

Laser prostatectomy in high-risk patients

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ABSTRACT

الأهداف: لتقييم المرضى ذوي الخطورة العالية بالعمليات ومدى تحملهم. وكذلك نتائج عمليات تبخير البروستاتا باستخدام إشعاع الليزر الأخضر في علاج المرضى الذين يعانون من البروستاتا الحميدة.

الطريقة: شملت الدراسة إحدى عشر مريضاً من ذوي الخطورة العالية في العمليات في المركز الطبي الدولي - جدة - المملكة العربية السعودية، من الفترة ما بين يناير وحتى سبتمبر 2007م. خضع المرضى المدمجين في هذه الدراسة لفحوصات سابقة للعمليات وكذلك بعد العمليات شاملة للقلب والتخدير. تم تسجيل الشكاوى التي تقدم بها المرضى ونتائج الأشعة التلفزيونية والتحليل المخبرية. أجريت عمليات على جميع المرضى باستخدام الليزر ذو الضوء الأخضر لإزالة البروستاتا عن طريق التبخير باستخدام قوة 120 واط .

النتائج: تم تسجيل المضاعفات أثناء وبعد العمليات. أعمار المرضى تراوحت ما بين 65-82 عاماً، بمعدل 75.3 ± 8.6 عاماً. سبعة من المرضى عانوا من احتباس بولي متكرر، وأربعة منهم عانوا من آلام حادة في الجهاز البولي السفلي. معدل حجم البروستاتا كان 61.2cc . مر جميع المرضى بمرحلة خالية من الصعوبات ومضاعفات بعد العمليات، ماعداً مريضاً واحداً استلزم إدخاله إلى قسم العناية المركزة بعد العملية. كمية الدم المفقودة في المرضى لا تذكر، باستثناء مريضاً وحده استدعت حالته إلى نقل دم. أزيلت جميع القساطر وثمانية من المرضى كانوا يعانون من استباق بولي.

خاتمة: تعتبر عمليات الليزر الأخضر للبروستاتا طريقة مأمونة وفعالة لمعالجة المرضى الذين يعانون من تضخم البروستاتا الحميد وذوي الخطورة العالية أثناء العمليات.

Objective: To evaluate the short-term tolerability and outcome of high power green light potassium titanyl phosphate laser prostatectomy in high-risk patients with symptomatic benign prostatic hyperplasia.

Methods: Eleven high risk operative patients were included in this study at the International Medical Center, Jeddah, Kingdom of Saudi Arabia, between January and September 2007. Patients

enrolled in this study underwent preoperative and postoperative, cardiac and anesthesia evaluation. Clinical presentations, ultrasound of urinary tract, and preoperative laboratory investigation were recorded. All patients underwent high power green light laser prostatectomy using the green light photo vaporization system with setting of 120 watts.

Results: The intraoperative and postoperative complications, and follow up were recorded. The patients' age varied between 65-82 years with a mean age of 75.3 ± 8.6 years old. Seven patients presented with refractory acute urinary retention, and 4 patients presented with severe lower urinary tract symptoms. The average prostate volume was 61.2 cc. All patients had uneventful intra- and postoperative course, without any significant complications, except one patient who required postoperative admission to the intensive care. The average blood loss was insignificant, and only one of the patients required blood transfusion. Foley catheters were removed one day after the procedure. All patients voided satisfactorily after removal of the catheter, and 8 patients complained of urgency.

Conclusion: High power green light laser prostatectomy is a safe and effective method of treating symptomatic benign prostatic hyperplasia in patients with high operative risk.

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Benign prostatic hyperplasia constitutes 20-40% of the whole urology workload in the Kingdom of Saudi Arabia.¹ Transurethral resection of prostate (TURP) remained for decades as the gold standard procedure after failure of medical treatment, severe

