

■ BY MARCO A. PELOSI II, MD, and MARCO A. PELOSI III, MD

New transobturator sling reduces risk of injury

By placing the tension-free sling between the 2 obturator foramina using a perineal approach, surgeons can eliminate complications that stem from passing needle carriers through the retropubic space. Here, 2 experts delineate this easily learned technique.

Potential complications associated with passing needle carriers through the retropubic space are eliminated, and cystoscopy is not routinely required with the use of a transobturator sling.

Although it is effective and easy to perform,¹⁻⁶ retropubic placement of suburethral tension-free vaginal tape (TVT) for the treatment of stress urinary incontinence has been associated with a number of bowel, vascular, nerve, and bladder injuries (TABLE).⁷⁻¹³

Such complications appear to be related to the unique upward vaginal passage of the metallic sling trocars through the retropubic space. Newer slings eliminate the upward approach, but still require routine cystoscopy to confirm an intact bladder and urethra.

A new tension-free suburethral sling addresses these shortcomings using an innovative transobturator route.¹⁴ In the new procedure, the surgeon uses needle passers to run the sling from one obturator foramen to the other. The perineal approach reproduces the natural suspension of the urethral fascia while preserving an intact retropubic space (FIGURE 1).

■Dr. Pelosi II is director and Dr. Pelosi III is associate director of the Pelosi Women's Medical Center, Bayonne, NJ.

What does 'tension-free' mean?

Tension-free slings are used to treat stress urinary incontinence caused by urethral hypermobility and intrinsic sphincter deficiency. In this approach, a synthetic transvaginal suburethral sling is placed through the retropubic space without using suspension sutures. The sling is held in place by the friction between the mesh and the tissue canals created by the metallic needle

KEY POINTS

- The route of the transobturator sling is strictly perineal, with a very short, blind passage through the crural region. This pathway ensures that the retropubic space is not entered and that the anatomic structures crossed by the needle passer and mesh are either muscle or fascia.
- The transobturator approach eliminates the need for routine cystoscopy in most patients.
- Short-term efficacy of the transobturator sling is similar to that of other suburethral tension-free slings.
- In our experience, the transobturator approach reduces average operating time to 17 minutes.

TABLE**Advantages of the transobturator sling**

- Offers short-term efficacy (1 year) similar to SPARC and tension-free vaginal tape systems
- Reproduces natural suspension mechanism of pubocervical fascia and pubourethral ligaments, which may pose less risk for overcorrection and dysuria
- Offers safe needle passage by avoiding the retropubic space
 - May eliminate vascular, bladder, and bowel injuries
 - Eliminates the need for cystoscopy in most patients
 - Avoids retropubic scarring
 - May prove useful in cases with scar tissue impedence
 - May prove useful in obese patients
 - May prove useful in treatment failures
- Offers shortened procedure time
- Increases surgeon comfort by minimizing blind perineal needle passage
- Is easy to learn and teach

Short-term efficacy of the Monarc transobturator sling is similar to that of the SPARC and tension-free vaginal slings.

passers. Scar tissue later fixes the mesh, preventing migration.

Because the sling is not anchored to the pubic bone, ligaments, or rectus fascia, it is considered “free of tension.” The result is a midcomplex urethral support that limits urethral descent, improves the stabilization mechanism generated by pubourethral ligaments and levator ani muscles, and reinforces support of the backboard vaginal hammock.

A tension-free sling designed to reduce injury

Since its introduction in the mid 1990s, S retropubic placement of suburethral tension-free tape has continued to gain in popularity.¹⁵⁻²² The technique has several advantages: It is simple to perform under local, regional, or general anesthesia, and has proved to be a safe treatment for stress urinary incontinence, with minimal complications in experienced hands. Still, injuries have occurred⁷⁻¹³—likely due to the blind passing of metal trocars from the vagina upward through the retropubic space.^{9,23}

