



## COMPARATIVE ANALYSIS OF CONVENTIONAL MONOPOLAR TURP VS GREEN LIGHT LASER PHOTOVAPORIZATION OF PROSTATE, EXPERIENCE OF A PERIPHERAL TERTIARY CARE CENTRE

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### ABSTRACT

**Introduction:** Lower urinary tract symptoms (LUTS) due to benign prostatic hyperplasia (BPH) are among the most common complaints reported by adult males to their general practitioners. It is estimated that up to 50% of men over the age of 50 and 80% of men over the age of 80 experience LUTS from BPH.1 **Objectives-** The main objective of this study was to compare the clinical outcomes in terms of symptom improvement and early postoperative results after monopolar resection TURP or laser TUVP for benign prostatic hyperplasia. **Materials And Methods-** During a 18 months period From August 2022 to January 2024. a prospective hospital based Randomized Control Study was conducted at a rural tertiary care hospital. The study involved 150 patients. Patients were randomized into two groups of 75 each to undergo TURP either with Monopolar TURP (Group 1) or transurethral vaporization of prostate (TUVP) (Group 2). We used the AMS Green light XPS system for LASER group. Martin ME MB2 monopolar system was used for monopolar TURP and the setting used was 120W for cutting and 60W for coagulation. **Results-** . In present study demographic data were equal between monopolar and GLL PVP group. Resection time was more for the GLL PVP group as we used thick loop for resection and resection time found to be a statistically significant factor. Resection time was 42 minutes- + 5.020 SD for monopolar group and 45.11+ 4.029 SD minutes in GLL PVP group. Regarding improvement in IPSS in monopolar group it is about 10.43 points+ 1.569 SD and in GLL PVP it is 9.88points +1.528 SD at the end of one month. Qmax in monopolar group is 8.18 ml+ .75 SD and in GLL PVP 8.15ml+.81 SD. Quality of life index also shown equal results between two groups. Fall in sodium is more with monopolar about 7 meq and it is 4 meq with GLL PVP. This is statistically significant (p=0.001). Transurethral syndrome developed in two of the monopolar group that was promptly recognized and treated. **Conclusion-** Our review suggests that GLL PVP is a safer and more efficacious procedure than standard TURP.

**KEYWORDS :** benign prostatic hyperplasia, GreenLight laser photoselective vaporisation of the prostate, transurethral resection of the prostate, safety, efficacy, transurethral surgery

### INTRODUCTION:

Lower urinary tract symptoms (LUTS) due to benign prostatic hyperplasia (BPH) are among the most common complaints reported by adult males to their general practitioners. It is estimated that up to 50% of men over the age of 50 and 80% of men over the age of 80 experience LUTS from BPH.1 Despite medical therapy represents the first line of treatment, many men progress and need surgical therapy. For its well-documented favorable long-term outcomes, transurethral resection of the prostate (TURP) is still considered the reference treatment for clinical BPH.2 However, TURP has its issues of postoperative morbidity, especially in patients on antiplatelet/anticoagulant medications and with a large prostate volume, wherein an increased rate of bleeding requiring transfusions, TUR-syndrome, and long catheterization time have been reported.3,4 New energy sources/modalities, mainly bipolar and laser energies, have been introduced in the last three decades to decrease the early morbidity of monopolar TURP. Among them, one of the most practiced techniques is the photoselective vaporization of the prostate (PVP) with the GreenLight laser™ (GLL) (American Medical Systems, Minnetonka, USA). The first generation machines (60 W and 80 W) used a potassium-titanyl-phosphate crystal to double the frequency of a Nd:YAG laser, emitting a 532-nm wavelength, delivered to tissues by a side-firing fiber and producing a vaporization effect due to a very high absorption coefficient at this wavelength by its target chromophore that is hemoglobin molecule.5 This high energy density delivered to the prostatic tissue leads to rapid vaporization of the superficial tissue with a small rim of coagulated tissue.6 The new generation machines use a lithium-triborate crystal that allowed an increase in the maximum power output of the GLL from 80 W to 180 W. Moreover, new fibers have been

introduced, resulting in even higher energy application and faster tissue vaporization via a larger laser beam area.7 Therefore, GLL has become the reference surgical technique to manage patients who cannot stop anticoagulation/antiplatelet therapy.8 Regarding efficacy in the functional outcomes, GLL PVP showed early comparable results compared to standard TURP.9 However, GLL PVP has been criticized for lower reduction of prostate volume compared with TURP that could translate into a major reoperation rate for residual/regrowth adenoma in the long term. High-power potassium-titanyl-phosphate laser PVP was first described by Hai and Malek in 2003 and long-term results of comparative studies with TURP are still lacking.10 Therefore, we aimed to review the safety and efficacy of studies comparing GLL PVP and TURP in the medium-term (at least 2-year follow-up).

