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Bladder perforation after TVT-SecurTM procedure: how secure is TVT-SecurTM?

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Abstract

Background A rare but challenging complication of midurethral tape procedures is perforation of the tape through the bladder wall.

Cases We saw three patients in whom unrecognized bladder perforation during TVT-SecurTM procedures occurred. It took an average follow-up time of 11 months before the bladder perforations were identified by introital ultrasound. Complete excision of the mesh was achieved endoscopically (TURP resectoscope) and/or by traditional vaginal tape removal techniques. Following tape removal, there has been no recurrence of urinary tract infections, and the irritative voiding symptoms have resolved in all three cases.

Conclusions Bladder perforation after mini-sling procedures can be managed using a combined transurethral/vaginal approach. This technique is minimally invasive, safe, and successful. Careful introital ultrasound should be performed in patients presenting with new lower urinary tract symptoms after sling surgery to avoid delays in diagnosing bladder perforation.

Keywords Bladder perforation · Complications · Mini-slings · Stress urinary incontinence · Synthetic mesh · Tension-free vaginal tape

Introduction

The tension-free vaginal tape (TVT) is the gold standard for treatment of female stress urinary incontinence (SUI) and has success rates of up to 90 % [1]. This high success rate is also confirmed by the 17-year follow-up data recently published by Nilssen et al. [2]. The most commonly reported complication of the retropubic tape is inadvertent bladder perforation during surgery [1, 3]. The incidence of bladder perforation after TVT insertion ranges from 3 to 6 % [4, 5]. Recognized intraoperatively, bladder perforation can be easily managed with removal and reinsertion of the TVT trocar outside the bladder, followed by transurethral catheter placement for bladder decompression. Undiagnosed, it may cause potentially serious postoperative complications such as hematuria, irritative bladder symptoms, pelvic pain, recurrent urinary tract infections, bladder stones, and sinus tract formation. A second generation of slings was introduced, the TVT-OTM, with the aim of reducing these mesh-related complications by passing the tape through the obturator foramen, thereby avoiding the bladder area [6]. Compared to the TVT, the transobturator approach successfully reduced bladder perforation, but a different complication profile emerged including higher rates of dyspareunia, persistent pain, and neurologic symptoms in the groin and thigh region [6, 7]. To avoid these complications, a third tape generation was introduced, the mini-sling (TVT-SecurTM) [8]. According to the manufacturer's recommendations, it is at the surgeon's discretion to perform a urethrocytoscopy following a TVT-SecurTM placement in hammock (H) position. Therefore, possible bladder perforation during the procedure may go unnoticed [9]. Patients with bladder perforation can initially present with a variety of mild symptoms that are likely underdiagnosed and underreported [1]. We

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saw three patients with unrecognized TVT-Secur™ mesh perforation of the bladder who had similar histories in terms of diagnosis, treatment, and outcome. We present all three case histories below while discussing the first case in greater detail.

Case report 1

A 71-year-old woman had a several-year history of severe SUI. After all conservative treatments failed, she underwent a mini-sling procedure (TVT-Secur™, H position, Gynecare) in another hospital. The short-armed TVT-Secur™ eliminates the need for exit incisions, thereby avoiding injury of structures at risk such as the intestine and bladder. Eight months after the intervention, the patient presented to our bladder center with irritable bladder symptoms, persistent SUI, reduced urine flow, and an increased post-void residual urine volume of about 150 ml. Since the sling intervention, the patient had undergone various diagnostic procedures (two 0° and 12° cystourethroscopies and normal CT scan) and repeated long-term antibiotic treatment for recurrent urinary tract infections (UTI) including febrile episodes.

An introital ultrasound examination was performed, which immediately revealed the cause of her symptoms: (1) perforation of the bladder base in the retropubic area on the left (Fig. 1), and (2) cranial displacement of the TVT-Secur™, which caused high tension and pinch cock action on the urethra at the level of the bladder neck (positive snap phenomenon as determined by Hegar urethral sounding [10]). The dystopic tape position explained the high residual urine volume with therapy-refractory infections/febrile

episodes and overactive bladder (OAB) symptoms. The third cystoscopy, performed with a 70° lens, confirmed a partially intravesical TVT-Secur™ despite poor visualization due to bloody, turbid urine (Fig. 2).