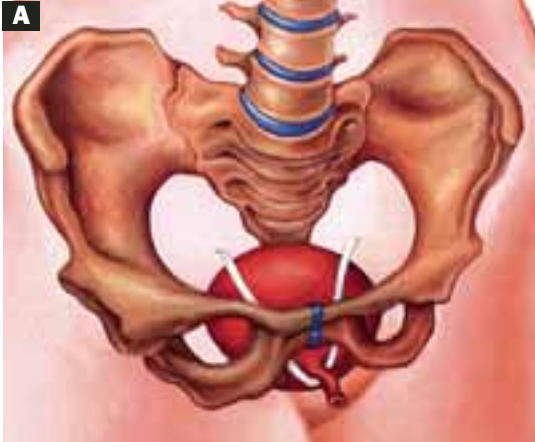
Downward placement introduced. In an effort to reduce these complications, tension-free sling systems that rely on suprapubic, downward needle-carrier placement through the retropubic space were developed, such as the SPARC Female Sling System (*American Medical Systems, Minnetonka, Minn*), introduced in 2001.²⁴ The manufacturer of the traditional TVT (*Gynecare, a division of Ethicon, Somerville, NJ*) also recently introduced suprapubic needle passers. However, because these slings still require passage through the retropubic space, their use may lead to vascular, bowel, and bladder injury. Routine cystoscopy is therefore required.

The transobturator sling. In the Netherlands in 1998, Nickel et al²⁵ reported a successful sling procedure using a polyester ribbon passed through the obturator foramen and around the urethra for treatment of refractory urethral sphincter incompetence in female dogs. In France in 2001, Delorme¹⁴ introduced the transobturator sling procedure in humans. Dargent et al²⁶ then performed the operation in 71 patients using a technique inspired by Delorme, and found the short-term results similar to those of the TVT.

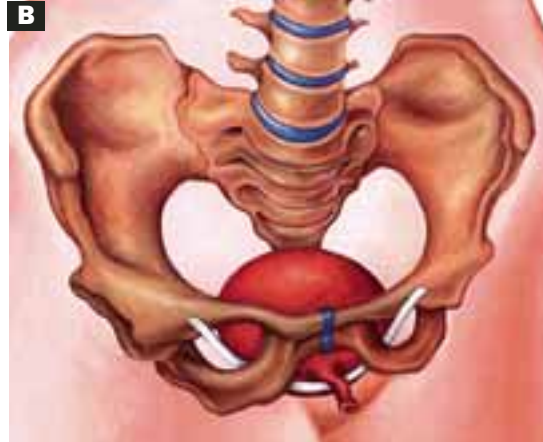
The Monarc transobturator sling (*American Medical Systems*), introduced in Europe in January 2003, has been used successfully in more than 1,000 procedures (FIGURE 2). This new system offers significant

FIGURE 1

Suburethral slings: Retropubic and transobturator pathways



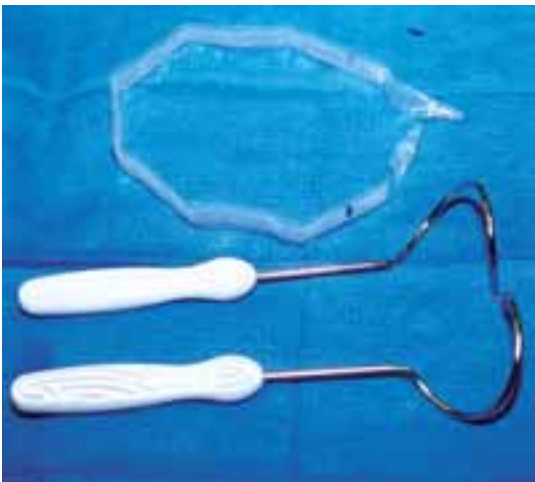
Traditional suburethral tension-free slings require the needle passers and sling to be placed through the retropubic space.



The newer transobturator sling uses a perineal approach. The needle passer and sling are passed from one obturator foramen to the other, preserving an intact retropubic space.

FIGURE 2

Monarc transobturator sling system



The Monarc system consists of 2 stainless steel helical-shaped needle passers and a 1-cm by 35-cm polypropylene sling mesh with a protected sheath, attached connectors, and a reabsorbable tensioning suture.

