ELSEVIER

EARLY RESULTS OF PUBOVAGINAL SLING LYSIS BY MIDLINE SLING INCISION

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ABSTRACT

Objectives. To describe a simplified technique and results of pubovaginal sling lysis by incision of the sling in the midline by way of a transvaginal approach.

Methods. We reviewed the charts of 19 women who underwent pubovaginal sling lysis for obstruction. Patients presenting with retention, incomplete emptying or storage, or voiding symptoms suggesting obstruction after pubovaginal sling placement were evaluated with videourodynamic studies and cystourethroscopy. The diagnosis of obstruction was made on the basis of a combination of clinical, urodynamic, and endoscopic findings. All patients underwent a midline incision of the sling by way of a transvaginal approach without formal urethrolysis.

Results. The mean patient age was 57 years. Fifteen women (79%) had an autologous rectus fascial sling, 3 (16%) an allographic fascia lata sling, and 1 (5%) a polypropylene sling. Twelve women (63%) presented with urinary retention and required catheterization to empty. The other 7 women presented with obstructive and/or irritative symptoms without the need to catheterize. The mean time to sling lysis was 10.6 months from the initial surgery. The mean follow-up was 12 months (range 1 to 55). Overall, sling lysis was successful in 84% of the women. Stress incontinence recurred in 17%. No significant perioperative complications occurred.

Conclusions. Pubovaginal sling lysis without formal urethrolysis appears to be a safe and effective method of relieving obstruction. The success and recurrent stress incontinence rates are comparable to those with formal urethrolysis.

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In the past decade, sling procedures have become standard because of their proven long-term efficacy and application to all types of stress incontinence.[1–3] With more slings being performed, complications, including obstruction, are more prevalent. Patients with obstruction may present with complete urinary retention or obstructive voiding symptoms and less obviously irritative symptoms, including urge incontinence.[4] A meta-analysis by the American Urological Association Stress Urinary Incontinence Clinical Guidelines Panel reported that the incidence of urinary retention more than 4 weeks after sling placement was 8% and the risk of permanent retention "generally does not exceed 5%".[5] A recent series of 252 women by Morgan *et al.*[2] reported a prolonged urinary retention rate of 2.4%.

Traditionally, obstruction after incontinence surgery, including slings, has been handled by formal urethrolysis, with reported success rates of 65% to 93%.[4,6–11] In 1995, Ghoniem and Elgmasy[12] reported successful treatment of a patient in urinary retention with a transvaginal sling incision and interposition of a free graft of vaginal wall. The technique of sling incision is appealing in that it is technically easier and requires less patient recovery than does formal urethrolysis. For the past several years, we have been using sling incision as a primary procedure for obstruction after pubovaginal sling placement. We describe our technique of pubovaginal sling incision and the early results.

MATERIAL AND METHODS

We reviewed the charts of 19 women who underwent transvaginal sling incision for obstruction after pubovaginal sling placement for stress incontinence. All patients had undergone

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a complete history taking, physical examination, postvoid residual urine determination, multichannel videourodynamic studies, and cystoscopy. All were deemed to have obstruction on the basis of a combination of clinical (history, physical examination findings, preoperative voiding status), urodynamic (relatively high pressure-low flow voiding), radiographic, and endoscopic (urethral angulation or kinking) parameters. Strict urodynamic criteria were not used to make a diagnosis of obstruction, as others have shown this alone to be unreliable in predicting the response to urethrolysis.[6–8] In all cases, the obstruction was caused by the sling itself and not by other conditions such as pelvic prolapse or cystocele kinking around the sling. All patients underwent sling lysis as an outpatient using the technique described below. The patients were evaluated at approximately 1, 3, 6, and 12 months postoperatively and yearly thereafter. Success was judged by the ability to void spontaneously with no or small residual urine and resolution of obstructive and irritative symptoms depending on the presenting symptoms.

