

TREATMENT OF PRIMARY BLADDER NECK OBSTRUCTION IN WOMEN WITH TRANSURETHRAL RESECTION OF THE BLADDER NECK

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ABSTRACT

Purpose: We describe the presentation, clinical characteristics, treatment and followup of a series of women with primary bladder neck obstruction (PBNO).

Materials and Methods: A patient data base was searched for women who underwent transurethral resection for bladder outlet obstruction diagnosed by videourodynamic study (VUDS) according to the Blaivas-Groutz nomogram for female bladder outlet obstruction between 1993 and 2002. A total of 37 women with obstruction were identified. Patients with neurogenic, traumatic, anatomical or iatrogenic causes of obstruction were excluded. Seven patients remained who had been diagnosed with PBNO, of whom all underwent transurethral bladder neck resection. Office records were reviewed for history, presentation, surgical treatment and clinical outcome.

Results: Seven patients were diagnosed with PBNO. Age was 39 to 81 years. Six of 7 patients presented with symptoms of obstruction, including a weak or intermittent stream and urinary hesitancy. These 6 patients had unremarkable physical examination findings with normal perianal sensation, anal sphincter tone and lower extremity reflexes. One patient presented with abdominal swelling, which on physical examination was found to be a markedly distended bladder containing more than 1,000 cc urine. All patients had overt urethral obstruction on VUDS. In 6 of 7 patients obstruction was clearly at the vesical neck and in 1 the obstruction site was equivocal. Three patients were treated or had previously been treated pharmacologically with α -blockers. All patients were subsequently treated with intermittent self-catheterization. All patients then underwent transurethral bladder neck resection at the vesical neck and proximal urethra. Surgical specimens weighed 1 to 5 gm and showed urethral fragments or fibromuscular tissue without specific pathological findings. Followup was 1 to 10 years (median 3) and it included physical examination, uroflowmetry, post-void residual urine measurement and videourodynamic study. Six patients considered themselves cured of lower urinary tract symptoms and 1 was improved. In 1 patient the obstruction site was not clear. One patient had mild stress incontinence under rare circumstances not severe enough to require protective pads. The average change in flow was 6 ± 10 vs 30 ± 17 ml per second ($p < 0.03$). The average change in voided volume was 194 ± 170 vs 416 ± 206 ml per second ($p < 0.06$). Average change in post-void residual urine was 680 ± 445 vs 173 ± 366 ml ($p < 0.05$).

Conclusions: PBNO is an exceedingly rare condition, which is easily treatable when properly diagnosed by VUDS. The presentation of patients in urinary retention in middle age suggests that PBNO may be more common in less apparent forms than has previously been recognized.

KEY WORDS: bladder, bladder neck obstruction, urethra, female

The overall incidence of urethral obstruction in women is variously estimated at between 1% and 30% who present with lower urinary tract symptoms (LUTS) with this variation in incidence reflecting a number of different definitions of obstruction, including symptomatic, pressure flow,^{1,2} radiographic³ and combined⁴ methods of diagnosis. Among the common causes of bladder outlet obstruction in women are previous anti-incontinence surgery, genital prolapse, urethral stricture, acquired voiding dysfunction, urethral diverticulum and detrusor-external sphincter dyssynergia. Primary bladder neck obstruction (PBNO) is uncommon in women and it is observed in between 1% and 16% of women deemed to have bladder outlet obstruction.^{3,5} It is much more commonly diagnosed in men⁶ and there is more reported

experience with therapy.^{6–8} We present urodynamic and clinical findings associated with the diagnosis and treatment of 7 women with PBNO.

METHODS

A patient data base was searched for women with bladder outlet obstruction diagnosed by videourodynamic study (VUDS) according to the Blaivas-Groutz nomogram for bladder outlet obstruction in women. A total of 37 patients were identified. Patients with neurogenic, traumatic, anatomical or iatrogenic causes of obstruction were excluded. Seven patients remained who had been diagnosed with PBNO. The office records were reviewed for history, presentation, and clinical and surgical treatment.