FIGURE 3

Vaginal incision



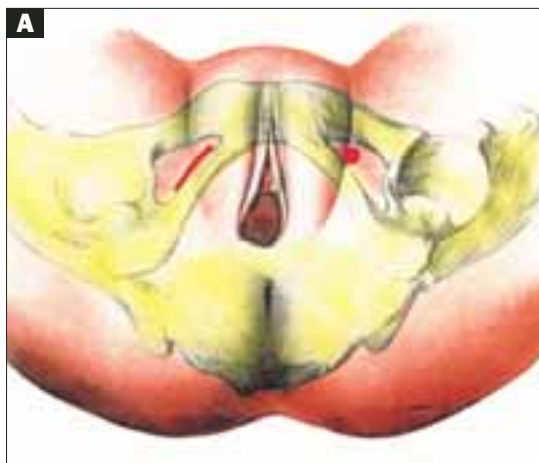
Inject a diluted vasoconstrictive solution into the anterior vaginal wall, and make a small vertical incision along the anterior vaginal mucosa 0.5 cm below the urethral meatus. Separate the vaginal epithelium from the underlying periurethral fascia using sharp and digital dissection, advancing bilaterally to the inferior pubic ramus. Insert a finger into the vaginal dissection and palpate the internal edge of the ischiopubic ramus and the upper-inner corner of the obturator foramen.

CONTINUED

- New transobturator sling reduces risk of injury

FIGURE 4

Needle entry: Transobturator sling procedure



The safe zone for needle insertion is the upper-inner corner of the obturator foramen (red line). The red dot indicates the recommended insertion site (upper inner corner).



The insertion area corresponds to the point where a horizontal line at the level of the clitoris crosses a vertical line at the level of the genitofemoral fold. Make a small skin incision at this point.

The Monarc transobturator sling, introduced in Europe in January 2003, has been used successfully in more than 1,000 procedures.

technical improvements over the original transobturator sling devices.

Specifically, the Monarc system simplifies rotation of the needle passer during insertion and extraction around the inferior aspect of the ischiopubic ramus. The 3-mm-diameter passers are specifically designed for right-side or left-side use. They are attached to fixed handles to create a natural wrist rotation. The sling connectors, meanwhile, facilitate rapid, effortless, and secure mesh placement and fixation.

Easy to learn and perform

Anesthesia may be local, regional, or general, and prophylactic antibiotics are routinely given. FIGURES 3 through 6 offer a

detailed description of how to surgically place the Monarc transobturator sling for treatment of stress urinary incontinence. What follows is a brief overview:

After making a small vertical incision along the anterior vaginal mucosa, use a finger to locate the upper-inner corner of the obturator foramen—the safe zone for needle insertion. You will incise the skin at this point and introduce the needle tip perpendicularly. Rotate the needle, with the tip following the posterior surface of the pubic ramus, until the tip exits the vaginal incision. Repeat this process on the other side.

Attach the sling and its plastic sheath, then draw both out through the skin incisions by pulling back on the needle passers. Cut the mesh, adjust the tension, and close the incisions.

A Foley catheter and vaginal packing with metronidazole gel may be used at the surgeon's discretion.

Route minimizes anatomical hazards. The pathway described ensures that the

CONTINUED ON PAGE 30

- New transobturator sling reduces risk of injury

FIGURE 5

Needle passage: Transobturator sling procedure



Insert your left index finger into the vaginal incision on the patient's left side. Holding the right-side Monarc needle, introduce the needle tip perpendicularly through the skin incision.



Place the thumb of your left hand onto the outside curve of the needle and gently push until its tip penetrates the obturator membrane and muscle. Use the needle's tip to locate the pubic ramus, and rotate the needle so that the tip follows the posterior surface of this structure. Continue this rotation, using your left index finger to guide the needle tip to exit the vaginal incision.



Repeat steps A and B on the contralateral side.



