Management of Urinary Fistulas Due to Midurethral Sling Surgery

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Purpose: We report our experience with the diagnosis and treatment of women with urinary fistula after mid urethral sling surgery.

Materials and Methods: We retrospectively reviewed the records of patients with urinary fistula secondary to mid urethral sling surgery. Electronic medical records and billing records were searched. We analyzed sling type, presenting symptoms and interval from initial sling surgery to 1) symptom appearance, 2) fistula diagnosis and 3) fistula repair. Symptomatic outcomes were assessed by PGI-I. Surgical outcomes were based on history and examination.

Results: We identified 10 women with a mean age of 58 years (range 37 to 70). Mean interval from mid urethral sling surgery to symptom onset, diagnosis and fistula repair was 2, 16 and 18 months, respectively. Mean followup was 26 months (range 4 to 96). There were 1 ureterovaginal, 1 enterovesical, 6 vesicovaginal and 7 urethrovaginal fistulas. Patients presented with stress urinary incontinence (70%), unaware incontinence (50%), overactive bladder (40%), pelvic pain (30%) and voiding symptoms (20%). Nine women underwent fistula repair and 1 underwent continent urinary diversion. A Martius flap was used in 6 of 9 patients, an omental flap and a bladder wall flap were used in 2 each, urethral reconstruction and ureterocolovesicostomy were performed in 1 each and 7 received an autologous pubovaginal sling. Seven patients (78%) underwent successful fistula repair. A successful symptomatic outcome was achieved in 5 of 7 women with stress urinary incontinence, 3 of 5 with unaware incontinence, 3 of 4 with overactive bladder, 2 of 3 with pelvic pain and 2 of 2 with voiding symptoms.

Conclusions: With careful attention to surgical principles and technique, including removal of as much of the adjacent mesh as possible, a successful outcome can be achieved in most patients with a fistula secondary to mid urethral sling surgery.

Key Words: urethra, fistula, suburethral sling, surgical mesh, postoperative complications

Abbreviations and Acronyms

MUS = mid urethral sling

OAB = overactive bladder

PGI-I = Patient Global Impression of Improvement

SUI = stress urinary incontinence

TVT = tension-free vaginal tape

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In the last 2 decades MUS has become the most commonly performed surgery for SUI in women.[1] More than 1 million TVT procedures were performed between 1996 and 2007, and by now more than 3 million MUS operations have been performed.[2] Minimally invasive techniques have gained popularity due to efficacy, short operative time and quick recovery.[3] However, complications can arise from MUS surgery, including pelvic organ perforation, urethral obstruction, urinary tract infection, erosion of the bladder, urethra and vagina, chronic pelvic pain and urinary fistula.[2,4,5]

Fistulas after MUS surgery have rarely been reported in the peer reviewed literature and to our

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knowledge there is no single case series.[6,7] We present our experience with patients referred to our tertiary care center who were found to have a urinary fistula after MUS surgery.

METHODS

We retrospectively reviewed the records of consecutive patients referred due to complications after sling surgery who were found to have urinary fistulas. Electronic medical records and billing records were searched for prior sling surgery and urinary fistulas from 1997 to 2013.

Baseline assessment at presentation included history and physical examination, a validated lower urinary tract symptom score questionnaire and cystourethroscopy. Select patients underwent videourodynamic studies and voiding cystourethrogram. Treatment was individualized based on clinical findings. Postoperative evaluation included history, physical examination, and lower urinary tract symptom score and additional studies on an individual basis. Furthermore, each patient completed the PGI-I questionnaire for each preoperative symptom.

The data analyzed were sling type, symptoms at presentation and the intervals from initial sling surgery to symptom appearance, fistula diagnosis and fistula repair. Symptomatic outcomes were assessed by the PGI-I using the scores 1—success, 2 or 3—improvement and 4 to 7—failure. Success or failure of fistula repair was based on history and examination.

