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Research Article

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Comparative Outcome Analysis of Greenlight Laser Prostatectomy Versus Bipolar TURP In Benign Prostatic Hyperplasia

Sanjay Kumar Mahapatra[1], Ashok Kumar Nayak[2], Jyoti Ranjan Behera[3], Biswajit Mohapatra[4]*, Sanjana Panigrahi[5]

[1]Associate Professor, HOD, Department of Urology, Vimsar Burla, India
[2]Professor, Department of General Surgery, Vimsar Burla, India
[3]Associate Professor, Department of Pediatrics, MKCG Medical College, Berhampur, India
[4]Assistant Professor, Department of Urology, MKCG Medical College, Berhampur, India
[5]Junior Resident, Department of General Surgery, Vimsar Burla, India

***Address for Correspondence:** Dr. Biswajit Mohapatra, Assistant Professor, Dept of Urology, MKCG Medical College, Berhampur, India
E-mail: drbmohapatra83@gmail.com

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ABSTRACT

Background: Benign prostatic hyperplasia is a disease of the prostate in ageing males. Bipolar TURP is gaining more acceptance due to decreased complications. The introduction of Photoselective Vaporisation of Prostate (PVP) or Green light Laser has emerged as a safer alternative to Bipolar TURP.

Methods: An unbiased cohort research comprising ninety patients (greenlight laser 45, bipolar TURP 45) between November 2020 to October 22 with BHP older than fifty years old with prostate of size 40–70 gm to compare the greenlight laser and bipolar TURP clinical outcomes.

Results: The patients' mean age in the Greenlight group was 69.756 years, with an SD of 6.5372, while their mean age in the TURP group was 65.067 years, with an SD of 4.3243. Comparably, in the Greenlight group, the patient's mean prostate volume was 59.556 gm with an SD of 6.8376, and in the TURP group, it was 51.644 gm years with an SD of 6.6441. With SD of 2.4073, 0.4931, and 3.8076, respectively, the mean operation time, length of hospital stay, and catheterization period with the Greenlight Laser were 72.022, 1.467, and 14.844. The average length of the bipolar TURP procedure, hospital stay, and catheterization were, in order, 54.467, 2.567, and 36.556, with corresponding SD of 6.2943, 0.8765, and 6.6829.

Conclusion: The current study concluded that the greenlight laser is a more secure and practical substitute for bipolar TURP. However, large randomised studies are needed to prove that greenlight laser is superior.

Key-words: Benign prostatic hyperplasia, Bipolar TURP, Green light, Photoselective Vaporisation of Prostate (PVP), Urology

INTRODUCTION

One of the main accessory sex glands in the male reproductive system is the prostate. It is endodermal and arises from the urogenital sinus [1]. Comprising fibro muscular and glandular tissue, it has a pyramidal structure and encircles the prostatic urethra from the bladder's base to the membranous portion of the urethra.

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It is known that before the 20 weeks of gestation, the foetal gland has five distinct lobes. Just three lobes—two lateral and one median lobe—are discernible in an average adult man. About one-sixth of the total seminal fluid is secreted by the prostate, which produces 0.5 ml of the fluid. The prostate secretes various secretory proteins, the most significant of which is PSA, or prostate-specific antigen. It serves as a prostatic disease marker [2].

The primary hormone affecting the prostate is testosterone, which is released from the testis' Leydig's cells and is regulated by LH, which is released from the anterior pituitary and is regulated by hypothalamic LHRH. The prostate and the pregenital skin contain significant concentrations of the enzyme 5 Alpha

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Reductase, which converts testosterone to 1,5-dihydrotestosterone (DHT) [3]. DHT aids prostate growth and development. The adrenal cortex secretes estrogenic hormones, which may contribute to the imbalance between DHT and local peptide growth factors in ageing men and raise their risk of benign prostatic hyperplasia (BPH) [4].

Bladder Outflow Obstruction (BOO) is the outcome of Benign Prostate Hyperplasia (BPH), a generalised prostate condition that develops with ageing. Occurs in males over 50; by the time they are 60 years old, the frequency is over 50%, and by the time they are 85 years old, it may reach up to 90%1. It is the most prevalent cause of BOO in men over the age of 70 and the primary source of substantial lower urinary tract symptoms in males [5]. Lower urinary tract symptoms, or BPH symptoms, come in a wide range of forms. Both the voiding and the storage symptoms fall within this category. Hesitancy, weak flow, intermittent stream, dribbling, and the sense of inadequate bladder emptying are among the symptoms. Frequency, urgency, nocturia, urge incontinence, and nocturnal incontinence are among the storage symptoms [6].

