

OHTAC Recommendation

Energy Delivery Systems for Treatment of Benign Prostatic Hyperplasia

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OHTAC Ontario
Health Technology
Advisory Committee



Ontario

The Ontario Health Technology Advisory Committee (OHTAC) met on August 18, 2006 and reviewed the health technology assessment report on energy delivery systems for treatment of benign prostatic hyperplasia (BPH). The review consisted of a presentation by the Medical Advisory Secretariat (MAS) and discussion.

BPH is a non-cancerous enlargement of the prostate. Patients with BPH normally present with lower urinary tract symptoms. About a quarter of men over the age of 50 have symptoms of BPH. The incidence of BPH increases with increasing age to the point that more than 80% of 80 years old men have enlarged prostate.

Traditional treatment of BPH includes watchful waiting, pharmacotherapy, and surgical procedures. Surgical techniques include transurethral resection of the prostate (TURP), transurethral incision of the prostate (TUIP), and open prostatectomy. TURP has been considered the gold standard and continues to be the operation most commonly performed in the treatment of BPH in Ontario. In this procedure, the prostate is resected through a cautery loop. After completion of the resection, all prostatic chips are evacuated and submitted for pathological examination.

Since the prostate is highly vascularized, resection of the tissue in TURP causes bleeding which obscures the visualization, therefore, bladder irrigation is required. Rarely, absorption of the irrigation fluids into the systemic circulation results in dilutional hyponatremia, a phenomenon called TUR syndrome. The incidence of this adverse event is low (about 0.5%), however, it may be life-threatening.

During the last decade, a number of treatment modalities using different sources of energy have been developed as alternatives to TURP. The goal is to develop techniques that can provide the patient with improvement in subjective and objective outcomes similar to TURP while improving on perioperative hemodynamic outcomes (TUR syndrome and blood loss) and length of hospital stay. A review of these systems by MAS concluded that:

Monopolar electrovaporization, a modification of TURP, entails the simultaneous vaporization and coagulation of prostatic tissue. Bipolar electrovaporization is a new technology that employs bipolar electrodes (active and return), so that the path of current flows only through the volume of tissue between the poles of the electrodes. The results of several randomized controlled trials (RCTs) have shown that both monopolar and bipolar electrovaporization produced similar outcomes to TURP in the

treatment of BPH while they have the advantages of reduced bleeding and less risk of TUR syndrome.

Laser treatment of BPH encompasses a variety of techniques using different laser wavelengths (Nd:YAG, Diode, Holmium:YAG, and Potassium Titanyl Phosphate). The procedures using Nd:YAG laser include visual laser ablation of the prostate (VLAP) and contact laser vaporization (CLV), while interstitial laser coagulation (ILC) uses diode laser.

A review of these methods showed that although patients undergoing VLAP were kept in hospital for shorter period of time, they had to be catheterized for significantly longer time to allow tissue sloughing off. In addition, a MAS meta-analysis on the rate of reoperation in VLAP studies showed that the difference between VLAP and TURP was significant in favor of TURP.

Patients undergoing ILC also needed to be catheterized for longer period of time compared to TURP. An important complication of ILC procedure was a significantly higher rate of urinary tract infection (UTI) associated with longer catheterization time.

A MAS meta-analysis of published RCTs on CLV with long-term follow-up showed that the improvement in urinary symptom scores was significantly better in patients undergoing TURP compared to CLV.

Holmium:YAG laser creates significant vaporization of the prostatic tissue while maintaining hemostasis and preventing TUR syndrome. The procedures using holmium:YAG laser include holmium laser ablation of the prostate (HoLAP), holmium laser resection of the prostate (HoLRP), and holmium laser enucleation of the prostate (HoLEP). HoLAP and HoLRP have been superseded by HoLEP.

HoLEP demonstrated superior outcomes compared to TURP since this technique allows true anatomic enucleation of the prostate. A MAS meta-analysis of 4 RCTs on HoLEP showed that this technique reduced urinary symptom scores and improved urinary flow significantly better than TURP.

Potassium titanyl phosphate (KTP) is a variation of Nd:YAG laser produced by doubling the frequency and halving the wavelength. This laser is visible to the human

eye as a green light. In contrast to Nd:YAG and holmium:YAG, KTP is strongly absorbed by hemoglobin.

Earlier studies used a low power of KTP but currently, a high power (80 W KTP) is used. However, no randomized controlled trial has been published to compare the efficacy and safety of this technique with TURP. A prospective cohort study published in 2005 has shown that outcomes are similar to TURP. However, the length of follow-up (6 months) is not sufficient to draw any definite conclusion. The advantage of this technique, if it can pass the test of time, is that it requires a short duration of catheterization and can be performed in an outpatient setting, which makes PVP a cost-effective procedure with a cost saving to the province to a maximum of \$13.5 million (not including capital costs) if all TURP procedures were to be replaced by PVP. This advantage has resulted in rapid diffusion of the technology in the United States even before rigorous evaluation could be applied as occurred with the other surgical technologies.

Transurethral microwave thermotherapy (TUMT) uses microwaves to deliver heat through a special catheter to selected portions of prostatic gland. The procedure can be performed with local anesthesia in an outpatient setting. Three RCTs which provided follow-up of one year or more have demonstrated significant difference between TUMT and TURP in improving subjective and objective outcomes in favor of TURP. In addition, patients required longer duration of catheterization.

Transurethral needle ablation of prostate (TUNA) uses radiofrequency waves to heat the prostatic tissue. Two small needles are placed inside the prostatic tissue under endoscopic control and energy is applied to the tissue to cause coagulative necrosis. The needles are subsequently placed in different areas of the prostate. The absorption of the necrotic tissue takes several weeks and patient often note little improvement in voiding symptoms until necrotic tissue are absorbed. RCTs showed that TUNA technique is significantly less effective in reducing urinary symptom score and improving urinary flow compared to TURP. In addition, a MAS meta-analysis on the reoperation rates reported by RCTs showed that significantly more patients undergo reoperation following TUNA than TURP.

The application of HIFU in BPH has not been demonstrated in any RCTs.

Projected diffusion of surgical approaches may be dampened by the rapid diffusion of drugs for this condition as demonstrated in Ontario over the past 4 years in the MAS analysis presented to OHTAC.

OHTAC makes the following recommendations regarding the above technologies:

- Based on effectiveness, economic analysis and complication rates, it is appropriate to offer TURP, HoLEP, bipolar, or monopolar electrovaporization to patients for the treatment of BPH.
- Informed consent for patients should include the fact that for HoLEP and bipolar electrovaporization, only 1-year follow-up is currently available, there is a slightly higher blood transfusion requirements for TURP and that TURP is associated with a small risk (0.5%) of TUR syndrome. Therefore, the choice of technique should be tailored around patient's characteristics and preferences, surgeon's experience and skills, and the availability of the technique.
- OHTAC recommends that facilities providing VLAP, CLV, ILC, TUMT, and TUNA consider alternatives mentioned above.
- OHTAC recommends that a registry study be conducted to establish longer term effectiveness and complication rates for PVP given the likelihood of increasing diffusion of this technology.