RESULTS

Ten women were found to have genitourinary fistulas. No patient was initially operated on by one of us. Mean age at presentation was 58 years (range 37 to 70). Mean followup was 26 months (range 4 to 96). Mean time from initial sling surgery to symptom appearance, fistula diagnosis and fistula repair was 2 months (range 1 week to 10), 16 months (range 1 to 36) and 18 months (range 4 to 36), respectively. Five patients underwent prior partial or complete sling removal due to complications, including urethral erosion in 3, sling infection in 1 and enterovesical fistula in 1. The original mesh sling was composed of monofilament polypropylene mesh in 6 cases (60%), polytetrafluoroethylene in 2 (20%), polyester in 1 (10%) and cadaveric tissue in 1 (10%). Each sling was placed with a retropubic approach.

Table 1 lists presenting symptoms, fistula type, diagnosis, interval from initial surgery to fistula repair, operation performed and surgical outcome. Five patients had 2 synchronous fistulas. The fistula was apparent on physical examination in only 4 patients. The remaining fistulas were identified by cystourethroscopy or voiding cystourethrogram, or at surgery (fig. 1). In 2 patients an obvious cherry red granuloma obscured the fistula (fig. 2). The woman in whom the fistula was discovered intraoperatively had undergone 2 prior mesh sling procedures and presented with severe OAB, sphincteric incontinence and vaginal extrusion. At surgery a large urethrovaginal fistula was identified at the bladder neck and proximal urethra that was not previously apparent. Nine patients were treated with fistula repair and 1 underwent continent urinary diversion. In 6 of these 9 patients the relevant adjacent portion of the sling was excised and in 3 it was not identified. Two of the latter 3 patients had undergone complete sling removal elsewhere. The third patient did not know that she had a mesh sling and her previous operative reports did not specifically mention it. Tissue excised during surgery was identified as mesh in the pathology report. Thus, it was not completely removed and the repair failed.

We used a Martius flap in 6 cases, an omental flap in 2 and a bladder wall flap in 2. Urethral reconstruction and ureterocolovesicostomy were done in 1 patient each and an autologous fascial pubovaginal sling was placed in 7. The patient with

Table 1. *Presenting symptoms, fistula type, diagnosis, time to repair, treatment and surgical outcomes*

		Fistula				
Pt No.	Presenting Symptoms	Type	Seen on Physical Examination	Initial Surgery-Repair (mos)	Treatment	Surgical Outcome
1	SUI, OAB, pain, voiding symptoms	Urethrovaginal	No	12	Primary closure, omental flap + autologous sling	Success
2	SUI	Urethrovaginal	Yes	7	Primary closure, Martius flap + autologous sling	Success
3	SUI, unaware incontinence	Urethrovaginal	Yes	4	Primary closure, Martius flap + autologous sling	Failure
4	SUI, OAB	Urethrovaginal	No	36	Urethral reconstruction, Martius flap + autologous sling	Success
5	SUI, unaware incontinence	Urethrovaginal/vesicovaginal	Yes	24	Primary closure, Martius flap + autologous sling	Success
6	SUI, voiding symptoms	Urethrovaginal/vesicovaginal	No	12	Primary closure, Martius flap + autologous sling	Success
7	SUI, unaware incontinence, OAB	Urethrovaginal/vesicovaginal	No	11	Primary closure, Martius flap + autologous sling	Success
8	Unaware incontinence	Ureterovaginal/vesicovaginal	No	25	Bilat ureterocolovesicostomy, omental flap + bladder wall flap	Failure
9	Unaware incontinence, pain	Vesicovaginal	Yes	24	Primary closure + bladder wall flap	Success
10	OAB, pain	Vesicovaginal/enterovesical	No	24	Continent urinary diversion	Success

