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Primary Bladder Neck Obstruction: Diagnostic and Management Considerations*

Learning Objective: At the conclusion of this continuing medical education activity, the participant will be familiar with the key diagnostic tests and findings, treatments and outcomes of primary bladder neck obstruction.

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ETIOLOGY AND INCIDENCE OF PRIMARY BLADDER NECK OBSTRUCTION

Primary bladder neck obstruction is a functional disorder in which the bladder neck fails to open adequately during voiding and no other anatomical obstruction or increased striated sphincter activity is present. The underlying cause of PBNO has not completely been elucidated. The condition was first described in 1933 by Marion, who postulated that the obstruction stemmed from hyperplasia or fibrous narrowing at the bladder neck.[1] Later the problem was thought to be functional in nature. During normal voiding as the bladder fills, the intraluminal urethral and intravesical pressures increase. For a voluntary void the external sphincter and pelvic floor relax, decreasing the urethral pressure before the intravesical pressure. Only when the proximal urethral pressure at the bladder neck equals the intravesical pressure does normal voiding occur.[2] Turner-Warwick et al theorized that with PBNO an abnormal morphological arrangement of the detrusor and muscle fibers leads to insufficient bladder neck opening.[3] Others have proposed an extension of the striated external sphincter muscle to the bladder neck.[4] Crowe et al found increased density of protein gene product and neuropeptide Y-immunoreactive nerves in bladder neck tissue from patients with bladder neck dyssynergia, suggesting that increased sympathetic tone at the bladder neck causes PBNO.[5]

As men get older the prostate can enlarge and become a source of bladder outlet obstruction. Clinically it becomes more difficult to distinguish PBNO from benign prostatic obstruction. Thus, most prevalence studies of PBNO in men are limited to younger populations. In 3 studies of men 55 years old or younger UDS for chronic voiding dysfunction revealed PBNO in 33% to 54%.[6-8] Because many series limit the study population to men younger than 55 years to avoid potential confounding from benign prostatic obstruction, little data exist about the incidence of PBNO in older populations.

Data on the prevalence of PBNO in women are similarly limited. Most epidemiological studies examine the prevalence of PBNO in a subset of women who present with bladder outlet obstruction, which must then be extrapolated from rates of bladder outlet obstruction in the general female population. It is estimated that 4.6% to 16% of women presenting with urinary obstruction have PBNO.[9-11]

CLINICAL PRESENTATION OF PRIMARY BLADDER NECK OBSTRUCTION

Clinical history. Evaluation begins with a thorough history and physical examination. **A high clinical suspicion is key, since the condition is often overlooked as evidenced by the average time to diagnosis**. Reports of PBNO symptom duration before treatment range from 6.7 years,[12] to 5.6 years[13] to 18.1 months.[8] In men the condition is most commonly diagnosed between ages 21 and 50 years,[13] while women are commonly diagnosed in the sixth decade of life.[14] Questionnaires can be an additional aid to patient history and provide a more objective measure to assess symptoms and impact on quality of life. In addition, creatinine and urinalysis values are important to evaluate renal function and rule out other possible acute urological pathology, especially in patients with urinary retention.[15]

Broadly speaking, obstructive voiding may be secondary to neurological, anatomical or functional causes (see Appendix). **PBNO is a functional obstruction and could be confused with detrusor-internal sphincter dyssynergia, although the distinction is that PBNO is not the result of a neurological condition or injury.** Increased internal sphincter activity leading to dyssynergia usually presents in combination with autonomic dysreflexia from upper thoracic spinal cord injuries or diseases. The history and physical examination are often the crucial and simple first step to separate these etiologies from each other.

Common symptoms. **Men and women may present with storage or voiding symptoms in addition to pelvic pain or discomfort.** In a study comparing the presenting symptoms of men and women with PBNO both genders tended to report voiding symptoms more than storage symptoms, and more men reported pelvic pain (46%) than women (15%).[16] Such symptoms may lead to misdiagnosis of chronic non-bacterial prostatitis or pelvic pain.[17] Rarely PBNO may cause symptomatic retention in men. In general, post-void residual tends to be greater and chronic urinary retention is observed more frequently in women.

