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Benign Prostatic Hyperplasia

180-W XPS GreenLight Laser Therapy for Benign Prostate Hyperplasia: Early Safety, Efficacy, and Perioperative Outcome After 201 Procedures

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Abstract

Background: Photoselective vaporisation of the prostate has evolved from the GreenLight 80-W KTP powered laser to the latest 180-W XPS laser involving a MoXy fibre.
Objective: Evaluate the prevalence of perioperative complications and short-term outcome for the first time with the XPS laser in men with lower urinary tract symptoms (LUTS) due to benign prostatic enlargement (BPE).
Design, setting, and participants: Prospective data were collected from consecutive patients at seven centres worldwide during June 2010 and March 2011. Indication for surgery was based on the European Association of Urology and the American Urological Association guidelines. Patients receiving anticoagulants or those with retention were included and analysed separately.
Intervention: 180-W XPS GreenLight laser prostatectomy using the MoXy fibre.
Measurements: Standard parameters associated with transurethral prostate surgery and perioperative prevalence of surgery-associated problems or complications were documented.
Results and limitations: A total of 201 patients were included in the study. Mean follow-up was 5.8 mo (standard deviation [SD]: 2.8; range: 1–12 mo). A quarter of the patients had a prostate volume $\geq$80 ml. For prostates between 51 and 60 ml, a mean of 300 kJ (SD: 112) of energy was applied (lasing time: 35.0 min; SD: 15). Statistically significant improvements were noted in all key parameters postoperatively. The prevalence of perioperative complications was low. Limitations of the study are short duration of follow-up and limited number of available patients for the functional follow-up.
Conclusions: The 180-W GreenLight XPS laser is a new effective treatment option with a low prevalence of perioperative complications for patients suffering from LUTS due to BPE.

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1. Introduction

Photoselective vaporisation of the prostate (PVP) involving the GreenLight KTP laser was first introduced in 1998 by Malek et al [1]. Green "light" (532 nm) is selectively absorbed within the tissue by haemoglobin ("red") and not by water and has a short penetration depth of 0.8 mm. Clinical outcome in men with benign prostatic hyperplasia (BPH) including long-term benefits up to 5 yr were subsequently reported in nonrandomised trials [2–5]. Studies also showed a comparable outcome of the 80-W GreenLight PV powered laser with transurethral resection of the prostate (TURP) [6,7]. There followed development of a higher powered laser operating at 120 W (GreenLight HPS) plus a new fibre design, and again benefits were reported including outcome to 3 yr [8–11]. The latest generation of PVP laser is the GreenLight 180-W XPS laser involving a new MoXy fibre that aims to improve efficacy, especially in patients with larger prostate glands. Operating on prostates with volumes >80 ml was considered by some to be too slow with the former 80-W KTP or 120-W HPS GreenLight laser. Thus the manufacturers claim that, to improve operative speed, the rate of vaporisation has increased through a 50% increase in power as well as a 50% increase in laser beam area. The actual depth of vaporisation and coagulation in the tissue remain the same as the 120-W system [12].

The International GreenLight Users (IGLU) group was formed as a coalition of eight centres with longtime expertise in laser prostatectomy. They have published pooled data on patients treated with the 80-W PV and 120-W HPS laser systems [9,10]. As some of the first users of the new 180-W XPS system, they present here early outcomes, surgery-associated side effects, and perioperative complication rates.

2. Patients and methods

2.1. Study population

Prospective data were collected from consecutive patients treated with the 180-W XPS laser therapy at seven centres in Europe, the United States, and Australia during June 2010 and March 2011. Indications for surgery were based on the criteria established by the guidelines of the European Association of Urology or the American Urological Association guidelines on BPH [13,14]. Patients receiving anticoagulants and those with a history of urinary retention or with catheterisation before surgery were not excluded (Table 1). Excluded from the study were patients with prostate cancer and patients with known neurologic disorders or a known history of spinal cord injury, urogenital trauma, bladder neck stricture, or evidence of active urinary tract infection (UTI).