The symptomatology of the patient and the findings of an objective examination determine how best to manage a patient with BPH. Treatment options include open prostatectomy and just watchful waiting [7]. Various minimally invasive and endoscopic procedures such as Transurethral Resection of Prostate (TURP), Transurethral Needle Ablation of Prostate (TUNA), Transurethral Incision of Prostate (TUIP), and Transurethral Ultrasound guided Laser Induced Prostatectomy (TULIP) fall in between the spectrum [8]. Medical management involves the use of alpha-blockers and five alpha-reductase inhibitors. The necessity for an open prostatectomy is decreasing in the current era of endoscopy. However, it is still recommended in cases of big prostates (more than 75 gm), BPH with large bladder diverticulum, BPH with large vesicle stones, and hip ankylosis [9].

TURP is the gold standard and the most commonly used surgical procedure. TURP can be done by both monopolar cautery and bipolar current. Bipolar TURP is now increasingly used because of the added advantage of reduced complications and advancement of devices [10].

A secure substitute for conventional TURP has been made available with the development of photoselective vaporisation of the prostate (PVP). The most extensively documented of the previous PVP laser generations is the 80 W potassium-titanyl-phosphate (KTP) laser. 2006 saw the launch of the Green Light High Performance System (HPS). Unlike the KTP laser, it produces a laser with the same wavelength and 120 watts of energy using lithium triborate crystals. Males taking anticoagulants and having big prostates have shown its safety and effectiveness [11].

MATERIALS AND METHODS

An unbiased cohort research comprising ninety patients (greenlight laser 45, bipolar TURP 45) with BHP older than fifty years old with prostate of size 40–70 gm to compare the greenlight laser and bipolar TURP clinical outcomes in terms of symptom alleviation, safety, and postoperative outcomes done in the department of urology, VIMSAR between November 2020 and October 2022.

Inclusion Criteria- Hemodynamically stable patient, more than 50 years old Male, able to give consent of his own, prostate size of 40 – 70gm as per USG Reports and agreed to the procedure of greenlight laser prostatectomy.

Exclusion Criteria- Patient who dies before completion of diagnostic procedures or before going for surgical intervention, terminally ill patient not suitable for surgery, any associated bladder cancer or any Bladder outlet obstruction causes other than BHP, defaulters who go away before the completion of the study, patients with reasons for contraindications for surgery, abnormal per rectal exam, neurogenic bladder with a clear etiology, urethral stricture or severe systemic disease.

Study Procedure- Includes questionnaire, scoring charts, bed head tickets, laboratory reports, and time recorder. Every patient who was enrolled in the trial gave their informed permission. Every patient's information was entered using the proforma. To undergo Greenlight Laser surgery (group 1) and Bipolar TURP, patients were divided into two groups of forty-five each. To gather the necessary data, a retrospective study was conducted on a small number of postoperative follow-up patients who

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had undergone the operations a few months prior, making up each group. The greatest number of patients who had procedures and were subsequently followed up postoperatively were observed prospectively or in an ambispective research. Patients undergoing Greenlight Laser Surgery or Photosensitive Vapourization of the Prostate comprised Group 1. The procedure was carried out under spinal anaesthesia, and a flexible fibre with a wavelength of 532 nm was used to administer the laser through a 23Fr cystoscope. The cystoscope, along with the flexible fiber was inserted through the urethral opening. The operating room monitor showed the pictures captured in real time by the cystoscope. Real-time images guided the control of the laser's direction and distribution of energy through the flexible fibre tube. The prostate tissue is vaporized by short bursts of laser radiation that are applied. This particular wavelength of laser was chosen because it vaporises the blood vessels in the prostate and is preferentially absorbed by the blood within the prostate, resulting in minimal to no bleeding. Normal saline irrigation fluid was continuously used to clean the surgical region, remove the cut prostate tissue, and keep the fibre tip cold.

Statistical Analysis- A study population was illustrated using descriptive statistics. A two-sided p-value was used to evaluate the relationships' statistical significance. A statistically significant p-value was defined as less than 0.05. To evaluate the statistical significance, the Chi-Square test was employed. The before and postoperative data from an operation were compared using the paired t-test. The parameters from the two processes were compared using the independent t-test. For statistical analysis, a commercially accessible computer software program called the Statistical Package for the Social Sciences (SPSS) version 26 was utilised.

Ethical Approval- Approved by the Institutional Ethics Committee. Both the Department of Urology & General Surgery, Vimsar Burla, India and the Department of Pediatrics & Urology of MKCG Medical College, Berhampur, India.

