SCIENTIFIC PAPER

De Novo Pudendal Neuropathy After TOT-O Surgery for Stress Urinary Incontinence

John D. Paulson, MD, James Baker, PhD

ABSTRACT

Background and Objectives: Five cases of pelvic nerve complications after transobturator tape (TOT) inside-out surgical procedures for stress urinary incontinence are presented.

Methods: We conducted a chart review of patients with complications referred to our practice.

Results: Five patients with nerve complications after TOT inside-out procedures were investigated. Pudendal neuropathy and interstitial cystitis were seen in this series of patients with several patients having myofascial pain in the lower abdominal area.

Conclusions: Although not commonly reported, complications from needle placement and from the area of needle exit in a TOT procedure can exist, and the surgeon must be careful when placing the needle through the area of the obturator fossa.

Key Words: Pudendal neuropathy, Interstitial cystitis, Transobturator tape surgery.

Institute for Advanced Endoscopic Training, Rockville, Maryland, USA (Dr Paulson).

Department of Anatomy, Howard University School of Medicine, Washington, District of Columbia, USA (Dr Baker).

Address correspondence to: Address for Correspondence: John D. Paulson, MD, 15636 Haddonfield Way, Gaithersburg, Maryland 20878, USA. Telephone: (240) 751-2175, Fax: (240) 482-1859, E-mail: endodoc11@gmail.com

DOI: 10.4293/108680811X13125733356279

INTRODUCTION

Since the advent of the tension-free vaginal tape (TVT), retro pubic sling surgery with TVT for stress urinary incontinence in the female has become the gold standard for treating stress urinary incontinence by this minimally invasive technique.[1] Follow-up has suggested that long-term results have shown efficacy, safety, and tolerability. In the early 2000s, vaginal slings (transobturator tape) [TOT] utilizing a transobturator technique (outside-in) became more popular[2] and could be performed quicker and seemed to have comparable efficacy and produced fewer problems with the bladder and the bowel.[3-7] De Leval in 2006[8] introduced a transobturator minimally invasive procedure for urinary stress incontinence (inside-out) in the female, which differed from the original TOT approach. This method involved placing the tunneling needle from inside the vagina, under the pubic ramus and out the obturator fossa. Subsequent studies have noted that its safety profile is comparable to that of the TOT (outside-in) and that it works as well in relieving incontinence due to stress.[5,9-11]

There have been reports of groin pain and other minor complications that usually subside spontaneously with the TOT-O procedure (inside out) and TOT outside-in. Reports of sexual dysfunction after these procedures are very limited.[9,11-13] No reports have been published of severe pelvic pain secondary to these procedures. The differential diagnosis of persistent pelvic pain can include muscle strain, osteitis pubis, inflammation, or nerve entrapment. This report explores the first reported cases of "De Novo Pudendal Neuropathy" in 5 individuals who had a TOT-O procedure. *Stedman's Medical Dictionary*[14] defines neuropathy as any disturbance or pathologic changes in the nervous system. Peripheral neuropathy is a problem with the nerves that carry information to and from the brain and spinal cord. This problem can produce pain, loss of sensation, and an inability to control muscles.[15]

CASE REPORT

From July 1, 2008 through June 30, 2009, five patients came to the office after surgical procedures for stress urinary incontinence and were seen for chronic pelvic

pain after TOT-O procedures that had been previously performed 6 months to 3 years prior to being seen. No pain had been noted prior to the surgical procedure performed for stress urinary incontinence. A complete history was taken. Exclusion of certain diagnoses or inclusion into the multitude of problems was necessary to formulate the diagnosis. A Pain, Urgency and Frequency (PUF) questionnaire[16] was administered to the patients, and abdominal and pelvic examinations were performed to check for any abnormalities including neuropathic and myofascial pain. Myofascial pain distribution in the lower abdominal area if present was confirmed, as was Carnett's sign; the area of distribution of the pudendal nerve was followed and pain, when elicited, was noted. Bladder tenderness to palpation after voiding was recorded.

If a patient had myofascial pain discomfort, blocks were injected with bupivicaine and decrease of pain was noted. For the patients who had pain in the pudendal area, an anesthetic response to a pudendal nerve block was carefully recorded.[17] It was determined that "clinical testing with positive anesthetic response during pudendal nerve block can be used to diagnose pudendal nerve entrapment." Cystoscopy with hydro distention with the patient under anesthesia was performed on the 5 patients, and glomerulations in all 4 quadrants were documented in 4 of the 5 patients.

