Embolization of a massive retropubic hemorrhage following a tension-free vaginal tape (TVT) procedure: case report and literature review

Kevin C. Zorn, MD, Sebastien Daigle, MD, Francois Belzile, MD, Le Mai Tu, MD

Department of Urology and Department of Interventional Radiology, Sherbrooke University Hospital, Sherbrooke, Quebec, Canada

ZORN KC, DAIGLE S, BELZILE F, TU LM. Embolization of a massive retropubic hemorrhage following a tension-free vaginal tape (TVT) procedure: case report and literature review. The Canadian Journal of Urology. 2005;12(1):2560-2563.

Introduction: *Since its description by Ulmsten, the TVT procedure has been proven to be safe and well tolerated. Bleeding and hematoma formation, although rare, can occur. Both conservative and surgical managements of this complication have been described.* ***Materials:*** *We report the first case in which a pelvic branch of the obturator artery was embolized using angiography.*
Results: *Our patient was spared surgical exploration and retained the TVT tape.*
Conclusion: *Angiography with vessel embolization, when available, should be considered in the treatment of TVT-procedure retropubic hemorrhages.*

Key Words: embolization, TVT, hemorrhage

Introduction

Tension-free vaginal tape (TVT) has gained popularity as a treatment of choice for women with stress urinary incontinence since its first use by Ulmsten in 1996.[1] It is a minimally invasive procedure with reported short operative and postoperative hospitalization times and low complication rates.

Herein, we describe a massive retropubic hemorrhage in a 44-year-old woman who underwent an uneventful vaginal hysterectomy and TVT sling procedure for menometrorrhagia and stress urinary incontinence. Angiography and selective embolization was required to control bleeding.

Accepted for publication January 2005

Address correspondence to Dr. Kevin Zorn, McGill University, Urology Dept., Royal Victoria Hospital, Room S6.60, 687 Pine Ave West, Montreal, Quebec H3A 1A1 Canada

Case presentation and management

Our patient is a 44-year-old, multipartous (G4P4) woman who suffered from menorrhagia and genuine stress urinary incontinence. Being otherwise healthy, there was no significant history for bleeding disorders, medication use or previous surgery. Pelvic ultrasound revealed a 2 cm x 2 cm uterine fibroma.

Urological investigations included a normal-finding cystoscopy and a complete urodynamic study, which revealed a stable, normal capacity bladder. Her Vasalva leak-point pressure was 78 cm H20.

After an uneventful vaginal hysterectomy under combined spinal and epidural anesthesia, a TVT sling was performed without technical difficulty. The trocar sites were positioned 5 cm apart. There was no

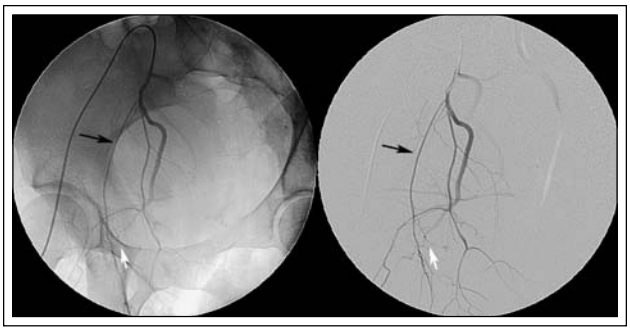

Figure 1. Angiography of the right internal iliac artery; (left) early filling of the obturator artery (black arrow) and its pubic branch (white arrow); (right) same image with bone subtraction.

urethral or bladder injury, nor bleeding from the retropubic sites. The estimated blood loss was 200 cc.

Six hours later, the patient became bradycardic and hypotensive. Blood studies revealed a hemoglobin of 59 (130 pre-operatively), thrombocytopenia and coagulopathy (INR = 1.71). Her abdominal exam was unremarkable. There was little blood loss in the packing and retropubic wound dressings.

Abdominal ultrasound demonstrated a 13.9 cm x 8.5 cm lower abdominal collection consistent with hematoma. With the potential of an intra-peritoneal bleed, laparoscopic evaluation was performed. A large Retzius space hematoma was confirmed. With ongoing blood-loss following four transfused blood units, angiography with attempted selective embolization was performed.