Associated conditions. Based on the pediatric literature, bladder neck obstruction appears to be associated with VUR. It is thought to be caused by detrusor hypertrophy with subsequent narrowing of the bladder neck. In most cases the condition will resolve spontaneously after posterior urethral valve incision. However, bladder neck obstruction may persist in some boys, requiring further intervention.[18] PBNO with VUR has also been observed in patients without a history of posterior urethral valves. In 1 study 62 boys and girls with VUR and primary bladder neck dysfunction identified on pressure flow UDS and EMG were randomized to receive placebo vs treatment with an α blocker (prazosin).[19] Patients were followed for 12 months with serial uroflow and UDS, and reflux grade decreased in 60% of the treatment group compared to 17% in the placebo group ($p=0.002$). In addition, mean maximum detrusor pressure during voiding and PVR decreased significantly, and flow rate increased. Anecdotally, PBNO and concomitant VUR improve or resolve with surgical treatment of PBNO in adults. Further research is needed to understand how these conditions may relate and to determine whether this is a common pathophysiology or a cause and effect mechanism.

Physical examination findings. Physical examination is generally unremarkable, with patients exhibiting normal anal sphincter tone, lower extremity reflexes and perianal sensation. Prostate size and consistency should be assessed by digital rectal

ABBREVIATIONS: EMG (electromyography), FDA (U.S. Food and Drug Administration), IPSS (International Prostate Symptom Score), LUTS (lower urinary tract symptoms), onaBoNTA (onabotulinumtoxinA), PBNO (primary bladder neck obstruction), PdetQMax (detrusor pressure at maximum flow rate), PVR (post-void residual), QMax (maximum urinary flow rate), TUIBN (transurethral incision of the bladder neck), TUIP (transurethral incision of the prostate), UDS (urodynamics), VUDS (videourodynamics), VUR (vesicoureteral reflux)

examination. It is important to rule out obstruction secondary to pelvic organ prolapse. In cases of urinary obstruction or large post-void residual the bladder may be palpable on bimanual examination.

EVALUATION OF PRIMARY BLADDER NECK OBSTRUCTION

Laboratory/office studies. Uroflowmetry and PVR are convenient screening tests as they are commonly available in the office setting. For men and women Qmax <15 ml per second is a generally accepted cutoff to suggest urinary obstruction, although <11 ml per second has also been proposed.[8, 12, 17, 20] In distinguishing between PBNO and dysfunctional voiding (another cause of bladder outlet obstruction in a neurologically intact patient) Brucker et al found that women with PBNO had lower Qmax (7 vs 12 ml per second) and higher PVR (400 vs 125 ml) on average than those with dysfunctional voiding.[10]

Radiological imaging. Ultrasound: At present ultrasound of the kidneys and bladder does not play a prominent role in initial evaluation of PBNO, although it may be a useful adjunct if there are other concerns. Ultrasound can help determine if hydronephrosis is present with the diagnosis of obstruction. It is also a tool to accurately size the prostate and/or determine if a median lobe is present.

There is increasing interest in the use of ultrasound technology for functional study to minimize radiation exposure and cost. A novel method used to determine bladder neck elasticity is to perform transabdominal ultrasound measures of shear wave elastography.[21] Although not presently ready for clinical practice, preliminary studies in continent women suggest that ultrasound may be a useful non-invasive method to evaluate the etiology of chronic urinary retention. Transvaginal ultrasound has also been evaluated as a tool to diagnose PBNO. In a study by Galica et al 15 women with a diagnosis of PBNO confirmed on VUDS were examined with transvaginal ultrasound of the urethra and bladder neck at capacity and during voiding.[22] Ultrasound images of the bladder neck in patients with PBNO remained essentially the same at rest and during micturition, while after TUIBN, the bladder neck appeared open during micturition. Furthermore, the authors noted that ultrasound measurement of the distance from the bladder neck to the vagina was a useful adjunct for surgical planning of incision.