The patient is placed in the lithotomy position and a Foley catheter inserted to identify the region of the bladder neck. An inverted U or midline incision is made to expose the area of the bladder neck and proximal urethra. As the vaginal wall is dissected away, the sling should be identified above the periurethral fascia. It may be encased in scar tissue. In cases of excessive tension, the sling may be difficult to identify. Inserting a cystoscope or sound into the bladder and placing upward traction on it can help to expose the sling. Once the sling has been identified, it should be separated from the underlying periurethral fascia with sharp or blunt dissection. The dissection may be facilitated by grasping the sling with an Allis clamp on either side of the midline and exerting downward pressure. To avoid injury to the bladder and urethra, the dissection may be started distally, identifying the normal urethra, and then proceeding more proximally until the plane between the sling and urethra is identified. A right-angle clamp may be placed between the urethra and periurethral fascia, and then the sling is cut in the midline (Fig. 1). In cases of extreme tension, the ends of the sling may snap back into the retropubic space. Usually, the sling stays secure and may be mobilized off of the periurethral fascia to, but not through, the endopelvic fascia (Fig. 2). The retropubic space is not entered, and the urethra is not freed from the undersurface of the pubic bone; thus, the lateral support is not disturbed. The ends can be left in situ or excised. The vaginal wall is closed and the Foley catheter removed at the end of surgery or shortly thereafter. In cases in which the sling cannot be identified, formal transvaginal urethrolysis is recommended.

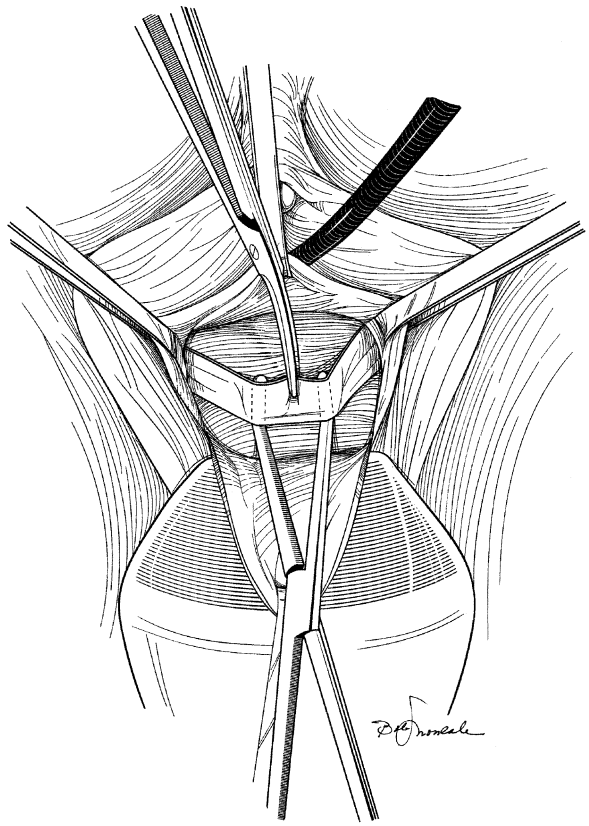

FIGURE 1. *After an inverted U or midline incision, the sling is isolated in the midline and incised. A right-angle clamp may be placed between the sling and the periurethral fascia to avoid injury to the urethra.*

RESULTS

The mean patient age was 57 years (range 35 to 75). All patients reported "normal emptying" before sling surgery. Fifteen women (79%) had an autologous fascial sling, three (16%) an allographic fascia lata sling, and one (5%) a synthetic (polypropylene) sling. The sling was identified and incised in all patients by the described technique. The mean time to takedown of the sling was 10.6 months (range 3 to 72).

Twelve women (63%) presented with partial or complete urinary retention and were dependent on catheterization to empty adequately. Of these 12, 8 also had urge incontinence and 2 had frequency and urgency without urge incontinence. Of the 7 patients who did not present in urinary retention, 4 (21%) had obstructive symptoms and incomplete emptying, but did not depend on regular catheterization to empty. Three of these patients also had frequency, urgency, and urge incontinence. Finally, 3 women (16%) presented primarily with irritative symptoms (2 with urge incontinence) without emptying complaints. Thus, a total of 16 women (84%) had irritative symptoms and 13 (68%) had urge incontinence. Only 1 patient (5%) had stress incontinence. Ten (53%) had recurrent urinary tract infections, and nine (47%) complained of pelvic pain associated with voiding or urgency.