RESULTS

A total of 90 patients, who participated in the study were randomized. Group 1 consisted of the patients who had undergone Greenlight laser surgery, and Group 2 consisted of patients who had undergone Bipolar TURP surgery.

While comparing both the procedures concerning the Age distribution and Prostate volume, it was found that, in the Greenlight group, the mean age of the patient was 69.756 years, and the standard deviation was 6.5372, and in the TURP group, the mean age was 65.067 years, and the standard deviation was 4.3243. Similarly, in the Greenlight group, the mean prostate volume of the patient was 59.556gm, and the standard deviation was 6.8376. In the TURP group, the mean prostate volume was 51.644gm years, and the standard deviation was 6.6441.

Table 1: Age and Prostate Volume Comparison

Procedure 1					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Age	45	52.0	79.0	69.756	6.5372
Volume	45	42.0	68.0	59.556	6.8376
Procedure 2					
Age	45	54.0	72.0	65.067	4.3243
Volume	45	41.0	66.0	51.644	6.6441

We employed the greenlight XPS system in our study. Ninety patients were randomly assigned to receive either a greenlight laser or a bipolar TURP. The mean age of the patients in the Greenlight group was 69.756 years with a standard deviation of 6.5372, whereas the mean age of the patients in the TURP group was 65.067 years with a standard deviation of 4.3243. Comparably, in the Greenlight group, the patient's mean prostate volume was 59.556 gm with a standard deviation of 6.8376, and in the TURP group, it was 51.644 gm years with a standard deviation of 6.6441. Catheterization, length of hospital stay, and operation time were all statistically

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significant variables. For the GreenLight Laser, the average procedure time, length of stay in the hospital, and catheterization period were 72.022, 1.467 and 14.844 in that order, with corresponding standard deviations of 2.4073, 0.4931, and 3.8076. For bipolar TURP, the average operation time, length of hospital stay, and catheterization duration were 54.467, 2.567, and 36.556, respectively, with standard deviations of 6.2943, 0.8765, and 6.6829. (Table 1 & Fig. 1).

Table 2: Comparison of operation time, Hospital stay and Duration of Catheterization between both procedures.

Group Statistics					
	Procedure	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Operation time (minutes)	1.0	45	72.02	2.40	0.35
	2.0	45	54.46	6.29	0.93
Hospital stay (days)	1.0	45	1.46	.49	0.07
	2.0	45	2.567	.87	0.13
Duration of Catheterization (hours)	1.0	45	14.84	3.80	0.56
	2.0	45	36.55	6.68	0.99

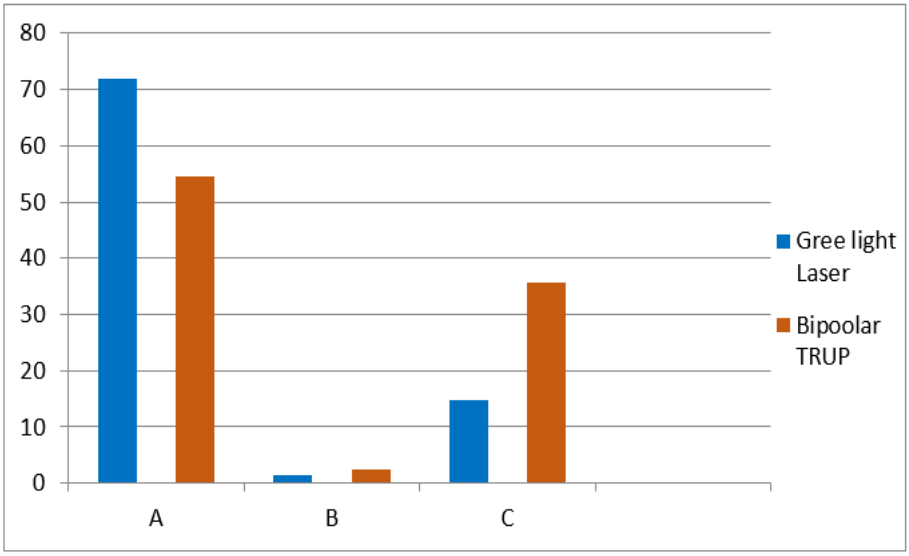

Fig. 1: Comparison of (A) Operation Time (B) Hospital Stay and (C) Duration of Catheterization Between Greenlight Laser and Bipolar TRUP

