. Statistical significance is defined as $P \leq 0.05$.

3. Results

Sixty-three women underwent SS revision for the indication of voiding dysfunction, with an overall success rate of 87%. Twenty-two of these women (35%) had had their initial SS placement performed elsewhere by a general gynaecologist. The remaining 41 (65%) of synthetic slings were placed at a tertiary urogynaecology unit, with 6 of the slings placed by the urogynaecology fellow and 35 by a consultant urogynaecologist. The overall prevalence of a concomitant procedure for prolapse at the time of SS placement was 49% (31 procedures).

The total of 63 women underwent three types of procedure: simple SS division (46/63, 73%), partial excision of SS material (13/63, 21%) and either division or excision but with a concomitant procedure to prevent recurrent SUI (4/63, 6%). There were no intraoperative complications related to the revision surgery. Table 1 illustrates the functional outcomes for each group subsequent to SS revision surgery.

Subsequent surgery for recurrent SUI was 1/46 (2.2%) in the sling division group, 3/13 (23.1%) in the sling excision group and 0/4 (0%) in the group who underwent revision with a concomitant procedure to prevent recurrent SUI ($P = 0.04$).

The mean interval between SS placement and its revision was 12.4 months, ranging from one week to 8 years. Women who underwent SS revision within 1 year of placement were classified as early revision ($n = 45$) and those at greater than 1 year as late ($n = 18$). As can be seen in Table 1, eight women (8/63, 13%) experienced persistent symptomatic voiding dysfunction following revision surgery and were considered to be unsuccessful. Of these eight, six had undergone early revision (6/45, 13%) while two were classified as late revision (2/18, 11%).

There were 41/63 (65%) women who had had their initial SS placed at our unit. These women all had preoperative urodynamics performed prior to initial SS placement. We were unable to obtain the preoperative urodynamics results of the 22 women who had their primary SS placement elsewhere. Four of the 41 women (9%) had an incidental finding of asymptomatic voiding dysfunction at their initial urodynamics. This was defined as a post-void residual of >150 ml or a maximum flow rate of <15 ml s. Following SS revision surgery, seven (7/41, 17%) were considered to have failed revision surgery. These women had persistent symptomatic voiding dysfunction with post-void residuals >150 ml. Of these, 3/7 (43%) were those with evidence of asymptomatic pre-operative voiding dysfunction. The fourth woman with evidence of pre-operative voiding dysfunction, while not diagnosed with voiding dysfunction at the present time, is complaining of severe urgency and urge incontinence, which is resistant to anticholinergic therapy.

Table 2 illustrates the 63 SS revisions for voiding dysfunction classified according to manufacturer's tradename of the SS implicated. It also identifies which slings were monofilament (57, 90%) and which were multifilament (6, 10%), and which were placed via a retropubic route (52, 83%) and which were placed via transobturator route (11, 17%).

Table 1
Functional outcomes following SS revision.

	A. Sling revision and concomitant SUI surgery $N = 4$ (%)	B. Sling division $N = 46$	C. Partial sling excision $N = 13$	P value[a]
Persistent voiding dysfunction	2/4 (50)	5/46 (10.9)	1/13 (7.7)	0.09
Surgery for recurrent SUI	0/4 (0)	1/46 (2.2)	3/13 (23.1)	0.04
De novo urgency	1/4 (25)	5/46 (10.9)	2/13 (15.4)	0.51
Persistence urgency	2/4 (50)	14/46 (30.4)	4/13 (30.8)	0.72

[a] Fisher exact with Freeman–Halton extension.

4. Comments

Complications of synthetic slings can present in a variety of ways such as voiding dysfunction, pain, infection and extrusion of the sling material. An Austrian study using a national database reported that 1.4% of women who had undergone a TVT® placement subsequently required reoperation to loosen, remove or cut the sling [6].

A recent study by South et al. [7] concluded that an overall improvement in lower urinary tract symptoms occurred more often in patients who had an early sling lysis (defined as <1 year) as opposed to those whose sling lysis was performed late (>1 year). Our results did not demonstrate a clear difference between early and late SS revision, with 6/45 (13%) of the early revision group and

Table 2
Revised synthetic slings categorised by SS type.

Tradename	Filament type (monofilament or multifilament)	Route retropubic (RP) or transobturator (TO)	Number (%)
Advantage	Mono	RP	2 (3%)
Dacron	Multi	RP	1 (2%)
InFast	Multi	RP	1 (2%)
IVS	Multi	RP	4 (6%)
Monarc	Mono	TO	7 (11%)
Prolene	Mono	RP	2 (3%)
TVT	Mono	RP	42 (67%)
TVT-O	Mono	TO	4 (6%)
Total			63 (100%)

Advantage® (Boston Scientific, Natick, MA, USA).
Monarc® (American Medical Systems, Minnetonka, MN, USA).
InFast® (American Medical Systems, Minnetonka, MN, USA).
Prolene® (Ethicon, Somerville, NJ, USA).
TVT-O® (Gynecare, Somerville, NJ, USA).
IVS® (Tyco Healthcare, Mansfield, MA, USA).
TVT® (Gynecare, Somerville, NJ, USA).