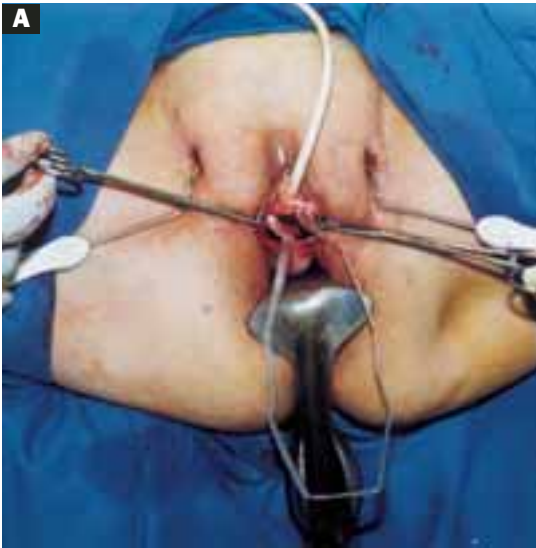
With the needle-passer tips extending out of the vaginal incision, attach the sling and its plastic sheath using the connectors. Make sure the mesh lies flat and is not twisted before attaching the connector to the second needle.

CONTINUED

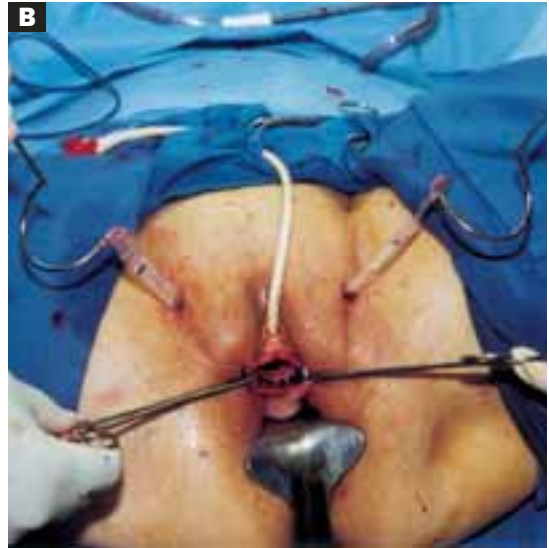
- New transobturator sling reduces risk of injury

FIGURE 6

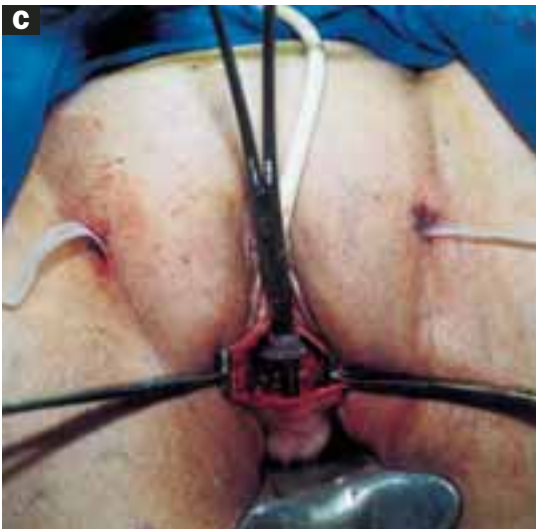
Sling placement



Visualize the connected sling.



Pull the sling and sheath out through the needle paths by retracting the needle passers, using a reverse rotating motion, until the connectors with the mesh are pulled through the skin incisions. Cut the mesh and sheath, leaving sufficient mesh exposed to grasp for later adjustment.

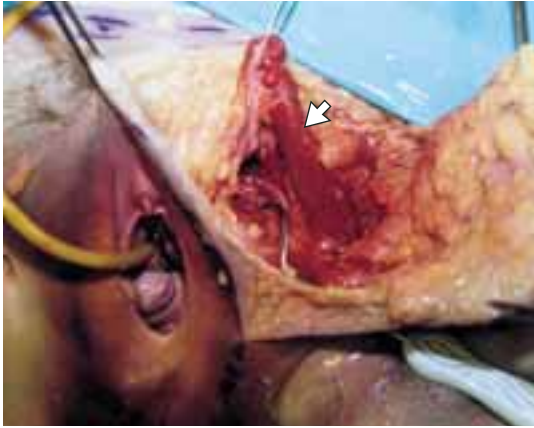


Place a forceps or other instrument between the mesh and urethra. Adjust the mesh tension, leaving approximately 2 mm of space between the urethra and the mesh.



