



Research Article

Efficacy and Safety of High energy ThuVAP (Thulium laser Vaporization of Prostatic Adenoma) at 200W

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Abstract

Objectives: BPH is a common condition afflicting the aging male. The aim of our study is to highlight the safety and efficacy of high power (200 Watt) ThuVAP as a valid alternative treatment option for BPH unresponsive to medical therapy and associated with LUTS.

Methods: Patients with BPH unresponsive to conventional therapy were treated with ThuVAP at high power - 200Watts (between July 2020 - December 2021). 106 patients were enrolled and 98 underwent surgery. ThuVAP was performed with a standard Iglesias 26ch resectoscope employing a 800µm fiber with a continuous mode 200Watt setting for vaporization and a 30Watt setting for hemostasis on a Quanta system Cyber TM thulium laser. Patients were evaluated pre- and post operatively by an senior consultant urologists.

Results: A total of 98 patients were treated. Patient preoperative characteristics were: mean IPSS of 26, mean QOL of 5, preop Qmax 5.7±4.3ml/sec, PVR 173±35 ml, prostate size (as measure on transrectal ultrasound) 133±65 ml, prostate adenoma size 94±40 ml, mean PSA 4.14 ng/ml. Post operative characteristics were evaluated at 45 days after surgery and evidenced mean IPSS of 12, QOL 1.3, Qmax 19.7±3.2ml/sec, PVR 21±5ml, PSA 1.1ng/ml. All patients referred improvement regarding symptoms and QOL with ameliorated perception of voiding as confirmed by uroflowmetry values. No adverse events were recorded.

Conclusions: Our study showed that 200watt ThuVAP is a safe, repeatable, and effective treatment modality in patients with symptomatic BPH unresponsive to conventional therapy.

Keywords: BPO; BPH; Laser surgery; LUTS; Prostate; ThuLEP; Thulium laser; ThuVAP

Abbreviations: BPH: Benign Prostatic Hyperplasia; BPO: Benign Prostatic Obstruction; DRE: Digital Rectal Examination; HoLeP: Holmium Laser Enucleation of The Prostate; ICS: International Continence Society; IPSS: International Prostatic Symptoms Score; LUTS: Lower Urinary Tract Symptoms; PSA: Prostate Specific Antigen; PVR: Post Void Residual; QOL: Quality of Life; Thulep: Transurethral Thulium Laser Enucleation Procedures of The : Transurethral Resection of The Prostate,, UFM: Uroflowmetry; 5ARI: 5-Alpha-Reductase Inhibitors

Introduction

Benign prostatic hyperplasia is a condition that affects aging males, and it is considered a common cause of LUTS. Guidelines of the European Association of Urology recommend surgical endoscopic treatment as a gold standard therapy for BPH especially TURP (Trans Urethral Resection of Prostate) [1]. Innovations in the field of laser technologies has allowed these to be employed for prostate adenoma vaporization and enucleation [2]. Those techniques are considered a valid alternative to TURP with accurate preoperative patient selection. At this moment in time four laser can be employed thulium, holmium, diode and green light [3]. ICS defines ThuVAP as “Thulium Laser vaporization of the prostate (ThuVAP). Prostate tissue removal by vaporization using the continuous wave thulium Laser with a wavelength between 1940 and 2013 nm” [4]. Recently endoscopic prostate laser treatments have gained popularity as a safe and valid alternative to TURP. Advantages of employing a laser are the irrigation with saline solution (0.9%) thus eliminating the risk of TUR-syndrome, a lower rate of intra- and post-operative hemorrhage due to the haemostatic characteristic of the laser thus permitting to treat patients with bleeding disorders or under anticoagulant therapy [5]. Despite the variety of treatments available there is no consensus about the best surgical for BPH treatment [5]. Our aim is to report our results regarding efficacy and safety of using Thulium laser vaporization of the prostate (ThuVAP) at a high 200Watt power setting for the treatment of BPH as a valid alternative not having observed adverse events along with and a high patients satisfaction rate and improvement in terms of uroflowmetry, IPSS and QOL.

