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IUJ VIDEO

Transvaginal bladder-neck closure: a step-by-step video for female pelvic surgeons

Andrey Petrikovets[1] · Helen Sun[1] · David Sheyn[1] · Emily Slopnick[1] · Adonis Hijaz[1]

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Abstract

Introduction and hypothesis Transvaginal bladder-neck closure is a definitive surgical option for urethral erosion due chronic bladder catheterization in patients with neurogenic bladder. Surgeons who perform female pelvic reconstructive surgery have limited exposure to this procedure in their training. The purpose of this video is to demonstrate a transvaginal bladder-neck closure due to urethral erosion in a patient with neurogenic bladder due to persistent neuropathy from Guillain-Barré syndrome managed with prolonged catheter drainage.

Methods We used a live-action surgical demonstration to describe transvaginal bladder-neck closure with urinary diversion.

Results This video provides a step-by-step approach to transvaginal bladder-neck closure as treatment for urethral erosion from chronic catheterization. This video can be used to educate and train those performing female pelvic reconstructive surgery.

Conclusions Surgeons who perform female pelvic surgery should be familiar with the complications of chronic Foley catheterization and treatment options that include transvaginal bladder-neck closure. This video may be used to facilitate reproducibility and comprehension of this procedure.

Keywords Bladder-neck closure · Surgical video · Neurogenic bladder · Chronic Foley catheterization · Urethral erosion

Introduction

Neurogenic lower urinary tract dysfunction in women with neurogenic bladder may be managed with multiple modalities, depending on the nature of the dysfunction. Treatment options include anticholinergic medications, onabotulinumtoxinA injection, clean intermittent catheterization, suprapubic catheterization, sacral neuromodulation, and as a last resort, chronic urethral catheterization [1]. Chronic use of an indwelling urinary catheter is an option for patients with neurogenic bladder who require long-term control of urinary incontinence or retention but are unable to self-catheterize, do not have a caretaker, or have intractable skin breakdown [2, 3]. In a large cohort of patients with multiple sclerosis, 25% required catheterization, 43% of whom had an indwelling catheter [4]. Prolonged catheterization has many risks, including progressive catheter upsizing due to leakage around the catheter, catheter encrustation, malignancy, chronic urinary tract infections, and, ultimately, urethral erosion due to an effaced and irreparable urethra [2, 5].

Transvaginal bladder-neck closure (BNC) with urinary diversion is a definitive surgical option for women with urethral erosion associated with neurogenic bladder to bypass the damaged urethra while preserving the bladder and ureteral function [2, 6]. This procedure may also be indicated in women who have severely shortened urethras, refractory urethrovaginal fistulas, or refractory intrinsic sphincter deficiency [7, 8]. BNC requires concurrent urinary diversion, which can be achieved using continent-catheterizable augmentation, incontinent ileovesicostomy, or a suprapubic catheter [9]. Although transvaginal BNC is highly effective and well tolerated for treatment of the lower urinary tract, female pelvic reconstructive surgeons have limited exposure to this procedure during their training [2, 9, 10]. The purpose of this

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s00192-018-3766-4) contains supplementary material. This video is also available to watch on http://link.springer.com/. Please search for this article by the article title or DOI number, and on the article page click on 'Supplementary Material'.

✉ Andrey Petrikovets
andrepetrikovets@yahoo.com

[1] University Hospitals Cleveland Medical Center, Female Pelvic Medicine & Reconstructive Surgery Center, Urology Institute, 11100 Euclid Avenue, Cleveland, OH 44106, USA

video is to demonstrate a transvaginal BNC with suprapubic catheter placement in a woman with neurogenic bladder and urethral erosion due to persistent neuropathy from Guillain-Barré syndrome managed with prolonged urinary catheter drainage. Using live footage and step-by-step instructions, this video serves as an educational tool for female pelvic reconstructive surgeons of all levels to understand and learn this surgical procedure.

Materials and methods

This video uses live surgical footage to demonstrate a transvaginal BNC with suprapubic urinary diversion. The following steps are key to successfully performing the procedure and are highlighted in the video:

Step 1: Insertion of a suprapubic catheter using the Lowsley retractor. A small incision is made two fingerbreadths above the pubic bone through the level of the fascia. The Lowsley retractor is introduced through the urethra, into the bladder, and exposed through the suprapubic incision. A 20-F urinary catheter is grasped with the Lowsley retractor and pulled into the bladder in a retroactive fashion. This allows for urinary diversion given the planned bladder-neck closure.

