

Reclamation of normal urinary control is more than an issue of mere convenience to many men treated for BPH and prostate cancer.



Stenting of the Urethra for the Treatment of Urinary Complications Related to the Prostate

By Douglas O. Chinn, M.D.

As many men who have experienced prostate-related conditions already know, problems with the prostate often result in problems with urination. Normal urination is dependent upon a patent – or open – urethra to deliver urine from the bladder to the exterior of the body. Should the urethra become pinched off or otherwise obstructed, normal urinary flow stops and urine accumulates in the bladder (a condition known as urinary retention).

Under normal conditions, urine fills the bladder and is held in check by the urinary sphincter until a suitable occasion for voluntary urination comes to pass. But in the case of a blockage of the urethra that prevents urine from flowing toward the outside, urine may start “backing up” into the kidneys, which create urine by filtering nitrogen and metabolic waste products from the blood.

The urine and filtered byproducts drain from the kidneys into the bladder, which serves as a reservoir until we void to empty the bladder. Obstruction of the urinary flow out of the bladder (either from an enlarged prostate, post-procedure swelling, or scar tissue) can cause urine to back up from the bladder, through the ureters, and into the kidneys. In the event that urine reaches all the way to the kidneys, serious damage can occur to both the bladder and kidneys (see the classic *Gray’s Anatomy of the Human Body* drawing of the kidneys, ureters, and urinary bladder in Figure 1).

Significant urinary obstruction is therefore much more than a nuisance or painful interlude – it is potentially a medical emergency. Often, the prostate is implicated in urinary obstruction because the urethra is formed at the opening of the bladder and immediately runs through the prostate (the “prostatic urethra”).

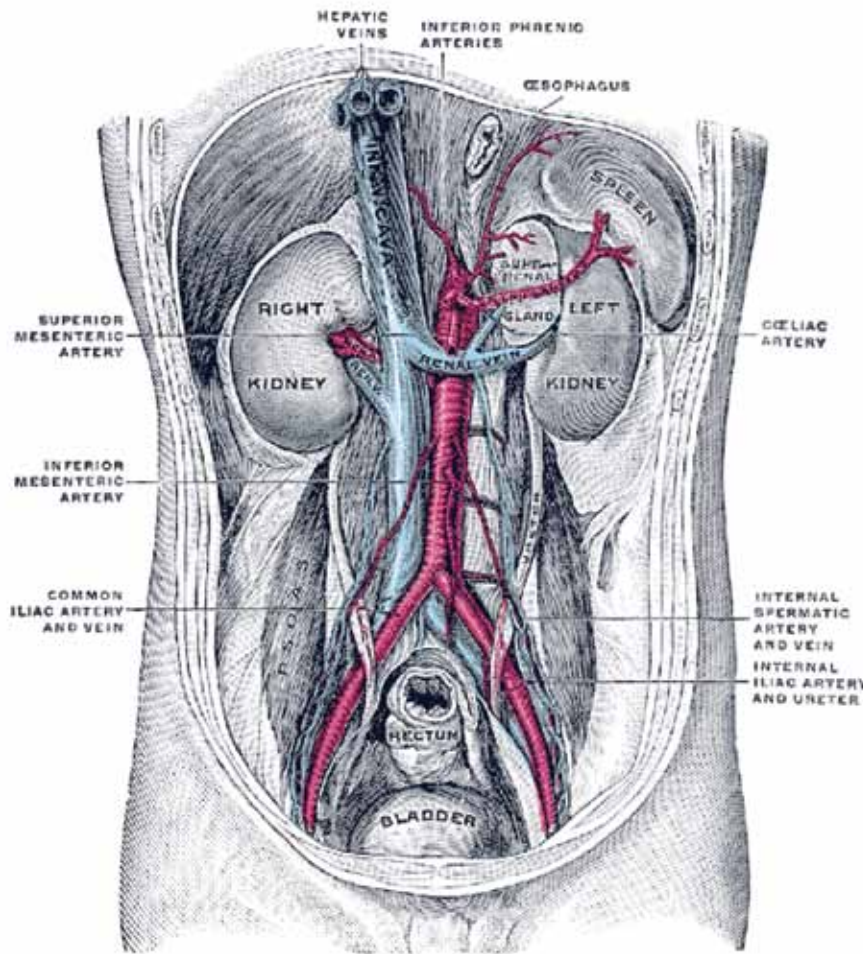


Figure 1. Urinary Bladder, Ureters, and Kidneys.