Under anesthesia, the tape was completely removed using a combined transurethral (TURP resectoscope) and vaginal approach. The suburethral portion of the vaginal mucosa was incised and the residual part of the mesh was completely removed. The small inadvertent bladder wall damage did not require repair. No other intraoperative complications occurred. To ensure complete mucosal healing, a 14-French Foley catheter was kept on free drainage for 7 days. All symptoms—infection, OAB, and pain—resolved promptly. After 3 months of pessary treatment, a “classical” first generation TVT procedure was performed, since the patient experienced recurrent incontinence due to a short, low-pressure urethra immobilized by excessive scar tissue (intrinsic urethral sphincter deficiency).

Since that second intervention, the patient has been continent and able to void her bladder without residual urine. Her pain disappeared and she has had no further episodes of recurrent UTI at 18-month follow-up.

Case report 2

Our second case was a 64-year-old woman who presented with chronic UTI, symptoms of OAB, and pain 22 months after a TVT-Secur™ (H approach, without intraoperative cystoscopy) was externally placed. Ultrasound and cystoscopy revealed a small calcified piece of tape within the bladder. Only the intravesical part of the tape was excised



Fig. 1 Parasagittal angulated view showing the *left* TVT-Secur™ arm perforating the bladder. The asymmetrically placed tape is located too far proximal to the mid-urethra at the level of the bladder neck; as a result, the remaining *right* tape arm is too short to adequately support the mid-urethra (not shown)

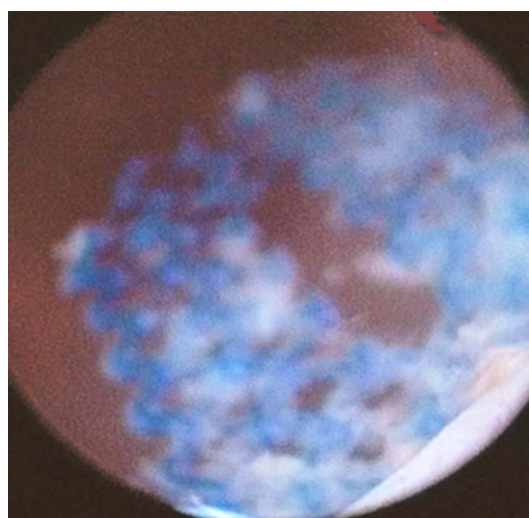


Fig. 2 Bloody urine and chronically infected intravesical TVT-Secur™ portion

using a TURP resectoscope. All urinary symptoms subsequently resolved completely.

Case report 3

Our third patient was a 56-year-old woman who presented with a 1-year history of mixed stress and urge incontinence and recurrent UTI after TVT-SecurTM (U position) placement. Cystoscopy revealed tape perforation into the bladder. According to the surgeon's report, intraoperative cystoscopy was undertaken but did not detect bladder injury. Cystoscopy revealed the polypropylene mesh with some encrustation in the right anterior bladder wall. Due to a very tight and dystopic tape at the level of the bladder neck on ultrasound, complete excision of the tape was necessary using the same technique as in the first case. She subsequently underwent a TVT procedure for recurrent SUI and was dry at 6-month follow-up.

