

# The practical assessment and management of bladder outflow obstruction

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## Abstract

The initial management of bladder outflow obstruction typically related to benign prostatic hyperplasia (BPH) falls to a large extent within the remit of general practice and the family physician. Referral onwards to secondary care typically arises following the failure to respond to conservative measures or when complications have supervened – the most significant of which is urinary retention. In the hospital setting, anaesthesia, constipation and immobility are the common precipitants. What follows is a practical guide to the management of these situations and provides an overview of the conservative, medical and surgical treatments available.

**Keywords** Bladder outflow obstruction; BPH; post void residual; prostate

## Bladder outflow obstruction

At the most basic level, flow is proportional to ‘pipe’ size (dictated by the prostate) and pump pressure, which is determined by the bladder. The bladder is best seen as a reservoir which enables an individual to discharge urine at a ‘socially convenient’ time. A ‘normal’ bladder will hold up to 500 ml comfortably but will typically have a ‘working’ volume of 300–400 ml and should empty completely (leaving a post-void residual (PVR) of nothing) (Figures 1 and 2). Normal voiding frequency is 5–7 times a day and up to once at night. In terms of flow rates, Urologists are interested in the maximum flow rate or Qmax (Figure 3). Broadly speaking, a young man will void at a speed in excess of 25 ml/second. An individual will have noticed that their flow will have slowed when below 20 ml/second; more obviously slowed when less than 15 ml/second; significantly slowed below 10 ml/second; and a trickle when below 5 ml/second. As the flow reduces, so the PVR tends to increase leading to urinary frequency which is a consequence of the loss of functional volume and commonly most bothersome at night (nocturia). Patients are often unaware of incomplete bladder emptying. Post-void residuals can be surprisingly large, with

excessively large residuals indicative of detrusor failure (chronic retention). Huge residuals can lead to hydronephrosis and obstructive uropathy.

In the acute setting, practical management is about eliciting whether an episode of urinary retention or acutely deteriorating symptoms is directly precipitated by an event (such as anaesthesia, surgery or constipation) in which case they are likely to return to their previous baseline level, or whether it is the precipitated deterioration in pre-existent symptoms, in which case treatment will often be required. A proper history is important, ideally supplemented by the International Prostate Symptom Score (IPSS). Weak stream, intermittent flow, straining to void all imply bladder outflow obstruction, although detrusor failure is an alternative cause. These symptoms typically arise as a consequence of bladder outflow obstruction (BOO) usually as a consequence of prostatic obstruction or occasionally urethral stricture disease. Palpation for a palpable bladder and digital rectal examination are mandatory. In terms of prostate size they are small (15–30 g) (not much to feel), medium (30–40 g) (obvious to feel and can manipulate finger to sides), large (50–80 g) (difficult to feel sides), huge (100–300 g) (finger bent backwards). Weight can be directly extrapolated as volume 1 ml = 1 g and estimations are notoriously inaccurate. In terms of texture they are either smooth (probably benign) or irregular and hard (probably malignant). Direct measurement from imaging is based on the sphere volume formula: width × height × length × 0.52.

The most useful investigation to do is a measurement of post-void residual (PVR) using a bladder scanner. There is no accepted definition of a significant PVR but anything above 100 ml is probably significant in practical terms. Viewing the residual as a percentage of voided volume adds significance, i.e. 100 ml residual following a 200 ml void equates to a residual of one-third bladder volume as opposed to 100 ml residual following 400 ml void in which case residual is one-fifth. Stratification of patients at risk of retention is largely based on age (older more likely >70), prostate volume (>40 cc), PVR >140 ml, Qmax <12 and pre-existent symptoms.

## Conservative treatment

The majority of men suffering from lower urinary tract symptoms (LUTS) are unlikely to progress to acute urinary retention or other complications (e.g. renal insufficiency, stones, urinary tract infections, etc.). In the placebo arm of the MTOPS study, clinically significant progression was 17% at 4.5 years or 4.5% per year. Urinary retention was 2% and surgical intervention 5% after 4.5 years.<sup>1</sup> As such, men with mild to moderate uncomplicated LUTS who are not too troubled by their symptoms are suitable for watchful waiting. This more conservative approach negates the risk of side effects and complications imposed by medical and surgical therapy. Watchful waiting should include a range of behavioural and dietary modifications including:

- Education (about the patient's condition).
- Reassurance (that cancer is not a cause of the urinary symptoms, once malignancy has been excluded). Patients are equally likely to have cancer with or without LUTS.
- Lifestyle advice such as:

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**Figure 1** Probe position for post void bladder scan.

