

SUPRAMEATAL TRANSVAGINAL URETHROLYSIS

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ABSTRACT

Purpose: We describe and assess a method of urethrolysis using a transvaginal suprimeatal approach without lateral perforation of the urethropelvic ligament.

Materials and Methods: Between March 1993 and December 1997, 32 consecutive women 32 to 79 years old underwent suprimeatal transvaginal urethrolysis at 2 institutions. In all cases anti-incontinence surgery was done previously, including a pubovaginal sling procedure in 12, Marshall-Marchetti-Krantz procedure in 8, Burch colposuspension in 6, modified Pereyra transvaginal urethropexy in 4, and Gittes suspension and anterior repair in 1 each. Of the 32 patients 20 were in urinary retention and 12 had primarily urge and/or irritative voiding symptoms, or urge incontinence. In the patients in urinary retention average maximal detrusor pressure was 41.4 cm. water. In all cases physical examination, cystourethroscopy and video urodynamics were done before suprimeatal transvaginal urethrolysis. Obstruction was defined as detrusor pressure greater than 20 cm. water at maximum urinary flow of less than 12 ml. per second. Urethral obstruction was presumed when examination revealed urethral angulation, tethering, narrowing or scarification. Impaired detrusor contractility was diagnosed when detrusor pressure at maximum urinary flow was less than 20 cm. water at maximum urinary flow of less than 12 ml. per second.

Results: After suprimeatal transvaginal urethrolysis 13 of the 20 women (65%) in urinary retention voided well and in 8 of the 12 (67%) with urgency symptoms resolved. Postoperative stress urinary incontinence developed in only 1 case.

Conclusions: The success rate of suprimeatal transvaginal urethrolysis to treat urinary obstruction associated with anti-incontinence procedures compares favorably to that of other described alternative approaches. The success rate in patients with definite urodynamic criteria for obstruction was not significantly better than in those who underwent suprimeatal transvaginal urethrolysis based on physical examination and clinical judgment. Preoperative maximal urinary flow rate was associated with operative success ($p = 0.018$), while preoperative post-void residual urine and maximum detrusor pressure failed to reveal a difference between operative success and failure.

KEY WORDS: bladder, vagina, urethra, urinary incontinence, complications

Bladder outlet obstruction is a troublesome complication of anti-incontinence procedures with a reported incidence of approximately 1 to 5%.¹⁻⁷ Symptoms associated with bladder outlet obstruction include urinary frequency, urgency, urge incontinence, decreased urinary flow, recurrent urinary tract infection and urinary retention. The diagnosis of outflow obstruction after anti-incontinence procedures may be difficult to establish, necessitating urodynamic testing. Although a detrusor contraction of adequate force and duration with low urinary flow indicates obstruction, to our knowledge strict criteria defining obstruction in women have not been defined previously. In addition, some patients do not have a detrusor contraction during the urodynamic study and the diagnosis remains empirical.

Urethrolysis via retropubic and transvaginal approaches has been reported as a technique to correct outflow obstruction in women after anti-incontinence surgery.^{1,8-12} As described by Webster and Kreder, retropubic urethrolysis involves a retropubic takedown and subsequent obturator shelf repair.¹⁰ As described by Nitti and Raz, the transvaginal approach is done through an inverted U-shaped incision in the anterior vaginal wall with the apex halfway between the bladder neck and urethral meatus.⁹ Lateral dissection is performed along the

paraurethral fasciae with sharp perforation of the urethropelvic ligament for entering the retropubic space. The urethra is then mobilized beginning laterally and directed medially with complete mobilization from the underside of the symphysis pubis. The McGuire technique of transvaginal urethrolysis involves a midline or U-shaped incision, as in the approach to a Raz transvaginal urethropexy.^{8,11,13} Access is then obtained directly to the retropubic space and dissection is completed laterally until traction on the Foley catheter reveals increased urethral mobility.^{8,11,13}

We describe a method of urethrolysis using a suprimeatal approach, which allows direct dissection of the ventral portion of the urethra and mobilization of the urethra from the under surface of the symphysis pubis. This approach permits untethering of the urethra under direct vision as well as direct access to the retropubic space to remove sutures and/or adhesions. The method parallels total mobilization of the urethra, as described by Webster and Kreder in their retropubic urethrolysis technique.¹⁰ The difference between this technique and other transvaginal approaches is that lateral perforation of the urethropelvic ligament is not needed, minimizing the chance of recurrent urethral hypermobility and subsequent incontinence. This approach was mentioned by Nitti and Raz⁹ but to our knowledge our article represents the first formally reported series.