2.2. Surgical technique

The procedure was conducted using the "IGLU modular technique," as previously described [15]. In all procedures, the 180-W XPS GreenLight laser in combination with the MoXy fibre was used. Laser cystoscopes from 22.5F to 26F were used with cooled or room temperature saline irrigation. The maximum power setting was 180 W, adjustable in 10-W steps.

Table 1 – Baseline patient characteristics

Parameter/subgroup parameter	Mean plus or minus SD (range) or No. (%)
Age (n = 201)	70.7 ± 9.2 (43–93)
PSA, ng/ml (n = 189)	5.5 ± 6.9 (0.2–77)
Age <70 yr (n = 92)	4.6 ± 4.1 (0.4–22)
Age >70 yr (n = 97)	6.2 ± 8.8 (0.2–77)
PBx before surgery done (n = 25)	11.4 ± 11.8 (0.4–77)
No PBx before surgery done (n = 164)	4.5 ± 4.1 (0.2–21)
Prostate volume ≤40 ml (n = 48)	2.8 ± 4.0 (0.2–22)
Prostate volume >40–80 ml (n = 86)	4.7 ± 3.7 (1.0–21)
Prostate volume >80 ml (n = 49)	9.6 ± 11.0 (0.7–68)
IPSS (n = 132)	19.6 ± 7.7 (2–35)
Q_{max}, ml/s (n = 109)	8.4 ± 3.7 (4.1–14.8)
PVR, ml (n = 147)	190 ± 355 (n.m.*–2600)
Prostate volume, ml (n = 194)	67.6 ± 42.1 (6–340)
≤40 ml (n = 51; 26.3%)	31.4 ± 7.8 (6–40)
>40–80 ml (n = 93; 47.9%)	59.8 ± 11.9 (41–80)
>80 ml (n = 50; 25.8%)	119.0 ± 50.1 (83–340)
No. of patients on/with:	
Aspirin	55 (27.4)
Coumarin	25 (12.4)
Clopidogrel or prasugrel	9 (4.5)
Catheterisation before surgery	51 (25.4)
History of occasional retention but no catheter before surgery	70 (34.9)
α-Blocker	93 (46.3)
5-ARI	41 (20.4)
History of prostatitis	16 (8)

SD = standard deviation; PSA = prostate-specific antigen; PBx = prostate biopsy; IPSS = International Prostate Symptom Score; Q_{max} = maximum flow rate; PVR = postvoid residual (urine); 5-ARI = 5α-reductase inhibitor.
* Not measurable in catheterised patients.

2.2.1. Assessment

Standard parameters associated with transurethral prostate surgery and the prevalence of surgery-associated problems or complications were prospectively documented and measured preoperatively and at 1 mo, 3 mo, and 6 mo postoperatively. Prostate volume was determined prior to treatment using transrectal ultrasound. Perioperative complications and surgery-related symptoms were recorded.

2.3. Statistical analysis

Statistical analysis was performed using the IBM SPSS Statistics v.19.0 (IBM Corp, Armonk, NY, USA) software package. Analysis of variance was used for testing numeric data. The paired-sample t test was used to analyse the *before* and *after* surgery measures. For categorical data, the chi-square test was utilised. A two-sided $p < 0.05$ was considered statistically significant. Results are given as mean plus or minus standard deviation (SD) or number of available cases (percentage). Logistic regression was used to estimate predictive factors associated with surgery-related symptoms or complications. Odds ratios (ORs) with 95% confidence intervals (95% CIs) are presented including the significance level.

3. Results

3.1. Patient characteristics

Table 1 shows the baseline characteristics of the 201 patients treated with the GreenLight 180-W XPS laser. Prior to surgery, 70 patients (34.9%) reported previous occasional urinary retention, and 51 patients (25.4%) were catheterised. Of the patients included, 25 (12.4%) had a preoperative