Bipolar, Monopolar, Photovaporization of the Prostate, or Holmium Laser Enucleation of the Prostate

How to Choose What's Best?

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KEYWORDS

• Benign prostatic obstruction • Laser • Resection • Enucleation • Vaporization

KEY POINTS

- Relief from benign prostatic obstruction is possible by enucleation, resection, or vaporization.
- Laser enucleation gives the best long term functional results, with low perioperative risk, but has a steep learning curve.
- GreenLight photovaporization is useful in patients at high risk of bleeding and with limited prostate volume.
- Bipolar resection is a safe alternative to monopolar resection with comparable outcomes and no limitation owing to prostate size.
- The field is evolving, with many of innovative techniques that may help to refine indications according to patients' profiles.

INTRODUCTION

Lower urinary tract symptoms owing to benign prostatic obstructions (BPO) are highly prevalent and a huge number of men undergo surgery for BPO relief each year.[1] Among available options, aside traditional monopolar transurethral resection of the prostate (M-TURP) and open prostatectomy, many surgical options have been validated and are available for use in current clinical practice.[2,3] Transurethral ablative therapies are based on 3 different approaches: resection, vaporization (eventually combined in vaporesection), or enucleation. Available tools include monopolar energy, bipolar energy, holmium laser, photovaporization of the prostate (PVP; GreenLight) laser, and other less studied energy sources (thulium lasers, diode laser, etc). To date, the following surgical techniques have been validated through level 1 evidence studies: M-TURP, bipolar TURP (B-TURP), transurethral bipolar enucleation (TUBE), holmium laser enucleation of the prostate (HoLEP), and GreenLight PVP, as well as thulium vaporesection and enucleation.[2–4]

The respective results of each technique in currently available randomized, controlled trials (RCTs), in terms of BPO relief and tissue removal, seems more related to the type of tissue ablation chosen. Indeed, enucleation is associated with a higher amount of prostatic tissue removed, greater decrease in prostate-specific antigen, more improved peak flow rate (Q_{max}), and greater

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change in International Prostate Symptom Score (I-PSS); results of resection and PVP seem comparable.[2–6] However, long-term data and some head-to-head comparisons are still missing. Furthermore, these techniques offer different types and/or rates of immediate or late complications. Their respective indications rely on patients' characteristics (risk of bleeding, life expectancy, and associated conditions), patients' expectations (notably in sexually active patients), and expertise of the surgeons (habits, learning curve, availability of the devices).

This paper aims to provide the best up-to-date information on the 4 major surgical transurethral techniques available on the market, to help urologists in choosing between M-TURP, B-TURP/TUBE, GreenLight PVP, and HoLEP. A cost-effectiveness analysis was considered to be out of the scope of this paper.

MONOPOLAR TRANSURETHRAL RESECTION OF THE PROSTATE

Indications

M-TURP is considered as a standard procedure for BPO relief, and has now been used for more than 7 decades. One of its main assets is the large clinical experience available in the literature, because nearly all urologists do M-TURP on a daily basis. M-TURP has thus been used as the reference treatment arm in more than 200 comparative studies in the past 30 years. However, owing to the need of glycine continuous flow irrigation the procedure, it is usually recommended to use M-TURP for prostates of less than 80 mL.[5] Furthermore, several RCTs and metaanalyses have shown that M-TURP is associated with a higher risk of bleeding compared with laser surgery (either PVP or HoLEP).[2,7,8] It may explain that no RCT have compared M-TURP with laser procedures in patients under anticoagulation, therapy likely owing to ethical reasons. At present, M-TURP remains an option for BPO relief in patients with small prostates (when the risk of bleeding is minimal) or in patients with voiding difficulties in the context of known prostate cancer.

Functional Results

It has been shown by numerous studies that M-TURP is able to relieve BPO with a high success rate. The procedure is associated with a drop in the I-PSS of around 70%, a reduction of prostate volume of around 45%, an increase of Q_{max} of around 12 mL/s, and a reduction is postvoid residual volume (PVR) of around 76%.[2,9–11]Those results are durable with an overall estimated recurrence of BPO in about 10% of cases in the long term.

Complications

Intraoperative complications are dominated by bleeding, with rates between 3% and 8.6%, depending on the type of patients studied and whether it is in current clinical practice or clinical trials.[2,9–13] The risk of bleeding is even greater under anticoagulation therapy. TUR syndrome may occur in as many as 1% to 2% of patients owing to dilutional hyponatremia and is characterized by mental confusion, nausea, vomiting, and visual disturbances. It has been reported to occur in as many as 1% and 2% of cases.[2,9]

Postoperative clot retention owing to bleeding occurs in 1% to 7% of patients reported in the literature.[9] This complication is influenced by technical difficulties, prostate size, venous injury, depth of resection, and irrigation quantity after the procedure. Obviously, patients under anticoagulation therapy are at greater risk. Postoperative acute urinary retention can occur in 3% to up to 9% of cases.[2,9–12] It may be transient or impossible after further trials of voiding without catheter. In these cases, reevaluation of the patient by endoscopy and urodynamics is mandatory because many other factors can explain the situation (detrusor impairment, insufficient tissue removal). Urinary tract infections (UTIs) are usually successfully managed by antibiotics[2,9,11] and occur in up to 20% of patients. Some authors have proposed that preoperative bacteriuria, duration of the procedure, postoperative stay duration, and postoperative invasive care were linked to an increased rate of UTIs. Further complications can occur but are not frequent, underreported, and not seen in small RCTs in the literature. Those include perforation of the bladder neck, injury of ureteral orifices, and bladder wall injury. Mortality of the procedure is estimated to be around 1 in 1000 in the largest case series.[10]

Long-term complications include mainly bladder neck contracture, urethral strictures, incontinence, and sexual dysfunction. Bladder neck contracture occurs rather after TRUP in small prostates around 3% in the literature ($\leq$10%), and are managed successfully by incisions.[2,9,11] Urethral strictures occur in 2% to 10% of cases in the literature,[2,9,11] and are probably influenced by the size of the scope, the technology used, as well as UTIs. Urethral stricture is usually managed by laser of cold knife incision. Incontinence after TURP is rather unusual, is mainly owing to sphincter injury, and occurs in up to 2% of cases.[2,9,11] Reoperation rates depend on follow-up duration. It ranges