Discussion

Challenges still exist for treating stress urinary incontinence with sling procedures. Initial results with third generation slings seem to be promising in terms of outcome and complication rates [8, 11]. But mid-term outcome data of single-incision mini-sling TVT-SecurTM suggest that the lower complication rates compared with TVT/TVT-OTM interventions come at the cost of surgical effectiveness of the procedure [12–14]. Even with the latest generation of mini-slings, surgical treatment of incontinence is still associated with serious complications such as pain, infection, de novo OAB, bladder perforation, and severe bleeding [11, 12, 15, 16]. For timely recognition of possible complications, we recommend routine intraoperative cystoscopy using a 70° cystoscope, even after mini-sling procedures [17]. As illustrated by our case reports, bladder perforation at the base or lateral wall with intravesical sling placement can be easily overlooked due to the problem of the dead angle when a cystoscope with a 0°/30° angle optic is used. We have shown in earlier publications that, besides cystoscopy, introital ultrasound is a very useful diagnostic tool in planning the primary intervention and especially in managing complications or planning a repeat intervention [18, 19].

An intravesical tape must be removed surgically, which can be a demanding procedure. There is no general agreement on the best surgical approach for removal of an anti-incontinence sling in patients with complications [10, 20, 21] or on the most suitable route—vaginal or transurethral or both. In our experience, it is possible in most cases to expose the tape or parts of it through a small vaginal incision, to then grasp it with Kocher's clamps and,

with traction on the tape, systematically detach it from surrounding tissue using blunt dissection with scissors or the fingers. In this manner, the tape can finally be pulled out completely, or at least part of it can be dissected free from surrounding tissue all the way to the bladder wall. Depending on the site and size of the injury to the bladder and urethra, the wound is sutured close in one or several layers, or catheter drainage of urine for 7–10 days may be sufficient for spontaneous healing to occur. Bladder repair was not necessary in any of our patients, and a transurethral balloon catheter was placed for an average of 7.0 days (range 5–9).

In the case presented in detail, we used a combined approach to remove the tape. The smaller, intravesical portion of the tape was cut and pulled out through the urethra, while the remaining tape was removed through the vagina using the tension and traction technique described above (Fig. 3). Vaginal exposure revealed a dystopic, cranially placed tape under great tension with a curled deep portion suburethraly.

In our experience, a sling passing through the bladder or urethra is usually easy to remove through the vagina. Other approaches are not only more complex but often also less successful. With other approaches, particularly the transurethral route, it is often not possible to completely remove all eroded mesh fibers from within the bladder, giving rise to persistent complications. Unconventional techniques have also been reported in the literature including excision of an encrusted intravesical TVT using a Holmium-YAG laser [22, 23]. To prevent stone formation and recurrent UTIs, the tape should be removed using full layer excision including the bladder mucosa and muscle [17]. In particular, a combined approach (vaginal/transurethral) may become necessary when extensive adhesions are present due to long-standing inflammation (e.g., retropubic peritonitis), precluding transvaginal removal of the tape after mobilization and excision using the technique described above.

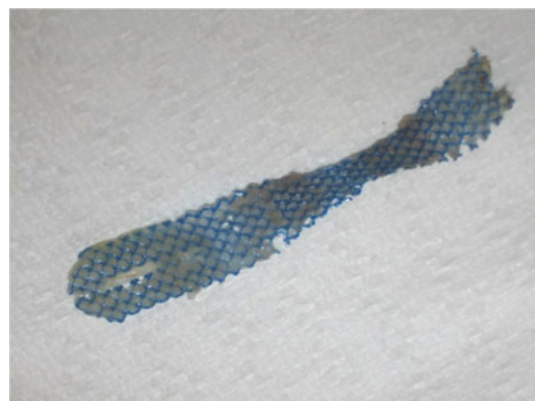


Fig. 3 Transvaginally resected portion of the sling

The guiding principle is “to identify, treat and prevent further problems” to ensure optimal quality of anti-incontinence surgery. This principle has not changed over time, and strict adherence to it is in the interest of our patients [1]. New approaches and techniques, while often promising, are sometimes accepted without thorough investigation. The surgical community should be vigilant and critically assess a new technique before it is propagated and becomes widely adopted. The introduction of a series of new sling and mesh operations in increasingly rapid succession has shown us that several years of application and postoperative follow-up are needed to arrive at a well-balanced and critical appraisal of the effectiveness and potential complications of a newly introduced surgical technique or technical variant.

Conflict of interest None.

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