With respect to the urodynamic parameters, detrusor instability was demonstrated in 13 patients (68%). The mean bladder capacity was 404 mL and the mean postvoid residual volume was 339 mL (range 4 to 491). Sixteen women were able to generate a detrusor contraction during urodynamic studies and 3 (16%) could not. Of those who did generate a detrusor contraction, 14 (74% of total) had urodynamic evidence of obstruction by the criteria of both Chassange *et al.*[13] and Nitti *et al.*[14] and 2 (10%) did not meet both criteria. Both of these patients had low pressure–low flow voiding dy-

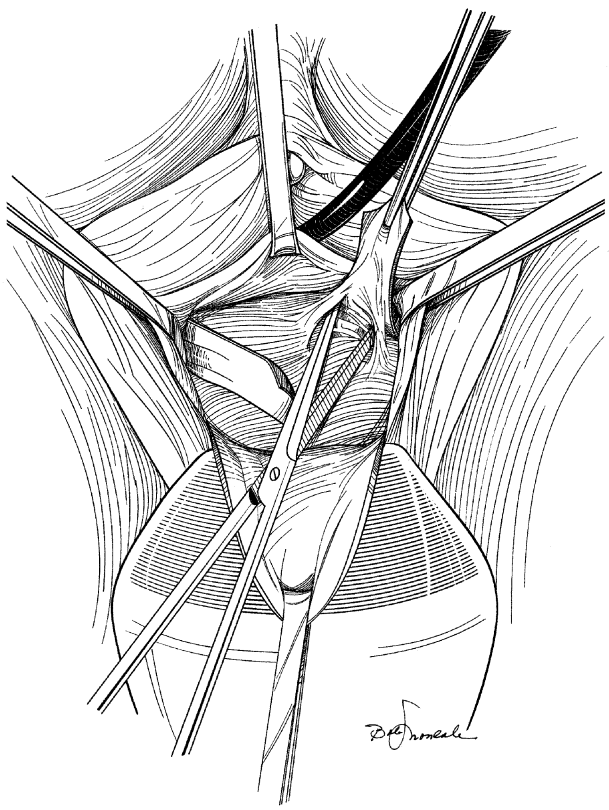

FIGURE 2. *The sling is freed from the undersurface of the urethra toward the endopelvic fascia. Ends may be excised or left in situ.*

namics (detrusor pressure at maximal urinary flow rate [PdetQmax] = 10 cm H_2O with Qmax = 1 mL/s and PdetQmax = 12 cm H_2O with Qmax = 6 mL/s) and evidence of narrowing or acute angulation on the voiding cystourethrography and cystoscopy.

The mean follow-up was 12 months (range 1 to 55). Sling lysis was successful in 16 patients (84%). Three women with urinary retention or incomplete emptying did not improve. The other 13 women with obstructive symptoms and/or retention were cured of those symptoms. In addition, 11 of the 13 had resolution (n = 9) or improvement (n = 2) of their irritative symptoms. All 3 patients with primary complaints of irritative symptoms improved. The mean postoperative postvoid residual urine volume in the successful cases was 5.5 mL (range 0 to 50), and the mean in the unsuccessful cases was 237 mL (range 92 to 320). Two of the women with failure underwent a successful retropubic urethrolysis, and the third was awaiting additional treatment at last follow-up. No preoperative parameters were predictive of failure.

Sling lysis resulted in recurrent stress incontinence in 3 (17%) of 18 women who were stress continent before lysis. Stress incontinence was documented by history and physical examination. In two, it recurred within the first month after surgery and in one at 22 months. Two responded favorably to a transurethral collagen injection and the third underwent a repeated pubovaginal sling 1 year after the takedown. In the patient with stress incontinence before sling lysis, it persisted to the same degree and she chose not to treat it. No significant operative complications, including significant bleeding or urethral injury, occurred.

COMMENT

Suburethral slings are now widely accepted as both primary and secondary treatment for all types of stress incontinence. Numerous techniques have been described, and common sling materials include autologous and allograft fascia and synthetic mesh. Successful placement of a suburethral sling requires a balance between providing support and avoiding obstruction. To date, no standardized technique for determining the ideal sling tension exists, but most experts recommend that the sling be tied without any tension. Adhering to this principle, bladder emptying efficiency is preserved in most cases.[15] However, mechanical outlet obstruction remains a known risk. Transient urinary retention is common, but most patients return to spontaneous voiding within the first 10 days.[3,16] In contemporary series, the risk of permanent urinary retention is 1.1% to 2.4%.[1,2,17] Obstruction can also result in urinary frequency, urgency and urge incontinence, recurrent urinary tract infections, prolonged suprapubic or ilioinguinal pain, and painful voiding, even if emptying is complete.[4] Therefore, it should be considered in patients who present with any persistent voiding dysfunction after pubovaginal sling surgery, even if emptying is complete. In the current study, 16% of patients did not have obstructive symptoms or retention.