RESULTS

Seven women who underwent transurethral bladder neck resection (TURBN) and their medical records were reviewed for clinical data. Age was 39 to 81 years. Six women presented in

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Clinical characteristics of patients with PBNO

	Pt 1	Pt 2	Pt 3	Pt 4	Pt 5	Pt 6	Pt 7
Age	52	72	51	81	43	39	52
Max detrusor pressure (cm H ₂ O/ml/sec)	166	54	44	40	51	25	82
Q _{max} (cm H ₂ O/ml/sec)	1	13	0	2	19	3	4
Uroflow (ml/sec):							
Before	1	2	1	5	27	3	2
After	29	17	49	3	43	10	38
Voided vol (cc):							
Before	0	250	150	150	542	170	100
After	400	300	816	150	496	300	350
Residual vol (cc):							
Before	1,300	800	350	350	1,100	60	800
After	25	1,000	39	22	42	30	50
Pathological diagnosis	Fibromuscular tissue lined by urothelium with squamous metaplasia	Squamous mucosa, inflammation, underlying smooth muscle	Fibromuscular tissue	Fibromuscular tissue portions	Squamous metaplasia with underlying fibroconnective tissue + mild chronic smooth muscle inflammation	Squamous epithelium hyperplasia with focal papillomatosis, hyperkeratosis + condyloma acuminatum	Benign urethral inclusion cyst

urinary retention and 1 had abdominal swelling. Three patients complained of associated severe urinary urgency. Three patients had been previously treated with α -adrenergic blockers without symptom resolution. All patients were initially treated with intermittent self-catheterization. The table lists clinical and urodynamic characteristics.

All patients were obstructed by VUDS criteria (fig. 1). Overt radiographic evidence of obstruction at the vesical neck was seen in 6 of 7 patients. In 1 patient the obstruction site was not clearly visualized. All patients underwent TURBN at the vesical neck and proximal urethra in a hospital based ambulatory surgery unit.

Surgical technique. Incisions are made at the 5 and 7 o'clock positions with a Collings knife extending from just inside the vesical neck through the proximal third of the urethra. Using a resectoscope small segments of the interposing tissue within the proximal third of the urethra are resected. Surgical specimens weighed 1 to 5 gm and showed urethral fragments without specific pathological findings. The table lists histopathological findings.

Followup was 1 to 7 years (median 3). Six patients considered themselves cured, although the patient in whom the obstruction site was not clear considered symptoms improved. This patient continued intermittent self-catheterization. One patient who noticed mild stress incontinence under rare circumstances did not wear protective pads 8 years after surgery. All patients underwent postoperative clinical examination with a full bladder and VUDS to assess the operative results as well as assess for post-procedure stress urinary incontinence. Figures 2 to 4 show changes in postoperative voiding characteristics, including flow, maximum voided volume and post-void residual volume. Figures 5 and 6 show preoperative and postoperative VUDS in a representative case.

DISCUSSION

PBNO is a rare condition that probably affects less than 1% to 3% of women with LUTS, although in specific populations it has sometimes been more prevalent. Farrar et al examined 2,500 women with LUTS and noted obstructed voiding in less than 7% with distal urethral obstruction rather than bladder neck obstruction accounting for the majority.⁹ Groutz et al reviewed the VUDS and clinical findings of almost 600 women with LUTS and identified 38 (6.5%) who met urodynamic criteria for obstruction, including maximum noninvasive uroflow measurements of less than 12 ml per second and detrusor pressure at maximum uroflow of greater than 20 cm H₂O during the pressure flow phase of VUDS.⁴ More than 75% of these cases had common