Material and Methods

Patients and Study Population

Between July 2020 and December 2021, we enrolled 106 patients with BPO associated obstructive symptoms such as hesitancy, poor and/or intermittent stream, straining, prolonged micturition, feeling of incomplete bladder emptying, dribbling, and storage or irritative symptoms such as frequency, urgency, urge incontinence, and nocturia. All patients underwent preoperative

urologic consultation / clinical evaluation, physical examination and DRE, a transrectal ultrasound with evaluation of prostate and adenoma volume, uroflowmetry, urine analysis, blood test including PSA, cystoscopy, IPSS and QOL assessments. Ninety-eight patients underwent surgery whilst 8 patients were excluded due to concomitant pathologies (5 prostate cancers, 3 bladder stones). All patients had conservative medical treatment before surgery: 85 patients were on combination alpha-blockers and 5ARI and the remaining 13 patients only alpha-blockers.

Surgical Procedure

The surgical procedures were performed by four expert urologists. All patients underwent spinal anesthesia. An Iglesias system with a continuous flow resectoscope 26Ch (Karl Storz) and a 12° lens were used with continuous saline irrigation (NaCl 0.9%). The Laser thulium Quanta System Cyber TM laser in continuous emitting 200W mode and a 800µm laser fiber were always employed. Vaporization was performed with the tree or two lobes technique. The output rates employed were 200Watts for vaporization and 30Watts for hemostasis. At first the bladder neck was opened with an incision at 5 and 7 o'clock, using the painting technique, vaporization was then initiated with the third lobe - if present. The lateral lobes are then completely vaporized (reaching the prostatic capsule). This technique provides a working channel that allows a good irrigation flow which facilitates vision by displacing the bubbles away from the optic created during vaporization. When vaporization is completed a 20Ch Dufour catheter was placed and a continuous bladder irrigation with saline is maintained for 12 hours. Patient's hospital stay was 2 days - bladder irrigation is stopped on the first post-op day and the urethral catheter was removed on the second day with patients continuing alphaltics for 10 following surgery.

Results

A total of 98 patients were treated. Preoperatively characteristics were: mean age 69±11 years, indwelling catheter 19 patients, 43 patients were on anticoagulant or antiplatelets therapy, mean IPSS was 26, mean QOL was 5, Qmax 5.7±4.3ml/sec, PVR was 173±35ml, prostate size was 133±65 ml with adenoma size 94±40 ml, mean PSA was 4.14 ng/ml. Mean operative time was 58±36 minutes, mean laser time was 48±20 minutes, mean energy/time was 11262 J/min. All patients were discharged day 2 post operatively. None of our patients required blood transfusion, mean hemoglobin levels (Hb) drop was 0.8g/dl. We had no Clavien ≥III within 30 days. No readmission was registered, only three patients required catheterization due to post-operative edema and in these the catheter was removed after 7 days with return to normal voiding. Post-operative characteristics were evaluated at 45 days following surgery. Mean IPSS was 12, QOL 1.3, Qmax 19.7±3.2ml/sec, PVR 21±5ml, PSA 1.1ng/ml. All patients referred initial post-operative urgency and mild dysuria (easily

controlled with pain relivers) over the first post- operative week following which improvement in terms of symptoms, and QOL with a perception of better as confirmed by uroflowmetry values.