The diagnosis of obstruction after incontinence surgery can be difficult to make on the basis of urodynamic criteria alone. We defined urodynamic obstruction according to the pressure flow criteria of Chassange *et al.*[13] (PdetQmax greater than 20 cm H_2O and Qmax 15 mL/s or less) and the videourodynamic criteria of Nitti *et al.*[14] (radiographic evidence of obstruction between the bladder neck and distal urethra in the face of a sustained detrusor contraction). Recently, Blaivas and Groutz[18] described a nomogram for bladder outlet obstruction using noninvasive Qmax and Pdet max during urodynamic testing. We believe that all 14 of our patients deemed "urodynamically obstructed" would have fit the criteria for obstruction on the nomogram; however, adequate noninvasive flow rates were not available for all patients. Several investigators have shown that urodynamic pa-

rameters alone do not predict the response to urethrolysis.[6–8] In addition, 10% to 64% of women in retention will not demonstrate a detrusor contraction during urodynamic studies, yet such patients respond well to urethrolysis.[4,7,8] In these patients, the diagnosis of obstruction can only be inferred based on previous normal voiding and emptying findings. In the current study, 16% could not generate a contraction during urodynamic studies. Classic high-pressure low-flow voiding dynamics do confirm the diagnosis of obstruction, but are not a consistent finding. We believe videourodynamic studies offer an advantage over simple urodynamic studies in this patient population, because of the ability to simultaneously image the bladder outlet. Nevertheless, we believe that the diagnosis of obstruction after anti-incontinence surgery should be made on the basis of the combination of factors listed above. Because obstruction may improve or resolve with time, we prefer waiting 3 months before surgical intervention.

Traditional management of iatrogenic bladder outlet obstruction after anti-incontinence surgery has involved complete urethrolysis, by a retropubic, transvaginal, or suprameatal approach, with reported success rates of 65% to 93%.[4,6–11] Most of these series included patients who were obstructed after a number of different anti-incontinence procedures and only two have stratified their results specifically for pubovaginal slings. Foster and McGuire[7] found that transvaginal urethrolysis was successful in 50% of pubovaginal sling obstructions, which was less than for needle suspension (75%) or retropubic urethropexy (63%). These investigators hypothesized that lateral dissection in the transvaginal approach fails to relieve the direct suburethral compressive force of the sling. Petrou *et al.*[11] reported that the suprameatal approach is superior to the transvaginal approach in these patients, in that it allows access to, and division of, the lateral wings of the sling. Successful results were achieved in 8 of 12 sling patients using this technique. Recurrent stress incontinence is a potential problem after urethrolysis and has been reported to occur in 0% to 19% of women.[4,6–11]

In 1995, Ghoniem and Elgmasy[12] reported successful treatment of a woman in urinary retention with transvaginal sling incision and interposition of a free graft of vaginal wall. Since that time, several small series have reported on successful sling incision with or without vaginal wall graft interposition. Kusuda[19] reported successful outcomes for 5 patients who underwent lateral sling incision. Defreitas and Herschorn[20] had a 94% success rate in 16 women with lateral sling incision, with a 34% rate of recurrent stress incontinence. A lateral incision of the sling might be particularly beneficial to avoid urethral injury in cases in which the sling can be identified, but dissection in the plane between the sling and urethra is difficult. We did not experience this difficulty in any patient in this series. Shenassa *et al.*[21] and McLennan and Bent[22] used vaginal wall interposition in 12 and 4 women, respectively. The success rate was 92% and 100%, respectively, but stress incontinence recurred in 25% in each series. Amundsen *et al.*[23] reported the use of the midline incision in 10 of 32 patients who underwent takedown of pubovaginal sling, in whom the sling was easily identifiable. In the rest, formal urethrolysis with entrance into the retropubic space was necessary. The overall success rate was 84%, but the results were not stratified between the sling incision and formal urethrolysis. These investigators reported that in 9 of 12 obstructing autologous rectus fascia slings, the sling material could not be identified and was replaced by dense fibrosis. We have not found this to be the case and are usually able to identify the autologous fascial sling quite easily. We would agree, however, that if a fascial sling (autologous or allograft) cannot be identified, formal urethrolysis should be performed.