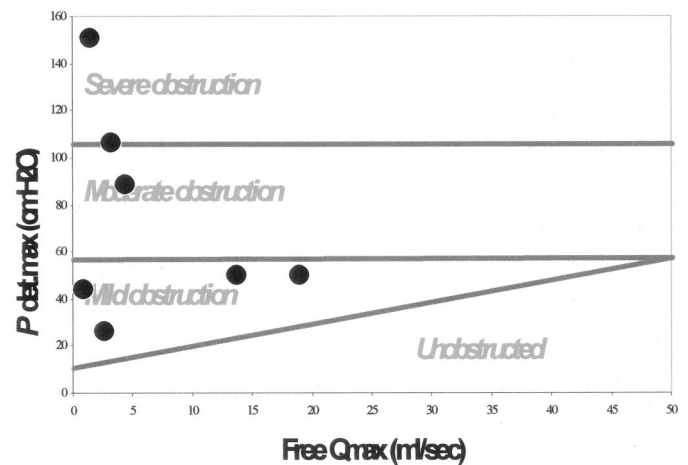


FIG. 1. Blaivas-Groutz nomogram for female bladder outlet obstruction plotting maximum detrusor pressure (p_{detmax}) in cm H₂O on VUDS against Q_{max} in ml per second.

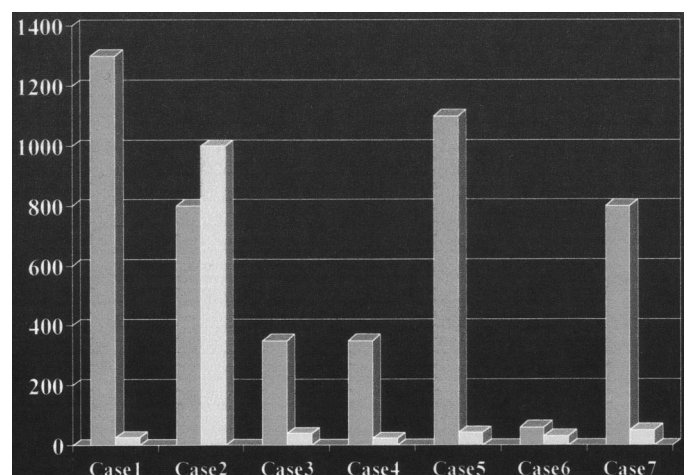


FIG. 2. Preoperative and postoperative post-void residual volume in ml assessed by sonographic scan in all cases.

etiologies, such as prolapse, stricture, urethral diverticulum or detrusor-external sphincter dyssynergia. Nitti et al analyzed 261 women with LUTS who underwent VUDS and were able to complete voiding pressure flow studies with fluoroscopic imaging of the bladder outlet.³ They defined obstruction as "radio-

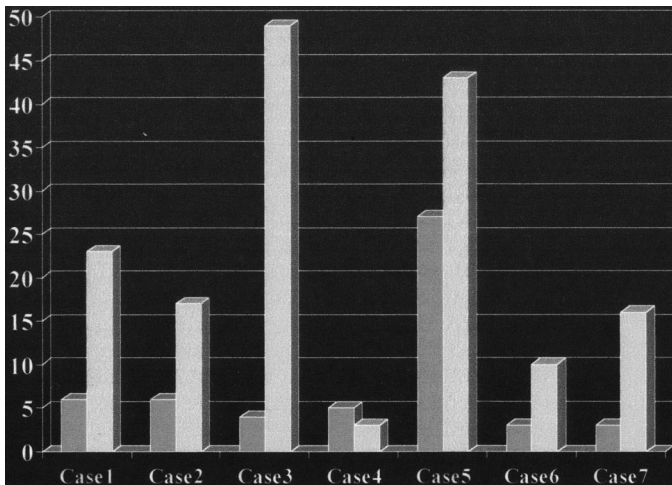


FIG. 3. Preoperative and postoperative maximum voided volume in ml in all cases as determined by voiding diary.

