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LASER PROSTATECTOMY: THE START OF NEW ERA OF PROSTATE SURGERY IN IRAQ

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Abstract

This study was done to evaluate a newly introduced technology to my country to determine the safety of the procedure, to what extent can it reduce patient's symptoms and what are the possible complications that are associated with it. In addition to balance the benefits of the procedure to the draw backs, risks and complications.

The study enrolled forty-one patients with Benign prostatic hyperplasia, with high international prostate symptom score and low flow rate excluding other causes for that like stricture, stone or neurological causes. A high power 180 W diode 980 nm LASER was used to vaporize the prostate recording data regarding the procedure and all patients were checked one month later for symptom scoring, flow-rate and ultrasound examination.

The mean size of the prostate gland 53.07 gm ±11.75 SD, the Mean operative time was 61.51 min. The mean I-PSS was 9.82±1.88 SD compared to the pre-operative mean of 20.24±2.62 SD which is statistically significant (t (41) =17.66, P≤0.001). The maximum flow-rate was 7.94 ml per second ± 2.41 SD before surgery and there was a significant rise of 14.15 ml per second ± 2.502 SD postoperatively (t (41) = -14.86, P≤0.001). The only significant complication patients had was voiding irritative symptoms.

The results show clearly that 980 diode LASER is an effective procedure for the treatment of patients with benign prostatic hypertrophy, as well as being safe procedure that could be recommended as replacement for transurethral resection of the prostate with some reservations regarding the cost of the fiber.

Introduction

Man aging is an inevitable process that results in enlargement of the prostate gland what is called benign prostatic hyperplasia BPH leading to the symptoms of bladder outlet obstruction[1], with increasing symptoms as age progress at that time the patient will request a solution to this problem. During the last few decades the predominant procedure was the transurethral resection of the prostate nevertheless it was not free of morbidity and mortality with a reported mortality rate of 0.2% and morbidity rate of 18% within the first 90 days following the resection[2-3], still it is an effective treatment with long standing results. The challenge was in finding a replacement with less morbidity and mortality this was LASER an acronym standing for light amplification by stimulated emission of radiation ,the first medical use was back in 1985 by Shanberg et al[4] using an end firing fiber which represented a bad experience in LASER surgery for BPH since it was associated with bleeding and sever postoperative symptoms that lasted for long period of time, there was a lot of development in LASER prostatectomy regarding the generator and the fiber, now in addition to the previous ND:YAG LASER type of LASER there are the holmium(Ho):YAG LASER, potassium titnyl phosphate (KTP) and diode LASER. The fibers varied according to diameter, site of exit of LASER beam and the way of delivering the beam to tissue by

inserting the fiber in the tissue, contacting it, semi contact or non-contacting fibers. LASER energy can be adjusted through different ways, it can be done by changing the mode of LASER waves whether continuous or pulsed mode, also the change in the frequency can have its influence on LASER energy[5]. LASER energy can affect prostatic tissue in different ways, by coagulation, incision, resection, vaporization and combination of these modes.

The first time LASER prostatectomy introduced in Iraq was by the author in 2009 and this study is the result of years of experience in using LASER for prostatectomy in Basra Iraq, the used machine was a high power 180W, 980nm diode LASER, capable of delivering both pulsed and continuous wave modes of LASER. The reason of choosing it was in the characteristic wave length that allowed absorption of the energy by both water and by hemoglobin making it suitable for vaporization of the prostatic tissue and at the same time have good hemostatic properties, providing both limited blood loss and rapid ablation rate[6,7].

The author aimed at studying the efficacy and safety of LASER prostatectomy and whether it could be a suitable substitute for transurethral and open prostatectomy.

Materials and methods

During the period between August 2009 and June 2016 a total number of 41 patients underwent LASER prostatectomy in AL-Mosawee Hospital Basrah, Iraq. Those patients were evaluated preoperatively by history, examination including neurological exam and investigations focusing on the international prostate symptom score (IPSS) including score 12 or more, prostate size by ultrasound, maximum flow rate excluding patients with flow rate more than 12 ml per second, post voiding residual volume, prostatic specific antigen (PSA), to exclude patients with prostatic carcinoma, other neurological causes for the patients lower tract obstructive symptoms and prostatitis.

