

Laser Surgical Intervention for Benign Prostate Hyperplasia: Preliminary Report

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ABSTRACT

Objective: We evaluated the clinical outcomes and cost characteristics of different surgical procedures for symptomatic benign prostatic hyperplasia (BPH). **Methods:** An outcome and cost analysis was performed for 20 patients treated with transurethral resection of the prostate (TUR-P), and 20 with diode laser. The operative time, hospital stay and quality of life were compared between groups. **Results:** The diode laser group had a better quality of life than the TUR-P group. The hospital stay, bleeding rate and postoperative pain score were significantly lower for those receiving diode laser treatment than those who underwent TUR-P ($p < 0.001$). Indirect costs such as investment in laser equipment and accessories were higher in the diode laser group than the TUR-P group ($p < 0.001$). **Conclusions:** Treatment with the 980-nm diode laser offers a better quality of life and lower bleeding rate than TUR-P. These promising preliminary results warrant further long term clinical investigation and follow up.

Key words: prostate, hyperplasia, Diode Laser

INTRODUCTION

Benign prostatic hyperplasia (BPH) places a significant burden on men's health. Population based data indicates that 75% of men older than 70 years have at least one lower urinary tract symptom (LUTS) ascribed to BPH [1]. BPH can cause voiding dysfunction and urinary tract infection. Most patients receive surgical or pharmacological treatment. Although recent research has presented new therapeutic options for BPH, transurethral resection of the prostate (TUR-P) still seems to be the gold standard of treatment [2,3]. It is a challenge for alternative treatment modalities to try to match the efficacy of TUR-P but with less perioperative morbidity [4]. Several laser devices working at different wavelengths have been introduced in the last few decades [5,6].

A recently introduced diode laser system operates at a wave length of 980 nm [7]. Since the energy of this wave length offers high simultaneous absorption by water and hemoglobin, it is postulated that the diode laser combines high tissue ablative properties with good homeostasis. In this study, the efficacy and cost effectiveness of the diode laser was evaluated in the treatment of BPH.

METHODS

Between August to November 2008, 20 patients with symptomatic BPH between the ages of 50 and 89 (average 76) years were enrolled in this study. The costs and hospital stay for those patients treated with diode laser were compared with 20 patients treated with TUR-P by the same physician. All patients received spinal anesthesia. Patients with symptomatic BPH and obstruction who met the following criteria were included: (1) American Urologic Association Symptom

Index (AUA-SI) ≥ 20 ; (2) prostate size > 30 g on transrectal ultrasonography (TRUS); (3) peak flow rate < 12 mL/sec. Those patients whose plasma prostate-specific antigen (PSA) > 4.0 ng/mL received a thorough TRUS evaluation and a subsequent prostate needle biopsy to rule out the possibility of malignancy. Table 1 details the clinical pathway of both TUR procedures. The UROLAS 980 is a diode laser system emitting a laser beam of 980 nm. (Biolitec-AG, Jena, Germany) The light is transmitted through a 600- μ m side-fire fiber probe to vaporize the prostate tissue in a noncontact mode. The laser was evaluated at an output power level of 1 to 210 W in the continuous wave (CW) mode. TUR-P was performed with a standard monopolar loop with 24 Fr resectoscopy (Karl Storz). All patients completed AUA-SI questionnaires prior to treatment, and 3 and 6 months after the procedure. They were also questioned about their sexual function (erection and ejaculation). The uroflow rate and post-voiding residual urine were obtained before treatment, and 3 and 6 months after surgery. After admission, a complete history was taken, and a digital rectal examination, plasma PSA level, urinalysis, complete blood count, chest radiograph, and electrocardiography were done.

RESULTS

Forty patients in this study provided complete data over the 3 months for analysis. All subjective and objective urinary parameters showed significant improvement after diode laser treatment. The AUA-SI fell from 23.7 to 9.7 at the 3rd month evaluation after the diode laser procedure. The quality of life index also fell from 4 to 2, representing an improvement in voiding satisfaction from mostly dissatisfied to mostly satisfy. Table 2 displays the treatment outcomes and quality of life of both groups. The mean operative duration of the diode group was 95 (range 62-145) min, and blood loss was negligible. The mean catheterization time after the diode laser procedure was less than 24 hours. Less than 5% of patients developed sexual dysfunction and persistent urinary incontinence. Table 3 displays the age, hospital stay, and mean hospitalization charges categorized according to the experience of

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Table 1. Categories of Information Evaluated for Assessing the Results of Implementing Diode Laser

Category	Admission (Pre-Op)	Day 1 (OP day)	Day 2 (discharge)
Laboratory tests	CBC, urine analysis, BUN Creatinine, sugar, PSA, EKG, Na, K, Cl, albumin		
Radiology	Chest X-ray, KUB		
Pharmacology	Antibiotics sent to operating room	Intramuscular anesthetics Analgesics (oral) Antibiotics	C C
Operation & Anesthesia	Operating permit Anesthesia preparation Nursing preparation	Diode laser	
Specific tests	TRUS, Uroflow rate		
Others	Vital sign, Nothing by mouth from midnight Fleet enema	C Diet as tolerated Foley catheter	Removal of Foley

C: continued; CBC: complete blood count; BUN: blood urea nitrogen; PSA: prostate specific antigen; TRUS: transrectal ultrasonography

Table 2. Results of Diode in 20 patients

	Initial	3 months	6 months
AUA-SI	23.7 ± 5.7	9.7 ± 6.5	10.2 ± 6.6
QoL	4.4 ± 1.1	2.15 ± 0.83	2.0 ± 0.65

AUA-SI: American Urologic Association Symptom Index; QoL: quality of life

Table 3. Details of Age, LOS, and Admission Charges in Patients Categorized According to Experience of Physician between Implementation of the Diode laser and TUR-P

	TUR-P	Diode	<i>p-value</i>
No. of cases	20	20	
Mean patient age (years)	72	76	0.849
Mean DOS (days)*	5.9	≤ 2	< 0.001
Mean admission charge (NT\$)	45,106	50,705	> 0.05
Equipment and accessories (TUR loop and Laser fiber)	3,000	11,000	< 0.001
Post operation pain score (average)	8	4.5	< 0.001

*Differences were considered statistically significant at $p < 0.05$

TUR: transurethral resection of the prostate; DOS: duration of stay

the physician and the therapy (TUR-P or diode laser). The mean hospital stay of the diode laser group was significantly lower than the TUR-P group (≤ 2 days to 5.9, $p < 0.001$). However, the expenses for patients treated by diode laser appeared to be slightly higher than for those in the TUR-P group. The cost of laser equipment and accessories (laser fiber) is the major cause of additional fees in the total hospitalization charges. Readmission rates were not significantly different between the diode laser and TUR-P groups.

DISCUSSION

The selection of an appropriate treatment for symptomatic BPH

can be a challenge for both patients and urologists. Ideally, the choice should be made with primary concerns for clinical efficacy, patients' specific goals, reasonable assessment of surgical risks and finally, the cost of treatment. The diode laser procedure for BPH provides acceptable clinical efficacy with a substantially decreased risk of post-operative hematuria. The efficiency, short learning curve and low morbidity profile together make the diode laser a highly acceptable treatment modality for BPH. Our experience showed the diode laser is a new technology for most urologists. However, the expense, safety precautions, long-term effectiveness and general acceptance are all important prohibitors for this procedure. Future studies should include a comparative study with large sample sizes and long term follow-up.

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