Remove the plastic sheath from the sling mesh by pulling up from both sides and trim the mesh at the level of the subcutaneous tissue. Close the skin and vaginal incisions.

CONTINUED

FIGURE 7**Route of transobturator sling minimizes anatomical hazards**

The needle travels around the ischiopubic ramus. Transobturator needle passage begins with penetration of the skin and subcutaneous tissue. After traversing the superficial perineal fascia, the needle crosses the adductor muscles of the thigh near their pubic bone origin and below the insertion point of the adductor longus tendon (arrow). It then penetrates the obturator membrane, obturator internus muscle, and periurethral endopelvic fascia. After passing the level of the white line—either over or under the puborectalis section of the levator—the needle exits through the vaginal incision.

retropubic space is not entered and that muscle or fascia are the only anatomic structures crossed by the needle passer and mesh. No major vessels or nerves come in contact with the sling (FIGURES 7 and 8).

Our fluoroscopic observations of the transobturator sling in cadavers show that insertion of the needle passer through the obturator foramen with exit through the vaginal incision under the mid-urethra is precise and simple (FIGURE 9).

Our comparative studies in cadavers revealed that, despite the different shape and placement, lengths for the SPARC and Monarc transobturator slings in the same cadaver are almost equivalent—ranging from 12 to 14 cm, depending on the patient's height and weight (FIGURE 10).

IMAGE: Maura Flynn

FIGURE 8**The obturator foramen**

The tough obturator membrane covers the foramen. The obturator canal is 2 to 3 cm long and is located at the anterolateral upper margin of the membrane. The distance between the safe zone for needle insertion and the obturator canal is approximately 3.5 to 4 cm. At the safe entry zone (green area), the anterior branch of the obturator artery is reduced to a capillary diameter and no significant arteries, veins, or nerve pedicles are present.

These considerations strongly suggest that the transobturator sling offers a simpler approach with fewer potential anatomic hazards than retropubic tension-free slings.

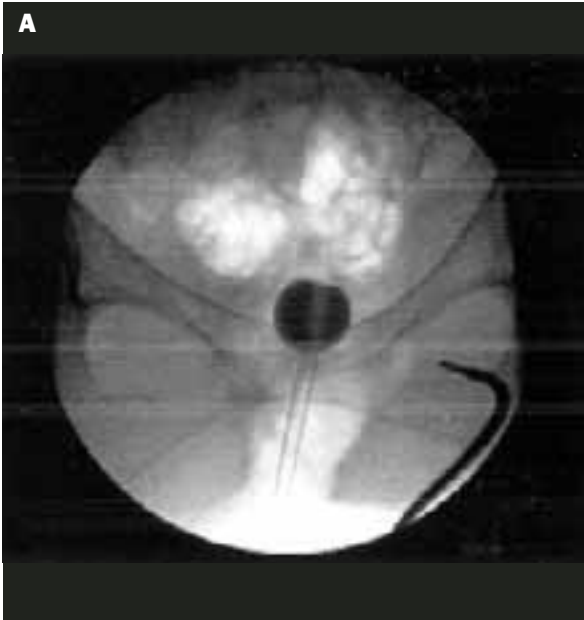
The transobturator sling involves fewer potential anatomical hazards than retropubic placement.