Voiding Cystourethrography: Voiding cystourethrography may be used to examine the bladder neck but it is more commonly performed in conjunction with pressure flow UDS.

Cystoscopy. Cystoscopy may be performed to assess for anatomical obstruction such as prostatic enlargement, bladder neck contracture or urethral stricture. On cystoscopy a high bladder neck may be the only abnormality seen and PBNO may be described as a high bladder neck, although this is a non-preferred term. The diagnosis of PBNO is made fluoroscopically, not by cystoscopy, by demonstrating inadequate opening of the bladder neck during voiding without anatomical obstruction.

Urodynamics. Technique: **Urodynamics play a critical role in the diagnosis of primary bladder neck obstruction.** Pressure flow studies are used to diagnose obstruction, and the location of the obstruction can be identified with fluoroscopy. UDS should be performed per International Continence Society standards,[23] which usually include having the patient intubated with a 6Fr to 7Fr transurethral catheter and a rectal balloon catheter. Studies generally include pelvic floor EMG, most commonly with surface electrodes on the perineum. Filling cystometry with saline (or radiographic contrast material for VUDS) is performed. When VUDS are performed, fluoroscopic images are obtained as determined by the clinical scenario at select times, which may include filling, Valsalva maneuver, void/attempt to void and post-void residual.

Diagnostic Criteria: The characteristic finding of PBNO on pressure flow studies is obstruction, which is characterized as high pressure, low flow voiding. **The obstruction occurs from a closed bladder neck during micturition (or attempt at micturition if no flow is seen)**, and there should not be any increased activity at the level of the urinary sphincter (determined by EMG). Multiple attempts have been made to define the urodynamic parameters of obstruction in women, with PBNO being just 1 potential cause of obstruction. Akikwala et al compared different urodynamic criteria proposed for bladder outlet obstruction in 154 women who underwent VUDS for LUTS, and found that PdetQmax ≥20 cm water and Qmax ≤15 ml per second correlated with a clinical assessment of obstruction.[24] For men PdetQmax ranges from 20 to 200 cm H_2O with Qmax similar to that in women, at <15 ml per second.[17-19]

EMG is usually performed along with pressure flow studies. **Increased EMG activity during voiding is a hallmark of dysfunctional voiding and is not expected if obstruction is due to PBNO.** However, abnormal EMG activity can be seen in patients with PBNO. Brucker et al reported increased EMG activity in 14.3% of women diagnosed with PBNO, which was attributed to artifact of the surface electrode as fluoroscopy confirmed the location of the obstruction at the level of the bladder neck.[10] Other associated findings during UDS of patients with PBNO exist. For example, 32% of a prospective cohort of men with voiding dysfunction had involuntary detrusor contractions.[13]

Fluoroscopic UDS vs Conventional Pressure Flow Studies: Various nomograms and uroflowmetry criteria may be used as a guide or screening tool for defining obstruction and subsequently can suggest PBNO as the cause of obstruction. **However, ultimately the definitive diagnosis of PBNO, as opposed to other functional or anatomical obstruction, is made with fluoroscopic imaging at the time of UDS, also known as videourodynamics** (fig. 1). PBNO has been defined as failure of the bladder neck to open adequately (remaining closed or narrow on fluoroscopic images) during voiding, resulting in obstruction of urinary flow in the absence of other causes of obstruction or increased striated sphincter activity.[25] Thus, some advocate defining PBNO based on fluoroscopic imaging regardless of pressure flow criteria, assuming voiding or attempt at voiding can be documented. Other causes of incomplete bladder emptying or obstruction, such as impaired bladder contractility, dysfunctional voiding and Fowler syndrome, may be clinically indistinguishable from PBNO if we just rely on tests such as physical examination, cystoscopy and non-invasive uroflow.[26]

TREATMENT OF PRIMARY BLADDER NECK OBSTRUCTION

Treatment of PBNO ranges from conservative observation to medications to office procedures. Ultimately endoscopic management may be selected.