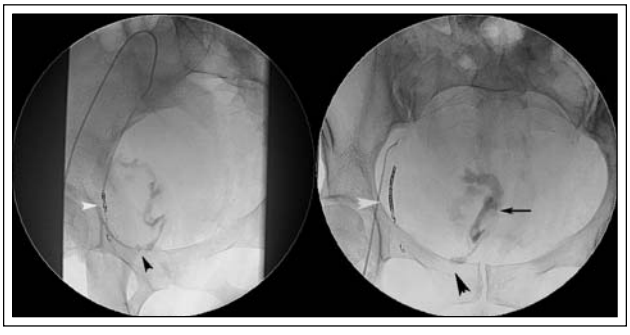

Figure 2. (left) Partial embolization showing several embolic coils above and below the pubic branch of the obturator artery (white arrow head). The leak is seen along the superior-posterior edge of the pubic bone (black arrow head). (right) - Post embolization with complete occlusion using multiple coils (white arrow head), residual contrast is seen from the vessel injury site (black arrow head) and within the retropubic hematoma (black arrow). Note the medial location of hemorrhage, only 2 cm from the midline.

Angiography localized significant bleeding from a branch of the right obturator artery; an anterior branch of the internal iliac vessel Figure 1. Embolization was successful through the use of platinum micro coils and polyvinyl alcohol particles Figure 2.

Thereafter, the patient remained stable. Her Foley catheter was removed on post-operative day 3. She successfully voided with minimal residual volumes and noted marked improvement in her stress incontinence.

Discussion

The TVT procedure has proven to be safe and well-tolerated when performed as described by Ulmsten. Bladder perforation with the trocar is the most common with reported incidences of 0-25%.[2-4]

Bleeding and hematoma formation, although rare in the retropubic space can occur when trocar passage occurs in an excessively lateral plane. Excessive flexion of the legs during positioning can contribute to occurrence.[5] Assurance that the two suprapubic trocars are placed one fingerbreadth cephalad and lateral to the pubic tubercles, never more than 5 cm apart as well as the use of Allen stirrups for proper lithotomy position will allow for successful retropubic space access. Less commonly, hematoma can result from an occult bleeding diathesis.

Once a hematoma is identified, conservative management should include serial ultrasound assessment and close patient monitoring. Aspiration or open drainage is necessary for patients with fever or persistent pain.

Literature reports have described incidents of retropubic hematomas from 1%-2%.[4,6-11] In a nationwide Finnish analysis on 1455 operations, Kuuva reported an incidence of 1.9%.[10] With regards to significant hematomas, 16 cases were noted in the literature – only 6 of which were considered severe hemorrhage. Table 1

To date, there have been no reported cases of angiographic localization and therapeutic embolization for the treatment of severe bleeding post-TVT. Our case demonstrates an injury to a branch of the obturator artery which was situated immediately behind the pubic arch, 2 cm from the midline.

The obturator artery is a branch of the internal iliac artery in 75% of individuals. This vessel passes anteriorly and caudally along the pelvic sidewall before exiting through the upper part of the obturator foramen. Intrapelvic branches include a pubic branch.

TABLE 1. **Reported TVT procedure hemorrhagic complications.**

Author	N=	# of hemorrhages	Description	Management
Soulie et al 2000[5]	120	2 (1.7%)	Both patients had large Rhezius space hematomas	Neither required surgical intervention
				Only one required transfusion
Cour et al 1999[7]	50	1 (0.5%)	Retzius space hematoma	Required several transfusions
				Surgical evacuation of hematoma
				TVT preservation
Karram et al 2003[12]	350	6 (1.7%)	Four were completely asymptomatic and diagnosed only on pelvic examination	Spontaneous resolution
			One bled in the immediate post-operative period	Required two transfusions Managed conservatively
			One presented 6 weeks post-operatively with a pelvic mass	Conservative management
Kuuva et al 2002[10]	1455	5 (0.34%)	One had an intra-operative blood loss of 2510 ml	Treated with vaginal temponade, manual compression, IV tranexamic acid (Caprilon®) and blood transfusions
			One case of arterial bleeding behind the symphysis	Required laparotomy during which the TVT tape was removed
			Two cases with significant intra-operative bleeding	One was treated with IV tranexamic acid One treated with manual compression
			One intra-operative injury of the epigastric vessel	Intra-operative vessel ligation
Vierhout 2001 (case report)[13]	1	1	Symptomaticperi-operative Retzius space hematoma	Secondary laparotomy required during which the TVT tape was removed
				Source of the bleed was not identified
				Ten units of blood were transfused
				Full recovery
Primicerio et al 1999 (case report)[14]	1	1	External iliac vein was perforated	Necessitated vascular repair

The pelvic branch is given off just before the obturator artery leaves the pelvic cavity, ascends upon the back of the pubic bone and coarses along the posterior surface of the abdominal wall to anastamose with both that of the opposite pubic branch and the inferior epigastric artery. It is this pubic branch that was injured and ultimately embolized in our patient.

