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BPH – Prostatic Diseases

Short Term Outcomes of High Power (80 W) Potassium-titanyl-phosphate Laser Vaporization of the Prostate

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Abstract

Purpose: We have evaluated the safety and efficacy of 80 W potassium-titanyl-phosphate (KTP) laser in the treatment of patients with lower urinary system symptoms (LUTS) due to benign prostatic hyperplasia.

Materials and methods: A total of 186 patients with LUTS have been evaluated using the International Prostate Symptom Score (IPSS) and quality of life (QoL) scoring questionnaire. Volume of prostate, postmictional volume of residual urine (PVR), maximum flow rate (Qmax) and serum prostate specific antigen (PSA) values were determined. Laser vaporization of the prostate with an 80 W KTP was applied to all the patients. IPSS and QoL scores were evaluated on postoperative days 30, 90 and 180. The below values were measured on the postoperative days mentioned respectively: Qmax-15, 30 and 90; PSA-1, 15, 30 and 60; PVR-90.

Results: The results of 186 patients, who underwent KTP laser treatment, have been evaluated. Mean age of the patients was 66 ± 8 (47–90). Mean volume of prostates, mean operative time and mean energy delivery were 48.1 ± 13.2 ml (26–70), 57 ± 17 minutes (10–120) and 105 ± 37 kJ (20–350), respectively. Following the procedures, Foley catheters were removed after a mean time of 7.59 ± 0.9 hours (6–13). Compared with the preoperative period, IPSS, QoL, PVR and Qmax values decreased significantly during the postoperative period ($p < 0.01$). Mean preoperative PSA value was 2.59 ± 0.9 ng/ml (0.28–4). There were statistically significant increases in PSA values on postoperative day 1 ($p < 0.001$). However, on postoperative day 15, PSA values decreased as low as preoperative values. There was moderate dysuria in 55 (30%) patients with a mean duration of 2 months and mild hematuria in 10 (18%) patients with a mean duration of 1 month postoperatively. Urinary tract infection occurred in 12 (6%) patients. None of the patients had fever or required re-catheterization. We observed contracture of the bladder neck in 2 (1%) patients and clot retention in 2 (1%) patients. Urinary incontinence due to operation was not observed.

Conclusions: KTP laser vaporization of the prostate is a treatment method which can be used in patients at high risk of anestesia. This procedure is safe and effective in that it quickly relieves bladder outlet obstruction symptoms and has a low rate of postoperative complications. However, long-term follow-up studies are called for in order to ascertain whether the results of this procedure are durable or not.

Keywords: Prostate; Prostatic hyperplasia; Vaporization; KTP; Laser surgery

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1. Introduction

Benign prostatic hyperplasia (BPH) is seen with an increasing frequency in elderly men [1,2]. Frequency of BPH reaches a rate of 80% in 80-year-old males [3] and approximately 30% of them need to be treated [4]. Surgical procedures are required, when, recurrent urinary retentions, recurrent urinary tract infections, renal insufficiency, bladder stones, recurrent hematuria and/or symptoms interfering with quality of life despite medical treatment [5]. The 'gold standard' surgical procedure for BPH treatment is transurethral resection of the prostate (TURP) [6]. However, TURP has some complications; such as bleeding requiring blood transfusion, clot retention (5.5%), TUR syndrome (2–3%), urethral stricture (3.1%), bladder neck contracture (7.1%) [7–12]. The rapidly aging population caused an increase in number of high risk patients. So, there is a need for a new technique which will combine the rapid success rate of TURP with a safe treatment profile. Continuing research into improving surgical techniques used in the treatment of bladder outlet obstruction due to BPH have provided a lot of alternatives to TURP. Some of these are transurethral needle ablation (TUNA), transurethral microwave therapy (TUMT), interstitial laser coagulation (ILC), Nd:YAG laser and Holmium laser [13–21]. The clinical safety as well as immediate and sustained efficacy of laser prostatectomies for relieving patients with BPH have been demonstrated comprehensively. However, postoperative discomfort has led these procedures to fall into disfavor.

The 80 W KTP laser is a recent invention, emitting light at a wavelength of 532 nm, which is strongly absorbed by hemoglobin. This study has, therefore, dealt with the safety and efficiacy of KTP laser vaporization of the prostate.