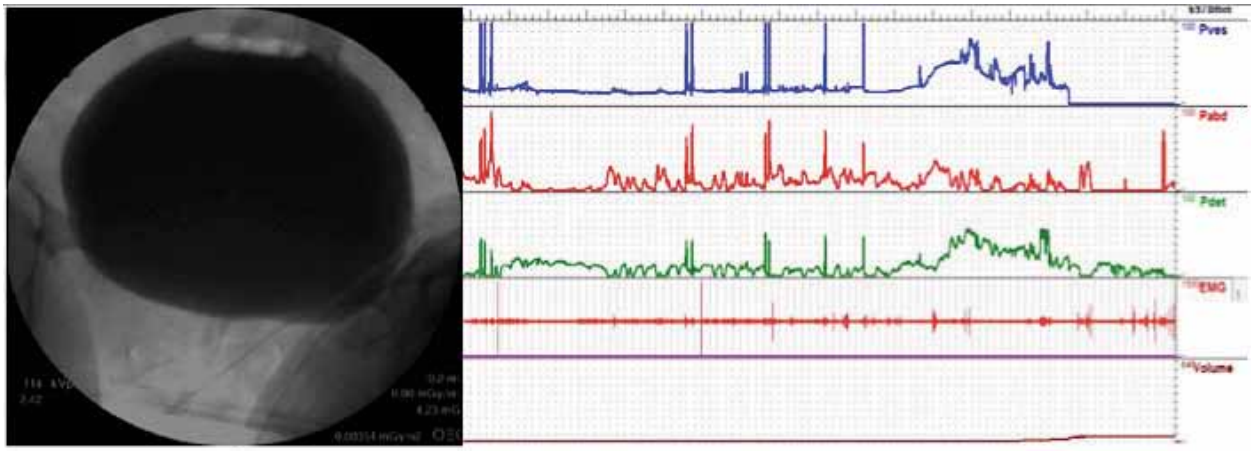

Figure 1. Videourodynamics tracing in 53-year-old woman who presented with urinary retention shows high pressure, low flow void with incomplete bladder emptying. Bladder was filled with 760 ml contrast material. During voiding phase detrusor pressure (*Pdet*) was 23 cm H_2O and patient voided 1.3 ml with Qmax 0.6 ml per second. No increased EMG activity was seen with void. Voiding cystourethrography confirmed closed bladder neck at rest. *Pabd*, abdominal pressure. *Pves*, intravesical pressure.

Conservative treatment/behavioral modification. Observation is a reasonable approach to management in individuals with minimal symptom bother, normal renal function and low PVR. However, little is known about the natural history of PBNO. **It is generally recommended to follow these patients with annual history and physical examination, PVR measures and uroflow.** Worsening symptoms or changes in non-invasive tests should spur further evaluation and may require treatment.[27]

Pharmacotherapy. α Blockers: **α Blockers are used as first line pharmacological treatment for PBNO in men and women.** The primary effect is thought to be on the smooth muscle of the bladder neck, although these agents may also work on the bladder through local and central effects. Stimulation of α1-adrenergic receptors by norepinephrine via sympathetic pathways results in increased tonic contraction of the bladder outlet.[28] There are no reported placebo controlled trials for this indication and no regulatory approval, and thus use is considered off-label.