The first step was to determine the symptoms. Often there is a spontaneous or evoked burning pain. It is also possible to have a deep aching or noxious feeling in the pelvic area and an exaggerated sensation to a stimulus that usually does not cause discomfort. Pudendal nerve pain often worsens in the sitting position with relief or amelioration by standing, or sitting on a toilet seat. The second step was to locate the site of the symptoms on physical examination. Lastly, the third step involved giving an anesthetic block to the pudendal nerve. If relief of the symptoms was noted, this was used to help diagnose pudendal nerve entrapment.[17]

Determining a myofascial neuropathy involves getting a history, physical examination, and an anesthetic block to the area of distribution of the nerve that relieves the discomfort. This was performed on each of the patients.

Therapy involved specific blocks (abdominal myofascial blocks, such as ilioinguinal/iliohypogastric nerve blocks, pentosan polysulfate sodium, instillations of the bladder [using lidocaine, heparin, triamcinolone, and bicarbonate] and adding DMSO [dimethyl sulfoxide] after several instillations), and 3 of 5 patients were given gabapentin.

RESULTS

All patients had TOT inside-out procedures. All had no history of pain prior to the surgery for incontinence and symptoms as described previously. PUF questionnaires revealed probable interstitial cystitis (IC) with levels ranging from 16 to 25 **(Table 1)**. Abdominal myofascial pain syndrome was elicited in 2 patients. Cystoscopy demonstrated positive glomerulations in 4 of the 5 patients tested **(Table 1)**. All patients responded to blocks with anesthetic agents administered, and over time, the continuation of these blocks led to a diminution of discomfort.

Alleviation of both bladder pain and pudendal pain was noted. Sexual dysfunction mostly dyspareunia, was improved by treating these problems. Although follow-up of the treatments were not performed for an extended duration of time, 2 patients became asymptomatic within 5 months to 6 months, and within a year all had improved. One patient did not return for follow-up after several months but had significant improvement, and let us know she was doing well and would call if her pelvic pain became a problem.

Table 1.
Five Patients With Pelvic Pain

Patient	Bladder Pain by Examination	Pudendal Pain by Examination	Dyspareunia Before Treatment Visual Analog Scale [18-20]	Myofascial Pain Abdominal	PUF Scores[14]	Cystoscopy >10 Glomerulations Per Quadrant
1	+	+	8/10	-	23	+
2	−	+	9/10	-	19	+
3	+	+	10/10	+	25	+
4	+	+	10/10	+	22	+
5	+	+	10/10	-	16	−

DISCUSSION

Reports of the safety of both the TOT outside-in and the TOT inside-out have shown that both the operations are usually safe.[3-7,9-11,13,21-23] A study of embalmed hemi pelvises that looked at the various nerves and their relationship to the various sling procedures demonstrated that the distances to the dorsal nerve of the clitoris are similar, but that there is a major difference in that the distance from the needle to the obturator canal is closer in the inside-out technique. This means that the inside-out procedure may be fraught with increased potential problems of nerve damage.[24] The entry point is always more exact than the exit point in these types of surgical procedures.

As the pudendal nerve leaves the ischiorectal fossa and passes into the urogenital triangle, it gives off the perineal nerve and dorsal nerve of the clitoris. The perineal nerve penetrates the posterior aspect of the superficial fascia and enters the superficial pouch of the perineum. It divides into muscular branches to supply the ischiocavernosus, bulbospongiosus, and superficial transverse perineal muscles and continues into the skin as the posterior labial branches. In addition, branches of the perineal nerve enter the deep pouch to supply the sphincter urethrae and sphincter vaginalis. The dorsal nerve to the clitoris passes through the deep pouch and courses along the dorsal aspect of the clitoris.

Surrounding the vagina and lower uterus are many sympathetic and parasympathetic branches coursing from the inferior hypogastric plexus. Vaginal nerves from the lower part of the inferior hypogastric plexus and uterovaginal plexus follow the vaginal arteries to supply the vaginal walls, the erectile tissue of the vestibular bulbs and clitoris, the urethra, and the greater vestibular glands. Running with these fibers are many general visceral afferent (GVA) fibers that follow the sympathetics and parasympathetics back to the spinal cord (they run with the pelvic [parasympathetic] and sacral [sympathetic]) splanchnics. Pelvic pain fibers from the upper parts of the vagina (GVA) run with the pelvic splanchnic nerves. If the anterior vagina wall is being dissected, rarely general visceral efferent (GVE) and GVA fibers may be damaged accounting for why there are very few problems with vaginal surgery involving the anterior compartment.

