Prostate Volume Did Not Affect Voiding Function Improvements in Diode Laser Enucleation of the Prostate

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Purpose: We compared safety and surgical outcomes in patients with different prostate sizes treated with diode laser enucleation of the prostate.

Materials and Methods: From 2008 to 2012 consecutive patients with benign prostatic obstruction undergoing diode laser prostate enucleation at our institution were enrolled for analysis. A single surgeon performed diode laser prostate enucleation with an end firing, continuous wave diode laser (980 nm). Based on preoperative prostate volume on transrectal ultrasound, patients were stratified into 2 groups, including group 1—65 with less than 60 ml and group 2—55 with 60 ml or greater. Baseline and perioperative characteristics, and postoperative surgical outcomes were compared between the 2 groups.

Results: A total of 120 men with a mean ± SD age of 70.2 ± 9.0 years were enrolled for analysis. Compared with group 1 patients, those in group 2 had larger mean total prostate volume (85.0 ± 24.6 vs 40.9 ± 10.8 ml), longer mean operative time (117.7 ± 48.2 vs 60.7 ± 25.0 minutes), higher mean retrieved prostate weight (37.3 ± 16.1 vs 12.5 ± 7.3 gm) and a higher mean tissue retrieval ratio (74.4% ± 22.2% vs 58.8% ± 23.2%, $p < 0.01$). There was no significant difference in the postoperative hemoglobin decrease in the 2 groups (median 0.5 vs 0.9 mg/dl, $p = 0.11$). The rate of temporary postoperative urinary retention after Foley catheter removal was significantly lower in group 2 (15.4% vs 3.6%, $p = 0.04$). Postoperative improvements in the peak flow rate, post-void residual urine volume and International Prostate Symptom Score were comparable in the 2 groups.

Conclusions: Although patients with a larger prostate required significantly longer operative time and laser energy, voiding function improvements and surgical complication rates of diode laser prostate enucleation were comparable in patients with a larger vs smaller prostate.

Key Words: prostate; lasers, semiconductor; prostatic hyperplasia; organ size; urination

Abbreviations and Acronyms

BPH = benign prostatic hyperplasia

DiLEP = diode laser prostate enucleation

HoLEP = holmium laser prostate enucleation

IIEF-5 = International Index of Erectile Function, 5-item version

I-PSS = International Prostate Symptom Score

PSA = prostate specific antigen

PVP = prostate photovaporization

PVR = post-void residual urine

Qmax = peak urine flow rate

TUR = transurethral resection

TURP = prostate TUR

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Study received hospital ethics committee approval.

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TRANSURETHRAL resection of the prostate remains the reference surgery to treat BPH.[1] Reported complication rates of TURP range from 11% to 20%.[2] As prostate size increases, the rate of complications such as blood transfusion, TUR syndrome, surgical revision, infection and mortality increases. Therefore, various lasers, including lithium triborate, holmium, thulium and diode lasers, have been adopted to decrease the morbidity and

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mortality associated with the procedure, especially for larger prostates.[3,4] In addition to safety concerns, to our knowledge the efficacy of laser treatment in patients with different prostate volumes remains undetermined. Te et al noted that clinical outcomes in men with a smaller or larger prostate treated with PVP might be disproportionate[5] but Gu et al reported that prostate volume did not affect the surgical outcome of PVP.[6] Elzayat et al considered HoLEP more suitable for larger prostates,[4] while Humphreys et al observed that HoLEP efficacy was independent of prostate size.[7]

Previously, a diode laser (980 nm) was used to vaporize the prostate with inconclusive efficacy results and the main problems associated with postoperative tissue sloughing.[8] Recently, we used the diode laser (980 nm) to enucleate prostates and achieved safety and efficacy comparable to those of TURP.[9] In addition, DiLEP provided better hemostatic ability than TURP, as evidenced by a lesser postoperative decrease in hemoglobin (mean 0.9 vs 1.6 gm/dl, $p = 0.03$).[9] To our knowledge the hemostatic ability of DiLEP in patients with different prostate sizes is unknown.

Although DiLEP could create a TURP-like tunnel, followup uroflowmetry and lower urinary tract symptoms may be different in patients with prostates of different sizes. Therefore, we compared the perioperative parameters, complications and postoperative outcomes of DiLEP between patients with different prostate sizes.