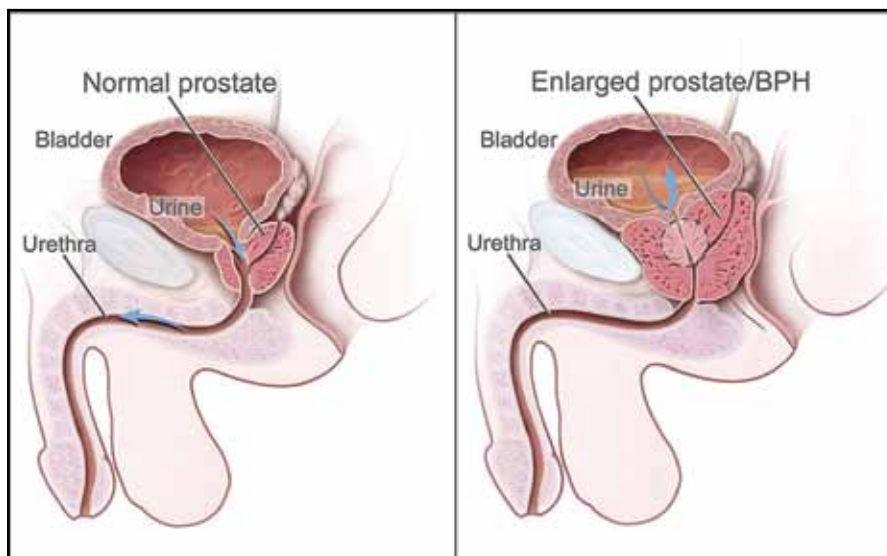


Figure 2a/2b. Normal and Enlarged Prostate at the Bladder Outlet

Since the prostate is essentially wrapped around the urethra at the bladder outlet (see Figure 2a), anything that causes the prostate to become enlarged, inflamed, or irritated will have repercussions on urinary function.

Enlargement of the prostate is most often due to the proliferation of prostatic glands with age – a condition known as benign prostatic hyperplasia (BPH). As the glandular elements of the gland grow, they crowd the interior of the prostate and begin to pinch off the prostatic urethra, reducing the ability of the urethra to transport urine from the bladder to the outside world (depicted in Figure 2b).

In addition to BPH, several other conditions exist – including an enlarged prostate caused by uncontrolled prostate cancer – that also cause the prostatic urethra (or neighboring urinary tract) to obstruct the flow of urine from the bladder. These conditions often are caused by, or are exacerbated by, treatment of the prostate for BPH or prostate cancer. Thus, one of the chief complications of BPH treatment and of prostate cancer treatment is “acute urinary retention”, or the dangerous accumulation of urine in the bladder due to the obstruction of urinary flow.

When BPH is treated, for instance, it is often through the application of energy to the excess tissue around the urethra. This energy might be supplied by a laser, by a heating element, or by microwaves, all of which cause the overgrown tissue around the urethra to retract. While this treatment will ultimately (Continued on Page 10)

make the prostatic urethra wider, and thus more effective, in the short term the prostatic urethra will swell – hindering urinary flow.

Many minimally invasive (non-surgical) prostate cancer treatments will also cause the prostate – and therefore the prostatic urethra – to swell or react in such a way as to make urinary obstruction either inevitable or highly likely, at least for some patients. Cryosurgical treatment of the prostate, HIFU, and prostate brachytherapy will often lead to potential problems with obstruction in the short term. Other conditions that tend to occur or worsen after prostate cancer treatment with radiation, such as bladder neck contracture and urethral stricture, also lead to significant risk of urinary retention. In patients who already have an enlarged prostate with outlet obstruction, treatment with external beam or seed implant radiation therapy can also cause urinary retention or diminished urinary stream and force until the swelling (known as “edema”) subsides.

Traditionally, urinary retention has been managed by urinary catheterization. Catheterization can be performed various ways, but in all cases it involves the draining of the urinary bladder through a conduit that does not rely on the problematic prostatic urethra. “Supra-pubic” (*above the pubic bone*) catheterization takes place when a tube is inserted directly into the bladder through the skin and muscle of the abdomen below the umbilicus (“belly button”), but above the pubic bone at the front of the pelvis. This tube can be used to drain the bladder through tubing into a bag for storage and disposal.



Dr. Douglas Chinn

Douglas Chinn completed his medical education at USC, and his internship and residency at Los Angeles County Medical Center. He joined the general urology practice started by his father (now retired) and brother. Dr. Chinn is a pioneer in cryosurgery for kidney and prostate cancer, and developed the patented temperature monitoring technology that is used today in cryosurgery. Dr. Chinn has published, lectured and trained physicians in cryosurgery world-wide. Dr. Chinn first studied HIFU in Europe three years ago, and now feels that its time has come.

Other forms of urinary catheterization involve threading a catheter (flexible tube) into the penis and up into the bladder, where the catheter can either remain for some time (“indwelling”) or be inserted by the user occasionally to drain the bladder (“intermittent”).

In either case, the source of the obstruction is bypassed via artificial conduit to compensate for a problematic, but natural, urethra. Because urinary obstruction can quickly become a serious medical condition with long-term consequences, urinary catheterization is a widespread occurrence after prostate-related treatments and procedures.

