Bladder Outlet Obstruction in Women: Prevalence, Recognition, and Management

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Bladder outlet obstruction in women is an infrequently diagnosed urological condition. Its prevalence has been estimated to be between 2.7% and 29%. The large variation in prevalence is likely a result of the lack of standard diagnostic definition for the evaluation of female bladder outlet obstruction. A combination of history taking; physical examination; and diagnostic tests, including simple pressure void studies, radiographic imaging, endoscopic visualization, and multichannel videourodynamics provides a consistent way to accurately recognize and diagnose bladder outlet obstruction. Causes of obstruction are varied and numerous but generally fall within two broad categories: functional and anatomic. Treatment options are tailored to individual causes of obstruction and range from conservative pharmacologic and behavioral options to more-invasive surgical procedures.

Introduction

Bladder outlet obstruction is less frequently diagnosed in women than in men. While its true prevalence probably is less than in men, it remains an underdiagnosed condition for several reasons. First, bladder outlet obstruction often is not suspected in women. While anatomic causes such as pelvic prolapse or obstruction after anti-incontinence surgery are often obvious, functional causes require a more precise understanding of voiding dysfunction. Second, women complain less of classic obstructive symptoms (*eg*, poor flow, hesitancy, stranguria) than do men. Part of this may be because women are poor historians with respect to the force of their urinary stream, since they void in private and have little opportunity to compare their voiding with other women [1]. Women with obstruction commonly present with storage symptoms of urinary frequency, urgency, urge incontinence, and recurrent urinary tract infections [2,3]. Finally, there are no universally accepted urodynamic criteria for the diagnosis of bladder outlet obstruction in women as there are in men; however, several recent criteria have been proposed. Therefore, a high index of suspicion and better criteria to define obstruction in women are needed so that clinicians can accurately diagnose and treat the different causes of bladder outlet obstruction.

The causes of bladder outlet obstruction in women are as numerous and varied as in men. Obstruction may be divided broadly into two types, functional and anatomic. In functional obstruction there are no apparent structural or anatomic abnormalities, rather it is caused by a breakdown of the normal voiding process. With anatomic causes of obstruction, the problem often is identified when the patient is not in the act of voiding; however, its effect can be identified only during micturition. Common causes of functional and anatomic obstruction are shown in Table 1.

We begin with a short overview of the prevalence of bladder outlet obstruction in women. We then discuss how to define and recognize female bladder outlet obstruction. Lastly, we discuss different etiologies of obstruction and their specific diagnosis and treatment.

Prevalence and Definition of Bladder Outlet Obstruction in Women

The prevalence of bladder outlet obstruction in women is not well known and in all likelihood has been largely underestimated. Previous large retrospective reviews of women referred for evaluation of lower urinary tract symptoms reported rates of 2.7% to 29% [4••] The most likely reason for this wide variation in reported prevalence is the lack of standard diagnostic definitions for the evaluation of female bladder outlet obstruction.

The literature throughout the past several decades is replete with different theories of how to diagnose bladder outlet obstruction in males. Most of these are based on the concept of high pressure; low-flow voiding dynamics is the hallmark of obstruction [5–7]. Unfortunately, voiding pressures, flow rates, and other criteria for bladder outlet obstruction in men do not seem to apply to women. Recently, there has been a renewed interest in defining obstruction in women. Some early definitions of obstruc-

Table 1. Anatomic and functional causes of bladder outlet obstruction in women

Anatomic obstruction
Inflammatory processes
Bladder neck fibrosis
Urethral stricture
Meatal stenosis
Urethral caruncle
Skene's gland cyst/abscess
Urethral diverticulum
Pelvic prolapse
Uterine prolapse
Cystocele
Enterocele
Rectocele
Neoplastic
Urethral carcinoma
Bladder carcinoma
Gynecologic (extrinsic compression)
Retroverted uterus
Vaginal carcinoma
Cervical carcinoma
Ovarian mass
Iatrogenic obstruction
Anti-incontinence procedures
Multiple urethral dilatations
Urethral excision/reconstruction
Miscellaneous
Urethral valves
Ectopic ureterocele
Bladder calculi
Atrophic vaginitis and urethritis
Functional obstruction
Primary bladder neck obstruction
Dysfunctional voiding
Detrusor–sphincter dyssynergia