MATERIALS AND METHODS

The study was approved by the ethics committee at our hospital. Between October 2008 and June 2012 we retrospectively enrolled consecutive patients with significant BPH treated with DiLEP, which was performed by a single surgeon (SSDY). Inclusion criteria for surgery were Qmax less than 12 ml per second, voided volume greater than 150 ml and I-PSS greater than 12. Patients with urethral stricture, neurogenic bladder, chronic prostatitis and prostate or bladder cancer were excluded from analysis. Patients with increased PSA or abnormal findings on digital rectal examination needed negative biopsy results before surgery. According to total prostate volume measured on transrectal ultrasound, patients were divided into 2 groups, including group 1—total prostate volume less than 60 ml and group 2—total prostate volume 60 ml or greater.

Hemoglobin was measured the day before surgery and at 8 a.m. on postoperative day 1. Perioperative parameters were collected, including operative and laser enucleation time, laser energy, retrieved prostatic tissue weight, urethral catheterization time and postoperative hospital stay. Uroflowmetry and PVR were recorded at baseline, and at 1, 3 and 6 months of followup. The I-PSS was completed at baseline, and at 3 and 6 months of followup. Serum PSA was measured preoperatively in all patients and 3 months postoperatively only in men with preoperative PSA greater than 4 ng/ml. Prostate size on transrectal ultrasound was measured at baseline and 6 months after surgery. The IIEF-5[10] was completed by patients who achieved sexual activity 1 month before surgery and 6 months postoperatively.

Postoperative surgical complications associated with the procedures were documented. Temporary urinary retention was defined as failure to void via the urethra after removing the indwelling catheter. Volitional voiding occurred after adequate management, such as recatheterization for a short period. The tissue retrieval ratio was defined as retrieved prostate weight in gm divided by adenoma size in ml measured on transrectal ultrasound of the prostate.

Technique of DiLEP

We previously described the DiLEP technique in detail.[9] Briefly, all procedures were performed with the patient under spinal anesthesia. We used a 27Fr continuous flow laser resectoscope (Olympus®) and an end firing, 600 μm fiber continuous wave diode laser (980 nm) (Bio Litec, Jena, Germany). Laser power was set at 80 W.

We modified the HoLEP technique[11] to develop the current 4-U incision DiLEP technique. Incisions were made lateral to the verumontanum and extended toward the bladder neck. The incisions were deepened until the surgical capsule was reached. The 2 incision lines were then connected above the verumontanum (fig. 1, *A*). The adenoma was pushed with the resectoscope beak. The second U incision was made at the anterior lobe with incisions at the 1 and 11 o'clock positions, and the 2 incisions were subsequently connected by a transverse

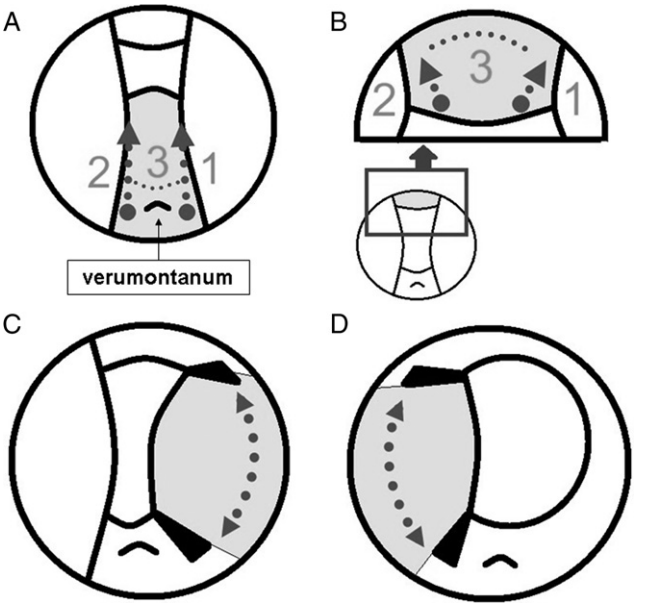

Figure 1. DiLEP 4-U incision technique. *A*, sequence of incision lines to enucleate median lobe for first U incision. *B*, sequential incision lines between 1 and 11 o'clock positions on anterior lobe for second U incision. *C* and *D*, distal margin is marked on lateral lobe and incision lines of median and anterior lobes are connected for third and fourth U incisions.