



International Journal of Surgery Science

E-ISSN: 2616-3470

P-ISSN: 2616-3462

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www.surgeryscience.com

2020; 4(4): 108-111

Received: 19-08-2020

Accepted: 25-09-2020

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Efficacy and safety of thulium laser prostatectomy

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DOI: <https://doi.org/10.33545/surgery.2020.v4.i4b.837>

Abstract

Benign prostatic hyperplasia (BPH) is one of the most common diseases in middle-aged and elderly men causing lower urinary tract symptoms (LUTS). Patient with BPH presenting with recurrent urinary tract infection, renal insufficiency, recurrent gross hematuria, refractory acute urinary retention requires surgical treatment. Numerous surgical options are available for the treatment of BPH and with transurethral resection of the prostate (TURP) remaining the gold standard surgical treatment. Various studies showed newer modality Thulium laser enucleation prostatectomy is as effective as TURP.¹ Laser can be broadly classified in ablating lasers and cutting lasers. Nd: YAG laser and potassium-titanyl-phosphate (KTP) laser are the ablating lasers while holmium: yttrium-aluminum-garnet (Ho: YAG) laser, thulium laser and diode laser are the cutting lasers. Thulium laser is a continuous wave laser of wave length 2 micron producing clean and faster cuts and good hemostasis. This study puts in an effort to find the efficacy and safety of Thulium Laser Prostatectomy in patients with benign prostate hyperplasia.

Keywords: Efficacy, safety, thulium, laser prostatectomy

Introduction

Benign prostatic hyperplasia (BPH) is one of the most common diseases in middle-aged and elderly men causing lower urinary tract symptoms (LUTS). Patient with BPH presenting with recurrent urinary tract infection, renal insufficiency, recurrent gross hematuria, refractory acute urinary retention requires surgical treatment. Numerous surgical options are available for the treatment of BPH and with transurethral resection of the prostate (TURP) remaining the gold standard surgical treatment. Various studies showed newer modality Thulium laser enucleation prostatectomy is as effective as TURP.¹ Laser can be broadly classified in ablating lasers and cutting lasers. Nd: YAG laser and potassium-titanyl-phosphate (KTP) laser are the ablating lasers while holmium: yttrium-aluminum-garnet (Ho: YAG) laser, thulium laser and diode laser are the cutting lasers. Thulium laser is a continuous wave laser of wave length 2 micron producing clean and faster cuts and good hemostasis. After Thulium laser enucleation of prostate, prostate chips by morcellator suck in to suction machine and send for H.P.E. TURP syndrome is one of the commonest and dreaded complications of urological endoscopic surgery in perioperative period happened due to dilution of sodium through excessive absorption of irrigation fluid and from loss of sodium into the stream of irrigation fluid from the prostatic resection site. The IPSS is a good instrument to grade baseline symptom severity, assess the response to therapy, and detect symptom progression in men managed by watchful waiting. PVR urine normally ranges from 0.09 to 2.24 mL, with the mean being 0.53 mL. PVR is best viewed as a safety parameter. Men with significant PVR monitored more closely if they elect nonsurgical therapy. It can be measured noninvasively by transabdominal ultrasonography. Uroflowmetry is measurement of the rate of urine flow over time and an assessment of bladder emptying. Patients with a Qmax (peak flow rate greater than 15 mL/sec appear to have poorer treatment outcomes after prostatectomy than patient with Qmax of less than 15ml/sec.

This study puts in an effort to find the efficacy and safety of Thulium Laser Prostatectomy in patients with benign prostate hyperplasia.

Aims and objectives

- To study the efficacy and safety of Thulium Laser Prostatectomy in patients with benign prostate hyperplasia.

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Methodology

Study design: Hospital based cross-sectional Study

Study period: April 2019–August 2020.

Study setting: Department of Urology Father Muller Medical College, Mangalore.

Study population: All BPH patients requiring Thulium Laser Prostatectomy at our centre.

Sample size: 50 patients. Minimum of 25 patients requires as per statistics. 25 will undergo the TURP and 25 will undergo the Thulium laser (thulep)

Sampling Technique: Purposive sampling.

Inclusion criteria

Patient with BPH that requires surgical management due to refractory urinary retention, recurrent UTI, recurrent gross hematuria and renal insufficiency.