- reduction in fluid intake at specific times aimed at reducing urinary frequency when most convenient (e.g. at night or when going out in public)
- avoidance or moderation of intake of caffeine or alcohol, which may have a diuretic and irritant effect, thereby increasing fluid output and enhancing frequency, urgency and nocturia
- use of relaxed and double-voiding techniques
- urethral milking to prevent post micturition dribble
- distraction techniques such as penile squeeze, breathing exercises, perineal pressure, and mental tricks to take the mind off the bladder and toilet, to help control storage symptoms
- bladder retraining that encourages men to hold on when they have sensory urgency to increase their bladder capacity and the time between voids

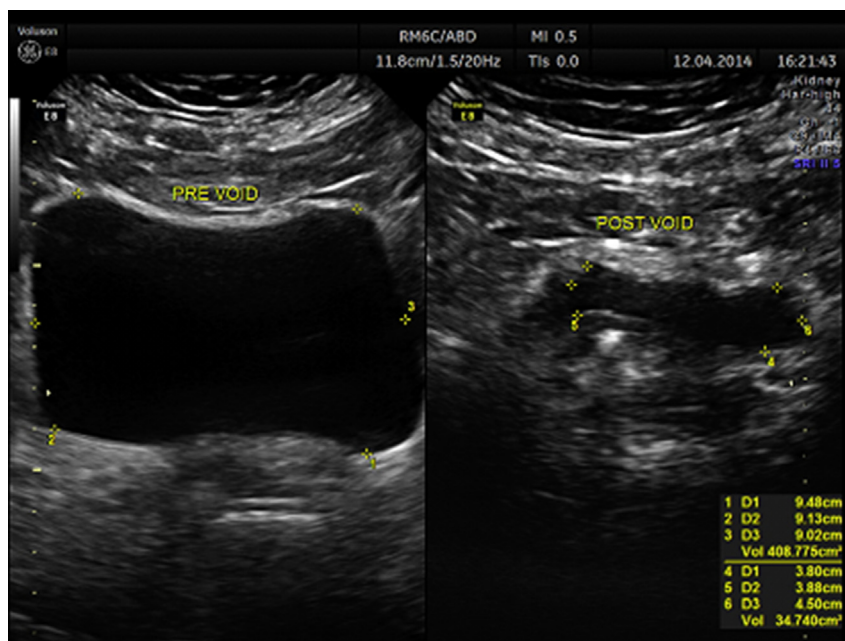
- reviewing the medication and optimizing the time of administration or substituting drugs for others that have fewer urinary effects (in particular diuretics)
- treatment of constipation
- weight reduction (causal relationship established between metabolic syndrome and LUTS)
- review presence of sleep apnoea and snoring given the strong relationship between this and nocturnal polyuria, (apnoea causes right heart strain which leads to release of Atrial Natriuretic Peptide (ANP) and subsequent diuresis).

Patients at high risk of BPH progression, i.e. age >70 years, increasing symptom bother, PSA >1.4 ng/ml, prostate >30 g, low peak flow rate (Qmax < 12 ml/second) and high post void residuals are the strongest predictors of clinical failure and in these patients, medical therapy should be considered.

### Pharmacological treatments

#### Flow improvement medication

**Alpha antagonists:** alpha-1 blockers are considered the first-line drug treatment for male LUTS because of their rapid onset of action (1–2 days), good efficacy and low rate and severity of adverse events. Alpha-1 blockers aim to inhibit the effect of endogenously released noradrenaline on smooth muscle cells in the prostate thereby reducing prostate tone and bladder outflow obstruction (BOO).<sup>2</sup> Typically, this class of drugs increases maximal flow rates (Qmax) by 2–4 ml/second with a reduction in post void residuals by 30 ml. In practical terms this is just enough difference to be noticeable but reduces IPSS by a surprisingly large amount (30–50%). They do not reduce prostate size nor prevent acute urinary retention.<sup>3,4</sup> Tamsulosin, a selective alpha-1 receptor antagonist is a popular choice given its tolerability and modest adverse effects (anejaculation, asthenia,



**Figure 2** Pre-and post-void bladder scan ultrasound images (pre-void 408 ml, post-void volume 35 ml).

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