Three patients were unfit medically neither for general nor for spinal anesthesia there for the procedure of LASER vaporization of the prostate was conducted by endoscopicaly infiltrating the prostate with lidocaine HCL 1% injected through a special G7 Fr flexible endoscopic needle, only those three patients were given 100 mg diclofenac orally one hour prior to the procedure and a parenteral anxiolytic was administered at time of surgery.

Thirty-three patients had spinal anesthesia (80.4%), and 5 patients had general anesthesia (12.1%), the procedure was done by the same surgeon (the author). All patients had antibiotic administered at initiation of the procedure, using a G23 Fr continuous flow resectoscope with a side firing single use disposable twister fiber, the irrigating fluid was distilled water and the generator was a 980 nm diode LASER set to pulse continuous mode with a staring power of 80 W and raising it by 10 W every few minutes until reaching the maximum 180 W. The procedure aimed at creating a cavity similar to that produced by transurethral resection (see fig.1) by vaporizing the median lobe first and then making our way through each lateral lobe at a time with a catheter left in for no more than 12 hours. All patients were followed postoperatively by estimating a (IPSS), presence of bleeding postoperatively, incidence of incontinence, ultrasound exam with post voiding residual volume and flow rate. Statistical analysis of the results was done using an IBM SPSS version 23.

Results

The mean age for the studied group of patients was 71.95 years ± 9.88 SD range from 55 years to 93 years, with prostate gland size mean 53.07 gm ± 11.75 SD ranging from 29 gm to 74 gm and PSA mean 2.47 ng/dl ± 1.04 SD (Table I).

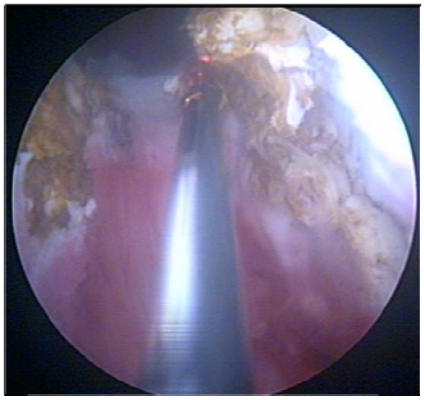

Figure 1: Lateral lobe vaporized in aim of TUR like cavity

Table I: Mean and range distribution for age, PSA and prostate size

	N	Minimum	Maximum	Mean	Std. Deviation
Age	41	55.00	93.00	71.9512	9.88168
Prostate size	41	29.00	74.00	53.0732	11.75881
PSA	41	0.50	4.80	2.4771	1.04189

Mean operative time was 61.51 min ranging from 40 min. to 90 min. The mean energy was 269883 J ± 25416 SD, the patient was out of hospital either the same day or early morning of the next day. The majority of patients 90.2% (Table II) were bloodless within 12 h (no hematuria).

Table II: Post-operative bleeding

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**no bleeding after 12 h**	37	90.2	90.2	90.2
	still bleeding after 12 h	4	9.8	9.8	100.0
	Total	41	100.0	100.0	

The mean time for keeping a catheter postoperatively was 10.26 hours ±4.301 SD9 see Table (IV) with a maximum of 24 h and a minimum of 0 h i.e. we did not insert a catheter initially. All patients were followed up in one-month period. There was 14.6% incidence of incontinence while 85.4% were dry see Table (III).

Table III: Post- operative incontinence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**incontinence**	35	85.4	85.4	85.4
	dry	6	14.6	14.6	100.0
	Total	41	100.0	100.0	

Table IV: Post-operative catheterization time

	N	Minimum	Maximum	Mean	Std. Deviation
Post op. catheterization time hours	41	0.00	24.00	10.2683	4.301