In a retrospective study of 24 men younger than 55 years with PBNO treated with 1 to 2 mg doxazosin daily 58% had greater than 50% reduction in IPSS.[8] Improvement in urodynamic measures was seen as well, with significantly higher mean PdetQmax and lower mean Qmax in those men reporting symptomatic improvement. **Despite success with medication, long-term compliance may be a concern.** Trockman et al reported that only 30% of men treated with 2 mg prazosin twice daily or 2 mg terazosin daily remained on therapy despite 67% experiencing improvement in AUA symptom index scores.[12] Nitti et al described similar success with regard to compliance and symptom improvement with only 24% of men remaining on therapy for more than 1 year, although 58% experienced significant clinical improvement.[29]

Success rates of α blockers in women with functional obstruction are similarly about 50% to 70%, with improvement noted in subjective symptoms, flow rate and PVR across multiple studies.[30, 31] In the first prospective study of tamsulosin in 18 women who received 0.4 mg tamsulosin daily average Qmax increased by 7.1 ml per second, PVR decreased by 93 ml and PdetQmax decreased by 19.5 ml after 30 days of treatment.[32] Similarly Athanasopoulos et al reported significant improvement in Qmax and PVR in 25 women with PBNO.[14] After an 8-week treatment course with 5 mg alfuzosin twice daily Qmax improved from 10.6 to 14.2 ml per second and mean PVR decreased from 90.8 to 60.4 ml. Anecdotally many more women have issues tolerating this pharmacotherapy than men.

Skeletal Muscle Relaxants: Baclofen is a GABA derivative that works as an agonist of the $GABA_B$ receptor, and results in decreased reflex transmission and relaxation of skeletal muscle. It is FDA approved for suppression of voluntary muscle spasm in patients with multiple sclerosis and traumatic spinal cord lesions.[33] Baclofen is not FDA approved for functional bladder outlet obstruction, although it has been studied in this population. In a randomized, placebo controlled, crossover study of 60 women with dysfunctional voiding (not PBNO) in whom anticholinergic therapy failed significant improvement was noted in voids per 24 hours, EMG activity, Qmax and PdetQmax with baclofen vs placebo.[34] Application of these findings to patients with PBNO is limited given the different mechanism of obstruction, as the study criteria were increased EMG activity and storage LUTS, and did not include VUDS. Common side effects of baclofen are somnolence, nausea and dizziness in approximately 10% of patients, and risk of teratogenicity in pregnancy category B3, further limiting its use.[33, 35]

Botulinum toxin A. onaBoNTA causes muscle paralysis by preventing the release of presynaptic vesicles containing acetylcholine and inhibiting neuronal signaling. Presently, onaBoNTA is FDA approved for use in the urinary tract only for intradetrusor injection for medication refractory neurogenic and non-neurogenic detrusor overactivity. The approved dose for these indications is 200 U and 100 U, respectively. However, onaBoNTA has been studied for other lower urinary tract indications. Kuo reported outcomes of its use in non-neurogenic cases of chronic urinary retention or difficult urination.[36] Half of the 103 patients studied were treated with 50 U and the remainder with 100 U injected into the external sphincter at the 3, 6, 9 and 12 o'clock positions. Of the 19 patients (18%) with a non-relaxing sphincter 78.8% had excellent or improved results. The etiologies of the dysfunctions were detrusor sphincter dyssynergia, dysfunctional voiding, non-relaxing urethral sphincter, cauda equina lesion, peripheral neuropathy and idiopathic detrusor underactivity. It is noteworthy that PBNO was not identified or studied, despite being a cause of lower urinary tract dysfunction.

Sacco et al reviewed patient reported outcomes of 35 men with PBNO following onaBoNTA injection.[37] IPSS significantly improved from 21.9 at baseline to 7.8 at 2 months, and nearly

80% of participants were willing to repeat the procedure. Qmax and PVR also significantly improved. While botulinum injections do not offer sustained symptom improvement as medication effects typically decline by 9 months, unlike TUIBN there is no significant risk of retrograde ejaculation. onaBoNTA has not been studied specifically in women with PBNO. One caution with urethral injection of onaBoNTA is the risk of de novo or worsened stress urinary incontinence with an incidence of 4% to 50%.[36,38,39]