Recently, the U.S. Food and Drug Administration (FDA) has approved a device called “The Spanner” (AbbeyMoor Medical, Parkers Prairie, MN). The Spanner (shown in Figure 3) is more prop-

erly known as an urethral stent, a stent being a device placed into a natural conduit – typically a blood vessel – in order to keep it patent, or open. Stents have been used to prop coronary arteries open since the 1980s, when it was shown that coronary stents could be used to avoid open arterial graft bypass surgery.

In this case, the Spanner stent is used to prop open a portion of prostatic urethra that is having trouble staying open on its own, due to BPH, following treatment for BPH or prostate cancer, or for other conditions where catheterization would usually be performed to ensure proper urinary flow and avoid urinary retention. The use of a stent – as opposed to a catheter – allows the patient to urinate on his own, rather than relying on an artificial conduit system that drains the bladder without the need for “natural” urination.



Figure 3. The Spanner Urinary Stent

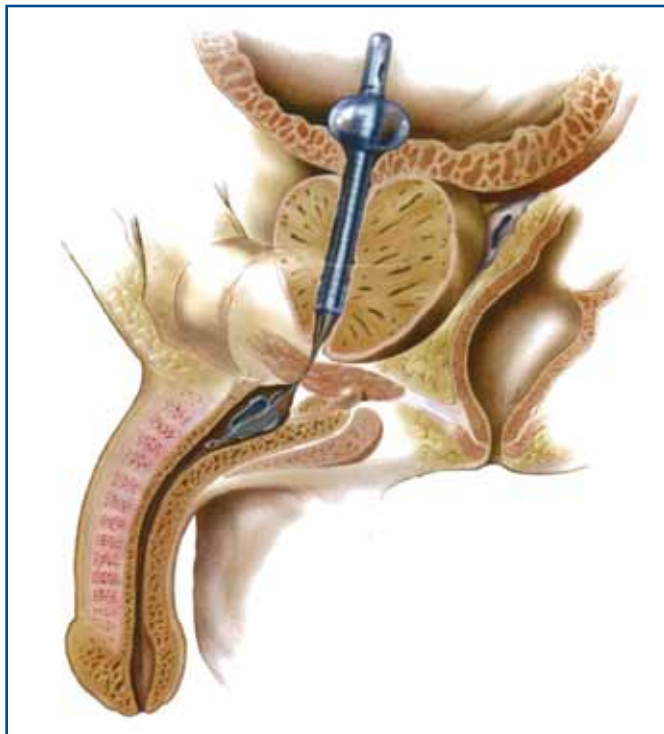


Figure 4. Illustration of the Insertion of The Spanner Urinary Stent.

When successfully deployed (depicted in Figure 4), the stent frees the patient from having to wear bags – overnight or leg bags – which attach to urinary catheters to collect urine. The stent therefore keeps the patient from having to worry about draining the bag, and also eliminates the pulling of the bag on the catheter, which

can be quite uncomfortable. Furthermore, there is no irritation at the end of the penis (meatus) where the catheter exits. In comparison to vascular stents, the Spanner stent is temporary, meaning that it can be left in place over extended time (typically one to three months), but can be easily changed or removed as necessary. This stent is also easily placed and removed in the office just like a regular catheter.

At a recent presentation (Western Section of the American Urologic Association, October 2009), clinical experiences to-date with the Spanner were presented. Clinical indications for use of the Spanner include:

1. **Acute retention status post minimally invasive therapy of BPH (microwave therapy and radio frequency ablation);**
2. **Acute retention following cryosurgery and high intensity focused ultrasound (HIFU);**
3. **Acute retention or severely restricted urinary flow after external beam radiation therapy or radioactive seed implant therapy;**
4. **Chronic retention due to scar tissue after radiation, cryosurgery, HIFU, or radical prostatectomy (open or robotic).**

A recent report (1) concluded that for 206 men treated for a variety of the conditions mentioned above, the Spanner stent proved to be a versatile, easily tolerated, and successful device for the treatment of urinary outlet obstruction resultant from several causes.

In conclusion, the Spanner prostatic urethral stent is a new device that benefits the urologic patient with poor urinary stream and/or urinary retention due to a variety of conditions. It is much more comfortable than having to wear either a suprapubic or indwelling urethral catheter with a drainage bag, and certainly is more convenient than having to intermittently catheterize oneself. The Spanner is easily placed and removed in the office. To this author, the utility and ease of use make the Spanner the “Swiss Army knife” of urologic outlet obstruction. Currently, no other such device with these specific characteristics and advantages is available in the world. Furthermore, this device is FDA approved and currently available and covered under Medicare.

1. Shore ND, Baig MM, Cantwell AL, Chinn DO, Susan LP. How to manage BOO with temporary prostatic stenting. *Urology Times* July 2009:16-19.