Overview of interventional treatment options for benign prostatic hyperplasia

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Abstract

Transurethral resection of the prostate (TURP) remains the gold standard surgical intervention for men with benign prostatic hyperplasia (BPH). However, there are other, newer technologies that have also demonstrated safety and efficacy at least equivalent to that of TURP (e.g., Holmium laser, photoselective vaporization of the prostate). These minimally invasive techniques may be particularly useful for selected patient populations (e.g., those on anticoagulant therapy).

Surgical management of benign prostatic hyperplasia (BPH) after failure of medical therapy did not evolve much over the first 50 years following the introduction of transurethral resection of the prostate (TURP) in the 1930s. However, over the past two decades, many alternatives have become available. Some have come and gone already, such as balloon dilation, urethral hot water balloon (thermotherapy), and alcohol injections. There are, however, several newer technologies that provide some advantages for certain patient profiles. The following review provides an overview of the various surgical options, including summaries of some of the more compelling literature published in this field.

Contemporary data on TURP

In 2008, Reich et al. published data on 10,654 German patients undergoing TURP with monopolar technology from January 1, 2002 until December 31, 2003. They reported that the mortality rate for TURP was 0.1%, and the cumulative short-term morbidity rate was 11.1%.[1] Complications included failure to void (5.8%), surgical revision (5.6%), significant urinary tract infection (3.6%), bleeding requiring transfusions (2.9%) and transurethral resection (TUR) syndrome (1.4%).

Other researchers have compared outcomes with monopolar versus bipolar technology. Mamoulakis et al performed a meta-analysis of 16 randomized, controlled trials involving a total of 1,406 patients.[2] They reported that there were no clinically relevant differences in short-term (12-month) efficacy between the two types of TURP, but that bipolar TURP was associated with a lower incidence of TUR syndrome and clot retention rates, and shorter duration of irrigation and catheterization.

Newer technologies for TURP-like BPH surgery

Essentially, the newer technologies all aim to create a TURP-like defect. The majority are different types of lasers with varying wavelengths and absorption characteristics. The two most frequently used lasers with the greatest evidence base are the Holmium laser and the green light photoselective vaporization of the prostate (PVP) (534 µm wavelength). The remainder are modifications on the TURP using larger loops or bipolar energy and saline irrigation fluid. These treatment modalities were required to show equivalence to established techniques and most of them were able to show equivalence but no superiority, except in one study showing superior urodynamic outcomes when comparing Holmium laser enucleation (HOLEP) to TURP.[3] The most important challenge in all minimally invasive surgeries (MIS) for BPH is durability or the need for reoperation over time.

Holmium-Yag laser

Holmium-Yag laser was the first energy used to truly enucleate the prostate off its surgical capsule; the term HoLEP (holmium laser enucleation of the prostate) was introduced by Dr. Peter Gilling and colleagues in the late 1990s.[4] With the introduction of HoLEP, managing any size prostate became quite feasible.

This technique has the most evidence-based literature to support the claim that it is size independent, with excellent long-term outcomes and low morbidity with very low re-operation rates over a 10-year follow-up.[5-15] The learning curve for HoLEP is steeper than for other techniques,[16-18] which has limited its widespread adoption. However, it remains the standard against which other techniques claiming ability to treat any size prostate gland should be compared.

Green light photoselective vaporization of the prostate

This procedure has been shown to provide a TUR-like cavity,[19,20] but the clinical outcome for smaller or larger prostates might be disproportionate.[21] The functional outcome in larger prostates

(>80 mL) is similar to that in smaller glands, but there was a significant trend to a higher re-operation rate in men with larger prostates.[22]

In terms of safety, the green light laser has been shown to be safe, with lower rates of transfusion, capsule perforation and clot retention compared to TURP.[23,24] Compared to open prostatectomy, this technique was associated with a lower number of blood transfusions and less recatheterization.[25] Investigators have also shown that this procedure can be used on patients who are receiving anticoagulant therapy.[26]

The learning curve with the photoselective vaporization of the prostate (PVP) procedure has been relatively short. Skills acquired with other cystoscopic procedures largely apply. It has been shown that at least 10 to 15 procedures should be performed on small prostates (<50 mL) prior to treating challenging large glands.[27,28] PVP provides good treatment efficacy and minimal bleeding, even when the surgeon has minimal experience.[29]

Other options

Other techniques using the term enucleation need more time to prove their equivalence but there are some very attractive alternatives being validated. This includes XPS green light laser, thullium laser enucleation, transurethral enucleation in saline using bipolar technology, diode lasers, plasmakinetic enucleation or vaporization. We need more time for validation before we can completely endorse one over the other.

Which intervention for which patient?

In general, the data with laser vaporization techniques have shown that outcomes are size dependent, with better outcomes for small to moderate size prostates but not for larger glands. All vaporization techniques share the same limitation of size dependency and hence are mostly reserved for small to medium size glands. Under certain circumstances, such as anticoagulated patients, lasers do have an advantage over traditional techniques, with the added benefit of using saline and avoiding the rarely encountered TUR syndrome. In the majority of cases of small to moderate size glands, the results of lasers are not better than TURP, which still remains the standard of care under these circumstances. Managing larger prostates remains challenging. Using a laser enucleation technique is a better option over open prostatectomy. The most validated enucleation technique is the Holium Yag laser enucleation (HOLEP). Other technologies are attempting to produce the same results. The available data is scarce, but hopefully, with time they will be able to answer this important question.

The limitations of the research with lasers have been that most randomized controlled trials compared one laser to TURP; it is very seldom that we see one laser compared to another. Furthermore, few of the studies are stratified for gland size and even fewer compared laser to open prostatectomy.

The Achilles tendon of minimally invasive techniques is the failure of treatment over time, requiring reoperations. This has been demonstrated many times in long-term publications, particularly with respect to larger glands.

Conclusions

In summary, no one treatment fits all patients. For small to medium size prostates, lasers and TURP are associated with approximately equivalent outcomes. As such, TURP is typically the intervention of choice. However, there are many patients that would be better served using lasers (e.g., those on anticoagulant medication). Based on the strength of the data accumulated with the HoLEP procedure, it is advisable that at least one urologist per large urology centre should master the technique and offer it as the treatment of choice for large glands.

The choice of therapy should be based on patient-centred indications, avoiding commercial and media pressure promoting the use of lasers. We should always keep the resectoscope ready and handy, as TURP still remains the gold standard.

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