Laparoscopic Surgical Complete Sling Resection for Tension-Free Vaginal Tape–Related Complications Refractory to First-Line Conservative Management: A Single-Centre Experience

Morgan Roupré⁎,1, Vincent Misraï⁎,1, Christophe Vaessen, Florence Cour, Alain Haertig, Emmanuel Chartier-Kastler

⁎Department of Urology, Groupe Hospitalo-Universitaire EST, Pitié-Salpêtrière Hospital, Assistance Publique-Hôpitaux de Paris (AP-HP), Faculté de Médecine Pierre et Marie Curie, University Paris VI, Paris, France
1Department of Urology, Clinique Pasteur, Toulouse, France

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Abstract

Background: Tension-free vaginal tape (TVT) has been largely used for the management of stress urinary incontinence. In certain cases, however, this procedure results in bothersome complications that lead to a complete resection.

Objective: We assessed the technical feasibility and functional outcome after complete laparoscopic resection of TVT.

Design, setting, and participants: Thirty-eight women with TVT-related complications refractory to first-line management underwent a complete laparoscopic tape resection between 2001 and 2009.

Surgical procedure: Complete laparoscopic resection was achieved with either an intra- or extraperitoneal laparoscopic approach. Laparoscopy was performed with four ports: a 10-mm umbilical telescope port, two 5-mm ports placed medially to the anterior superior iliac spines, and a 10-mm port placed at the midpoint between the pubis and umbilicus. The two half-tapes were dissected towards the urethra and removed.

Measurements: All data referring to patient demographics, surgery, tape-related complication, and perioperative outcomes were recorded.

Results and limitations: The mean age of the patients was 66.2 yr (range: 45–79 yr). TVT-related complications included bladder erosion, vaginal extrusion, and bladder outlet obstruction or groin pain. The resection took place at a mean time of 25 mo (range: 6–80 mo) after TVT placement. Resection was complete in all patients, within a mean operative time of 110 min (range: 50–240 min). All women reported a total decrease of symptom-related complications within a mean follow-up period of 37.9 mo (range: 2–80 mo). However, recurrent incontinence occurred in 65.7% (n = 25) of the patients. The main limitation of the study was the lack of a validated questionnaire to assess the evolution of functional disorders.

Conclusions: Complete laparoscopic resection of TVT is safe and technically feasible. In the limited number of women who have persisting disabling symptoms after conservative management, urologists must be aware that a complete resection can help resolve the symptoms.

⁎ Corresponding author. Academic Urology Department, Hospital Pitié-Salpêtrière, 47-83 Boulevard de l’Hôpital, 75013 Paris, France.
E-mail address: morgan.roupret@psl.lap.aphp.fr (M. Roupré).
2. Methods and patients

Midurethral sling (MUS) procedures are now considered the gold standard for surgical management of female stress urinary incontinence (SUI). Owing to its technical feasibility and long-term success rate, tension-free vaginal tape (TVT) was the first procedure to revolutionise and challenge the management of SUI [1–3]. TVT was extensively performed until the emergence of the transobturator approach and the third generation of TVT (TVT-SECUR, Ethicon, Somerville, NJ, USA), which led to a decrease in TVT use by urologists and gynaecologists [4–7].

Thus, >1 million TVT slings have been placed worldwide since its first description in 1996 [8]. TVT has always been considered to be a safe and minimally invasive anti-incontinence procedure [9]. However, a growing number of postoperative complications and unexpected surgical injuries associated with the retropubic route have been reported in recent literature [10–12]. These complications include perioperative and postoperative complications such as bladder injury, mesh erosion, chronic pain, or infection.

Among these complications, some are refractory to first-line conservative management and require a more radical surgical treatment. Indeed, surgical teams have already reported their management of MUS complications, but these experiences are still scarce in the current literature [13,14]. To date, only two studies have demonstrated that resection of a MUS is safe and technically feasible using a laparoscopic approach and that it helps to manage tape-related complications in specific cases [12,15]. In the current study, we report our specific clinical experience of TVT-related complications that required complete laparoscopic resection.

