Comparison between Photoselective Vaporization of Prostate by Diode Laser and Monopolar Transurethral Resection of Prostate in Single Center Experience

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Abstract

Background: Transurethral resection of prostate has been regarded as the gold standard surgical management of benign prostatic hyperplasia (BPH).With the evolution of new technologies, laser prostatectomy emerged as an alternative.

Aim of the study: To compare the rate of outcome of diode laser vaporization of prostate and Transurethral Resection of Prostate in Al Diwaniya governorate.

Patients and methods: From October 2017 to October 2018, forty patients with surgical indications of prostatectomy were enrolled in this study. Their ages ranged from 60-75 years with a mean age 68.6 years and prostate size ranged from 40-80 ml with a mean size 62.175 ml. Twenty patients underwent diode laser vaporization of prostate and another 20 patients underwent Transurethral Resection of Prostate. The choice based on surgeon preference and patient ability. Preoperative evaluation was done for all patients by history, physical examination and investigations. International Prostate Symptoms Score, maximum flow rate, digital rectal examination, prostate specific antigen, abdominal ultrasound, urinalysis, blood urea, s.creatinine, complete blood count were all done preoperatively. One pint of compatible fresh blood prepared.

Results: The rate of significant bleeding and transfusion in diode PVP and TURP was (zero vs. 35% respectively) , in PVP and TURP the mean irrigation amount perioperatively was (10.10 vs. 33.15 pints respectively) , mean operative time was (70.80 vs. 50.00 min respectively) ,mean hospital stay was (16.03 vs. 30.09 hours respectively), mean time to urethral catheter removal was (24 vs. 81.71 hours respectively), postoperative complication rate (mainly dysuria) was (75% vs. 65% respectively), mean postoperative IPSS was (14.40 vs. 14.20 respectively) , mean postoperative Qmax was (15.45 vs. 16.30 ml/sec respectively). There was no statistical difference between both groups in regard to lowering IPSS or increment in Qmax. The mean cost was (1500 vs. 500.42 dollars) in diode PVP and TURP respectively.

Conclusion: Diode laser vaporization of prostate is a good alternative to TURP with comparable results in treatment of BPH especially in patients taking anticoagulant drugs who cannot stop their medication. However, the high cost of this procedure and dysuria as a complication may prevent the common use of this technique.

Key word: *Diode photoselective vaporization of prostate, Transurethral resection of prostate, Benign prostatic hyperplasia.*

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Introduction

Benign Prostatic Hyperplasia (BPH) is a histologic diagnosis that refers to the proliferation of smooth muscle and epithelial cells within the prostatic transition zone

and periurethral zone. [1] BPH is commonly characterized by lower urinary tract symptoms (LUTS). [2] The prevalence of histologically diagnosed BPH increases from 8 percent in men aged 31 to 40, to 40 to 50 percent in men aged 51 to 60, to over 80 percent in men older than age 80. [3] The prevalence of moderate or severe LUTS for men in the fifth, sixth, seventh, and eighth decades of life to be 26, 33, 41, and 46 percent, respectively. [4] Patients often presents with LUTS as storage irritative symptoms (frequency ,urgency and nocturia) due to bladder response to obstruction (increased pressure) and voiding obstructive symptoms (straining, weak stream, intermittency and feeling of incomplete bladder emptying). [5] BPH is a progressive condition that can lead to serious long-term complications such as acute urinary retention (AUR), [6] renal insufficiency, development of gross hematuria, bladder calculi, urinary incontinence, and recurrent urinary tract infections (UTIs). [7] Medical history can establish the severity of LUTS by IPSS, [8] . PSA should only be performed if life expectancy is greater than 10 years and if a diagnosis of prostate cancer would modify the management approach. [9] Medical treatment includes Alpha 1 antagonist, 5-alpha reductase inhibitors, Anti-muscarinic agents [(10) (11)] and Phosphodiesterase-5 inhibitors [(12, 13),] when medical treatment fails to control patients complains, surgical intervention is mandatory; however, surgery is associated with a number of complications. Surgical approach includes TURP [14] . Laser prostatectomy is either coagulation or vaporization (or both), resection or enucleation depending on the wavelength applied [(15,16)]. The usage of TURP is gradually decreasing (nearly 5%/ year). [17] Types of laser procedures includes HoLEP which can be used in large glands (100-150) and has comparable efficacy and good outcome compared to open prostatectomy and TURP but longer operating time. [18] In this study, we want to compare the rate of intraoperative bleeding and the need for blood transfusion, the amount of irrigant, operative time, hospital stay, time of urethral catheterization, postoperative complications and the cost of diode laser vaporization of prostate and TURP in Al Diwaniya governorate.