2. Materials and methods

This study was carried out between September 2003 and June 2004. All the operations were performed by the first two authors. 186 patients who were suffering from LUTS due to BPH and all failed previous medical therapy were included in this study. Inclusion criteria were presence of moderate or severe LUTS (IPSS > 8) and Qmax value less than 10 ml/sec. PVR was not accepted as an inclusion criterion. Patients with values or conditions mentioned below were excluded from the study: a preoperative PSA value higher than 4 ng/ml, a prostate volume larger than 70 ml and/or the use of a indwelling urinary catheter, previous prostatic surgery, urethral stricture, prostatic malignancy or neurogenic bladder disease. QoL scoring questionnaire and IPSS were used to evaluate the patients. Prostate volume was determined both by digital rectal examination (DRE) and transrectal ultrasound scanning (TRUS). PVR was measured by transabdominal ultrasonography. Uroflowmetry was performed to measure Qmax value. Baseline values were obtained for the below: full blood count, urea, creatinine, electrolytes, bleeding and clotting times and PSA. Urinalysis of each patient was performed. Those with a urinary tract infection had been treated before operation. All the patients were counselled and a written consent was obtained from each. Pillai's Trace test for multiple comparisons and Bonferroni test for dual comparisons were made use of in statistically analyzing the data.

Laser vaporization was performed with an 80 W KTP laser, using a GreenLight PVP system and a StarPulse quasicontinuous wave laser (Laserscope, San Jose, California), which emits green light with a wavelength of $\lambda = 532$ nm. Light procedured in the StarPulse laser device is transmitted by a 600 μm optical fiber (ADD Stat, Laserscope). The fiber is inserted through a 22-Fr continuous flow laser cystoscope with a separate irrigation channel.

A prophylactic antibiotic (cephalosporin of first generation) was given to all patients preoperatively. All patients received spinal anesthesia and they all underwent KTP laser vaporization of the prostate. Isotonic saline at room temperature was used as irrigation solution. At the end of each operation, a 20-Fr Foley catheter was inserted for irrigation. Irrigation with saline solution was commenced in the operating room. When the patients recovered from spinal anesthesia and were able to drink adequately, irrigation was stopped. Following their stabilization, full blood count, urea, creatinine and electrolytes were measured. The patients were discharged oral analgesic and antibiotic at a mean time of 14.4 ± 1.2 (10.5–17) hours. IPSS and QoL scores were evaluated on postoperative days 30, 90 and 180. The below values were measured on the postoperative days mentioned respectively: Qmax-15, 30 and 90; PSA-1,15,30 and 60; PVR-90.

3. Results

Mean age of the patients was 66 ± 8 years (47–90). Mean volume of the prostates was 48.1 ± 13.2 ml (26–70). Mean duration of catheterization was 7.59 ± 0.9 hours (6–13) and that of hospitalization was 14.4 ± 1.2 hours (10.5–17). IPSS values in the preoperative period and on postoperative days 30, 90 and 180 were 18.8 ± 4.7 (10–33), 14.1 ± 3.3 (8–27), 6.7 ± 1.6 (4–15) and 6.8 ± 1.3 (4–16), respectively. Qmax values in preoperative period and postoperative days 15, 30 and 90 were 7.18 ± 2.2 ml/sec (2–12), 13.6 ± 1.6 ml/sec (10–20), 14.8 ± 1.6 ml/sec (12–22) and 14.8 ± 1.6 ml/sec (12–22), respectively. PVR values in the preoperative period and on postoperative day 90 were 135.9 ± 96.7 ml (10–400) and 8.8 ± 4.4 ml (0–30), respectively (Table 1, Fig. 1).

PSA values in the preoperative period and on postoperative days 1, 15, 30 and 60 were 2.59 ± 0.95 ng/ml (0.28–4), 17.29 ± 6.72 ng/ml (6.1–58.2), 2.7 ± 2.36 ng/ml (0.8–7.4), 1.97 ± 1.02 ng/ml (0.2–6.8) and 1.49 ± 0.9 ng/ml (0.1–5.8), respectively (Table 2, Fig. 2).

In 21 cases (11%) with uncontrolled bleeding, we achieved effective hemostasis using 40 W KTP laser