MATERIALS AND METHODS

We retrospectively evaluated 32 consecutive women 39 to 79 years old who underwent suprameatal transvaginal urethrolysis at 2 institutions. Transvaginal urethrolysis was performed in patients with a history of anti-incontinence surgery in whom refractory symptoms were thought to be secondary to mechanical urethral obstruction and when a retropubic or suburethral anterior vaginal wall approach was deemed suboptimal. Previous anti-incontinence surgery involved a pubovaginal sling procedure in 12 cases, Marshall-Marchetti-Krantz procedure in 8, Burch colposuspension in 6, modified Pereyra transvaginal urethropexy in 4, and Gittes suspension and anterior repair in 1 each. Average followup was 1.5 years (range 3 months to 6 years).

Patients were grouped for symptomatic analysis according to symptoms after anti-incontinence surgery and the urodynamic diagnosis into group 1—20 in urinary retention and group 2—12 with primarily urge and/or irritative voiding symptoms, or urge incontinence. Cases were also analyzed based on whether the evaluation before urethrolysis revealed definite urodynamic criteria of obstruction or the diagnosis of obstruction was presumed based on physical examination. In groups 1 and 2 average maximum detrusor pressure at maximum flow rate was 41.5 and 45 cm. water, and average post-void residual urine was 490 and 86 cc, respectively.

All patients underwent physical examination, cystourethroscopy and video urodynamics performed with room temperature radiographic contrast medium via a 7F double lumen catheter. Video urodynamics included medium fill cystometry, detrusor pressure and urinary flow determination, assessment of post-void residual urine, and fluoroscopic bladder imaging intermittently during the filling and voiding phases, and with the Valsalva and coughing maneuvers. Scheduled followup included history and physical examination, measurement of urinary flow and post-void residual urine, and repeat urodynamics as clinically indicated. The diagnosis of obstruction was considered definite based on maximum urinary flow less than 12 cc per second and detrusor pressure at maximum urinary flow greater than 20 cm. water. The diagnosis was presumed when physical examination revealed urethral angulation or tethering, cystoscopy showed urethral narrowing or scarification, or there was a temporal relationship between anti-incontinence surgery and the onset of voiding dysfunction.

For suprameatal transvaginal urethrolysis the patient is prepared and draped in a modified dorsal lithotomy position, and a 16F Foley catheter is passed into the bladder. A semi-lunar, inverted U-shaped incision is made through the vestibular epithelium between the 9 and 3 o'clock positions 1 cm. from the urethral meatus (fig. 1). Allis clamps are placed on the inferior and superior margins of the incision. With the urogenital diaphragm on tension the perineal membrane is incised in the midline using Metzenbaum scissors with traction on the inferior Allis clamp. A plane is dissected with a Metzenbaum scissor just above the urethra. With combined sharp and blunt dissection the urethra, vesical neck and bladder are freed from the pubic and pelvic attachments anteriorly and laterally, and the pubovesical ligament medially (fig. 2).¹⁴ The index finger is then passed ventral to the bladder and into the retropubic space of Retzius. Downward pressure of the index finger places tension on the obstructing tissue, which may then be mobilized or incised under direct vision. With a sweeping motion of the index finger from medial to lateral iatrogenic and reactive attachments to the urethra may be bluntly and/or sharply disrupted (fig. 3).