Patients and Methods

From October 2017 to October 2018, forty patients with surgical indications of prostatectomy were enrolled in this study. Their ages ranged from 60-75 years with a mean age 68.6 years and prostate size ranged from 40-80 ml with a mean size 62.175 ml. Twenty patients underwent diode laser vaporization of prostate and another 20 patients underwent Transurethral Resection of Prostate. The choice based on surgeon preference and patient ability. Preoperative evaluation was done for all patients by history, physical examination and investigations. International Prostate Symptoms Score, maximum flow rate, digital rectal examination, prostate specific antigen, abdominal ultrasound, urinalysis, blood urea, s.creatinine, complete blood count were all done preoperatively. One pint of compatible fresh blood prepared.

Results

Our patients data were comparable between the two groups with a mean age of 68.6±4.14 years (range 60-75years) and mean prostate size of 62.175 ± 10.885 ml (range 40-80 ml).Their mean PSA was 3.615 ng/ml (range 1.5-8ng/ml).Regarding vesical stones, one patient (5%) of laser group was with 18 mm stone and 3 patients (15%) of TURP group with 18, 13 and 15 mm vesical stones which were removed before beginning of the procedure. Four patients (20%)were on anticoagulants who could not stop their medications (all of them on warfarin 5 mg, 2 patients with cardiac stents, 1 patient with prosthetic mitral valve and 1 patient with deep lower limb venous thrombosis).All of them were enrolled in laser group as shown in table 1.

Table 1: General characteristics of patients

Characteristic	Laser n = 20	TURP n = 20	P
Age (year) mean ±SD	68.50 ±4.14	68.70 ±4.03	0.878* NS
Size of prostate (ml) mean ±SD	59.35 ±10.885	65.00 ±9.03	0.082* NS
PSA(ng/ml) mean ±SD	3.62 ±2.07	3.62 ±1.72	0.993* NS
Presence of stones < 20 mm, n (%)	1 (5%)	3 (15 %)	0.598 † NS
Patients on anti-coagulant, n (%)	4 (20 %)	0 (0 %)	0.106 ¥ NS

n: number of cases; SD: standard deviation; *: independent samples t-test; †: Yates correction for continuity; ¥: Fischer exact test; NS: not significant

The indications for intervention in both groups were the same and included thirteen patients (32.5%) with moderate to severe IPSS (who were already on medical treatment), recurrent urinary retention in 10 patients (25%), gross hematuria in 4 patients (10%), recurrent urinary tract infection in 10 patients (25%) and deterioration in renal function in 3 patients (7.5%).Table2

Table 2: indications of surgery

	Laser group No %	TURP No %
Moderate – sever IPSS	7 35%	6 30%
Recurrent urinary retention	5 25%	5 25%
Gross hematuria	2 10%	2 10%
Recurrent UTI	4 20%	6 30%
Deterioration in renal function	2 10%	1 5%

The mean operative time in laser group was 70.8 min. (range 60-80 min.) , while in TURP group was 50 min. (range 40 – 60 min.) (figure 11). Regarding intraoperative complications, no patient developed significant intraoperative bleeding in laser group. In our study, we determined significant intraoperative bleeding as reduction in blood pressure that required transfusion, while seven patients (35 %) in TURP group developed significant intraoperative bleeding and required intraoperative blood transfusion. No patient in laser group developed obturator reflex in comparison with TURP group in which 3 patients (15 %) developed obturator reflex, as shown in table 3.

Table 3: operative time and intraoperative complications

	Laser group	**TURP group**	**P value**
Mean operative time(min.) ± SD	70.80 ± 5.07	50.00±6.19	<0.001** HS
Intraoperative bleeding	0 (0 %)	7(35%)	0.008 * HS
Obturator reflex	0(0%)	3(15%)	0.598* NS

**: independent samples t-test. *: Fischer exact test . SD :standard deviation . HS :highly significant . NS :not significant

Table 4: postoperative care

	Laser group	TURP group	P value
Mean amount of irrigation (pints) ±SD	10.10±2.59	33.15±5.24	< 0.001 * HS
Mean hospital stay (hours) ±SD	16.03 ±3.89	30.09 ±10.32	< 0.001 * HS
Mean time of urethral catheterization (hours) ±SD	24	81.71±10.34	< 0.001 ** HS
Mean cost (dollars) ±SD	1500	500.42±195.32	< 0.001 ** HS

*Independent samples t-test. **One sample t-test; SD: standard deviation; HS: highly significant at at P ≤ 0.01

The mean follow up period was two months. All of the patients were assessed clinically by calculating IPSS and Q max .The mean pre-operative IPSS was 17.65 (range 13 – 27) and significantly decreased post operatively in both groups (mean IPSS 14.3 with range of 9-18), with the mean IPSS of laser group decreased from 20.1 to 14.4 and that of TURP decreased from 18.75 to 14.2.