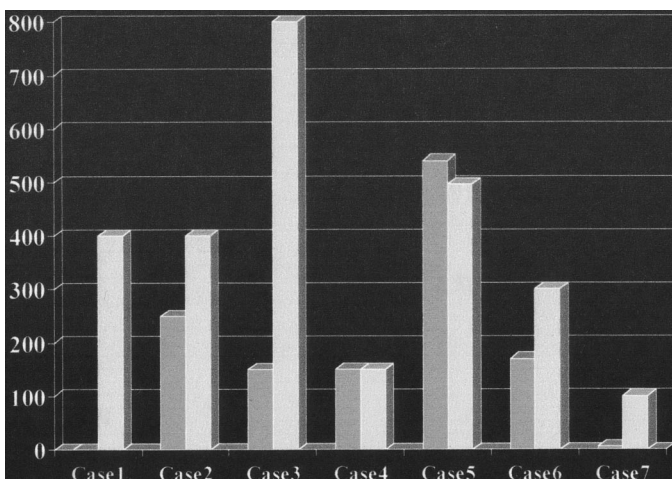


FIG. 4. Preoperative and postoperative Qmax in ml per second in all cases.

graphic evidence of obstruction between the bladder neck and distal urethra in the presence of a sustained detrusor contraction,⁹ and compared pressure flow characteristics in obstructed and nonobstructed cases by this criterion. A total of 76 cases (29%) met this definition of obstruction. This group exhibited a significantly lower maximum flow rate, higher detrusor pressure at maximum uroflow and higher post-void residual volume.³ Of the patients 12 (16%) were considered to have PBNO.

Like Tash et al we noted what appears to be a relatively high percent patients with PBNO.¹⁰ However, we believe that this finding is a result of the nature of a highly specialized practice as well as the methodology that we used to identify patients. The denominator to which these 7 patients should be appropriately compared is the approximately 130 women found to have obstruction on VUDS during this time period (6.5% of approximately 2,000 VUDS). Therefore, we estimate that the rate of PBNO is about 5% of women who are found to have bladder outlet obstruction.

Medical and surgical therapy for PBNO can be considered. Pharmacological therapy with α -blockers has been used in men, although little evidence exists that predicts success and few objective results are reported.^{6,11} In male adolescents and men PBNO has been effectively treated with surgical resection at the vesical neck,^{7,8,11} at the risk of resulting retrograde ejaculation. Diokno et al reported successful results in women using YV-plasty of the bladder neck to treat bladder outlet obstruction¹² but we have never found this surgery to be necessary and prefer the less morbid endoscopic approach. We have previously reported successful TURBN for PBNO in a different series of patients.¹³ Based on our additional experience we continue to advocate cautious and gradual TURBN. Initially we planned to do transurethral incisions of the bladder neck in these patients. In fact, all surgeries began with incision of the proximal third of the urethra at the 5 and 7 o'clock positions using a Collings knife electrode. It is crucial to consider that failure to relieve obstruction is generally correctable by repeat resection, while incontinence that results from overzealous therapy requires a more extensive remedy.