The Nantes criteria[25] were developed for the diagnostic criteria of pudendal neuropathy; this entity is a clinical problem that often is difficult to diagnose **(Table 2)**. All 5 patients fulfilled the criteria.

Table 2.
Criteria of the Nantes Criteria for Pudendal Neuropathy. Adapted from Labat et al.[25]

Essential Criteria
Pain is in the territory of the pudendal nerve: from the anus to the penis or clitoris
The pain is predominantly experienced while sitting
The pain does not awaken the patient at night
Pain has no objective sensory impairment
Pain is relieved by a diagnostic pudendal nerve block
Complementary Diagnostic Criteria
There can be burning, shooting, stabbing pain, and numbness
Occasionally there is allodynia or hyperpathia
There can be rectal or vaginal foreign body sensation
There can be worsening of pain during the day
It is predominantly unilateral pain
The discomfort can be triggered by defecation
There can be a presence of tenderness on palpation of the ischial spine
Clinical neurophysiology findings in nulliparous women
Exclusion Criteria
If there is exclusivity with coccygeal, gluteal, pubic, or hypogastric pain
Pruritus
Exclusively episodes of paroxysmal pain
If imaging abnormalities can account for the pain
Associated Signs Not Excluding the Diagnosis
Buttock pain while sitting
Referred sciatic pain
Pain referred to the medial aspect of the thigh
Suprapubic pain
Urinary frequency and/or pain on a full bladder
Pain occurring after ejaculation
Dyspareunia and/or pain after sexual intercourse
Erectile dysfunction
Associated with normal clinical neurophysiology

One reported case in the literature has shown that hemorrhage and nerve damage of the needle tunneler in a TOT inside-out procedure could be a cause of bleeding and pain.[26] Corona et al[27] have recently described neuropathy after TOT surgery and proposed laparoscopic neurolysis as therapy.

History must be extensively explored for all patients with chronic pelvic pain. Exclusion of other diagnoses or inclusion into the myriad of problems often helps with the

diagnosis. A neuropathic pain in the perineum, genital, and ano-rectal areas commonly demonstrates as a burning pain with or without a component of severe sudden or "electric shock-like" sensations. Occasionally, the patient has a deep aching pain or sensation and an increased appreciation to any physical stimulus with an exaggerated sensation of pain for any given stimulus. Often there is a pain sensation occurring with a particular stimulation, which usually does not cause discomfort, or there can be an unpleasant or exaggerated prolonged pain response. Symptoms of pudendal nerve entrapment are often exaggerated while sitting. Standing can often relieve these symptoms. When one is lying down or "sitting on a toilet seat," these symptoms are usually absent. This was seen in most of our patients. Sexual dysfunction and bowel or bladder changes can often accompany the problems.[28,29]

CONCLUSION

Location of symptoms can be noted from the physical examination, allowing treatment with the addition of ancillary therapies, such as instillations and nerve blocks with local anesthetic medicine. When administered with good response and benefit, the correct diagnosis can be made and treatment can be improved.

References:

1. Ulmsten U, Henriksson L, Johnson P, Varbos G. An ambulatory surgical procedure under local anesthesia for treatment of female urinary incontinence. *Int Urogynecol J Pelvic Floor Dysfunction*. 1996;7(2):81-85.

2. Delorme E. Transobturator urethral suspension: mini-invasive procedure in the treatment of stress urinary incontinence in women. *Prog Urol*. 2001;11:1306-1313.

3. Costa P, Delmas V. Trans-obturator-procedure - "inside-out or outside-in": current concepts and evidence base. *Curr Opin Urol*. 2004;14:313-315.

4. Debodinance P. Transobturator-urethral sling for the surgical correction of female stress urinary incontinence: Outside-in (Monarc) versus Inside-out (TVY-O). Are the two ways reassuring? *Eur J Obstet Gynecol and Reprod Biol*. 2007;133:232-238.

5. Debodinance P. Soutènement sous-urétral par la voie obturatrice pour la cure chirurgicale de l'incontinence urinaire d'effort féminine : dehors en dedans (Monarc®) *versus* dedans en dehors (TVT-O®) Les deux voies sont-elles sécurisantes? *J Gynecol Obstet Biol Reprod*. 2006;35:571-577.

6. Rinne K, Laurikainen E, Kivelä A, et al. A randomized trial comparing TVT with TVT-O: 12 month results. *Int Urogynecol J*. 2008;19:1049-1054.