When obstruction is caused by a pubovaginal sling, dissection may be carried laterally until the wings of the sling are easily identified. The wings may then be mobilized and sharply incised with Mayo scissors or a knife (fig. 4). When obstruction is due to sutures from retropubic or transvaginal

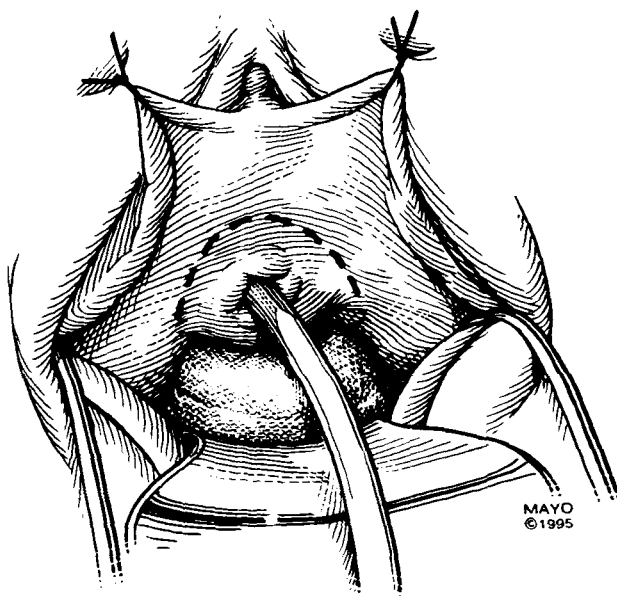


FIG. 1. Inverted U incision is made between 9 and 3 o'clock positions 1 cm. from urethral meatus.

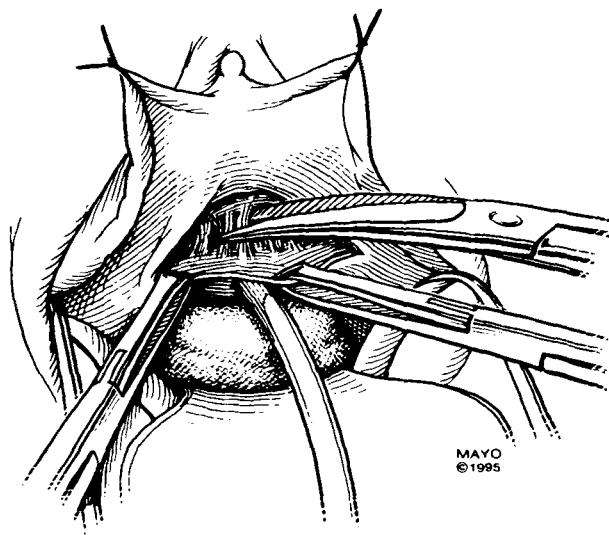


FIG. 2. Plane is dissected above urethra to base of symphysis pubis.

suspension, dissection performed to free the urethra from the posterior side of the symphysis pubis identifies these sutures well. The obstructing sutures may be easily palpated with the index finger, and then individually palpated and divided. In some cases it may be advisable to place a Martius or omental graft between the pubis and urethra to prevent repeat tethering and recurrent obstruction.

After adequate mobilization cystourethroscopy is performed to ensure that no bladder or urethral injury has occurred. Closure is completed with interrupted 2-zero polyglactin sutures. Depending on clinical circumstances, a Foley catheter remains indwelling for drainage for approximately a week or a suprapubic tube is placed and a voiding trial is initiated the next day.

RESULTS

After suprameatal transvaginal urethrolysis 13 of the 20 group 1 patients voided, while 1 each had stress urinary

TABLE 1

	Group 1	Group 2
No. pts.	20	12
Av. cc post-void residual urine (range)	490 (265-1,100)	86 (10-250)
Av. cc/sec. max. urinary flow (range)	Less than 1 (0-7.5)	6.7 (2.75-21.00)
Av. cm. water max. detrusor pressure at max. flow rate (range)	41.5 (0-123)	45 (0-83)
No. pts. postop.:		
Stress urinary incontinence	1	0
Urge incontinence	1	4
Success	13	8