Endoscopic management. Dilation of Bladder Neck: Dilation is used for other indications of annular narrowing but has not been reported as primary treatment for PBNO. Instead, incision or resection of the obstructed portion is advocated, with some using dilation for recurrent obstruction after initial incision.[40]

TUIP/TUIBN: In men the traditional surgical treatment of PBNO is aimed at opening the annular ring of the bladder neck, thus relieving the obstruction. TUIP or TUIBN is usually performed with the patient under general or spinal anesthesia. Most commonly a 24Fr to 26Fr resectoscope is used with a Collings knife (fig. 2) or laser to incise from approximately 1 cm distal to each ureteral orifice through the bladder neck to just proximal to the verumontanum. In some cases the bladder neck and/or prostate can be resected or removed. Incisions are typically made at the 5 or 7 o'clock position, or in some cases the 2 and 10 o'clock positions (fig. 3). The depth of incision is increased until no ridge is visible at the bladder neck and fat is visualized through the capsular fibers. Unilateral or bilateral incisions may be performed, although retrograde ejaculation is less likely to result from unilateral incision.[12,17]

TUIBN for women is performed in a similar fashion to TUIP in men. However, the incision extends from just inside the vesical neck through the proximal third of the urethra. Turner-Warwick et al first reported endoscopic incision in 1973.[3] They described an anterior bladder neck incision at the 12 o'clock position to prevent complications of stress incontinence and fistula. At present there is no standard endoscopic incision, although different sites of incision have been proposed and studied over the years, including 5 and 7 o'clock, and 2 and 10 o'clock positions. In addition to the incision, some have described resection of a small segment of the tissue in the proximal third of the urethra.[9]

In a study of bilateral incision in 18 men mean Qmax significantly increased from 8.2 to 26.7 ml per second, and the mean

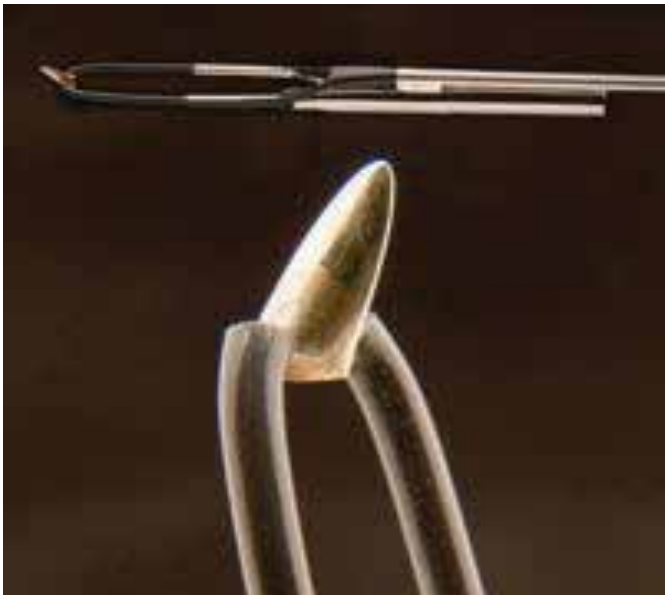

Figure 2. Collings knife.[47]

AUA symptom index scores of the 18 men treated improved from 17.1 to 4.3 with 30.2 months of follow-up.[12] With unilateral TUIP subjective improvement in Qmax is also demonstrated, although less than reported with bilateral TUIP, with an increase from 9.2 to 15.7 ml per second at 6 months.[17] Another study of unilateral TUIP indicated sustained improvement in IPSS and Qmax up to 1 year following surgery, with 55% reduction in IPSS and 95% improvement in Qmax.[41] To our knowledge no study has been performed directly comparing outcomes of unilateral and bilateral TUIP.