The mean IPSS was 9.82±1.88 SD compared to the pre-operative mean of 20.24±2.62 SD which is statistically significant (t (41) =17.66, P≤0.001),there was a significant change in the maximum flow rate(Q max) of urine a mean of 7.94 ml per second ± 2.41 SD before surgery to a significant rise of 14.15 ml per second ± 2.502 SD postoperatively (t (41)= -14.86, P≤0.001).There was a change of the post voiding residual urine volume, the pre-operative residual was 111.853 ml ± 33.85 SD it dropped significantly after one month to 42.17 ml ±10.36 SD which is statistically significant (t (41)=12.094, P ≤0.001) (Tables V & VI). The most common complication they had was irritative lower tract symptoms, it was reported in 31 out of 41 patients (75.609%), two patients had a secondary bleeding two weeks later (4.87%), one patient had retention ten days after the removal of the catheter (2.43%) it was due to a clot retention, the clot evacuated and the patients catheter removed and the patient was discharged.

Table V: Paired t test

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	**Qmax before operation**	7.9480	41	2.41685	.37745
	Qmax after operation	14.1546	41	2.50208	.39076
Pair 2	**IPSS before operation**	20.2439	41	2.62470	.40991
	IPSS after operation	9.8293	41	1.88285	.29405
Pair 3	**Post voiding volume before operation**	111.8537	41	33.85968	5.28799
	Post voiding volume after operation	42.1707	41	10.36075	1.61808

Table VI: Paired t test

		Paired Differences					T	df	Sig. 2-tailed
		Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	**Qmax before operation- Qmax after operation**	-6.206	2.672	.417	-7.050	-5.362	-14.868	40	.000
Pair 2	**IPSS before operation-IPSS after operation**	10.414	3.774	.589	9.223	11.606	17.666	40	.000
Pair 3	**Post voiding volume before operation- Post voiding volume after operation**	69.682	36.893	5.761	58.037	81.327	12.094	40	.000

Discussion

Studying the results we have showed that the procedure of LASER vaporization of the prostate using the diode LASER 980nm 180W was associated with dramatic improvement in patient's I-SPP with a decrease from 20.24 to 14.15 compared to the results of a study by Benjamin S. et al[8] in 2016 the mean I-PSS was 16 and decreased to 4 ,while the Q max was increased from 10.1 to 15.2 and the residual volume decreased from 77.3 to 31.3, these results show much more alteration than dose our results this can be

explained by the fact that there might be a difference in the type of fiber used or the mode of delivering the laser .These results can show how effective this type of procedure is, still it is a relative result that have many factors influencing it`s efficacy in the technical side or could be operator dependent. The low incidence of complications such as incontinence and the bleeding added to the safety of the procedure with the minimum or non-need for catheterization are important factors in reducing morbidity and decreasing the need for hospitalization. The generator of the 980 diode LASER is 30kg weight which makes it one the most easily transportable machines of its category, it requires only minimum maintenance, need no special installation or electricity source and the price is relatively less than other brands of the same category, with all these specifications it make the procedure using it more appropriate[9,10].

The procedure with this 980 diode LASER has few draw backs, for example although the hospital stay is less than other procedures but the coast of the machine and the single use disposable fiber make it more expensive than for example transurethral resection for the first it might coast about 3500 US Dollars the later might coast 2700 US Dollars this is considered as a disadvantage for LASER specially if we put in mind that some patients require more than one fiber to complete the procedure[11]. The other important limitation of LASER is to start with there will be a very rapid and good amount of tissue vaporization but as soon as you go on the next exposed layer and because of the effect of heat on the prostatic tissue you will be faced by a less LASER absorptive tissue as the amount of water and hemoglobin is reduced due to the heat effect becoming more difficult to vaporize as you go deeper in the tissue, making the procedure less effective for larger sized prostates. The effect of coagulative necrosis is another inevitable event that can complicate the procedure even with most experienced hands[12].

Conclusion

The procedure of 980 nm diode LASER prostatectomy was found to have good impact on both patient's symptoms and on the flow rate of urine together with a significant reduction in residual volume making the procedure effective one, adding to it the low incidence and short period of post-operative bleeding with few complications it can be considered also as a safe procedure. As for its draw backs being a newly introduced procedure to Iraq make it forgivable, and looking forward to improve and overcome these obstacles in the near future. The fact that it can be done under local anesthesia make it a unique option of treatment for those patients unfit for anesthesia. In short 980 diode LASER is safe, effective and good substitute for TURP.

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