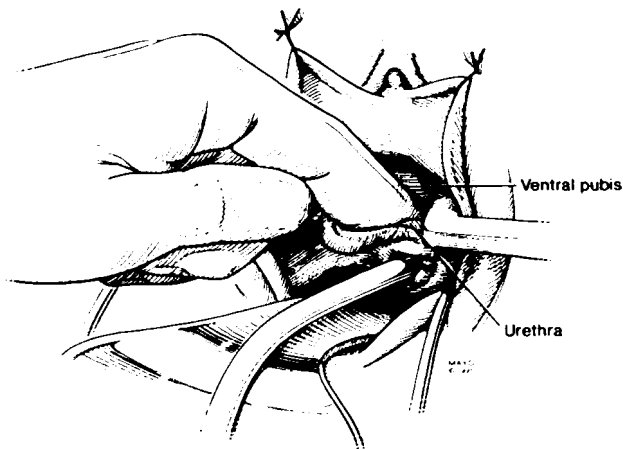


FIG. 3. Index finger may be used to untether urethra from under-side of symphysis pubis.

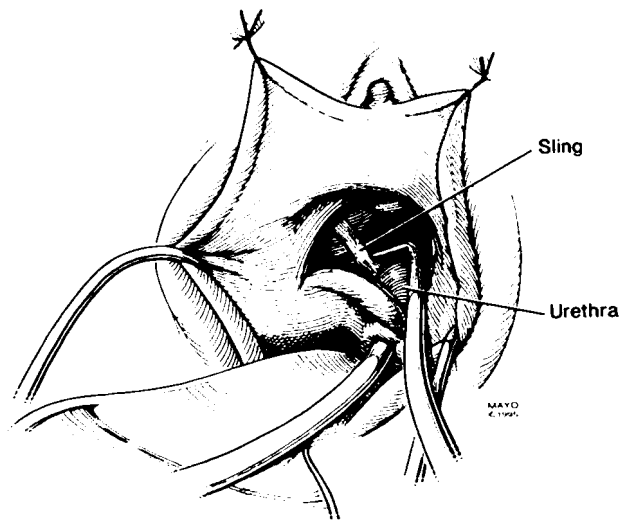


FIG. 4. Lateral dissection may identify wings of obstructing sub-urethral sling.

incontinence and urge incontinence (table 1). In 8 of the 12 group 2 patients symptoms resolved after suprimeatal transvaginal urethrolysis. Of the 4 patients in whom surgery failed 3 had persistent urgency and urge incontinence, while 1 had only urgency. Postoperative stress urinary incontinence did not develop in any of the 12 cases. Average post-void residual urine decreased to 27 ml. from a preoperative value of 86 ml. (table 1).

Of the 12 patients with obstruction secondary to a pubo-

vaginal sling 7 underwent urethrolysis due to urinary retention, while 5 had irritative symptoms. Of the 7 women in urinary retention 5 were rendered catheter-free and 2 continued to perform clean intermittent catheterization (71% success). Of the 5 women with irritative symptoms 3 no longer had urinary urgency or urge incontinence after urethrolysis. In comparison, women who underwent suprimeatal transvaginal urethrolysis due to obstruction from a modified Pereyra urethropexy did even better. The 2 patients in urinary retention voided, and the 2 with irritative and urgency symptoms were asymptomatic after urethrolysis. Results in patients with obstruction due to a Burch or Marshall-Marchetti-Krantz urethropexy were not as good (tables 2 and 3).

Repeat analysis of the data based on urodynamic criteria revealed that 25 patients had definite criteria of obstruction, while 7 had presumed obstruction. Of the 25 patients with absolute obstruction urethrolysis was successful in 17 (68%) and failed in 8. Of the 7 patients with presumed obstruction surgery was successful in 4 (57%) and failed in 3. The difference between the 2 success rates was not statistically significant (table 4). In 9 of the 11 women in whom urethrolysis failed postoperative diagnostic evaluation, including physical examination and urodynamic studies, revealed persistent detrusor instability in 3, impaired or absent detrusor contractility in 3, continued mechanical obstruction in 2 and learned voiding dysfunction in 1.

