

Case Report

The challenge of complex wound healing caused by necrotizing fasciitis after infection of tension-free vaginal transobturator tape (TVT-O) incontinence material

D. Semenič¹, N. Abersek², A. Zore³, A. S. Laganà⁴, D. Lukanović³

¹Department of surgical infections, Division of Surgery, University Medical Centre Ljubljana; Faculty of Medicine, University of Ljubljana

²University Medical Centre, Ljubljana

³Department of Gynaecology, Division of Gynaecology and Obstetrics, University Medical Centre Ljubljana (Slovenia)

⁴Department of Obstetrics and Gynecology, "Filippo Del Ponte" Hospital, University of Insubria, Varese (Italy)

Summary

Pelvic organ prolapse with or without stress urinary incontinence (SUI) is a common gynecological condition that occurs predominantly in middle and old age. Tension-free vaginal tape (TVT) technique is a surgical procedure for treatment of female SUI that is used worldwide. Severe complications are extremely rare. The authors present treatment methods with which they have successfully used for such cases. The Ljubljana University Medical Center carried out 2,587 TVT operations for genuine SUI between 1998 and 2017. The authors carried out a retrospective study to determine long-term success. However, in all of these years, they treated only two serious complications involving necrotizing fasciitis. Both patients were 61-years old, the first patient suffered necrotizing fasciitis shortly after her transobturator TVT (TVT-O) procedure, and the second six years after the initial surgery. Both of them had had repeated extensive fasciectomy, soft tissue debridement, and various modern wound dressing changes, and one of them had had negative pressure wound therapy. Severe complications of TVT-O are rare but present a possibility for great morbidity and mortality. Early surgical treatment plays an important role, together with additional medication.

Key words: Necrotizing fasciitis; TVT and TVT-O complications.

Introduction

Uncontrollable urine leakage or urinary incontinence (UI) is a health problem encountered in female patients of all ages. Several UI classifications are used, the most frequent being the clinical division of UI into stress UI (SUI), urge UI (UII), mixed UI (MUI), and overflow UI [1, 2]. SUI is defined as involuntary urine leakage on effort or exertion, sneezing, or coughing [3]. It affects 17% to 45% of adult women [4]. UI treatment can be conservative or surgical, depending on several factors. Indications for operative treatment are severe SUI, unsuccessful conservative treatment, and MUI with prevailing symptoms of SUI. When choosing a surgical treatment, it is necessary to bear in mind that more than two-thirds of SUI patients have altered statics of organs in the pelvis and pelvic floor. Because the goal is to try to improve quality of life as much as possible, the surgical procedure chosen should cure the most prominent and bothersome symptoms. There is a choice among vaginal, retropubic, combined (vaginal and abdominal), and endoscopic (laparoscopic and needle) procedures.

The most commonly used surgical treatment is tension-

free vaginal tape (TVT) technique [5]. In transobturator TVT technique (TVT-O), the tape is inserted under local anesthesia through small suburethral incision and under guidance of operator finger placed through the obturator membrane on both sides through ilio-inguinal small incision out. Transobturator foramen procedures are associated with a lower incidence of bladder injuries, retropubic hematoma, and voiding difficulties than TVT, but a higher incidence of groin/thigh pain [6].

Perioperative complications are rare and include vaginal injury (4.4%), hemorrhaging of more than 200 ml (3.2%), vascular damage (1.9%), hematoma on the leg (1.9%), and bladder perforation (1.2%). Early postoperative complications are inguinal pain extending to the legs (30.7%), headaches (23.7%), fever (12.8%), urinary tract infection (5.7%), and urinary retention (3.2%). Late postoperative complications include vaginal erosion (4.4%), de novo urge incontinence (8.9%), de novo dyspareunia (7.1%), perineal pain (4.4%), and worsening urgency (8.9%) [7].