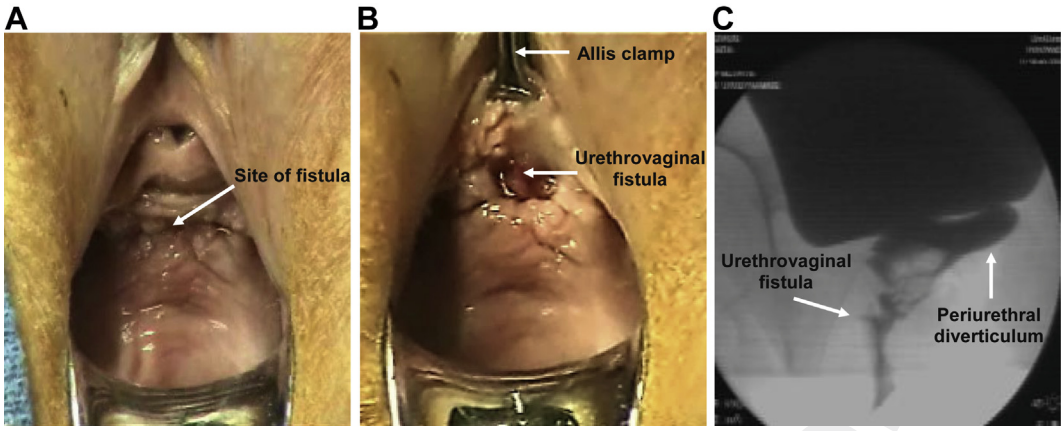

Figure 1. *A*, in woman with urethrovaginal fistula physical examination did not show fistula. *B*, at surgery traction on Allis clamp exposed fistula. *C*, voiding cystourethrogram reveals urethrovaginal fistula and periurethral diverticulum.

the enterovesical fistula ended up with a small, low compliance bladder that did not seem to be functionally useful. The decision was made to perform partial cystectomy and continent urinary diversion.

In 7 of 9 patients (78%) fistula repair was successful. One patient in whom it failed had a history of radiotherapy for cervical cancer. She had an approximately 6 × 6 cm defect that was not suitable for primary closure. A detubularized patch of colon was anastomosed to the posterior bladder wall and omentum was interposed between the vagina and the ureterocolovesical anastomosis. Repair also failed in the patient with retained mesh material, as described. Table 2 lists symptomatic outcomes [T2] categorized as success, improvement or failure based on the PGI-I.

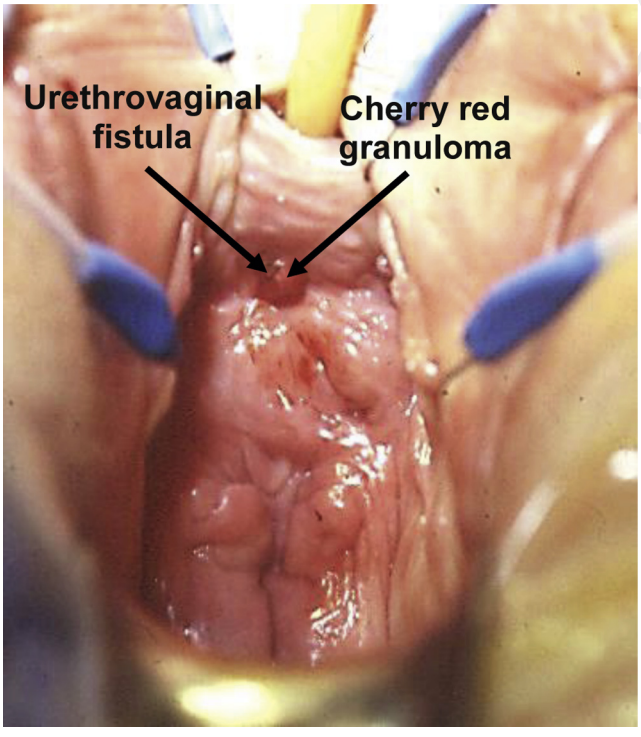

Figure 2. Cherry red granuloma masks urethrovaginal fistula.