Exclusion criteria

1) Minimal LUTS improved with medical management of BPH.

- 2) Contraindication for transurethral prostatectomy with having complicated urethral stricture or patient who have undergone previous hypospadias repair.
- 3) Active urosepsis.
- 4) Hip joint pathology which precludes lithotomy position, like patient who have severe ankylosis of hip joint.
- 5) Non consenting patient

Method

1. Informed consent was taken.
2. Patient information - Detailed patient information and history obtained.
3. Pre operative uroflowmetry, serum PSA and USG prostate and post void.
4. Elective surgery planned in major operation theatre.
5. First dose of antibiotic given at the time of induction of anaesthesia (Ceftriaxone 1 gm i.v ATD).
6. In follow up period of one month uroflowmetry and IPSS will be seen.
7. IPSS (International Prostate Symptom Score)

Symptom	Not At All	<1 Time In 5	Less Than Half The Time	About Half The Time	More Than Half The Time	Almost Always	Your Score
1. Incomplete Emptying	0	1	2	3	4	5	
2. Frequency	0	1	2	3	4	5	
3. Intermittency	0	1	2	3	4	5	
4. Urgency	0	1	2	3	4	5	
5. Weak Stream	0	1	2	3	4	5	
6. Straining	0	1	2	3	4	5	
	None	1 Time	2 Times	3 Times	4 Times	≥5 Times	
7. Nocturia	0	1	2	3	4	5	

The total symptom score ranges from 0 to 35

Score 0 -7 Mild LUTS

8-19 Moderate LUTS

20-35 Severe LU

Results

Table 1: Comparison of pre and post operative values in each group separately

			N	Mean ± SD	Mean difference ± SD	t	P VALUE
TURP	Pair 1	preoperative HB	25	12.12±0.99	0.61±0.86	3.58	0.002
		Postoperative HB	25	11.5±1.31			
	Pair 2	preoperative CR	24	1.14±0.38	-0.14±0.81	-0.84	0.41
		postoperative CR	24	1.27±0.83			
	Pair 3	preoperative Na	25	135.16±4.43	0.04±3.16	0.06	0.95
		postoperative Na	25	135.12±4.76			
	Pair 4	preoperative k	25	4.51±0.48	-0.18±0.45	-1.99	0.058
		postoperative k	25	4.66±0.6			
	Pair 5	preoperative ipss	25	28.51±3.69	16.56±3.55	23.34	<0.001
		postoperative IPSS	25	11.95±3.17			
Thulep	Pair 1	preoperative HB	25	13.4±1.44	0.68±0.73	4.63	<0.001
		Postoperative HB	25	12.7±1.34			
	Pair 2	preoperative CR	25	1.1±0.56	0.04±0.16	1.36	0.188
		postoperative CR	25	1.04±0.48			
	Pair 3	preoperative Na	25	135.88±3.44	-0.24±2.71	-0.44	0.662
		postoperative Na	25	136.12±3.95			
	Pair 4	preoperative k	25	4.22±0.33	-0.32±0.52	-3.11	0.005
		postoperative k	25	4.56±0.51			
	Pair 5	preoperative ipss	25	27.86±3.81	16.72±3.25	25.75	<0.001
		postoperative IPSS	25	11.14±3.26			

Table 2: Complications

Crosstab					
		group			Total
		TURP	Thulep		
Complication		Count	15	16	31
		% within group	60.0%	64.0%	62.0%
	capsule perforation	Count	2	0	2
		% within group	8.0%	0.0%	4.0%
	clot retention, urgency	Count	1	0	1
		% within group	4.0%	0.0%	2.0%
	clot retention pod 3, fever	Count	0	1	1
		% within group	0.0%	4.0%	2.0%
	fever pod 1	Count	0	1	1
		% within group	0.0%	4.0%	2.0%
	hypotension, acute kidney injury	Count	1	0	1
		% within group	4.0%	0.0%	2.0%
	retention	Count	1	0	1
		% within group	4.0%	0.0%	2.0%
	stricture	Count	1	0	1
		% within group	4.0%	0.0%	2.0%
	TUI	Count	0	1	1
		% within group	0.0%	4.0%	2.0%
	TUI, fever	Count	0	1	1
		% within group	0.0%	4.0%	2.0%
urinary incontinence	Count	0	1	1	
	% within group	0.0%	4.0%	2.0%	
urinary retention	Count	0	1	1	
	% within group	0.0%	4.0%	2.0%	
UTI after 2 month	Count	1	0	1	
	% within group	4.0%	0.0%	2.0%	
Ventricular tachycardia, intraop CPR	Count	1	0	1	
	% within group	4.0%	0.0%	2.0%	
Total		Count	25	25	50
		% within group	100.0%	100.0%	100.0%