DISCUSSION

Bladder outlet obstruction is an unfortunate complication of anti-incontinence surgery.^{1-3,5} Although combined urodynamics, endoscopic evaluation and physical examination have been performed by others to diagnose obstruction, it may be difficult to establish.^{9,11,12} Zimmern et al described a simple transvaginal approach to treat infravesical outlet obstruction after the Marshall-Marchetti-Krantz operation.¹ Other previously described urethrolysis techniques involve retropubic dissection, transvaginal lateral dissection and transvaginal lateral-to-medial dissection.⁹⁻¹¹ Our technique is different in that it involves a direct midline suprimeatal approach with visualization of obstructing sutures or an obstructing sling. This method also differs from the transvaginal lateral dissection approach described by Foster and McGuire.¹¹ They suggested that transvaginal lateral dissection is theoretically more efficacious for needle suspension or retropubic urethropexy than the pubovaginal sling because it involves lateral dissection. The potential advantage of suprimeatal transvaginal urethrolysis over the transvaginal

TABLE 2. Obstruction secondary to pubovaginal sling

	No. Pts.
Overall	12
Retention/postop. success	7/5
Urgency or urge incontinence/postop. success	5/3

TABLE 3. Obstruction secondary to nonpubovaginal sling

	No. Pts.
Overall	20
Retention	13
Urgency or urge incontinence	7
No. postop. success/total No.:	
Retention	8/13
Urgency	5/7
Retention, Burch procedure	3/5
Retention, modified Pereyra procedure	2/2
Retention, Marshall-Marchetti-Krantz procedure	3/5
Retention, anterior repair	0/1
Urgency, Burch procedure	1/1
Urgency, modified Pereyra procedure	2/2
Urgency, Marshall-Marchetti-Krantz procedure	1/3
Urgency, Gittes procedure	1/1

TABLE 4

Obstruction	No. Pts.		Total No.
	Success	Failure	
Absolute criteria	17	8	25
Presumed criteria	4	3	7
Totals	21	11	32

approach with lateral dissection is that the obstructing medial sutures of a Marshall-Marchetti-Krantz or Burch procedure, or the obstructing wings of a suburethral sling may be more easily identified. In addition, the lateral endopelvic fascial urethral support is not compromised and lateral dissection is limited. Nevertheless, our results still show that the modified Pereyra procedure is reasonably efficacious. The method that we report differs from the transvaginal lateral-to-medial dissection technique in that the lateral urethropelvic ligament is not formally perforated, allowing continued urethral support by this anatomical structure and precluding the need for repeat suspension after urethrolysis is completed.⁹ Not suspending the urethra again resulted in an insignificant rate of postoperative stress incontinence in our series with only 1 patient having this complication.

The results of suprimeatal transvaginal urethrolysis compare favorably to those of previously reported methods. The conversion of 13 of 20 cases (65%) from dependence on clean intermittent catheterization to spontaneous voiding compares well with the findings of others. Nitti and Raz noted conversion of 1 of 9 cases from clean intermittent catheterization to successful voiding.⁹ While this review also compares well to the 54% success rate described by Foster and McGuire for women in urinary retention,¹¹ it is not as good as the 100% success rate (5 of 5 women) for complete retention or 84% (21 of 25) for retention and incomplete emptying, as later reported by Cross et al.¹³ Although this success rate is not as high as that of the retropubic approach described by Webster and Kreder, in the latter study no patient was treated in whom obstruction was secondary to a suburethral sling.¹⁰ Foster and McGuire observed a decreased rate of success of urethrolysis after a pubovaginal sling procedure.¹¹ When reviewing cases of obstruction due to a pubovaginal sling, this approach is satisfactory with overall 66% success (8 of 12 cases).