DISCUSSION

Since the introduction of mid urethral TVT by Ulmsten and Petros in 1995,[8] its popularity has immensely increased and it is now the most common operation for sphincteric incontinence in the world. However, complications may be devastating and have a major impact on patient quality of life.[1,3,9]

Recent studies suggest that not only the severity but also the frequency of complications after sling surgery is considerably higher than previously recognized.[2,4,5,10–12] To our knowledge there has been no case series of urinary fistula after sling surgery to date. A literature review revealed only a few case reports.[7,13–18]

Risk factors associated with genitourinary fistulas are the same as those that predispose to mesh erosion. They include a history of pelvic surgery, excessive tensioning of the sling, improper dissection, urogenital atrophy, pelvic irradiation, history of cancer or presence of infection.[14,18] Underlying medical conditions, including congenital diseases involving collagen synthesis and structure, were also reported as risk factors for complications after sling surgery.[17] Nine of our patients had undergone

Table 2. *Symptomatic outcomes assessed by PGI-I*

	No. Pts	No. Success (%)	No. Failure (%)
SUI	7	5 (71)	2 (29)
Unaware incontinence	5	3 (60)	2 (40)
OAB	4	3 (75)	1 (25)
Pelvic pain	3	2 (67)	1 (33)
Voiding symptoms	2	2 (100)	0

at least 1 other pelvic operation in addition to the sling, including comprising hysterectomies, pelvic organ prolapse surgeries, failed sling excisions and previous attempts at fistula closure. One patient had received radiation for cervical cancer.

The intervals from sling surgery to symptom appearance, diagnosis and fistula repair vary. In our series the longest intervals were 10, 36 and 36 months, respectively, but intervals up to 8 years were reported.[7] Sahin et al reported on a woman who presented with a vaginocutaneous fistula and an inguinal abscess 6 years after a TVT operation.[18] These data are particularly important because the majority of studies of sling safety and efficacy are of much shorter duration (usually 1 year or less) than the interval during which fistulas may develop. This suggests that complications of MUS are more common than described in the peer reviewed literature.[2] We are unaware of any long-term studies in which fistulas were reported after MUS.[19–22] We believe that while it is likely that fistulas are more common than reported, the actual incidence is quite low at well under 1%.

Estevez et al concluded that 2 types of urethrovaginal fistulas can be distinguished according to time from the initial lesion to the onset of clinical symptoms.[15] 1) Short-term fistulas are probably due to an unknown intraoperative organ injury or to excessive tensioning of the sling. 2) Long-term fistulas diagnosed after several months may have a different complex pathophysiology. Clavé et al reported that the histological appearance of periprosthetic (mesh) tissue was consistent with acute infection in 44% of 84 explanted slings and with chronic inflammation in 42%.[23] Furthermore, on scanning electron microscopy they found that 42% of mesh implants underwent degradation after they had been in place at least 3 months. Degradation appeared as peeling of the fiber surface, transverse cracks, disintegrated surfaces, and partially detached material and flaking. We hypothesize that mesh infection/inflammation/degradation may all contribute to late development of fistulas.

Although all of our patients complained of incontinence, most had other symptoms that may have obfuscated the fistula diagnosis, such as OAB, voiding dysfunction and pelvic pain. In fact, fistula was suspected in only 2 patients and apparent on examination in only 4. The remaining fistulas were found by cystoscopy and cystography/voiding cystourethrogram, and only 1 was found at surgery. To further confound the problem recurrent sphincteric incontinence and urinary fistula coexisted in 7 of the 10 patients. This underscores the importance of maintaining a high index of suspicion and completely evaluating women with persistent symptoms after MUS.