Despite having undergone a vaginal hysterectomy prior to the TVT placement, the likelihood of vessel injury was not influenced. Vaginal surgery would not

have displaced the vessel. Passage of the TVT trocar through the retropubic space likely caused the vascular injury.

Excluding the reported epigastric and external iliac vessel injuries, all other severe Retzius space hemorrhages have been managed with observation, blood transfusions and surgical intervention. In Cour's series, there was one patient who required surgical evacuation of the hematoma.[7] There was neither mention of the vascular injury site nor the preservation of the TVT tape. In Kuuva's series, one patient required laparotomy during which the TVT tape was removed.[10] Vierhout described a case where laparotomy was required however, not being able to isolate the bleeding source.[13] The TVT tape was also removed.

Although increased numbers of reports have documented the efficacy of the TVT procedure, there are minimal data about the incidence of complications and how they are managed. Significant retropubic hematomas have been described with incidences of less than 2%. Treatment measures have included conservative management and surgical exploration, which most often has lead to removal of the TVT tape. Our case demonstrates the utility of angiography to identify the location of bleeding and to serve as a therapeutic option for hemostasis. Furthermore, attention to the pelvic branch of the obturator artery should be considered as a potential bleeding source in sling procedures. Angiography with vessel embolization, when available, should be considered in the treatment of TVT-procedure retropubic hemorrhages. □

References

1. Ulmsten U, Henriksson L, Johnson P et al. An ambulatory surgical procedure under local anesthesia for treatment of female urinary incontinence. *Int Urogynecol J* 1996;7:81-86.
2. Calvo JJ, Alfaro AH, de Garibya AS et al. TVT (tension free vaginal tape) new surgical technique for the treatment of stress urinary incontinence. *Arch Esp Urol* 2000;53:9-13.
3. Olsson I, Kroon UB. A three-year postoperative evaluation of tension-free vaginal tape. *Gynecol Obstet Invest* 1999;48:267-269.
4. Soulie M, Delbert-Julhes F, Cuvillier X et al. Cure of female urinary incontinence with Prolene band (TVT): Preliminary results of a prospective multicenter study. *Progres en Urologie* 2000;10:622-628.
5. Klutke JJ, Klutke CG. Tension Free Vaginal Tape Procedure. *AUA Update Series* 2003;Volume XXII; lesson 10:74-79.
6. Hermieu JF: Complication of the TVT technique. *Progres en Urologie* 2003;13(3);459-465.
7. Cour F, Barret E, Cathelineau X, Dell'oro A, Mombet, A, Guilloneau B, Veillon B, Vallancien G. Complications peri-operatoires de la bandelette sous-uretrale TVT dans le traitement de l'incontinence urinaire d'effort feminine. *Progres en Urologie* 1999;9:abst P48, 42A.
8. Delmas V, Javerliat I, Haab F et al. Complications per-operatoires de la bandelette sous-uretrale TVT dans le traitment de l'incontinence urinaire d'effort feminine. Abstract, XXIIIeme congres de la SIFUD, 2000.
9. Jacquetin B, Fatton B, Fernandez-Brusserolles M. Comparitive results of isolated TVT versus prolapse cure associated TVT: 171 cases with one to three years follow-up. Abstract, ICS 2000.
10. Kuuva N, Nilsson CG. A nationwide analysis of complications associated with the tension-free vaginal tape (TVT) procedure. *Acta Obstet Gynecol Scand* 2002;81(1):72-77.
11. Boustead GB. The tension-free tape for treating female stress urinary incontinence. *BJU International* 2002;89:687-693.
12. Karram MM, Segal JL, Vassallo BJ et al. Complications and untoward effects of the Tension-Free Vaginal Tape procedure. *Obstet Gynecol* 2003;101(5 Pt 1):929-932.
13. Vierhout ME. Severe hemorrhage complicating tension-free vaginal tape (TVT): a case report. *Int Urogynecol J Pelvic Floor Dysfunct* 2001;12(2);139-140.
14. Primicerio M, DeMatteis G, Montanino OM et al. Use of TVT (tension-free vaginal tape) in the treatment of female stress urinary incontinence. Preliminary results. *Minerva Gynecol* 1999;51:355-358.