The Ljubljana University Medical Center carried out 2,587 TVT surgeries (retropubic, transobturator, and mini-

Revised manuscript accepted for publication October 31, 2018

sling) for genuine SUI between 1998 and 2017. In January 2017 the authors carried out a retrospective study to determine long-term success. They selected all surgeries for which less than ten years had elapsed since the procedure and that involved women under 80 in 2016. The study thus included 1,087 women. The authors determined that 45 (4.1%) patients had intraoperative complications, and 107 (10.8%) had postoperative complications, among whom there were 12 cases of erosion of the tape in the vagina, 11 cases of infection, and 21 cases of complications with urine flow. Six patients had multiple concurrent complications. However, in all of these years the authors treated only two serious complications involving necrotizing fasciitis (NF).

NF is a rare severe bacterial infection involving fascia, subcutaneous tissue, and muscle. It is rapidly progressive and potentially fatal in nature with mortality figures between 6% and 76% [8, 9]. NF is classified into four types: polymicrobial/synergistic (Type 1), monomicrobial, Gram-positive (Type 2), monomicrobial, Gram-negative (Type 3), and fungal (Type 4) [7]. Type 1 is often seen in patients with diabetes mellitus and/or peripheral vascular disease. Type 2, however, seen in the present patient, is a fulminant monomicrobial septicemia associated with Group A or B streptococci, probably associated with the production of toxins, enzymes, or possible antigens, and it usually occurs in the absence of underlying medical conditions [9]

Case Report

Case 1

A 61-year-old obese woman with hypothyroidism, gout, unclassified tachycardia, depression, and chronic otitis media had undergone TVT-O for SUI. Her past surgical history included an appendectomy and cholecystectomy. Six days after the surgery she developed a fever (39.5°C), tachypnea, and brownish foul-smelling vaginal discharge. She was experiencing pain in both thighs and hips. On the 11th postoperative day she presented at the emergency department with fever and dyspnea, pain in the lower abdomen and thighs, and diarrhea. Physical examination confirmed a temperature of 38.4°C, a tender suprapubic region, and erythema along the right leg. There were no visible signs of infection at the insertion points used for the TVT-O (Figure 1). She was hospitalized in the intensive care unit with leukocytosis $24.0 \times 10^9/l$ ($4.0\text{--}10.0 \times 10^9/l$), CRP 402 mg/l ($< 5 \text{ mg/l}$), serum sodium 131 mmol/l (135–145 mmol/l), creatinine 121 $\mu\text{mol/l}$ (44–97 $\mu\text{mol/l}$), glucose 5.5 mmol/l (3.6–6.1 mmol/l), and lactate 3.2 mmol/l (0.6–2.4 mmol/l). Intravenous antibiotics were begun: meropenem 1 gram eight hours and clindamycin 600 mg per eight hours. Two days after admission, additional diagnostics with CT showed thickened fascia and fluid collection along large muscle groups of the right leg, extending all the way down to the anterior lodge of the gastrocnemius muscle. The TVT-O was removed. An incision was made in the skin and a fasciectomy was performed in the right femoral region medially to the adductor canal with the debridement of purulent content. Laterally, the same procedure was carried out on the vastus lateralis muscle, with drainage of liquid under the still vital fascia, on which fasciectomy was performed. In addition, incisions were made and fasciectomy was performed on the medial and lateral side of the lower right leg,



Figure 1. — Erythema of the the right lower limb.



Figure 2. — Incision of the skin, subcutaneous tissue, and fasciectomy on right femoral region medially to the adductor canal with debridement.



Figure 3. — Secondary wound sutures.



Figure 4. — Swelling of the right leg at the admission to Clinic for Infectious Diseases



Figure 5. — Debridement of the adductor canal



Figure 6. — Treatment with negative pressure with instillation.