symptoms, and the presence of complications. Many therapeutic modalities such as transurethral microwave thermotherapy (TUMA), interstitial laser coagulation of the prostate (ILC) and others, failed to replace TURP. Holmium laser enucleation of the prostate (HoLEP) proved to be a safe and effective alternative for TURP, and open prostatectomy for treating men with symptomatic benign enlargement of the prostate.^{2,3} A drawback of HoLEP is the prolonged learning curve, which is the main reason for lack of popularity of this procedure.^{4,5} Kaplan and Te⁶ had introduced the transurethral vaporization of the prostate 11 years ago. Most new technologies failed to provide safe and effective evaporation of the prostate, until the emergence of the powerful green light potassium titanyl-phosphate (KTP) laser.⁷ The laser energy is selectively absorbed by hemoglobin with the possibility of obtaining large cavity with minimal bleeding, and negligible fluid absorption. The green light laser system utilizes a KTP crystal to produce a light beam at a wavelength of 532 nm, which was usually taken by the red heme moiety at a power level of 80 watts, which creates tissue vaporization, and the procedure called photo selective vaporization of the prostate (PVP) with effective depth of action 0.8 mm.⁸ The safety and efficacy of the high powered KTP re-stimulated the urologist to treat high risk patients with benign prostatic hyperplasia (BPH) using this technique. The aim of our study was to confirm the safety and efficacy of this laser, in treating our subjects.

Methods. In this prospective study, 11 patients with high anesthesia risk underwent KTP laser prostatectomy using the high power green light vaporization system at the International Medical Center, Jeddah, Kingdom of Saudi Arabia between January and September 2007. Patients' age varied between 65 and 82 years with average age of 75.3 ± 8.6 years. The inclusion criteria were patients with multiple systemic diseases, high anesthesia risk patients, refractory acute urinary retention, or severely symptomatic BPH, physically in satisfactory performance status, and patients who signed the consent to participate in this study. All patients with moderate to low operative risk were excluded from this study. Perioperative routine laboratory, radiological and systemic check up were performed. Urodynamic studies were carried out for all patients with diabetes mellitus, to exclude hypotonicity of the bladder. All anticoagulants were stopped one week before admission. The mean size of the prostate gland estimated by transrectal ultrasonography was 61.2 cc with a range varied between 55-112 cc. The American Association of Anesthesia grading risk system was used to categorize the patients included in this study. Eight patients were categorized as high-risk patients

for anesthesia grade III, and 3 patients as grade IV. Nine patients were on acetyl salicylic acid, and 5 patients were also on warfarin and plavix (clopidogrel bisulfate). Ten patients had more than 2 comorbid illnesses such as diabetes mellitus, hypertension, coronary heart disease, and so forth, and one patient with mitral valve regurge (Table 1). Echocardiogram for all patients prior to surgery showed ejection fraction varied between 35-60%, except in one patient it was 20%. Intraoperative circulatory disturbances and blood loss were recorded. All patients underwent the same technique of laser prostatectomy using the high power green light vaporization system, and normal saline for continuous irrigation during the procedures. The procedures started by tunneling the prostate with a power of 80 watts, then the power was increased to 120 watt until the end of the procedure, and the energy used to evaporate the prostate was 275.01 to 690 kilo-joules with an average of 5832 kilo-joules. Postoperative ultrasonography was used to estimate the post-voiding residual urine. The mean follow-up period was 5.3 months with a range of 1-8 months.

Results. Preoperatively, the clinical presentation of patients was as follows; 7 patients with refractory acute urinary retention, and 4 patients with bothering obstructive and irritative symptoms, which did not respond to medical therapy such as alpha blockers and 5 alpha reductase for more than one year. Operative time varied between 45-170 minutes, with an average time of 80.8 minutes. Seven patients had spinal anesthesia, while 4 patients had epidural anesthesia. One patient had nonsurgical related fluid overload, and required postoperative admission to intensive care unit for 3 days. Two patients required coagulation of the bladder at the prostatic cavity by using the resectoscope. One patient required intra- and post-operative blood

Table 1 - Incidence of comorbid diseases in the study population (N=11).

Comorbid diseases	Number of patients
Hypertension	9
Diabetes mellitus	5
Ischemic heart disease	7
Renal function impairment	3
Mitral valve regurge	1
Pulmonary hypertension	1
History of myocardial infarction	1
Deviated trachea with history of cancer of the tongue	1

Table 2 - Immediate (within 72 hours) postoperative complications were some patients had more than one complication (N=11).

