Diode laser vaporization of prostate as treatment for benign prostatic enlargement: initial results of 73 patients with 1 year follow-up

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Objective: Our objective is to evaluate the efficacy, safety and 12 month outcome of a 980 nm diode laser with Twister fiber in the treatment of benign prostatic enlargement.

Materials and methods: Between February 2011 and January 2013, 73 patients with benign prostatic enlargement had undergone diode laser vaporization of prostate at our institution. The following parameters were assessed at baseline, and after a follow-up period of 3 and 12 months: International Prostate Symptom Score, peak urinary flow rate, post-void residual urine volume, and quality of life score.

Results: The procedure was completed successfully in all patients with no intraoperative complications. At 12 months postoperatively the percentage improvements in IPSS was -69.09%, Qmax +197%, PVR -88.54%, and QoL -68.29%.

Conclusion: Diode laser vaporization of prostate is safe and effective method for treatment of benign prostatic enlargement.

Key words: benign prostatic enlargement, diode laser, vaporization

INTRODUCTION

Lower urinary tract symptoms (LUTS), due to benign prostatic enlargement (BPE), are one of the most common problems affecting aging male. The related clinical symptoms have a serious impact on the patient’s quality of life. Transurethral resection of the prostate (TURP) and open prostatectomy (OP) represent currently the gold standard for the surgical treatment of benign prostate hyperplasia (BPH). Although these techniques have demonstrated long-term, satisfactory results, they are associated with substantial morbidity (hematuria, reoperation, dilutional hyponatremia, and the need for blood transfusion). As an alternative to TURP, various laser technology has been used to treat LUTS secondary to BPE for more than 15 years. Currently there are four groups of laser systems that are used for treatment of BPE:

- Kalium titanyl phosphate (KTP):neodymium (Nd): yttrium-aluminum-garnet (YAG) and LBO (lithium borate);Nd:YAG lasers
- Diode lasers
- Holmium (Ho):YAG lasers
- Thulium (Tm):YAG lasers.

The different systems produce different qualitative and quantitative effects in tissue, such as coagulation, vaporization, or resection and enucleation.

The purpose of this article is to evaluate a short-term outcomes of 980 nm diode laser vaporisation of prostate for treatment of BPE.

MATERIALS AND METHODS

Between February 2011 and January 2013, seventy-three patients with BPE had undergone diode laser vaporization of prostate, after failure of medical therapy (α1-blocker / 5α reductase inhibitor for > 1 year). Preoperative management included: medical history, digital rectal examination (DRE), urinalysis, prostate-specific antigen (PSA), transrectal ultrasound measurement of the prostate volume, measurement of peak urinary flow rate (Qmax) and post-void residual urine (PVR). PVR was measured by transabdominal ultrasound after free urflowmetry. International prostate symptom score (IPSS) and quality of life questionnaire (QoL) were completed by all patients. Study inclusion criteria were lower urinary tract symptoms caused by BPH, IPSS = 8, Qmax < 15 with or without PVR. Exclusion criteria were urethral stricture, prostate cancer and obvious manifested neurogenic bladder dysfunction. Prostate biopsies were performed in cases of elevated PSA of abnormal DRE to exclude prostate cancer. Patients were not required to discontinue anticoagulant therapy before the vaporisation.

All surgeries were performed in regional anesthesia by single surgeon (MA). A 980 nm diode laser generator (Evolve®, Biolitec AG, Jena, Germany) was used at a power setup of between 120 and 180 W in continuous
mode with Twister™ fiber (Biolitec AG, Jena, Germany). Normal saline solution was used as a irrigant. All patients received prophylactic antibiotics before surgery and for 3 days thereafter. First step of the surgical technique included the vaporization of lateral lobes of the prostate starting at the bladder neck. Slow sweeping motion with laser fiber was made along the length and breadth of each lobe, taking care at the apex to avoid the injury of external sphincter. The lobes were ablated evenly to the level of the capsular fibres. The median lobe was then vaporized to the level of the transverse fibres of the vesical neck. In the case of large median lobes, this was partially ablated before the lateral lobes to facilitate the movement of the scope and irrigation. The procedure was terminated when a TURP-like cavity was achieved. In all patients after the surgery, three-way catheter was inserted with adequate irrigation and left in situ for no more than 24 hours. Perioperative complications associated with the procedure were documented.

Patients were followed up at 3 and 12 months postoperatively. IPSS, QoL, Qmax, PVR volume were assessed. The investigational nature of the study was explained to the patients and all of them signed an informed consent form. We compared postoperative IPSS, QoL, Qmax, PVR with preoperative values.