Clinical experience yields positive results

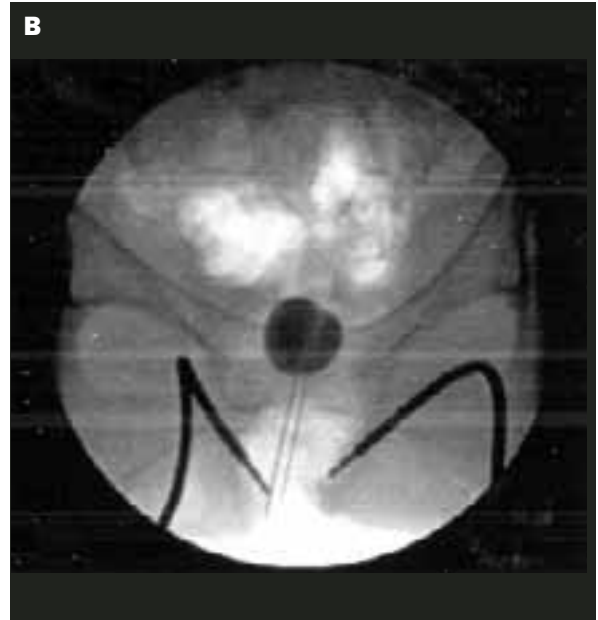
Early European series and our initial experience suggest that the short-term efficacy of the Monarc transobturator sling is similar to that of the SPARC and TVT slings. Average operating time is 17 minutes. The

FIGURE 9

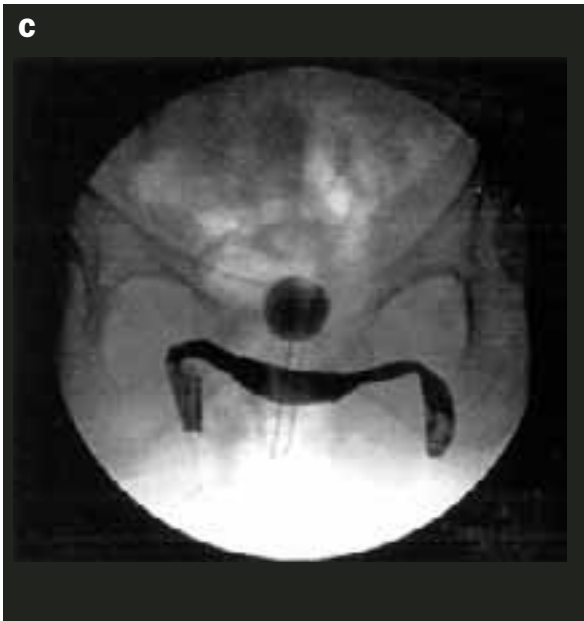
Fluoroscopic observation in cadavers



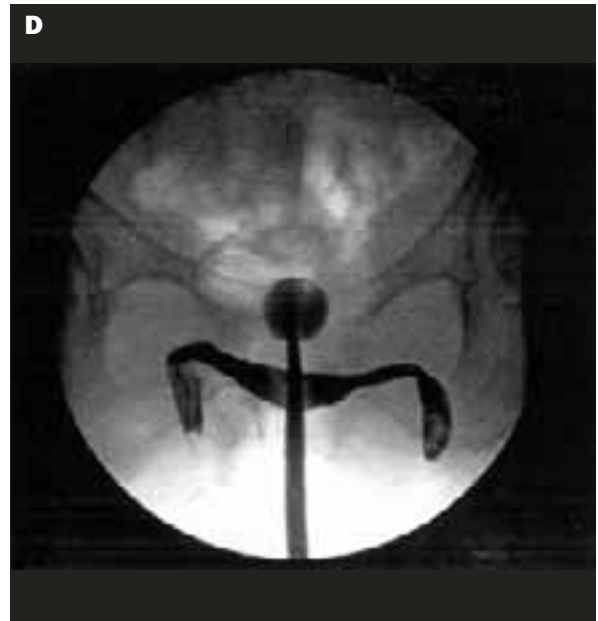
Here, the first needle passer is placed at the obturator foramen entry site.



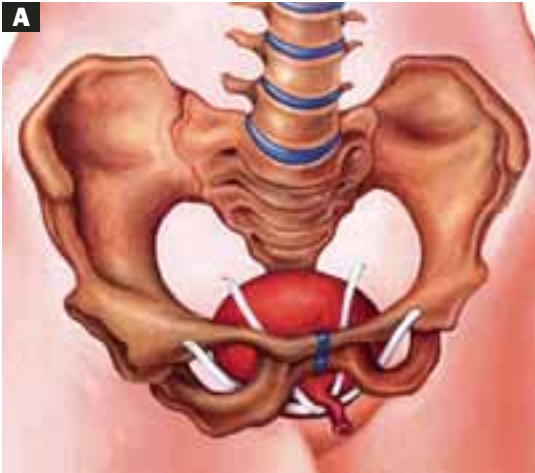
Both needles have been passed through their corresponding entry sites.