Symptoms	n (%)
Urgency and urge incontinence	6 (54.5)
Dysuria	4 (36.4)
Urinary retention	1 (9)
Dysuria	4 (36.4)
Hematuria	1 (9)

transfusion. The procedure started by tunneling the prostate with a power of 80 watts, then the power increased to 120 watts until the end of the procedure, and the energy used to evaporate the prostate varied between 275.017 kilo-joules and 690 kilo-joules with an average of 583.228 kilo-joules. In 9 patients, the urinary catheter was removed at first post-operative day, while in 2 patients catheters were removed on the third, and fourth post-operative day. Immediately after removal of the urinary catheter, 6 patients had urgency and urge incontinence, 4 patients had dysuria, one patient went into urinary retention and required re-insertion of the urinary catheter for 2 days, and only 3 patients (27.3%) continued to have urge symptoms (Table 2). Hospital stay varied between 1-6 days with an average of 2.3 days. Follow-up range was 1-8 months, during which the mean residual urine decreased from 119-230 cc to mean 37-109 cc, and the International Prostate Symptoms Score (IPSS) improved from 25.7 to 12.1. All these data were recorded 1-3 months after the procedure.

Discussion. Transurethral resection of the prostate stood as the gold standard procedure in the management of bladder outlet obstruction secondary to BPH, however, it is not without its disadvantages and limitations, especially in patients who are at high risk of developing fluid overload during the procedure, as it can be associated with a relatively high rate of complications (15%).⁹ The elevated demand on benign prostatic hyperplasia management for better quality of life and safety, has determined continuous research into development of less invasive therapies such as laser.

Photo selective vaporization of the prostate first introduced by Hai Ma and Malek,¹⁰ was at 28 watts power setting, then at 60 watts setting,¹¹ and at 80 watts setting.¹² The latest advancement in increasing the vaporization efficiency resulted in the evolution of a new higher power 532 nm wavelength laser system. It delivers the same 532nm wavelength with the same inherent absorption characteristics, however, with laser diode instead of an arc lamp as the energy source to

energize an neodymium-doped yttrium aluminium garnet (Nd:YAG) laser rod, the output of which is frequently doubled to the 532 nm wavelength, which allows the system to deliver up to 120 watt of quasi-continuous power for potentially higher vaporization efficiency.¹³ The increasing profile of safety demonstrated with PVP along with its remarkable hemostatic properties have encouraged us to use PVP in patients who are at high operative risks due to cardio-respiratory diseases, coagulation problems, and so forth, as TURP or open prostatectomy were not visible due to their complications, and many such patients are condemned to lifelong catheterization. The success and safety of PVP with a setting of 80 watts were documented by Reich et al,¹⁴ and other similar studies.^{15,16} The remarkably noticeable power of vaporization of the prostatic tissue by the new version of PVP system with setting of 120 watts led us to create a cavity, similar to that seen after TURP. However, the greater power led to a greater responsibility of the surgeon to be accurate and selective, as this system can more quickly create a surgical defect, and penetrate structures that were previously more difficult to vaporize, such as fibrotic prostatic tissue. The accurate and proper application of the laser fiber by maintaining it at a distance of 5 mm from the targeted tissue, leads us to effective vaporization of the prostatic tissue as the new green light high power system has a beam quality that maintains focus with negligible divergence up to 3 mm from the fiber, and limited divergence at 5 mm. The low risk of fluid absorption was well documented in the literature.¹⁷ All of our patients demonstrated no biochemical or clinical evidence of transurethral resection syndrome, also only one of our patients developed post operative pulmonary edema that was essentially with low ejection fraction of 20%, and did not have hyponatremia. Typically, the urine drainage after PVP is clear, therefore, the postoperative indwelling catheter can be removed the next day after the surgery. Early catheter removal is usually associated with earlier mobilization, shorter hospital stay, reduced hospitalization costs, and as such contributes much to an improved post operative recovery of the patients. The disadvantages of green light prostatectomy is the unavailability of prostatic tissue for histopathology, and the high cost of the laser probes, which in our study was approximately, 1700 dollars for each patient.

The study included a small number of patients, the follow up period of less than one year, and urodynamic studies limited only for diabetic patient to avoid an extra cost on the patient. Collaboration of multicentric local studies in the Kingdom of Saudi Arabia will help to identify the guidelines of applying such new technique to our population. Our study proved the tolerability and the possibility of treating high operative risk patients with symptomatic BPH.

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Related topics

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