Our success rate of 84% and recurrent stress incontinence rate of 17% are comparable with other series. In addition, our results and those of other sling incision series compare favorably with the formal urethrolysis while sparing the patient a longer and potentially more morbid operation. We experienced no significant complications with this procedure. Two of the 3 women with failure underwent subsequent successful retropubic urethrolysis and the third was awaiting additional treatment at last follow-up. We believe that in cases in which retropubic urethrolysis was successful, scarring within the retropubic space contributed to the failure of the suburethral sling release. Retropubic urethrolysis allows for a complete release of all scarring.

Our finding of recurrent stress incontinence in 17% of patients also compares favorably with other reports. Given this, we do not believe it is necessary to interpose a graft of vaginal wall or fascia between the cut edges of the sling as a theoretical safeguard against recurrent incontinence. In fact, this technique has not been shown to live up to this expectation, with recurrent stress incontinence rates of 25%.[21,22] This is also in agreement with earlier observations on mixed cohorts that concomitant resuspension at the time of urethrolysis is not necessary to prevent stress incontinence.[7,10,11] In the case of pubovaginal slings, it is possible that scarring and adhesions help to maintain lateral support after the suburethral segment is released. When incontinence does recur after sling release, periurethral bulking agents may be all that is required to correct it. In patients who have concom-

itant obstruction and stress incontinence, an argument for a simultaneous repeated incontinence procedure can be made; however, in the case of our patient, obstruction was the overwhelming symptom and therefore a maximal effort was made to relieve it.

CONCLUSIONS

Transvaginal sling incision appears to be a safe and efficacious method to treat obstruction after pubovaginal sling placement. It is technically easier than formal urethrolysis and has a low morbidity. The success rates and recurrent stress incontinence rates compare favorably with formal urethrolysis. It should be considered as a first-line treatment of an obstructing pubovaginal sling.

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EDITORIAL COMMENT

Urethral obstruction and urinary retention after pubovaginal sling placement is a difficult problem for both patient and surgeon. From the patient's perspective, the possibility of postoperative long-term intermittent catheterization or the use of indwelling catheters is one of the most unappealing aspects of anti-incontinence surgery. If patients were informed preoperatively that this complication were likely, very few would trade stress urinary incontinence for postoperative permanent urinary retention or severe frequency, urgency, and obstructive symptoms. Fortunately, long-term obstruction after pubovaginal sling placement is very uncommon in experienced hands. Although it is well accepted that postoperative urinary retention after pubovaginal sling resolves spontaneously in the vast majority of cases, in some it does not. As days and weeks pass, anxiety and discomfort grow. Several questions invariably confront the surgeon during this period. How long is too long to wait for normal voiding to resume? Once iatrogenic obstruction is considered likely, what type of evaluation is necessary before intervention? What is the ideal intervention?

The answers to the first two questions were not intended to be addressed by this report. Most commonly, a combination of variables, including clinical experience, physical examination findings, preoperative voiding dynamics, and patient bother (disgust?) determines when to end the wait for normal voiding to resume. As the authors note, the evaluation and diagnosis of possible urethral obstruction in women is difficult under the best of circumstances using even sophisticated videourodynamic analysis. However, as an answer to the third query, this report does seem to suggest that a simple midline incision of the sling material might be an adequate initial treatment. The results are encouraging, with 83% of patients treated successfully. The incidence of recurrent stress urinary incontinence in this study was acceptably low. It is unclear, however, whether these patients will remain free of stress incontinence in the long term, although with preservation of the lateral support of the urethra as described by the authors, it is possible. I think that most would agree that although the described technique is not new,[1] it is effective and certainly less invasive than formal transvaginal, suprameatal, or retropubic urethrolysis. Furthermore, as the authors note, if this technique were to be ineffective in relieving obstruction, it does not exclude formal urethrolysis in the future.