2.2. Laparoscopic procedure

All TVT removal procedures were performed with a pure laparoscopic approach (either extra- or intraperitoneal) and with or without a combined vaginal route.

Ports were mapped as follows: Two 5-mm ports were placed medially to the anterior superior iliac spines, two 10-mm ports were placed in the umbilicus (telescope port), and one was placed at the midpoint between the pubis and umbilicus. All procedures were performed with a 0° optic. The first step of dissection always consisted of releasing the retropubic space. The primary objective was to identify the two half-tapes in contact with the pubis, which corresponded to their normal path. The half-tape was then grasped and drawn downwards. The transparietal tract of the tape was dissected by remaining in contact with the tape and by successively crossing the rectus abdominis muscle fibres and fascia. Dissection of the fascia revealed adipose tissue that could be mobilised without resistance, thereby allowing for a complete extraction of the transparietal tract. Urethral release was performed medially as far as possible without opening the vagina. The two left fingers of the surgeon were placed inside the vagina to help the dissection and to check the anterior vaginal wall (no blood on the gloves after vaginal examination) to avoid any undiagnosed injuries. Redon suction was then placed in the retropubic space. Fragments of tape were sent for histologic and bacteriologic examination. In cases of bladder erosion, the dissection was continued down to the point of entry of the tape into the bladder. The bladder was opened, and the mesh was removed with clean margins. The repair of the cystotomy was performed using Interrupted 3.0 Vicryl sutures. Perioperative data were reviewed for laparoscopic approaches (ie, mean operating time, organs injuries, and conversion into open surgery).

A concomitant vaginal procedure was performed if complete resection of the mesh was not entirely afforded with the laparoscopic access. The suburethral portion of the vaginal mucosa was incised and the urethra dissected, allowing the resection of the residual part of the mesh.

2.3. Follow-up

Continence, voiding difficulties, and pain were reassessed at 1, 3, 6, and 12 mo after the surgery and yearly thereafter. All women attended the follow-up appointments.

The recurrence of stress urinary incontinence was assessed by clinical examination (stress cough test), the pad test, and urodynamics. Bladder outlet obstruction (BOO) and groin pain were assessed by uroflowmetry, clinical interview, and examination.

3. Results

Overall, 38 women with a mean age of 66.2 ± 10 yr (range: 45–79 yr) at the time of resection were included in the analysis. The median BMI was 25.5 kg/m² (range: 22–32 kg/m²). All TVTs had been implanted at another centre, and the patients were referred to our centre for management of tape-related complications.

3.1. Patients

Eight women (21%) had undergone a previous Burch colposuspension procedure. Thirty-four women (89.4%) were initially treated with a TVT for pure SUI. The remaining four women (10.5%) presented with mixed urinary incontinence. The data on the type of tapes removed were missing.
except in six cases, in which type 3 polypropylene mesh was used. Resection took place within a mean delay of 25 ± 21 mo (range: 6–80 mo) after TVT placement. Table 1 lists all the complications following the sling procedure.

### 3.2 Vaginal extrusion and bladder mesh erosion

Sixteen women reported symptoms such as vaginal discharge and/or bleeding, dyspareunia, recurrent urinary tract infections, and/or de novo urge incontinence within a mean of 10.2 mo (range: 3–47 mo) after the TVT procedure. There were isolated vaginal extrusions in seven cases and bladder mesh erosion in nine cases.

### 3.3 Vaginal extrusion

Vaginal examination revealed abnormal findings in the periurethral area or in the vagina, ranging from a small area of granulated tissue to a visible part of the mesh.

### 3.4 Bladder erosion

Urethral and bladder erosion were revealed during a cystoscopic 70° optic examination. Urethral erosion was seen directly as sling material within the urethral lumen or the sinus tract or as granulation tissue. Most bladder erosion was located next to the bladder neck.