Note the strictly perineal route of the sling, which runs almost horizontally from one obturator foramen to the other.



A metal sound placed inside the Foley catheter further delineates the position of the sling beneath the urethra.

FIGURE 10**Routes of transobturator and retropubic slings**

Graphic depiction of both the transobturator sling and the retropubic tension-free sling in place.



Fluoroscopic image of both slings in a cadaver. The transobturator sling runs horizontally while the retropubic tension-free sling forms a tighter "U."

No major vessels or nerves come in contact with the transobturator tension-free sling.

technique involves a short learning curve (approximately 4 cases).

Cystoscopy is not routinely required; we perform it only in women with significant prolapse or suspected urethral injury, and have encountered no intraoperative or postoperative complications.

No patients have complained of postoperative pain in the area of the adductor muscles of the thigh, and no sling erosions have occurred. We also have found this approach useful in obese patients and women with retropubic scarring, in whom retropubic needle passage can be a challenge.

In addition to its application in the treatment of female stress urinary incontinence, the transobturator foramen route was recently used to insert the anterior wings of a large mesh in the repair of severe cystocele.²⁷

Although long-term follow-up data are

not available for the transobturator approach, short-term results are encouraging. Large comparative studies with other anti-incontinent procedures are needed. ■

REFERENCES

1. Reschers UM, Tunn R, Buczkowski M, et al. Tension-free vaginal tape for the treatment of stress urinary incontinence. *Clin Obstet Gynecol.* 2000;43:670-675.
2. Tamussino KF, Hanzal E, Kolle D, et al. Tension-free vaginal tape operation: results of the Austrian Registry. *Obstet Gynecol.* 2001;98:732-736.
3. Haab F, Sananes S, Amarenco G, et al. Results of the tension-free vaginal tape procedure for the treatment of type II stress urinary incontinence at a minimum follow up of one year. *J Urol.* 2001;165:159-162.
4. Rardin CR, Kohli N, Rosenblatt PL, et al. Tension-free vaginal tape: outcomes among women with primary versus recurrent stress urinary incontinence. *Obstet Gynecol.* 2002;100:893-897.
5. Vassallo BJ, Kleeman SD, Segal JL, et al. Tension-free vaginal tape: a quality of life assessment. *Obstet Gynecol.* 2002;100:518-524.
6. Karram MM, Segal JL, Vassallo BJ, et al. Complications and untoward effects of the tension-free vaginal tape procedure. *Obstet Gynecol.* 2003;101:929-932.
7. MAUDE: Food and Drug Administration Manufacturer and User Facility Device Experience Database. Available at <http://www.fda.gov/cdrh/maude.html>. Accessed June 7, 2003.
8. Peyrat L, Boutin JM, Bruyere F, et al. Intestinal perforation is a complication of TVT procedure for UI. *Eur Urol.* 2001;39:603-605.
9. Walters MD, Tulikangas PR, LaSala C, et al. Vascular injury during tension-free vaginal tape procedure for stress urinary incontinence. *Obstet Gynecol.* 2001;98:957-959.
10. Zilbert AW, Farrell SA. External iliac artery laceration during tension-free vaginal tape procedure. *Int Urogynecol J Pelvic Floor Dysfunct.* 2001;12:141-143.
11. Vierhout ME. Severe hemorrhage complicating TVT: a case report. *Int Urogynecol J Pelvic Floor Dysfunct.* 2000;12:139-140.
12. Brink DM. Bowel injury following insertion of TVT. *SAfr Med J.* 2000;90:450-452.
13. Shobeiri SA, Garely AD, Chesson RR. Recognition of occult bladder injury during the tension-free vaginal tape procedure. *Obstet Gynecol.* 2002;99:1067-1072.