Figure 7. — Split-thickness skin graft over adductor channel.

where the same conditions were found (Figure 2). Extensive debridement and wound irrigation were carried out. The initial cultures came back positive for Group A β -hemolytic *Streptococcus pyogenes*. Pathological examination of the tissues confirmed the diagnosis of necrotizing fasciitis of the right thigh and lower leg. Postoperatively, the patient's clinical state worsened, leading to respiratory insufficiency. Ten days after admission, the patient's CRP levels began to decline. CT was performed again and showed two abscesses: in the adductor muscle group there was a fluid collection approximately $6.5 \times 5 \times 1$ cm in size, without gas inclusions. The collection extended upwards almost to the right inferior pubic ramus, where there was a small fluid collection of 12 mm (in the adductor brevis muscle). The fascia between the adductor and obturator muscle group was thickened and stratified. The collection extended laterally and posteriorly, where the fascia of the biceps femoris muscle, semitendinosus muscle, semimembranosus muscle, and lateral part of adductor muscle group was diffusely thickened all the way to the knee joint. Reoperation was indicated, with additional incisions and debridement in the gluteal region and in the medial and lateral thigh region. Incisions in the lower leg from the initial surgery were closed with secondary sutures (Figure 3). One month after admission, the thigh incisions were closed with secondary sutures, followed by closure of the gluteal incision sites one week later using the same technique.

Case 2

A 61-year-old multipara, taking hypertensive and antidiabetic medication, received TVT-O for genuine SUI in 2009. The operation was routine and the patient was released on the first postoperative day. After six years the patient experienced groin pain in the right gluteal region and swelling of her right leg, and she developed a fever that had slowly risen to 39°C . She was first admitted to the Clinic for Infectious Diseases and later to the Division of Surgery, where a diagnosis of right lateral femoral necrotizing fasciitis was made (Figure 4). The patient was transferred to the Department for Surgical Infections, where she had more surgical procedures. After the TVT mesh was removed, a fasciotomy in the right gluteal and femoral region was made, in addition to multiple necrectomies/debridement of the adductor canal (Figure 5). After revisions of extensive and deep wounds on the right thigh, foam for treatment with negative pressure with instillation was applied. The patient was treated with imipenem/cilastatin 1 gram per eight hours i.v. after *Streptococcus constellatus* was isolated from the postoperative wounds. She had a regular checkup of the inflammatory parameters. (Figure 6). Wide-ranging skin defects were slowly reduced with secondary stitches while the patient was still on broad-range antibiotic ther-

apy. A split thickness skin graft was placed over the granulation tissue that covered the adductor canal (Figure 7). The patient underwent physiotherapy and was released from active treatment to hospital care after two months.

Discussion

Clinical presentation of necrotizing fasciitis includes general symptoms such as high fever, nausea, vomiting, diarrhea, malaise and pain, local swelling, and erythema. The overlying skin may become inflamed, turn reddish to purple, and develop blisters, but can remain unaffected and is therefore very difficult to diagnose. Laboratory findings are not specific and include anemia, leukocytosis, thrombocytosis, electrolyte imbalances, and hyperglycemia. [10]. Ultrasound and conventional X-ray images can show thickened soft tissue as well as presence of subcutaneous emphysema extending from the perineum and external genitalia to thigh [10, 11]. The most common imaging finding is soft-tissue gas. CT is the preferred method because MRI can be oversensitive and requires longer scan time. Findings include asymmetric fascial thickening, soft-tissue gas, inflammatory fat stranding, and possible fluid collections. [12].

Immediate and extensive surgical debridement of all necrotic tissue is essential, together with broad-spectrum empiric antibiotic. Debridement should be performed as soon as possible. The goal is to remove necrotic fascia, all necrotic tissue, including muscle and skin if necessary, according to the extended inflammation. Necrotic tissue does not have blood flow or oxygenation and requires surgical removal to reduce both bacterial and inflammatory burden [7].

It is difficult to state that the implantation of the propylene mesh was a direct reason for the complication six years later in the second presented case. In this case, the patient had insulin-treated diabetes and obesity; the fact that makes the connection more likely is the erosion of suburethral mucosa that the patient suffered from nine months after the initial surgery. It could be that weakened immunity caused delayed infection of the mesh.