### Aim And Objective:

The primary aim and objective of the present study is to compare the clinical outcomes in terms of symptom improvement and early postoperative results after monopolar resection TURP or laser TUVP for benign prostatic hyperplasia and with a secondary objective to study the advantages of green light laser photovaporization over monopolar transurethral resection.

### MATERIAL AND METHODS

**Study Type** - It is a hospital based Randomized Control Study

**Study Setting And Timeline** - The study was conducted in the department of urology of BSMCH with a time frame of 18 months, from the date of acceptance of synopsis.

**Place Of Study** - Department of urology, Bankura Sammilani Medical College and Hospital.

**Sample Size** – The calculated sample size for this study is around 150.

**Inclusion Criteria**

- 1) Prostate sizes > 30gms and less than 60 gms
- 2) Maximum flow rate (Qmax) less than 10 ml/s,
- 3) Men more than 45years and less than 70 years
- 4) Post void residual urine (PVR) exceeding 100 ml,
- 5) Patients who gave informed consent for the study were included

**Exclusion Criteria**

- 1) Urethral stricture,
- 2) Neurogenic bladder,
- 3) Previous prostate or urethral surgery
- 4) Unwilling patients

**METHODOLOGY**

Institutional Ethics Committee approval was obtained. Informed consent was taken from all patients who underwent surgery. All patient details were recorded as per the proforma. Patients were randomized into two groups of 75 each to undergo TURP either with Monopolar TURP (Group 1) or transurethral vaporization of prostate (TUV) (Group 2). We used the AMS Green light XPS system for LASER group. Martin ME MB2 monopolar system was used for monopolar TURP and the setting used was 120W for cutting and 60W for coagulation. The setup of instruments for monopolar TURP resection is well known. It includes 26 – Fr. Karl Storz non-continuous flow sheath with blind and visual obturator, resectoscope, monopolar loop, high frequency cord, 30 degree Karl Storz telescope and diathermy.

**STATISTICAL METHOD**

Descriptive statistics were used to illustrate the study population. The statistical significance of these correlations was assessed using a two-sided p-value. A p-value of <0.05 was considered as statistically significant. The Chi Square test was used to assess the statistical significance. A commercially available computer software package (Statistical Package for the Social Sciences (SPSS) version 17) was used for statistical analysis.

**RESULTS**

Total of 150 patients were randomized and participated in the study. Demographic data of the group 1 and group 2 are given in Table 1.

**Table 1. Demography**

FACTORS	MONOPOLAR	GLL-PVP	P VALUE
TOTAL NUMBER	75	75	
AGE IN YEARS	65.33	65.97	0.576
ON CATHETER	12	11	0.820
DIABETES MELITUS	13	12	0.826
HYPERTENSION	12	12	1.000

Mean age of patients in monopolar and mean age of GLL-PVP group patients are 65.33years and 65.97 years respectively. In the both monopolar and GLL-PVP group, patients with diabetes mellitus, hypertension and on Foley's catheter is almost equal. In monopolar group this was 13, 12 and 12 patients respectively and in GLL-PVP group this was about 12, 12 and 11 patients respectively. As for as these factors are considered both the groups are equally matched.

Table 2 : Comparing the preoperative markers such as IPSS, Maximum flow rate (Qmax), quality of life index (QoL), haemoglobin, pack cell volume and sodium in monopolar and GLL-PVP group.

**Table 2. preoperative Data S Of Monopolar & GLL-PVP Group.**

Variable	Group	N	Mean	Std. Deviation	P value
Maximum flow rate (Qmax)	Monopolar	64	9.5766	1.01899	.637
	GLL-PVP	63	9.4841	1.18120	.638
IPSS	Monopolar	75	23.17	1.996	.282
	GLL-PVP	75	22.84	1.779	.282
Haemoglobi n.	Monopolar	75	12.380	.8847	.694
	GLL-PVP	75	12.316	1.0925	.694
PCV	Monopolar	75	36.15	2.593	.833
	GLL-PVP	75	36.05	2.804	.833
Sodium	Monopolar	75	139.60	2.922	.870
	GLL-PVP	75	139.52	3.073	.870
QOL	Monopolar	75	3.93	.723	.826
	GLL-PVP	75	3.96	.761	.826