7. Descazeaud A, Salet-Lizée D, Villet R, et al. Traitement de l'incontinence urinaire d'effort par bandelette TVT-O: resultants immediate et un an. *Gynécologie, Obstétrique & Fertilité*. 2007; 35:523-529.

8. De Leval J. Novel surgical technique for the treatment of female stress urinary incontinence: transobturator vaginal tape inside-out. *Eur Urol*. 2003;44(6):724-730.

9. David-Montefiore E, Frobert JL, Grisard-Anaf M, et al. Perioperative complications and pain after the suburethral sling procedure for urinary stress incontinence: a French prospective randomised multicentre study comparing the retropubic and transobturator routes. *Eur Urol*. 2006;49:133-138.

10. Collinet P, Ciofu C, Costa P, et al. The Safety of the inside-out tape (TVT-O) treatment in stress urinary incontinence: French registry data on 984 women. *Int Urogynecol J*. 2008;19:711-715.

11. Daneshgari F, Kong W, Swartz M. Complications of mid urethral slings: important outcomes for future clinical trials. *J Urol*. 2008;180:1890-1897.

12. Roth TM. Management of persistent groin pain after transobturator slings. *Int Urogynecol J*. 2007;18:1371-1373.

13. Stanford EJ, Paraiso MFR. A comprehensive review of suburethral sling procedure complications. *J Minin Invasive Gynecol*. 2008;15:132-145.

14. *Stedman's Medical Dictionary*. 28th ed. Lippincott, Williams & Wilkins. 2005.

15. Medline Medical Dictionary, National Library of Medicine, National Institutes of Health. 2010.

16. Parsons CL, Dell J, Stanford EJ, et al. Increased prevalence of interstitial cystitis: previously unrecognized urologic and gynecologic cases identified using a new symptom questionnaire and intravesical potassium sensitivity. *Urology*. 2002;60(4):573-578.

17. Labat J, Riant T, Robert R, Amarenco G, Lefaucher J, Rigaud J. Diagnostic criteria for pudendal neuralgia by pudendal nerve entrapment. *Neurourol Urodyn*. 2008;27:306-310.

18. Todd KH, Funk KG, Funk JP, Bonacci R. Clinical significance of reported changes in pain severity. *Ann Emerg Med*. 1996; 27(4):485-489.

19. Averbach M, Katzper M. Assessment of visual analog versus categorical scale for measurement of osteoarthritis pain. *J Clin Pharm*. 2004;44:368-372.

20. Acute pain management: operative or medical procedures and trauma, clinical practice guideline No. 1. AHCPR Publication No. 92-0032d; February 1992. Agency for Healthcare Research & Quality, Rockville, MD;1992:16-117.

21. Lim JL, Cornish A, Carey MP. Clinical and quality-of-life outcomes in women treated by the TVT-O procedure. *BJOG*. 2006;113:1315-1320.

22. Davila GW, Johnson JD, Serels S. Multicenter experience with the Monarc transobturator sling system to treat stress urinary incontinence. *Int Urogynecol J.* 2006;17:460-465.

23. Zhu L, Lang J, Hai N, Wong F. Comparing vaginal tape and transobturator tape for the treatment of mild and moderate stress incontinence: A prospective randomized controlled study. *Int J Gynecol Obstet.* 2007;99:14-17.

24. Achtari C, Mckenzie B, Hiscock R, et al. Anatomical study of the obturator foramen and dorsal nerve of the clitoris and their relationship to minimally invasive slings. *Int Urogynecol J.* 2006; 17:330-334.

25. Labatt JJ, Riant T, Robert R, et al. Diagnostic criteria for pudendal neuralgia by pudendal nerve entrapment (Nantes criteria). *Neurourol Urodyn.* 2008;27:306-310.

26. Atassi Z, Reich A, Rudge A, Dreienberg R, Flock F. Haemorrhage and nerve damage as complications of TVT-O procedure: case report and literature review. *Arch Gynecol Obstet.* 2008;277:161-164.

27. Corona R, DeCicco C, Schonman R, Verguts J, Ussia A, Koninckx PR. Tension-free Vaginal Tapes and Pelvic Neuropathy. *J Minimally Invasive Gyn.* 2008;15:262-267.

28. Kammerer-Doak D. Assessment of sexual function in women with pelvic floor dysfunction. *Int Urogynecol J.* 2009; 20(Suppl I):S45–S50.

29. Mouritsen L. Pathophysiology of sexual dysfunction as related to pelvic floor disorders. *Int Urogynecol J.* 2009;20(suppl 1):S19–S25.