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Short communication

Adjusting bladder neck sling length to maximise same-day voiding

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The bladder neck fascial sling may become a more popular procedure if surgical modifications could ensure more rapid postoperative voiding, yet not compromising the 85% long-term cure rate. In a study of 80 women, we found that increasing the distance from the Prolene knot to the rectus fascia, while simultaneously observing the closure of the bladder neck with a cystoscope, resulted in 92% of women voiding the same day and 93% experiencing no stress incontinence at 1 year.

Keywords Allograft, bladder neck fascial sling, retention, urethroscopy.

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Introduction

The recent preponderance in the use of anti-incontinence procedures can be partially attributed to the successful utilisation of minimally invasive midurethral sling techniques. Midurethral sling support[1,2] applied through the retropubic approach has proven to be an effective cure for stress incontinence, with lasting results.[2] However, hesitation in use of the bladder neck fascial sling (BNFS) may be linked to the degree of difficulty in performing the procedure and its associated complications, including cystotomy, de novo urgency and urinary retention.[3,4] One misconception is that women will experience immediate difficulty with voiding in the perioperative time period (retention) or later with urgency. Unfortunately, there are currently no universal standards for selecting sling length. Many experienced surgeons advocate a two fingers' breadth separation (4 cm) of the sling knot from the rectus fascia. While some women may encounter prolonged retention, they do benefit from a long-term stress incontinence cure rate of 85%.[3,4] The author sought to determine whether postoperative voiding would improve with an increase in sling length.

Materials and methods

Between January 2002 and September 2003, 84 women consented to undergo a BNFS with Repliform dermal fascia (Boston Scientific, Natick, MA, USA) under a spinal anaesthetic and were followed with an observational study protocol including a 2-day, 1-week, 1-, 6- and 12-month follow-up intervals. This study received Internal Review Board committee approval from both the participating hospitals. All women underwent a thorough history and physical examination, completed a 3-day voiding diary, which included time of voiding and subjective degree of urge, stress incontinence (mild, moderate or severe), amount voided, number of pads used per 24 hours and the subjective degree of saturation (mild, moderate or severe). Women then underwent videourodynamics testing with a Medtronic Duet urodynamics system (Minneapolis, MN, USA), assisted with a General Electric 9800 portable fluoroscopy and a Sonesta (Stille-Sonesta Inc., Dallas, TX, USA) chair. The surgeon performed all studies with the same two urodynamics-trained nurses. Preoperative and postoperative Incontinence Impact Questionnaire (IIQ7)[5] and Urogenital Distress Inventory (UDI-6)[5] scores were recorded by an independent, unaffiliated nurse. Women were assessed for stress incontinence with a cough leak point pressure (LPP) measured as the lowest pressure at a 250-ml bladder capacity at which a loss of urine was noted with a cough, without a concomitant detrusor contraction. Preoperatively, all women were instructed on the technique of clean, intermittent catheterisation and informed of the need for Foley catheter insertion should their initial trial of voiding fail. Detrusor contractions without voiding were noted as detrusor overactivity (DOA). All women confirmed that they understood that during the procedure,

they would be required to cough 30 or more times and would receive little or no sedation. Women would have a catheter inserted after completion of the surgery, which would be removed 2 hours after return of normal lower extremity sensation and motor function. They would then be discharged home without voiding if they lived within 15 miles of the hospital, had a caretaker for 48 hours following surgery and had access to a telephone to contact their surgeon should any problems arise. They were also told that if they experienced any difficulty voiding, they were to go to either hospital's emergency room (ER) for catheter insertion. All women were discharged with written instructions, contact information and hospital ER phone numbers and locations. ER staffs were given written orders that should women present to the ER, they were to insert a 16F Foley catheter and notify the surgeon immediately. Catheters would be left in place for 24 hours prior to another trial of voiding to be initiated at the surgeon's office. Twenty-four to 48 hours following surgery, all women were reassessed in the office with an examination and ultrasound postvoid residual urine. A catheter was inserted if the postvoided urine volume was greater than 125 ml and another trial of void attempted 48 hours later. By postoperative day 7, women were again assessed by the surgeon and asked to report to the office with a comfortably full bladder. An ultrasound prevoid urine volume was performed and the woman examined once the volume was at least 150 ml. Under direct observation, women were then asked to cough ten times, with concomitant leakage noted as stress urinary incontinence (SUI). If a momentary delay between coughs and expelling of urine was present, cough-induced DOA was suspected. Women were then scheduled for follow-up examinations at 1 and 6 months, 1 year and annually thereafter. At their 1-year postoperative anniversary, women were asked if they would recommend the procedure to a friend, if they were satisfied with the results, if they had developed new onset urgency, and if they had already had urgency, whether the quality was the same, worse or better. Also noted were LPP, preoperative/postoperative postvoid residual urine in millilitres, time of the operation in minutes, presence of stress incontinence and time of onset.