For women long-term outcomes of TUIBN are favorable. In a small study with a median follow-up of 3 years 6 of 7 women considered the LUTS cured, while 1 noted improvement.[9] In that study objective improvement was observed with significantly increased average flow rate from 6 to 30 ml per second, voided volume from 194 to 416 ml and PVR from 680 to 173 ml. In a study of 30 women with 5-year follow-up data IPSS improved from 23.5 to 5.9, and Qmax increased from 7.61 to 17.53 ml per second and PVR decreased from 185.11 to 28.75 ml.[42]

In men the primary concern with TUIP/TUIBN is the development of retrograde ejaculation, especially as the population diagnosed with PBNO tends to be young men with greater

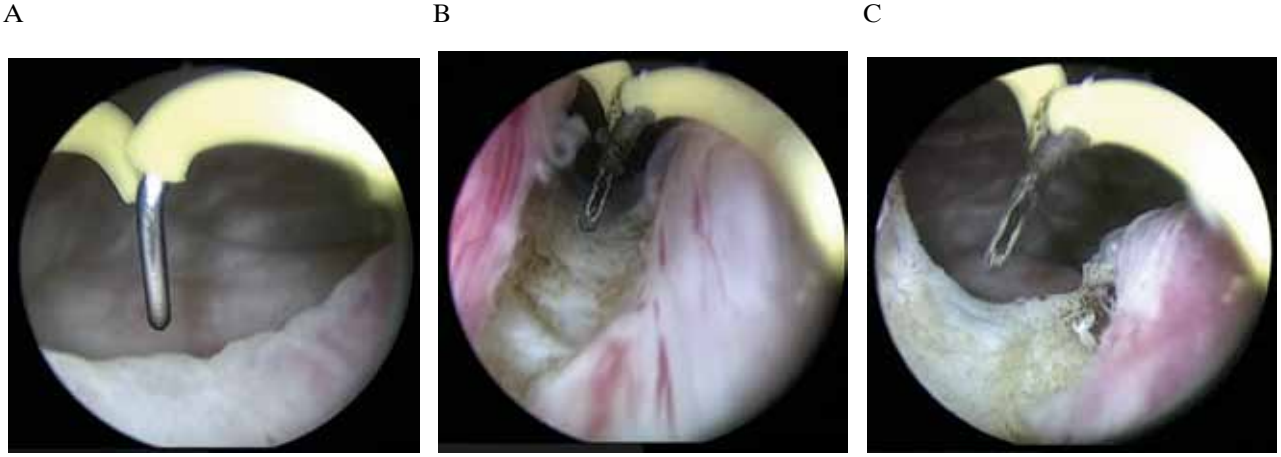

Figure 3. Primary bladder neck incision is typically performed at 5 and 7 o'clock positions. *A*, incision at 7 o'clock. *B,* appearance after incision. *C*, final open bladder neck.

concern for potential fertility and sexual function.[43] With bilateral incision the reported retrograde ejaculation rate ranges from 27% to 100%.[12, 44] In contrast, no retrograde ejaculation was noted in 2 studies of unilateral TUIP.[17, 45] Interestingly, in 35 men undergoing unilateral TUIP antegrade ejaculation was preserved but a significant decrease in sperm count was seen, which is difficult to interpret.[41] Preservation of 5 to 10 mm prostatic tissue proximal to the verumontanum has been proposed to maintain antegrade ejaculation. In a study of 33 men treated with this technique none of the 26 patients available for survey at 24 months postoperatively reported retrograde ejaculation.[40] Overall success determined by improved Qmax, IPSS and/or quality of life score was 84.6% (22 of 26 patients).

For women care must be taken to balance adequate resection with the risk of postoperative fistula or incontinence. In a study of long-term outcomes in 84 women 6 to 78 months after TUIBN Zhang et al reported successful recovery in 85.6%, similar to other series.[46] The major complications reported were hemorrhage, need for repeat bladder neck incision, urethral stricture, vesicovaginal fistula and stress urinary incontinence. Vesicovaginal fistula developed in 5% of women with incisions at the 5 and 7 o'clock positions, while no woman with incisions at the 2 or 10 o'clock position had a fistula. The authors concluded that this positioning decreased the risk of fistula formation, although others counter that that they believe length and depth of incision, especially if through to the fat layer outside the bladder, have a greater impact on fistula formation than location of incision.