All women had initially been managed unsuccessfully with repeated vaginal closure procedures, partial suburethral resection, or transurethral resection at the primary treatment centres.

### 3.5 Bladder outlet obstruction

Seven women experienced BOO with concomitant vaginal extrusion (n = 1) or bladder erosion (n = 2). All of these women reported recurrent urinary tract infections and voiding difficulties. Four women required bladder self-catheterisation. The mean maximal flow rate was 12 ± 3 ml/s. In one case, renal ultrasound revealed bilateral ureterohydronephrosis. All of these patients had previously been treated unsuccessfully with section (n = 3) and/or limited resection (n = 7) of the suburethral part of the tape.

### 3.6 Isolated chronic pelvic pain

Isolated chronic pelvic pain developed in 15 women within a mean of 14.3 mo (range: 2–30 mo) after the TVT procedure. Pain was located at the suprapubic or vaginal scar, in the vaginal vault, or at the left half-tape. Women complained of dyspareunia, voiding burns, left leg pain, and isolated pelvic pain. Disabling pelvic pain was induced in 11 women by filling the bladder during cystoscopy. In all cases, symptoms were refractory to previous medical treatment, including local infiltration of anaesthetics or corticosteroids.

### 3.7 Surgical resection

TVT tapes were entirely removed in all cases. Resection was completely performed under laparoscopy in 37 cases and was combined with a vaginal approach in one case.

No complications occurred during these procedures. The mean operative time was 110 min (range: 50–240 min).

### 3.8 Postoperative outcomes

Bladder catheterisation was required postoperatively for a median of 3.9 d (range: 2–8 d). The median hospital stay was 6.4 d (range: 3–10 d). All patients reported a partial or total decrease in pain after 1 mo of follow-up. After 6 mo, uroflowmetry revealed an improvement in the mean maximal flow rate to 20 ± 5 ml/s. All patients reported a total decrease in pain. Healing occurred in all cases.

At a mean follow-up of 37.9 mo (range: 2–80 mo) postoperatively, recurrent incontinence occurred in 25 women (65.7%), including SUI in 20 cases and urge incontinence in 5 cases within a mean of 0.65 mo (range: 0.1–3 mo) postoperatively.

Of the 20 women who experienced recurrent SUI, 11 developed intrinsic sphincter deficiency. However, all of these women had a lower preoperative urethral pressure closure.

### 3.9 Pathologic and bacteriologic analysis

Cultures of the removed meshes were routinely obtained. Bacteriologic analysis revealed *Staphylococcus aureus* in one case. In other cases, only nonspecific chronic signs of inflammation were found.

### 4 Discussion

Over the last two decades, TVT surgery had become the most common treatment for female SUI until the emergence of the transobturator tape and third-generation TVT [17]. Most teams that manage urinary incontinence in female patients have communicated data on the best treatment options, but very few have reported the complications of these treatments. However, widespread use of the retropubic route has resulted in an increasing number of reported complications, ranging from 4.3% to 75.1% in a recent review [11]. For instance, the erosion rate is reported to be between 0.3% and 14% [18]. However, its management remains a moot point, and the debate is still ongoing [18]. Certain questions are still being raised: When does the sling need to be removed? How is the resection...
performed? Does the resection have to be limited or complete? There are no current guidelines regarding the surgical management of TVT-related complications, and these clinical situations remain unclear.

Most authors suggest a conservative local management with repeat closure of the vaginal mucosa over the tape and minimal dissection in cases of limited vaginal extrusion [18,21]. Primary resection of extruded TVT is rarely proposed as the first-line management except in women with concomitant bladder erosion or de novo functional complications; however, resection must be performed radically in cases of proven mesh infection. Although polypropylene has been shown to be resistant to infection, removal of synthetic material must comply with the usual rules of resection. This includes complete removal of the implanted material, especially when the implantation of another material such as a new MUS, the ACT implant (Uromedica, Plymouth, MN, USA), or an artificial sphincter [22] is considered. A more radical approach is generally adopted in cases of urethral or bladder erosions, consisting of transvaginal urethral release and/or transurethral resection of the mesh [13].