For surgeons less experienced with this procedure, it may be prudent to determine the location of the ureteral orifices prior to insertion of the suprapubic catheter. In patients with urethral erosion, the urethra is typically wide and effaced. Surgeons may find it easy to visualize the interureteric ridge, bladder, and efflux from both ureteral orifices by visual inspection. Furthermore, 5 F open-ended ureteral catheters may be inserted to facilitate identification of ureteral orifices during the course of the procedure and mitigate the risk of ureteral injury.

Step 2: Delineation of urethral and vaginal anatomy. Two incisions are outlined with a marking pen: an inverted *U* around the urethra, and another inverted *U* about the anterior vaginal wall.
Step 3: Hydrodissection. The plane between the anterior vaginal wall and urethra are hydrodissected by submucosal injection of 1% lidocaine with 1:100,000 epinephrine.
Step 4: Creation of the inverted *U* flap. A scalpel is used to make an inverted *U* incision over the anterior vaginal wall to the level of the bladder neck. Allis clamps are then placed on the distal aspect of the flap for countertraction to facilitate sharp dissection with Metzenbaum scissors.
Step 5: Urethrolysis and retropubic dissection. With the anterior vaginal wall mobilized, a fine-tipped Bovie™ electrosurgical instrument is used to create the second inverted *U* around the urethra. Retropubic dissection is carried out sharply with Metzenbaum scissors to the level of the endopelvic fascia to mobilize the urethra circumferentially. Once the endopelvic fascia is perforated, the Metzenbaum scissors are spread to increase the opening to the retropubic space of Retzius. Urethrolysis is performed to mobilize the urethra. Ipsilateral blunt dissection is then carried out while hugging the posterior aspect of the pubic bone to free the urethra from its remaining retropubic attachments. Similarly, these steps are performed on the contralateral side. When the urethra is sufficiently mobilized, the perivesical fat should be visualized. Once sharp dissection is complete, blunt dissection is again performed to completely free the urethra from its retropubic attachments from 9 o'clock to 3 o'clock.
Step 6: Urethral excision to bladder neck. The mobilized urethra is then bisected to facilitate excision. Once bisected, urethral excision is performed using a fine-tipped Bovie™ to the level of the bladder neck. Care is taken to ensure that ureteral orifices are not involved in the excision; this can be facilitated by the insertion of 5-F open-ended catheters as described in Step 1.
Step 7: Bladder-neck closure. The bladder neck is closed in two layers. A 3-0 Vicryl suture in interrupted fashion is used for the first layer. Interrupted 2-0 Vicryl suture is used for the second imbricating layer. At this point, the suprapubic catheter is backfilled to ensure a water-tight closure.

If 5-F open-ended catheters were inserted to aid in identification of ureteral orifices at the beginning of the procedure, they should be removed prior to closure of the first layer of the bladder neck. Surgeons need to remain mindful of the location of the ureteral orifices in relation to the bladder neck during closure.

Step 8: Anterior vaginal wall reconstruction. The anterior vaginal wall is reconstructed by suturing the previously created *U* flap to the defect created by the excised urethra. The urethral defect is approximated from side to side to facilitate closure of the newly created space. In some cases, a Martius labial fat pad may be mobilized prior to closure to facilitate healing and mitigate the risks of fistula formation. Finally, the vaginal vault is packed, and the suprapubic catheter is left to gravity drainage.

Post-operative follow-up A cystogram is performed 4–6 weeks postoperatively, and the suprapubic catheter is exchanged in the office thereafter.

Conclusion

Transvaginal BNC with suprapubic catheter placement is an effective and well-tolerated surgical procedure for women with urethral erosion due to chronic indwelling catheter use. This video may be used to facilitate reproducibility and comprehension of this procedure for surgeons taking care of patients with complications from prolonged catheter use.

Compliance with ethical standards

Conflicts of interest AP, HS, DS, ES have nothing to disclose. AH is part of the speaker bureau for Astellas, Inc.

Consent Written informed consent was obtained from the patient for publication of this video article and any accompanying images.

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