Description of operative procedure

The woman was placed in a modified lithotomy position after administration of a spinal anaesthetic with a 1.5-hour duration. The legs were placed in Allen stirrups and the abdomen and vaginal area were prepared with Duraprep (3M, St Paul, MN, USA) and draped in a sterile manner. A 16F Foley catheter was inserted. A horizontal line was placed 1 cm distal to the bladder neck outline of the Foley balloon and another 2 cm distal to the first line. The area between both lines was infiltrated with 7–10 ml of 1% lidocaine with a 1:100 000 dilution of epinephrine. A 5-cm Pfannenstiel incision was performed until the rectus fascia was visualised. A 2- × 12-cm piece of Repliform (Boston Scientific, Natick, MA, USA) dermal fascia was then taken and the ends (1–2 cm from both ends) imbricated with 1-0 Prolene (Ethicon, Somerville, NJ, USA). The midline anterior vaginal wall was superficially incised between both lines and the endopelvic fascia perforated bilaterally with long curved Mayo scissors. Once the endopelvic fascia was perforated, steady, careful finger dissection was used to the retropubic space of Retzius until an abdominally placed hand was met on the rectus fascia through the Pfannenstiel incision. Then with fingertip guidance, a Stamey needle was brought down paravaginally on both the right and left sides. Each end of the Prolene suture was placed through the ipsilateral Stamey needle and brought up to the Pfannenstiel incision. Once the sling was placed distally, it was secured on right and left sides to the periurethral tissue with 3-0 Monocryl (Ethicon). The anterior vaginal wall was closed with running locking 2-0 Monocryl. The woman's position was then changed to a reverse Trendelenburg so that as close to a sitting position was obtained. The ends of the Prolene were taken and tied into a surgeon's knot; then a clamp was placed with rubber shod ends on the knot. Steady, firm traction was applied to the Prolene suture and the distance measured in centimetres from the surgeon's knot to the rectus fascia. A starting distance of 6 cm was measured with a surgical ruler. Then the bladder was filled to 250 ml. Pressure was applied to the bladder (for emptying the bladder, pressure was placed over the symphysis pubis to expel urine periodically) to obtain a good straight stream, and the woman was encouraged to cough strongly and consecutively ten times. If any immediate leakage occurred, the sling length distance was adjusted in 5-mm increments until no leakage occurred. Each successive measurement of sling length was re-evaluated by having the woman cough an additional ten times and placing the cystoscope in the distal urethra without the irrigation running. On a video monitor, the woman's cough was watched to ensure that the bladder neck closed well. Once this was achieved, an additional four knots were tied and the Prolene suture was cut with 2-inch suture tails. The skin was irrigated, then closed with staples. The Foley catheter was removed 2 hours after the woman regained full sensation and mobility in her legs. Because voiding in the hospital can be very awkward, the woman was discharged home without voiding. The surgeon and nurse telephoned later that evening to ascertain how well the woman was voiding and instructed her to report to the ER of either of the two participating hospitals for Foley catheter insertion if difficulty with voiding occurred.

Statistical analysis was performed using the Statistical Package for Social Sciences, version 11.0 (SPSS, Chicago, IL, USA). Analysis included simple medians and Student's *t* tests.