In our experience, endoscopic resection of TVT should not be routinely repeated after the first failure, especially if erosion involves a large bladder area. Indeed, erosion has a high potential of recurrence at the edges of the potentially infected mesh that could remain in the bladder. Moreover, urethral erosion is generally accompanied by other complaints (i.e., recurrent urinary tract infections or dysuria) and requires a more radical approach [6]. Although the rates of postoperative obstruction range from 1.9% to 19.7% [11], its management seems to be more consistent [23,24]. Urinary retention or even severe dysuria after TVT placement may require section or partial resection of the suburethral portion of the TVT [23,24].

Complete resection should always be considered in cases of failure of a previous partial surgical resection. However, complete resection has been rarely reported to date due to the limited knowledge regarding surgical indications and the complexity of the intraoperative procedure compared with TVT placement.

Consistent with previous reports [15,25], our series indicates that complete removal of TVT appears to be clearly indicated, especially when disabling chronic pain is associated along the course of the sling. Chronic groin pain is another unrecognised complication after MUS placement; however, it seems to occur more frequently with the transobturator (inside-to-outside) approach [8]. Chronic groin pain has been reported to occur in 1.5–30% of patients after TVT placement [26,27].

To our knowledge, only two reports have previously demonstrated that complete resection of TVT appears to be appropriate for managing isolated disabling chronic pelvic pain after the failure of analgesia or local infiltration [12,15]. The resection technique described in this article complies with the conventional resection criteria described previously [19]. Tsivian et al described a sling resection technique through a suprapubic incision after a failed attempt at transurethral removal [3]. Nevertheless, the laparoscopic approach has been shown to be a safe surgical method to access the space of Retzius, even in cases involving a previous surgery. It has the advantages of improved visualisation with magnification of the operative field, decreased blood loss, and a low rate of lower urinary tract injuries [22]. In addition, several theoretical advantages are linked to mini-invasive access and a lower surgical morbidity. In the meantime, the laparoscopic approach has been shown to improve postoperative outcomes with shorter recovery times and hospital stays.

After complete laparoscopic TVT resection, all of our patients reported a total decrease of disabling symptoms within a mean follow-up period of 37.9 mo. According to the literature, the recurrence of incontinence after removal of suburethral tape for vaginal erosion should be lower due to a lack of associated urethral erosion, which is likely a result of less trauma to the urethra during the dissection [19]. However, recurrent SUI with intrinsic sphincter deficiency occurred in 28.9% of women who had a lower urethral pressure closure preoperatively. For those patients who returned to their starting condition, the decision for a new surgical treatment can be psychologically traumatic and should be performed later. Further options such as the implantation of an artificial urinary sphincter are not without consequences and therefore require full patient compliance [22]. Thus we believe it would be interesting to report our experience regarding the management of recurrent incontinence in these women in future work.

5. Conclusions

TVT is still considered the primary surgical choice for female SUI. Although TVT offers an effective SUI treatment, it has significant associations with postoperative complications, leading (in specific cases) to a radical surgical management after the failure of first-line treatment. Complete laparoscopic resection of TVT is safe and technically feasible and can help resolve bothersome symptoms. However, women should be warned of the risk of recurrent incontinence.

Author contributions: Morgan Rouprêt had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Chartier-Kastler, Misraï, Rouprêt.
Acquisition of data: Misraï, Cour, Vaessen.
Analysis and interpretation of data: Misraï, Rouprêt, Haertig, Cour.
Drafting of the manuscript: Chartier-Kastler, Misraï, Rouprêt.
Critical revision of the manuscript for important intellectual content: Cour, Chartier-Kastler, Misraï, Vaessen.
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**Appendix A. Supplementary data**

The Surgery in Motion video accompanying this article can be found in the online version at doi:10.1016/j.eururo.2010.04.025 and via www.europeanurology.com. Subscribers to the printed journal will find the Surgery in Motion DVD enclosed.

**References**