Discussion

Vargas *et al.* (2014) [2] Published outcomes of 150W ThuVP with 6 months of follow up in 52 patients in Spain. Significant improvements were seen in Qmax (mean improvement 9.33 ml/s) and mean IPSS (reduction by 17 points). Immediate complications were recorded at 1 month follow up and included acute urinary retention (one patient), urinary tract infection (two patients) and gross hematuria (two patients). The only late complication observed (assessed at the 6 month mark) was bladder neck contracture, which was seen in one patient. Pariser *et al.* (2014) [3] First study to be published on outcomes on any technique for thulium laser prostatectomy in a North American patient population. The majority (78%) of patient were discharged home the same day of surgery. At 3 months, mean Qmax and PVR were significantly improved. At 3 months, IPSS was 8.7 ± 6.5 compared with 19.9 ± 8.0 at baseline. Although there was a significant change in hemoglobin from baseline (13.1–12.4g/dl), no patients received blood transfusions. Netsch *et al.* [4] Conducted Thulium laser on 56 patient. Transfusion required in 7.1% cases. In there study mean prostate size was 50 gm and mean operative time was 61.5 minute. Sun *et al.* [5]. In there study at multiple centers study on long-term results of thulium laser resection of the prostate on 2016 patient showed IPSS decreased by 72.3% and Qmax had increased by 178% and PVR had decreased by 81.8% by the end of follow up. In postoperative period. 3.1% experienced UTI, total of 9% patients had some type of temporary urinary incontinence, 3% had clot retention requiring bladder irrigation and in 0.6% of patient transfusion was required. Rausch *et al.* [6] performed ThuLEP between 2008 and 2012 in 234 patients with a mean

prostate size of 84.8 ± 34.9 ml using the RevoLix. Overall the 30-day complication rate was 19.7%. In the perioperative period, only 3% of patients experienced a UTI, 6.8% required catheter replacement and 0.9% required a blood transfusion. In the postoperative period, 3% experienced urgency incontinence and 2.1% experienced bladder neck stricture. Gross *et al.* [7] studied Complications and early postoperative outcome in 1080 patients after thulium vapoenucleation of the prostate at a single institution with mean prostate size 51gm and mean operative time was 56 min 8.4% experienced UTI and 1.7% of patient required transfusion. Bach *et al.* [8] In there short-term study 88 patients with a prostate volume of 61.3 ± 24.0 cm³ underwent vapoenucleation of the prostate with the 70W RevoLix. Significant improvements were seen at discharge in Qmax and PVR.

Szlauer *et al.* [9] found In contrast to some other laser systems, however the bare-ended quartz fibers of the thulium laser can be reused many times, which leads to almost negligible running costs. Xia *et al.* [10] found duration of hospital stay is less and drop of hb postoperative less in thulium laser turp than conventional turp. No significant difference found in complication rate and operative time. Yang *et al.* [11] found duration of hospital stay is less and drop of hb postoperative less in thulium laser turp than bipolar turp. No significant difference found in complication rate. Chang *et al.* [12] A total of 29 patients were assigned to have ThuVEP and 30 to TURP. Voided volume, Qmax, PVR and mean flow rate all improved significantly in both groups and there were no differences in IPSS or QoL after 1 year of follow up. Further they found complication rate that is blood transfusion required less in

thulium laser turp than bipolar turp. Cui *et al.* [13] performed a randomized trial comparing the safety and efficacy of standard TURP compared with TmLRP found no significant difference found in complication rate in thulium laser turp than bipolar turp.

Conclusion

In this study it was found that the procedure was very effective and safe. This study paves the way for further studies in all over the country to find the best ways to treat this pathology.

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