Results

Of the 80 women available for follow up, 74 were able to void the same day without a catheter (93%) (Table 1). Twenty-eight of 80 women (35%) were able to void within 4 hours of Foley catheter removal and while still at the hospital. Forty-six women (58%) voided at home. Six women (7.5%) could not void and presented to the ER for Foley catheter insertion. Four (5%) were able to void the following day and one on the second day. One woman (1.25%) required urethrolysis 3 months later for prolonged retention. Three women (3.75%) complained of de novo urgency. Four women (5%) required sling shortening under local anaesthetic while one women declined adjustment. There was no statistical correlation between LPP and sling length in centimetres. Seventy-five women (93%) did not demonstrate stress incontinence 1 year postoperatively. Patient satisfaction and willingness to recommend the procedure to a friend were both 90% (Table 1). Preoperative IIQ7 and UDI-6 median scores were 52 and 12, respectively; postoperative median scores of 9 and 3 demonstrated statistically significant improvements (both $P < 0.0001$). Each incontinence impact questionnaire has been well validated and provides an objective means of measuring urinary distress factors preoperatively and postoperatively.[5] There were three extraperitoneal cystotomies less than 1 cm in length each closed with continuous 3-0 Vicryl (Ethicon) without jeopardising the scheduled Foley catheter removal. Each of these three women had a history of a prior Burch colposuspension and anterior repair with nonabsorbable suture.

Table 1. Study women: demographics and median clinical data

	±SD	Range
Number of study women	80	
Median age (years)	61 ± 15.1	28–88
Median follow up (years)	1.6	1–2.6
Median Valsalva LPP (cmH_2O)	68 ± 16.8	38–99
Number of previous continence procedures	2	0–5
Operative time (minutes)	34 ± 14.5	20–47
Median preoperative postvoid residual (ml)	36 ± 28	0–78
Median postoperative postvoid residual (ml) ($P \leq 0.67$)	44.0 ± 5.9	0–94
Median maximum preoperative uroflow (ml/second)	18.6 ± 8.1	4.5–38.8
Median maximum postoperative uroflow (ml/second) ($P \leq 0.08$)	14.7 ± 5.9	3.6–39.1
Clinical results		
Successful same-day void (%)	93	
Trial of voids	1	1–4
Median days to voiding	<1	3 hours to 90 days
Median days to return to normal daily activity	4	1–10
Percent cure of stress incontinence	93	
De novo urgency (%)	3	
Satisfied with surgery results (%)	89	
Recommend procedure to a friend (%)	89	
Median preoperative IIQ7	52 ± 11.4	38.00–100
Median postoperative IIQ7 ($P \leq 0.001$)	9 ± 6.6	0–90.00
Median preoperative UDI-6	12 ± 4.6	4–16
Median postoperative UDI-6 ($P \leq 0.001$)	3 ± 2.1	0–15

Discussion

Studies conducted by Chaikin *et al.*[3] during the late 1990s have influenced the recent increase in utilisation of the BNFS. This upsurge in use also may be attributed to the procedure's long-term results as compared with the Burch colposuspension and bladder neck suspension. Obscuring the sling's benefits, however, is a propensity for complications with urinary retention and de novo urgency, perhaps resulting from sling length, with two fingers' breadth or the haemostat clamp breadth being too narrow. Performing a BNFS under spinal anaesthetic allows the surgeon to coach the woman to reproduce a good cough, or Valsalva manoeuvre, to better delineate sling length. Selecting appropriate length under these circumstances and thus more skilfully approximating the bladder neck closure may ultimately lead to improved same-day voiding, less de novo urgency (4%) and an acceptable recurrent SUI or revision rate (6%). Two well-validated standardised questionnaires (IIQ7 and UDI-6) were used preoperatively and 1 year postoperatively, and both demonstrated statistically significant improved scores for women's general urinary complaints. Procedural methods for sling length determination are not well documented in the literature, and most surgeons advocate a particular sling length approach based on their own or their mentor's experience. Ezzat,[6] for example, described his patients' success using an approach for sling length without intraoperative cystoscopic observance of bladder neck closure. He performed a BNFS under a spinal or epidural regional anaesthetic while using a polytetrafluoroethylene patch sling with Nylon suture. The sling length was adjusted to the point where, with a cough or strain (with the bladder filled to 200 ml), no stress incontinence was observed. Thirty-five women with less than 1-year follow up reported a 94% cure rate for stress incontinence without any occurrence of postoperative urinary retention. Clearly, methods for determining sling length must be defined, but whether these techniques will be reproducible and enduring will require further study.

Conclusion

Sling length can be increased from the commonly used two fingers' breadth distance (4 cm) from sling knot to the rectus

fascia, facilitating a more rapid return to voiding and maintaining stress incontinence cure rates. This improvement is achieved by adjusting sling length with concomitant cystoscopy of the bladder neck. With a strong cough, the bladder neck closes sufficiently to prevent leakage of urine. When achieved with careful adjustments, 93% of women will void the same day safely at home and enjoy a greater than 90% cure rate for SUI at 1-year follow up. ■

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