■ New transobturator sling reduces risk of injury

14. Delorme E. Transobturator urethral suspension: mini-invasive procedure in the treatment of stress urinary incontinence in women. *Prog Urol*. 2001;11:1306-1313.
15. Ulmstein V, Petros P. Intravaginal slingplasty (IVS): an ambulatory surgical procedure for treatment of female urinary incontinence. *Scand J Urol Nephrol*. 1995;29:75-82.
16. Chung MK, Chung RP. Comparison of laparoscopic Burch and tension-free vaginal tape in treating stress urinary incontinence in obese patients. *JSLs*. 2002;6:17-21.
17. Pelosi MA III, Pelosi MA II. Pubic bone suburethral stabilization sling: laparoscopic assessment of a transvaginal operation for the treatment of stress urinary incontinence. *J Laparoendosc Adv Surg Tech*. 1999;9:45-50.
18. Pelosi MA II, Pelosi MA III, Pelekanos M. The YAMA uropatch sling for treatment of female stress urinary incontinence: a pilot study. *J Laparoendosc Adv Surg Tech*. 2002;12:27-33.
19. Pelosi MA II, Pelosi MA III. Laparoscopic assessment of transvaginal suture fixation to Cooper's ligament for suburethral slings. *J Am Assoc Gynecol Laparosc*. 2001;8:S53.
20. Cundiff GW, Wright JE. A review of surgical management of genuine stress incontinence in women with a discussion of innovative procedures. *J Pelvic Surg*. 1998;4:271-278.
21. Sarver R, Govier FE. Pubovaginal slings: past, present, and future. *Int Urogynecol J*. 1997;8:358-368.
22. Kovac RS, Cruikshank SH. Pubic bone suburethral stabilization sling for recurrent urinary incontinence. *Obstet Gynecol*. 1997;89:624-627.
23. Muir TW, Tulikangos PK, Paraiso MF, et al. The relationship of tension-free vaginal tape insertion and the vascular anatomy. *Obstet Gynecol*. 2003;101:933-936.
24. Pelosi MA II, Pelosi MA III. Laparoscopic evaluation of a new tension-free vaginal sling (SPARC) for stress urinary incontinence. Proceedings of the 31st annual meeting of the American Association of Gynecologic Laparoscopists. November 2002; Miami, Fla.
25. Nickel RF, Wiegand U, van den Brom WE. Evaluation of a transpelvic sling procedure with and without colposuspension for treatment of female dogs with refractory urethral sphincter mechanism incompetence. *Vet Surg*. 1998;27:94-104.
26. Dargent D, Bretones S, George P, et al. Insertion of a suburethral sling through the obturator membrane in the treatment of female urinary incontinence. *Gynecol Obstet Fertil*. 2002;30:576-582.
27. Mouly P, Soulie M, Seguin P, et al. Vaginal reconstruction of a complete vaginal prolapse: the transobturator repair. *J Urol*. 2003;169:S182.

Dr. Pelosi II reports that he is a consultant for American Medical Systems. Dr. Pelosi III reports no affiliations or financial arrangements with any companies whose products are mentioned in this article.

Videotapes and preceptorships are available from the authors.

Address correspondence to: Pelosi Women's Medical Center, 350 Kennedy Boulevard, Bayonne, NJ 07002; telephone 201-858-1800; fax 201-858-1002; e-mail: mpelosi@aol.com

EXPLORE PRACTICE OPPORTUNITIES

WHEN YOU REGISTER YOUR CURRICULUM VITAE WITH THE PRACTICE OPPORTUNITIES DATABASE

NETWORK
with Hospitals, Clinics, Physician Groups,
and Recruiters
at no cost to you

Keep up with all the **Job Opportunities** in the U.S. and abroad. Send your CV information, complete with geographic preferences and date available, to the **Practice Opportunities Database**.

FAX, MAIL, OR E-MAIL YOUR CV TO:
Practice Opportunities

Dowden Health Media
422 South Boatman Road
Scottsburg, IN 47170
Fax: 812-752-9908 Phone: 800-336-9396
practice.opp@dowdenhealth.com

**Easy...Professional...
and FREE.**

We will share your CV with employers and recruiters who have positions available in the geographic location of your choice.