Multiple studies indicate de novo or worsened stress urinary incontinence as a possible side effect of TUIBN.[9] Care must be taken to identify and avoid injury to the external urethral sphincter, with incision limited to the proximal third of the urethra. However, incontinence has been reported even in the absence of external urethral sphincter damage.[46] This outcome is theorized to result from overflow incontinence in women with poor detrusor function when the sphincter relaxes during sleep. A modified approach has been proposed to minimize the risk of incontinence in women by incising at the 3, 6, 9 and 12 o'clock positions on the bladder neck. With this technique only 3% of patients (1 of 30) experienced stress incontinence postoperatively, which was reported to be minimal and resolved with physical therapy.[42] However, all women were required to undergo urethral dilation 1 month postoperatively to decrease recurrent obstruction. Blaivas et al argue for caution with resection as fistula or incontinence results from overzealous incision, requiring extensive treatment, while failure to relieve obstruction with adequate resection may be corrected with repeat resection.[9]

CONCLUSIONS

Primary bladder neck obstruction results from bladder neck failure to open appropriately during voiding. Because PBNO can present with various symptoms, it should be considered a possible etiology when patients present with LUTS, obstructive voiding symptoms or pain. Videourodynamics are required to diagnose PBNO. Treatment of PBNO can begin with α blockers but compliance with long-term medication is low and many patients will require surgery. Surgical techniques vary, with success reported with incision and resection of the prostate and/or bladder neck. Ultimately the goal of surgery is to open the bladder neck sufficiently to fix the obstruction while balancing the risks of retrograde ejaculation, fistula and incontinence. More systematic study of PBNO is needed, using uniform diagnostic criteria, to determine the optimal pharmacotherapies and surgical methods for treatment.

Appendix. Etiologies of obstructive voiding

Functional	Anatomical	Neurological
Primary bladder neck obstruction Dysfunctional voiding Fowler syndrome	Benign prostatic obstruction Bladder neck contracture Urethral stricture Genitourinary prolapse Prior anti-incontinence procedure	Smooth sphincter dyssynergia Impaired bladder contractility Detrusor external sphincter dyssynergia

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Study Questions Volume 39 Lesson 1

1. Primary bladder neck obstruction is theorized to stem from
   a. increased striated sphincter activity
   b. prostatic obstruction of the bladder neck
   c. neurological insult to the internal sphincter
   d. abnormal arrangement of detrusor and muscle fibers

2. A 42-year-old man has a 4-year history of a weak stream and frequency. On examination he has normal rectal tone and a 30 gm prostate. Uroflow demonstrates Qmax of 11 ml per second. The diagnosis of PBNO will be confirmed by
   a. closed bladder neck during voiding on fluoroscopy
   b. low voiding pressures during a pressure flow test
   c. increased EMG activity during voiding
   d. median lobe seen at cystoscopy

3. During the surgical treatment of PBNO the risk of retrograde ejaculation may be reduced by
   a. preserving some prostate tissue proximal to the verumontanum
   b. incising the prostate bilaterally
   c. incising the bladder neck at the 12 o'clock position
   d. incising with electrical current instead of laser energy

4. A 57-year-old woman diagnosed with PBNO on videourodynamics complains of urinary leakage soon after bilateral TUIBN. She is emptying the bladder well with an improved flow rate. She is dry most of the day but will leak with certain sudden movements, and she experienced worsened incontinence during a recent upper respiratory infection. The next step is
   a. observation
   b. pelvic floor exercises
   c. dilation of bladder neck
   d. repair the vesicovaginal fistula

5. Compared to women with PBNO, men
   a. report more voiding than storage symptoms
   b. report more storage than voiding symptoms
   c. report pelvic pain more frequently
   d. have larger PVRs on average

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