We and others^{9, 11-13, 15} have failed to clarify the precise role of urodynamics in the diagnosis and prediction of operative success or failure. To help determine predictive urodynamic data for operative success and failure we examined the 3 preoperative urodynamic variables of post-void residual urine, maximum urinary flow and maximum detrusor pressure at maximum urinary flow. These variables were analyzed separately in groups 1 and 2, and then combined in both groups. Using a rank sum test the only significant variable between later success versus failure was maximum urinary flow in both groups combined ($p = 0.018$). However, the questionable value of urinary flow rates tempers this finding.⁷ Analysis of preoperative post-void residual and maximum detrusor pressure failed to reveal a difference between operative success and failure. These findings have been confirmed by others.^{12, 13} Urethrolysis may fail for a number of reasons, including recurrent or persistent urethral

obstruction, learned voiding dysfunction, impaired detrusor contractility and detrusor instability. We noted all of these etiologies in our operative failures.

CONCLUSIONS

Urethrolysis may be accomplished by 1 or more of 3 basic surgical approaches, including the retropubic approach, transvaginal approach with lateral suburethral dissection and transvaginal approach with suprimeatal dissection as described. Due to surgical anatomy this latter technique may be most suitable when the urethra is fixed and obstructed in a high retropubic position, and surgical access is technically difficult via the transvaginal lateral suburethral approach. In regard to the evaluation of urethral obstruction in women secondary to an anti-incontinence procedure, our findings indicate that a history, including the temporal association of surgery and symptoms, and thorough physical examination remain as valuable as preoperative urodynamic testing.

REFERENCES

- Zimmern, P. E., Hadley, H. R., Leach, G. E. and Raz, S.: Female urethral obstruction after Marshall-Marchetti-Krantz operation. *J. Urol.*, **138**: 517, 1987.
- McDuffie, R. W., Litin, R. B. and Blundon, K. E.: Urethrovaginal suspension (Marshall-Marchetti-Krantz). Experience with 204 cases. *Amer. J. Surg.*, **141**: 297, 1981.
- Spencer, J. R. and O'Connor, V. J., Jr.: Comparison of procedures for stress urinary incontinence. AUA Update Series, vol. VI, lesson 28, 1987.
- Lockhart, J. L., Tirado, A., Morillo, G. and Politano, V. A.: Vesicourethral dysfunction following cystourethropepy. *J. Urol.*, **128**: 943, 1982.
- Kelly, M. J., Zimmern, P. E. and Leach, G. E.: Complications of bladder neck suspension procedures. *Urol. Clin. N. Amer.*, **18**: 339, 1991.
- Pow-Sang, J. M., Lockhart, J. L., Suarez, A., Langman, H. and Politano, P. A.: Female urinary incontinence: preoperative selection, surgical complications and results. *J. Urol.*, **136**: 831, 1986.
- Massey, J. A. and Abrams, P. H.: Obstructed voiding in the female. *Brit. J. Urol.*, **61**: 36, 1988.
- McGuire, E. J., Letson, W. and Wang, S.: Transvaginal urethrolysis after obstructive urethral suspension procedures. *J. Urol.*, **142**: 1037, 1989.
- Nitti, V. W. and Raz, S.: Obstruction following anti-incontinence procedures: diagnosis and treatment with transvaginal urethrolysis. *J. Urol.*, **152**: 93, 1994.
- Webster, G. D. and Kreder, K. J.: Voiding dysfunction following cystourethropepy: its evaluation and management. *J. Urol.*, **144**: 670, 1990.
- Foster, H. E. and McGuire, E. J.: Management of urethral obstruction with transvaginal urethrolysis. *J. Urol.*, **150**: 1448, 1993.
- Carr, L. K. and Webster, G. D.: Voiding dysfunction following incontinence surgery: diagnosis and treatment with retropubic or vaginal urethrolysis. *J. Urol.*, **157**: 821, 1997.
- Cross, C. A., Cespedes, R. D., English, S. F. and McGuire, E. J.: Transvaginal urethrolysis for urethral obstruction after anti-incontinence surgery. *J. Urol.*, **159**: 1199, 1998.
- Kennedy, W. T.: Incontinence of urine in the female. *Amer. J. Obst. Gynec.*, **33**: 19, 1937.
- Ghoniem, G. M. and Elgamasy, A. N.: Simplified surgical approach to bladder outlet obstruction following pubovaginal sling. *J. Urol.*, **154**: 181, 1995.