DISCUSSION

One of the most prevalent age-related issues affecting men worldwide is benign prostatic hyperplasia. A range of lower urinary tract symptoms (LUTS), including incomplete emptying, straining, nocturia, thin stream, intermittency, frequency, and urgency, are caused by to enlargement of the prostate. Prostatic enlargement often begins in middle age or older (40–50 years). 90% of persons have symptoms associated with benign prostatic hyperplasia by the time they are 80 to 85 years old. Obstructive and irritative symptoms are two categories of lower urinary tract symptoms associated with BPH [12]. A thorough history of the patient's symptoms should be obtained, and patient should undergo a methodical examination, with special attention paid to the genital and rectal exams. Uroflowmetry and Qmax recording are given particular emphasis once the basic workup is finished. Measurements of prostate volume and KUB ultrasound were made. Patients are classified as having mild, moderate, or severe symptoms based on the IPSS [13].

Treatment choices for benign prostatic hyperplasia wait and watch, medical and surgical treatment. As medical therapy, alpha-blockers and 5 alpha-reductase inhibitors can be administered 23. Depending on the needs of the patient, surgical procedures range from a minimally invasive technique to an open prostatectomy. The course

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of treatment is customised based on the patient's symptoms [14]. For minimally invasive procedures, transurethral resection of the prostate (TURP) is the gold standard. However, the Greenlight Laser is thought to be a more reliable and safe substitute [15]. The core part of the prostate that obstructs the flow of urine is heated and vaporised by the laser beam. Greenlight lasers have been linked to a decreased risk of bleeding, TUR syndrome, and shorter hospital stays. It causes deeper penetration and is also preferred in patients on anticoagulant therapy, high-risk cardiac patients and CKD patients [16].

Even though there was a noticeable improvement in the postoperative values for each surgery when compared to the preoperative values, there was no significant difference in Qmax, IPSS, QOL, or PVRU between the two surgeries [17]. Two bipolar group individuals experienced transurethral syndrome, which was quickly identified and treated. Urge incontinence was reported by 3 patients in the bipolar TURP group and 2 in the greenlight laser group; the prevalence of bladder neck contracture was similar in both treatment groups. Though complications developed in a lesser number of patients of greenlight laser as compared to the bipolar TURP group, the difference was not statistically significant [18,19].

Five hundred consecutive patients with LUTS due to BPH had PVP between September 2002 and April 2007 in a study by Ryan *et al*. [20] A follow-up of 30.6±16.6 (5.2–60.6) months was the mean. Seven surgeons conducted PVP on each patient. The average patient age was 71.4±9.6 (46-96) years, and the average prostate volume before surgery was 56.1±25.3 (10-180) millilitres. The average energy supply was 206±94 (2.4-619.0) KJ, and the average operation duration was 66.4±26.8 (10-160) min. There were no serious intraoperative problems seen in 45% of the patients (n=225), even though they were still on oral anticoagulants. In terms of hospitalisation after surgery, the mean duration was 3.7±2.9 (0-35) days, whereas for catheterization it was 1.8±1.2 (0-10) days. After three years, the QoL score was 1.3±1.3, the Qmax was 18.4±8.0 ml/s, and the mean IPSS was 8.0±6.2.

CONCLUSIONS

The current study concluded that the greenlight laser is a more secure and practical substitute for bipolar TURP. It improves postoperative Qmax, IPSS, QOL, and PVRU values in a manner comparable to bipolar TURP. Greenlight laser treatment is linked to longer operation times but shorter hospital stays, fewer catheterizations, and lower bleeding rates. Greenlight laser had fewer intraoperative and postoperative problems than bipolar TURP.PVP is the recommended surgery for people with CKD and heart problems. Greenlight laser's drawback is that it is not very economical. However, large randomised studies are needed to prove that greenlight laser is superior to bipolar TURP in terms of advantages.

CONTRIBUTION OF AUTHORS

Research concept- Sanjay Kumar Mahapatra, Biswajit Mohapatra

Research design- Ashok Kumar Nayak, Jyoti Ranjan Behera, Biswajit Mohapatra

Supervision- Ashok Kumar Nayak

Materials- Jyoti Ranjan Behera, Sanjana Panigrahi

Data collection- Jyoti Ranjan Behera, Sanjana Panigrahi

Data analysis and Interpretation- Ashok Kumar Nayak, Biswajit Mohapatra

Literature search- Ashok Kumar Nayak, Jyoti Ranjan Behera

Writing article- Ashok Kumar Nayak, Sanjana Panigrahi

Critical review- Sanjay Kumar Mahapatra, Jyoti Ranjan Behera

Article editing- Jyoti Ranjan Behera

Final approval- Sanjay Kumar Mahapatra

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