Hemodynamic stabilization, administration of broad spectrum intravenously antibiotic therapy, and early surgical procedures with mesh removal, fasciotomy, and soft tissue debridement are methods that improve survival of the affected patient.

Conclusion

Complications after TVT-O can present a diagnostic dilemma. Immediate recognition of the clinical picture and adequate diagnosis is crucial for successful treatment of necrotizing fasciitis, which is a rapidly progressive disease. The present authors' experiences, relevant references in the literature, and the presented patients suggest that there is a need to limit the use of meshes. They should only be used with recurrent symptoms and after unsuccessful conservative treatment. Placement should be carried out in experienced referral centers and in the hands of trained surgeons. In addition to minor complications, there is always the possibility of a major complication, such as severe necrotizing fasciitis with rapid progression and systemic toxemia.

References

- [1] Lukanović A.: "Sodobni terapevtski pristopi pri zdravljenju urinske inkontinence". *Zdrav Vestn.*, 2003, 72, 171.
- [2] Haylen B.T., de Ridder D., Freeman R.M., Swift S.E., Berghmans B., Lee J., et al.: "An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction". *Neurourol. Urodyn.*, 2010, 29, 4.
- [3] Abrams P., Cardozo L., Fall M., Griffiths D., Rosier P., Ulmsten U., et al.: "The standardisation of terminology in lower urinary tract function: report from the standardisation sub-committee of the International Continence Society". *Urology*, 2003, 6, 37.
- [4] Onwude J.L.: "Stress incontinence". *BMJ Clin. Evid.*, 2009, 2009, pii: 0808.
- [5] Zhang Z., Zhu L., Xu T., Lang J.: "Retropubic tension-free vaginal tape and inside-out transobturator tape: a long-term randomized trial". *Int. Urogynecol. J.*, 2016, 27, 103.
- [6] Bozkurt M., Yumru A.E., Salman S.: "Assessment of perioperative, early, and late postoperative complications of the inside-out transobturator tape procedure in the treatment of stress urinary incontinence". *Clin. Exp. Obstet. Gynecol.*, 2015, 42, 82.
- [7] Corona P.S., Erimeiku F., Reverte-Vinaixa M.M., Soldado F., Amat C., Carrera L.: "Necrotising fasciitis of the extremities: implementation of new management technologies". *Injury*, 2016, 47, 66.
- [8] van Stigt S.F., de Vries J., Bijker J.B., Mollen R.M., Hekma E.J., Lemson S.M., et al.: "Review of 58 patients with necrotizing fasciitis in the Netherlands". *World J. Emerg. Surg.*, 2016, 11, 21.
- [9] Johnson D.W., ElHajj M., EL OB-B., Miller H.J., Fine P.M.: "Necrotizing fasciitis after tension-free vaginal tape (TVT) placement". *Int. Urogynecol. J. Pelvic Floor Dysfunct.*, 2003, 14, 291.
- [10] Chennamsetty A., Khourdaji I., Burks F., Killinger K.A. Contemporary diagnosis and management of Fournier's gangrene. *Ther Adv Urol.* 2015;7(4):203–15
- [11] Singh A., Ahmed K., Aydin A., Khan M.S., Dasgupta P.: 'Fournier's gangrene. A clinical review'. *Arch. Ital. Urol. Androl.*, 2016, 88, 157.
- [12] Orłowski H.L., Mellnick V.M., Dahiya N., Katz D.S., Chang S.T., Siegel C., et al.: "The imaging findings of typical and atypical genital and gynecologic infections". *Abdom Radiol. (NY)*, 2016, 41, 2294.

Corresponding Author:
D. LUKANOVIĆ, M.D.
Department of Gynaecology
Division of Gynaecology and Obstetrics
University Medical Centre (Slovenia)
e-mail: david.lukanovic@gmail.com
david.lukanovic@mf.uni.lj.si