Table 5: IPSS and Q-max before and after operation

Characteristic	Laser n = 20		TURP n = 20		P *
	Mean	SD	Mean	SD	
IPSS (pre-operative)	20.10	4.30	18.75	3.61	0.289 NS
IPSS (post-operative)	14.40	3.05	14.20	2.88	0.832 NS
P †	< 0.001 HS		< 0.001 HS		----
Q-max(ml/s) (pre-operative)	10.30	1.66	10.20	1.85	0.858 NS
Q-max (ml/s) (post-operative)	15.45	1.15	16.30	0.86	0.012 S
P †	< 0.001 HS		< 0.001 HS		----

n: number of cases; SD: standard deviation; S: significant *: independent samples t-test; †: Paired samples t-test; NS: not significant at P ≤ 0.05; HS: highly significant at P ≤ 0.01

Regarding post-operative complications: no patient in laser group had frank hematuria in the immediate post-operative period compared to 2 patients (10 %) in TURP group. TUR syndrome did not occur in neither group. Four patients (20 %) in laser group had UTI in comparison to 5 patients (25 %) in TURP group. Acute retention occurred in 3 patients (15 %) in each group. Eight patients (40%) in laser groups complained from dysuria compared to 3 patients (15%) in TURP group. The overall complications rate was 75 % vs. 65 % for laser and TURP groups respectively. As shown in table 6.

Table 6: Post-operative complications

Complication	Laser n= 20	TURP n =20	P
Post-operative bleeding	0 (0%)	2 (10 %)	0.487 * NS
TUR syndrome	0 (0%)	0 (0%)	---
UTI	4 (20 %)	5 (25 %)	1.000 † NS
Acute retention	3 (15 %)	3(15 %)	1.000 † NS
Dysuria	8 (40 %)	3 (15 %)	0.077** NS

n: number of cases; *: Fischer exact test; †; ¥: Yates correction for continuity: **: Chi-square test; NS: not significant at $P \leq 0.05$

Discussion

In this study, we compared the rate of intraoperative bleeding, the amount of irrigation fluid needed, operative time, hospital stay, time to urethral catheter removal, postoperative complications, follow up results and the cost. In our study, no patient in laser group developed significant bleeding, while in TURP 35% of patients had significant bleeding and needed transfusion. Kuntz RM reported that bleeding and need for transfusion is reduced significantly in diode laser PVP compared to TURP. [19] Erol A. et al reported 1 patient with diode PVP developed bleeding that needed catheterization and irrigation. [20] Seitz M.et al stated no patient had significant bleeding in diode PVP. [21] Our study is comparable to these results. Reich O.et al reported rate of 7.1% of blood transfusion in TURP in 10,654 patients, [22] while in our study it is 35 %. This high rate may be due to small sample study. The amount of irrigation needed for laser group is much less (mean 10.10 pints) than TURP group (33.15 pints) and this is because less encountered bleeding in laser group. Mithani MH. et al had mean of 16.44 pints for laser group. [23] In our study, the operative time of laser group is longer than that of TURP by about 20 minutes. Razzaghi MR also reported higher operative time of laser because the time it takes for the light energy absorption by water and Hb. [24] In our study, the mean hospital stay for laser and TURP groups was 16.03 and 30.09 hours respectively. This less stay for laser can be attributed to less bleeding and uncomplicated procedure. Tugcu V.et al concluded also less hospital stay. [25] In our study, the urethral catheter was removed after 24 hours for laser group, while in TURP the mean time to remove the catheter was 81.71 hours .This is an advantage. Cetinkaya et al reported 1.45 day for laser and 2.63 day for TURP which is comparable to our results. [26] The overall complication rate of laser and TURP groups in our study was 75% and 65% respectively.

Conclusion

Diode laser vaporization of prostate is a good alternative to TURP with comparable results in treatment of BPH especially in patients taking anticoagulants who cannot stop their medication and this advantage make it better than TURP. However, the high cost of this procedure and dysuria as a complication may reduce the common use of this technique.

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the Al-Diwaniyah teaching hospital/ department of urology/ Al-Diwaniyah province, Iraq and all experiments were carried out in accordance with approved guidelines.

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