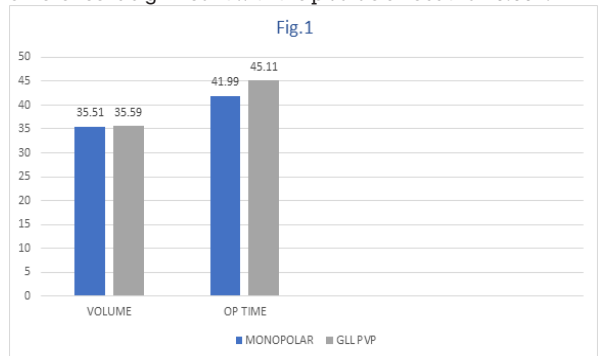
Mean of Q max in monopolar group was 9.58ml/second and in GLL-PVP group was 9.48ml/second. Similarly IPSS in monopolar and GLL-PVP group is 23.17 and 22.84. Quality of life index (QoL) of monopolar and GLL-PVP is 3.93 and 3.96. Mean haemoglobin and PCV in monopolar group was 12.38gm % and 36.15 as compared to GLL-PVP group value of 12.316gm% and 36.05 which is similar between two groups. Mean sodium level in monopolar and GLL-PVP is 139.60meq and 139.52 meq respectively. All these preoperative factors were comparable and equally distributed between both the groups. In statistical analysis there is no significance found between the groups. So both the groups are similar as for as pre-operative factors are concerned.

Table.3 compares the prostatic volume and intraoperative resection time in both monopolar and GLL-PVP groups. Mean prostate volume in monopolar group is 35.51grams with the standard deviation of 6.185. In GLL-PVP group mean prostate volume is 35.51grams with the standard deviation of 5.854. Hence prostate volume is similar in both the groups with the p value of .935

**Table:3. Volume And Intra Op Time**

Variable	Group	N	Mean	Std. Deviation	P value
VOL	Monopolar	75	35.51	6.185	.935
	GLL-PVP	75	35.59	5.854	.935
OP TIME	Monopolar	75	41.99	5.020	.001
	GLL-PVP	75	45.11	4.029	.001

Intraoperative resection time in monopolar group is about 41.29 minutes with standard deviation of 5.020 For GLL-PVP intraoperative resection time is about 45.11 minutes with standard deviation of 4.029. In Independent Samples Test this difference is significant with the p value of less than 0.001.



**Table:4. Postoperative Data S Of Monopolar & GLL-PVP Group:**

	Group	N	Mean	Std. Deviation	P value
QMAX - POST	Monopolar	64	17.7578	.74510	.376
	GLL-PVP	63	17.6349	.81244	.376
IPSS - POST	Monopolar	75	12.75	1.569	.400
	GLL-PVP	75	12.96	1.528	.400

Hb - POST	Monopolar	75	11.673	.8834	.672
	GLL-PVP	75	11.743	1.1035	.672
PCV - POST	Monopolar	75	34.47	2.522	.794
	GLL-PVP	75	34.35	3.069	.794
NA - POST	Monopolar	75	132.93	3.090	.001
	GLL-PVP	75	135.29	3.200	.001
QOL - POST	Monopolar	75	1.87	.577	.650
	GLL-PVP	74	1.82	.558	.650

Also there is change in PCV of about 1.71 in monopolar group and 1.68 in GLL-PVP group. In the post-operative period there was fall in serum sodium, haemoglobin and change in PCV. Monopolar group had fall off 7 meq of sodium and in GLL PVP group it was about 4 meq. This fall in sodium is statistically significant. Fall in haemoglobin is about 0.58 gram% in GLL-PVP group and is more in monopolar group with a fall of 0.71 gram%. But this fall is only in numbers it is not statistically significant.

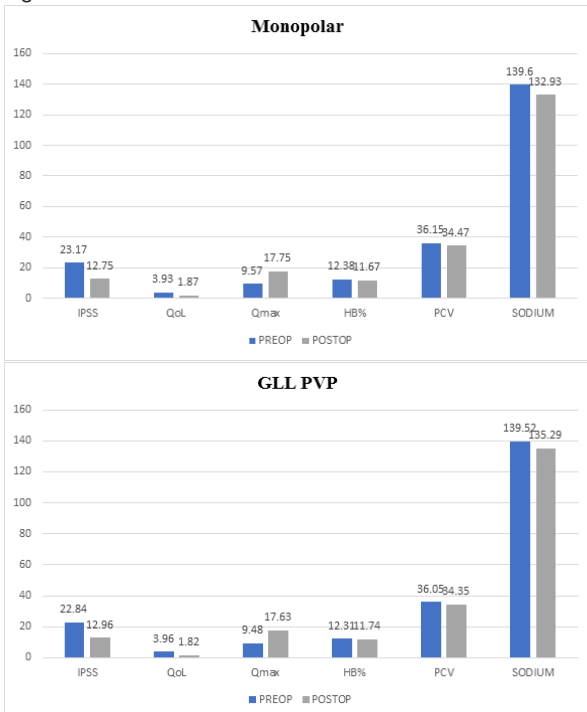
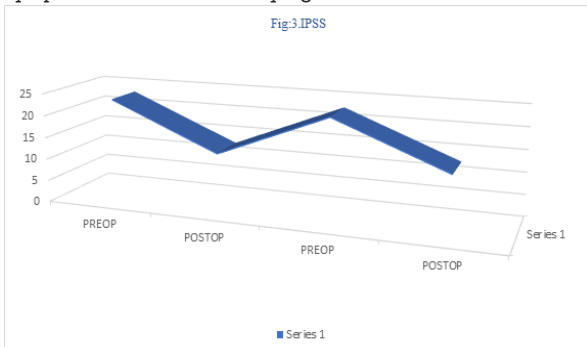