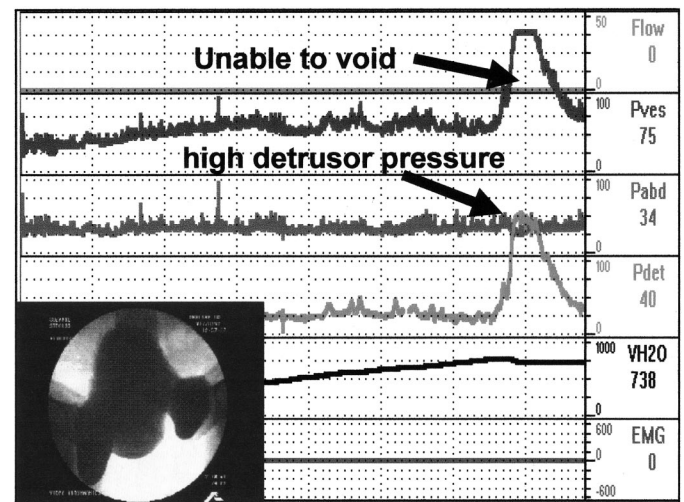


FIG. 5. VUDS in 51-year-old woman who presented with abdominal swelling, gradually worsening intermittent urinary stream and difficult voiding. Physical examination identified massively distended bladder. Fluoroscopy during filling phase demonstrated 2 large bladder diverticula (*inset*). Radiograph was obtained at maximum detrusor pressure (*Pdet*), showing no contrast in urethra, ie complete obstruction at vesical neck. Patient was unable to void and generated detrusor pressure greater than 150 cm H₂O (arrow). *Flow*, urine flow in ml per second. *Pves*, vesical pressure in cm H₂O. *Pabd*, abdominal pressure in cm H₂O. *VH₂O*, volume of water infused in ml. Provided by JGB.

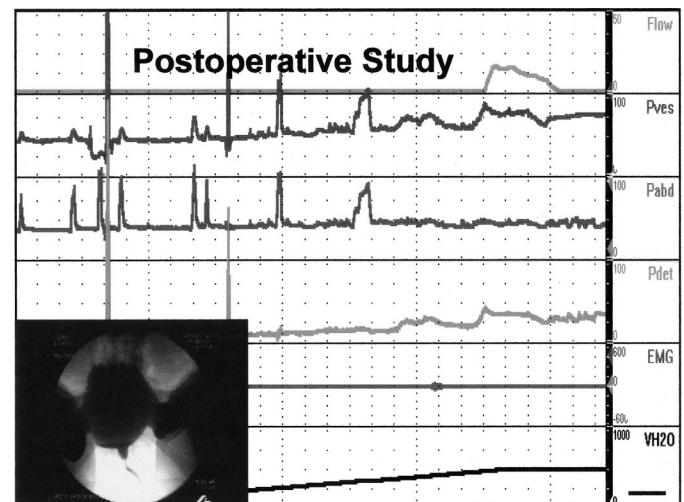


FIG. 6. Postoperative VUDS in patient able to void with urine flow 15 ml per second and detrusor pressure (*Pdet*) about 25 cm H₂O. VCUG (*inset*) was obtained during voiding phase. *Pves*, vesical pressure in cm H₂O. *Pabd*, abdominal pressure in cm H₂O. *VH₂O*, volume of water infused in ml. Provided by JGB.

With respect to our outcomes we attempted to corroborate subjective measures of cure (patient self-reporting) with objective evidence (flow and residual measurements) and we recognize that more extensive and more reliable subjective

measures of outcome can be obtained. We did not use quality of life questionnaires preoperatively and they cannot be applied retrospectively, although they might have provided a stronger argument for treatment success.

Squamous metaplasia was identified in some histological specimens. Although nonkeratinizing squamous metaplasia is often noted in the trigone of the female bladder, keratinizing squamous metaplasia is associated with ureteral obstruction, bladder contracture and vesical carcinoma.¹⁴ It is unclear what role it may have in bladder neck obstruction.

Finally, we wish to emphasize the vital role of VUDS for the correct diagnosis of this rare problem. Urethral obstruction is defined by the detrusor pressure/uroflow characteristics whose values are plotted on the Blaivas-Groutz nomogram.⁵ However, the video study is invaluable for defining the obstruction site and excluding other potential causes of obstruction, such as detrusor-external sphincter dyssynergia, acquired voiding dysfunction and urethral diverticulum. The proper diagnosis and treatment of women with PBNO rests on appropriate use of this tool in the correct clinical context. In each instance the interposing urethral tissue had the appearance of benign prostatic tissue and we elected to resect it at the conclusion of this minor surgery. The proximal urethra strongly resembled a transurethral prostate resection defect.

CONCLUSIONS

PBNO is an exceedingly rare condition, which is easily treatable when properly diagnosed by VUDS. The presentation of patients in urinary retention in middle age suggests that PBNO may be more common in less apparent forms than has previously been recognized.

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