tion were based on flow rate alone, even though this concept was never accepted in males. Farrar *et al.* [3] used only flow rates (maximum flow rate of <15 mL/s with a volume of 200 mL or more) to diagnose obstruction as they felt that low flow in the presence of normal or low detrusor pressures might be an indication of "relative" obstruction. Bass and Leach [1] stated that a peak flow of less than 15 mL/s with a voided volume of greater than 100 mL, a normal uroflow curve configuration, and no significant postvoid residual usually exclude outlet obstruction. Other authors introduced voiding pressure into the definition. Massey and Abrams [2] proposed that two or more of the following four parameters be included: flow rate less than 12 mL/s, detrusor pressure at peak flow greater than 50 cm H_2O, urethral resistance (pdet at $Qmax/Qmax^2$) greater than 0.2, and significant residual urine in the presence of high pressure or resistance. As a result, only 2.7% of the 5948 women who presented for urodynamic evaluation for a variety of complaints were "obstructed."

Based on our own experience, we have found it difficult to define outlet obstruction in women in terms of detrusor pressure or urinary flow rate either independently or together [8]. It is clear that bladder outlet obstruction can be defined in women by high pressure and low-flow voiding as it is in men. However, we believe that many cases of obstruction would be missed in women if the pressure and flow values used to define obstruction in men were used. It is well known that many women void normally with very low detrusor pressures (<10 cm H_2O). This may be due in part to the fact that many women void by pelvic relaxation or abdominal straining (by habit) without needing to generate significant detrusor pressures. Inherently, the female bladder outlet provides a very low resistance. A small degree of increased outlet resistance in the form of a functional or anatomic obstruction may be enough to disrupt voiding. We reasoned that adding another parameter to voiding pressure and flow rate might help to consistently diagnose obstruction in women. In 1999, we reported the use of simultaneous fluoroscopic imaging of the bladder outlet during voiding to help make the diagnosis of obstruction [9••] We defined bladder outlet obstruction in women using videourodynamics as radiographic evidence of obstruction between the bladder neck and distal urethra in the presence of a sustained detrusor contraction, without the application of strict pressure-flow criteria. In addition to making the diagnosis, fluoroscopic imaging localizes the site, which is equally important. Using these criteria in 261 consecutive women with nonneurogenic voiding dysfunction, we found 29% to be obstructed [9••]. There was a significantly lower maximum flow (Qmax) and higher detrusor pressure at maximum flow (pdet at Qmax) in obstructed versus unobstructed women, but the values are not what we expect to see in obstructed men. There also was significant overlap in voiding parameters among obstructed and unobstructed patients (Table 2).

Approaching obstruction in a slightly different way, Chassagne *et al.* [10••] proposed cutoff values for voiding pressure and flow rate. They prospectively studied two groups of women, obstructed women who were classified based on a diagnosis of clinical obstruction and unobstructed women or a control group who consisted of women with stress urinary incontinence (SUI) and no evidence of clinical obstruction. The authors used receiver operating characteristic (ROC) curve analysis to determine the optimum cutoff values for Qmax and pdet at Qmax. When Qmax and pdet at Qmax were used simultaneously to predict obstruction, the best combination was obtained using a Qmax of 15 mL/s or less and a pdet at Qmax of more than 20 cm H_2O (sensitivity 74.3%, specificity 91.1%). Lemack and Zimmern [11•] applied these cutoff values to a group of women who had varied voiding complaints and found that 20% met criteria for obstruction.

Most recently, Groutz and Blaivas [4••] created a nomogram using some of the principles cited above. This nomogram has several flaws, including the fact that pressure and flow are measured independently during different voids. Free-flow Qmax and catheterized pdetmax are used. Confirmation from other investigators is awaited.