Discussion

Thulium laser is considered an innovative technology in the urologic field [6,7]. The Thulium laser wavelengths range is 1940 - 2013 nm and presents a tissue depth penetration of 0.25mm both in continuous and pulsed modes. The Quanta system Cyber TM laser is a new generation laser working in a continuous mode. Use of the Thulium laser allows smooth incision with fast vaporization and high efficacy in terms of vaporization, it offers a complete absorption of laser energy in water, the target chromophore is water contained in the prostatic tissue [8]. Thulium laser was first used in a clinical setting in 2005 [9]. Thulium laser is commonly used in resection, enucleation and vaporization because of its shallow penetration [10-12]. Comparative studies between thulium laser prostatectomy vs monopolar or bipolar TURP along with HoLEP have been published demonstrating significant advantage for the thulium laser in terms of blood loss, catheter time and hospital stay. No advantage is observed in terms of symptoms or QOL when comparing ThuVAP to TURP [13-15]. A recent study by Maruccia et al describe a classification and standardization in terms of definition and power settings for laser treatments for BPH. The study aims to clarify the discordance present in literature and outlines the difference between laser procedures. It defines THUVAP as “Thulium vaporization of the prostate. Ideal laser settings: High power. Technique: Adenoma is ablated by a painting technique. The anatomical approach is not strictly needed and not intrinsic of the technique itself. Both side and frontal fibers can be used to perform this technique.” The study highlights the difference between techniques to fill the gap in literature in terms of comparison between technique, the standardization has the goal to uniform the terminology to allow the comparability between surgical approaches in terms of outcomes and surgical skills [2]. There is a lack in literature about high power thulium vaporization at 200W, the power rate commonly reported for vaporization is between 70W and 150W. Mattioli et al. describes his ThuVAP technique using a 70-W Revolix laser with a side-emission laser fiber on 200 patients, the prostatic adenoma is ablated by means of a painting technique with a safety and efficacy similar to TURP procedure [16]. Palmero-Martí et al. highlight the efficacy and safety of THUVAP technique at 150W compared to greenlight PVP in terms of IPSS and uroflowmetry; he defines both the technique effective and safe in medium volume prostates. Our study with 200W ThuVAP showed comparable results and operative times in prostates of all volumes [17].

Müllhaupt et al. analyzed the possibility of TUR-syndrome in ThuVAP surgery stating that ThuVAP might have a favorable safety profile regarding fluid absorption, conversely to our study

they use a lower power of 80-120W [18]. Bach et al. in a review compared the vaporization technique studies describing the efficacy of the ThuVAP technique in small volume prostates with a power of 120W [19]. Varga et al. showed the efficacy and safety of ThuVAP 150W Thulium:Yag laser with a low complication rate, achieving excellent hemostasis and symptomatic improvement compared to the baseline in small- medium volume prostates [20]. Pariser et al. too demonstrated the safety and efficacy of ThuVAP at 120w and 150w energy values [21]. This article has limitations. Firstly, reported experience has limited follow-up, providing little evidence about the long-term evaluation of LUTS resolution and durability of observed improvements. Furthermore, as reported by Maruccia et al., ThuVAP technique does not strictly entail an anatomical approach, which is not intrinsic of the technique itself, while ablating the adenoma by painting technique [2]. As a result of this, during the procedure operators may have not removed completely the adenomatous tissue measured pre-operatively. However, the goal of present study was to assess safety, feasibility and performances of 200W ThuVAP technique rather than comparing its performances against more radical techniques for BPH management (such as HoLEP). Additionally, the lack of tissue retrieval (as at the end of enucleation procedures, with morcellation phase allowing evacuation of dissected tissue) prevents precise understanding of how much adenomatous tissue has been effectively removed. A third limitation is the use of frontal surgical fibers only. Indeed, other previously studies reported the use of side-firing fibers to perform the same procedure. The outcomes reported in this study could thus differ from those achieved with a different ThuVAP technique entailing side- firing approach with the same output power.

Our study for the first time explores the possibility of Thulium vaporization at 200W showing his efficacy and safety in terms of amelioration of symptoms from the baseline and no complications in all prostate volumes with comparable outcomes and operative times. Indeed, literature is poor of evidence in this field and future studies should focus also on these aspects.

Conclusions

ThuVAP at 200Watt is a safe and effective endoscopic and simple treatment modality in patients with BPH associated with LUTS in prostates of all volumes. Our report highlights its efficacy with improvement in terms of IPSS, QOL and UFM. It showed comparable outcomes and operative times with the standard procedures (TURP) and was not related to any adverse event.

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