Fig.2: pre And Post Operative Data Of Monopolar And GLL PVP group

IPSS one of the important parameter which decrease in both the groups and this fall in score is desirable and it indicates successfulness of surgical management. Fall in IPSS is about 10.43 points in monopolar group and 9.88 in GLL PVP group by the end of first postoperative month. This improvement in symptom score is statistically significant.



Maximum flow rate improved by 8.15 ml in GLL-PVP group and 8.18 ml in monopolar group. Quality of life score decreases by 2.16 in monopolar group with 2.15 in GLL-PVP group and this change is not significant in between

monopolar and GLL-PVP groups.

Post-operative complications like clot retention, TUR Syndrome and failure to void, increased length of stay in hospital, blood transfusion rates, were reported after transurethral resection in monopolar group. In GLL-PVP group there is no incidence of TUR syndrome which occurred in the two monopolar group. In postoperative complications there is no statistical difference between two groups. In monopolar group three patient developed clot retention and in GLL-PVP group two patients developed clot retention which was treated with clot evacuation.

All postoperative catheters were removed on fourth postoperative day as per protocol and three patients in monopolar and two patients in GLL-PVP group developed failure to void they were catheterised and started on medications.

**DISCUSSION:**

In our prospective study we used AMS Greenlight XPS Laser system for GLL PVP. We randomized 150 patients and 75 patients were underwent GLL PVP. In present study demographic data were equal between monopolar and GLL PVP group. Resection time was more for the GLL PVP group as we used thick loop for resection and resection time found to be a statistically significant factor. Resection time was 42 minutes + 5.020 SD for monopolar group and 45.11 + 4.029 SD minutes in GLL PVP group. Regarding improvement in IPSS in monopolar group it is about 10.43 points + 1.569 SD and in GLL PVP it is 9.88 points + 1.528 SD at the end of one month. Qmax in monopolar group is 8.18 ml + .75 SD and in GLL PVP 8.15 ml + .81 SD. Quality of life index also shown equal results between two groups. Fall in sodium is more with monopolar about 7 meq and it is 4 meq with GLL PVP. This is statistically significant (p=0.001). Transurethral syndrome developed in two of the monopolar group that was promptly recognized and treated. **Emara et al** demonstrated in 131 men treated with the new generation 180 W High-Performance System that no perioperative transfusion was required and all men were discharged home the same day. Interestingly, more than 25% of patients in their series had a prostate volume larger than 80 mL.<sup>11</sup> GLL PVP is an expensive technique due to the machine and single-use fibers costs. However, the safer profile and shorter postoperative course make PVP more cost-effective compared to TURP. **Thomas et al** confirmed in a recent meta-analysis that GLL PVP becomes cost-effective compared to TURP if more than 32% of the patients can be discharged the same day.<sup>12</sup> The result of functional outcomes after surgery is another important point in evaluating comparative techniques. In this systematic review, the evaluation of functional outcomes was based on four pivotal findings: **IPSS with QoL item, Qmax and PVR**. Most of the data showed greater improvement in urinary symptoms after TURP, both early and in the medium-term follow-up. This finding might also be explained by a higher incidence of early postoperative dysuria/urgency after GLL PVP. Indeed, a recent systematic review confirmed that the incidence of postoperative dysuria/urgency after transurethral BPH surgery was significantly higher after ablation procedures as compared to enucleation techniques and TURP.<sup>13</sup>

Limitation and drawback of our study is small number of cases and short follow up period.

**CONCLUSION:**

1. The present study shows GLL PVP is as equally effective as monopolar in reducing the IPSS.
2. Increase in the quality of life and maximal flow rate of GLL PVP is equal to the results of monopolar TURP.
3. Our study shows that GLL PVP has less chance of hyponatremia hence TUR Syndrome as compared to

monopolar.

4. Resection time for GLL PVP in our study is more to compare with that of monopolar.

5. GLL PVP has better perioperative (catheterization time, length of hospitalization, blood transfusions) and early functional outcomes that have definitely to be balanced cautiously against an overall higher rate of reoperation, due to incomplete vaporization or regrowth of prostatic adenoma. Our review suggests that GLL PVP is a safer and more efficacious procedure than standard TURP in the early and medium-term. However, long-term definitive conclusions favoring one technique over the other cannot be claimed.

Further, multicentric prospective investigations comparing the long-term results of these two surgical procedures are recommended.

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