To that end it is essential for the examiner to witness urinary loss from the urethral meatus during stress maneuvers to document sphincteric incontinence. When there is the slightest suspicion of a fistula, the urethral meatus should be occluded and the vagina should be checked for leakage. Further, we recommend that cystoscopy be done routinely in women presenting with incontinence after MUS and there should be a low threshold to obtaining videourodynamics and/or voiding cystourethrogram (fig. 1, *C*). Other diagnostic tools such as 3-dimensional endovaginal ultrasound and magnetic resonance imaging have also been used[14] but we have not found them to be necessary.

Selection of the surgical technique depends on 3 main factors, including 1) ease of surgical exposure, 2) local anatomy, pliability and vascularity of the tissue surrounding the fistula and 3) history of radiotherapy. Because adequate exposure is exceedingly important, the surgeon should be adept at doing whatever is necessary to achieve it. The 2 possible approaches are transabdominal (transvesical or bladder splitting) and transvaginal (lithotomy or prone). The transabdominal route may be accomplished in open or laparoscopic/robotic fashion. The prone position is especially useful for fistulas that are difficult to visualize just proximal to the bladder neck or on the anterior vaginal wall when excessive scarring limits mobilization. As a general rule, the chosen route should be whatever the surgeon is most comfortable with that will provide optimal exposure.

Well vascularized tissue flap interposition is an important adjunct to successful repair. The need for a flap is best judged at surgery by the appearance of the tissue. It is not necessary when tissues appear healthy, pliable and well vascularized, and the fistula edges can be approximated loosely in several layers. When even one of these conditions is not met, we recommend a flap. In our judgment all patients in this series required a flap. Nevertheless, in the rare event that these conditions are met we do not believe that a flap is necessary. All adjacent mesh must be completely excised, leaving well vascularized, supple tissue for closure. The most commonly used flaps are the labial fat pad (Martius flap), peritoneum and omentum.[6,24] Bladder wall flaps can also be used for large defects not suitable for primary closure. When a vaginal approach has been used, we have never found a reason to do anything other than a Martius flap. However, for a radiation fistula we would recommend a gracilis muscle flap. With an abdominal approach we prefer omentum except for radiation fistulas, for which we recommend a seromuscular intestinal or rectus muscle flap.

When there is concomitant sphincteric incontinence, we prefer to repair it with an autologous rectus fascial sling at the same time as fistula repair and place a Martius flap between the reconstructed urethra and the autologous sling. Using this method a successful outcome has been achieved in 93% of our cases.[25] Others recommended that sling surgery be staged but another synthetic sling is contraindicated.[26]

Several determinants of unsuccessful fistula repair have been described, including small bladder size, prior repair attempts, pelvic radiation, vaginal scarring and circumferential urethral involvement.[27,28] There is conflicting evidence with regard to fistula size.[27,29] Only 1 of our patients had received radiation for cervical cancer. She presented with unaware incontinence, and a large vesicovaginal and ureterovaginal fistula. Despite undergoing what appeared to be optimal bilateral ureterocolovesicostomy with bladder and omental flap interposition the fistula repair failed. The 2 patients in whom repair failed had slings made of monofilament polypropylene. Although complications of multifilament slings have been reported,[30] we cannot draw a conclusion at this time about sling type (monofilament vs multifilament) as a risk factor for fistula.

The current study has the limitations of a small retrospective case series. Also, since none of the patients underwent the original sling operation at our institution, we could not assess the incidence of fistula after MUS. Nevertheless, to our knowledge this is the largest series in the peer reviewed literature to date. Other strengths include the use of well-defined, validated outcome tools to assess subjective and objective criteria as well as the fairly long followup.

CONCLUSIONS

Despite the high success rate of MUS and the low reported incidence of fistulas one should keep this diagnosis in mind when patients present with recurrent incontinence with or without other lower urinary tract symptoms even many years after the initial surgery. As this series demonstrates, with meticulous attention to the principles of fistula repair, including removal of the relevant adjacent portion of the sling, a successful outcome can be achieved in the majority of patients.

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