RESULTS

Mean patient age was 70 years (range 34–85). The mean preoperative prostate volume was 68 ccm (range 30–158 ccm) and mean PSA value was 3.5 ng/ml (range 0.31–14.7 ng/ml). Eleven patients (15.06%) had indwelling Foley catheter prior to the operation. Thirty-six patients (49.31%) were under ongoing anticoagulation therapy and forty-four patients (60.27%) had incontinence. Ten patients (13.69%) had mild dysuria more than 50% of our patients were under ongoing anticoagulation therapy (almost 50% of our patients were under ongoing anticoagulation therapy). The diode laser compared to KTP and Ho:YAG laser consume considerably less energy and high-voltage energy connection is not required. The drawback of this procedure is that no tissue is retrieved for histology. Seitz et al. 5,13 and Erol et al. 14 showed that the use of the high-power side-firing diode laser leads to a significant improvement in voiding function with low morbidity. Our results are similar with their conclusions. Ruszat et al. compared 980 nm high intensity diode (HiDi) laser with 120W HSP laser, and they stated that HiDi laser was more favorable in terms of haemostasis, but with higher rates of dysuria, urgency, urge incontinence, bladder neck strictures and tissue necrosis.7. In our study, we

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**TABLE 1**

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<th>Baseline</th>
<th>3 months follow-up</th>
<th>12 months follow-up</th>
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</thead>
<tbody>
<tr>
<td>Mean Qmax (mL/s)</td>
<td>6.9 ± 3.9</td>
<td>21.1 ± 7.1 (+205%)</td>
<td>20.5 ± 5.0 (+197%)</td>
</tr>
<tr>
<td>Mean PVR (mL)</td>
<td>192 ± 135</td>
<td>26 ± 21 (-86.45%)</td>
<td>22 ± 9 (-88.54%)</td>
</tr>
<tr>
<td>Mean IPSS</td>
<td>23.3 ± 5.9</td>
<td>9.1 ± 5.1 (-60.94%)</td>
<td>7.2 ± 4.2 (-69.09%)</td>
</tr>
<tr>
<td>Mean QoL</td>
<td>4.1 ± 1.1</td>
<td>1.7 ± 0.9 (-58.53%)</td>
<td>1.3 ± 0.5 (-68.29%)</td>
</tr>
</tbody>
</table>

Data expressed as mean ± SD and improvement in percentage. Abbreviations: Qmax - peak urinary flow rate; PVR - postvoid residual urine; IPSS - International prostate symptom score; QoL - quality of life.
only had ten patients with mild dysuria, which improved with conservative care within 2 weeks.

From our short-term data, the percentage improvements in IPSS (-69.09%), Qmax (+197%), PVR urine volume (-88.54%), and QoL (-68.29%) at 12 months postoperatively are comparable with those of KTP laser and holmium laser 18-21.

In this study, we used Twister laser fiber in all patients. There are several advantages from the Twister laser fiber in regard to side-firing fiber. No tissue distance needs to be observed, which is of particular importance at the beginning of the procedure due to the lack of working space within the prostatic urethra. Shaker et al. demonstrate higher ablation efficiency and resistance to degradation of the large Twister fiber as compared to the standard Twister fiber and side-firing fibers 22.

CONCLUSION

The preliminary results of prostate vaporisation with 980nm diode laser are promising, because of its haemostatic ability and satisfactory postoperative outcomes for up to 1 year. This kind of therapy can provide substantial improvements in IPSS, Qmax, QoL and PVR. Prospective randomized controlled trials with long term follow-up are necessary to confirm our favorable short term results.

SUMMARY

VAPORIZACIJA PROSTATE DIODNIM LASEROM KAO METOD LEĆENJA BENIGNE HIPERPLAZIJE PROSTATE

Cilj: Naš cilj je da procenimo efikasnost i bezbednost upotrebe 980nm diodnog laser a sa Twister fiberom u lečenju benigne hiperplazije prostate.

Materijal i metode: Izmedju februara 2011. i januara 2013, kod 73 pacijenta je učinjena laserska vaporizacija prostate, zbog benignog uvećanja prostate. Internacionalni prostata simptom skor, maksimalni protok urina, postmikcioni rezidum i kavalitet `i vota su pruženi na nalini pros tata sim ptom skor, maks imalni protok urina, pros tate, zbog benignog uve }anja pros tate. Internacio-

REF ER ENCES.


