

# MONOPOLAR VERSUS LASER (THUFLEP, HOLEP) ENDOSCOPIC ENUCLEATION OF THE PROSTATE: A SINGLE-CENTER EXPERIENCE

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## INTRODUCTION

Endoscopic enucleation has been recognized as a minimally invasive treatment modality for men with benign prostatic hyperplasia (BPH) including those with large-sized glands (>80 cc). The aim of our study was to compare the efficacy and functional outcomes of three different techniques of endoscopic enucleation of the prostate including monopolar enucleation, holmium laser enucleation (HoLEP), and thulium fiber laser enucleation (ThuFLEP).

## MATERIALS AND METHODS

Monopolar enucleation was performed with a monopolar electrosurgical generator, hook-electrode and straight loop. For HoLEP, we used VersaPulse (Lumenis, Israel) with a 550  $\mu$ m laser fiber. For ThuFLEP, we used thulium fiber laser Urolase (NTO IRE-POLUS, Russia) (fig. 1) and a 600  $\mu$ m fiber. Note that the wavelength of thulium laser is closer to the water absorption peak (fig 2). This fact explains two features specific to thulium enucleation: shallow penetration depth not exceeding 2  $\mu$ m, and a high energy absorption rate which results in instantaneous tissue vaporization. Another important feature of the laser is its operation in continuous wave mode which allows for excellent hemostasis as well as precise and shallow incisions. Insignificant time decrease could also potentially be attributed to the higher level of tissue vaporization during thulium enucleation.



WAVELENGTH 1.94  $\mu$ m ENERGY 8 JOULE MAX. POWER 120 W

FIGURE 1. TM-FIBER LASER

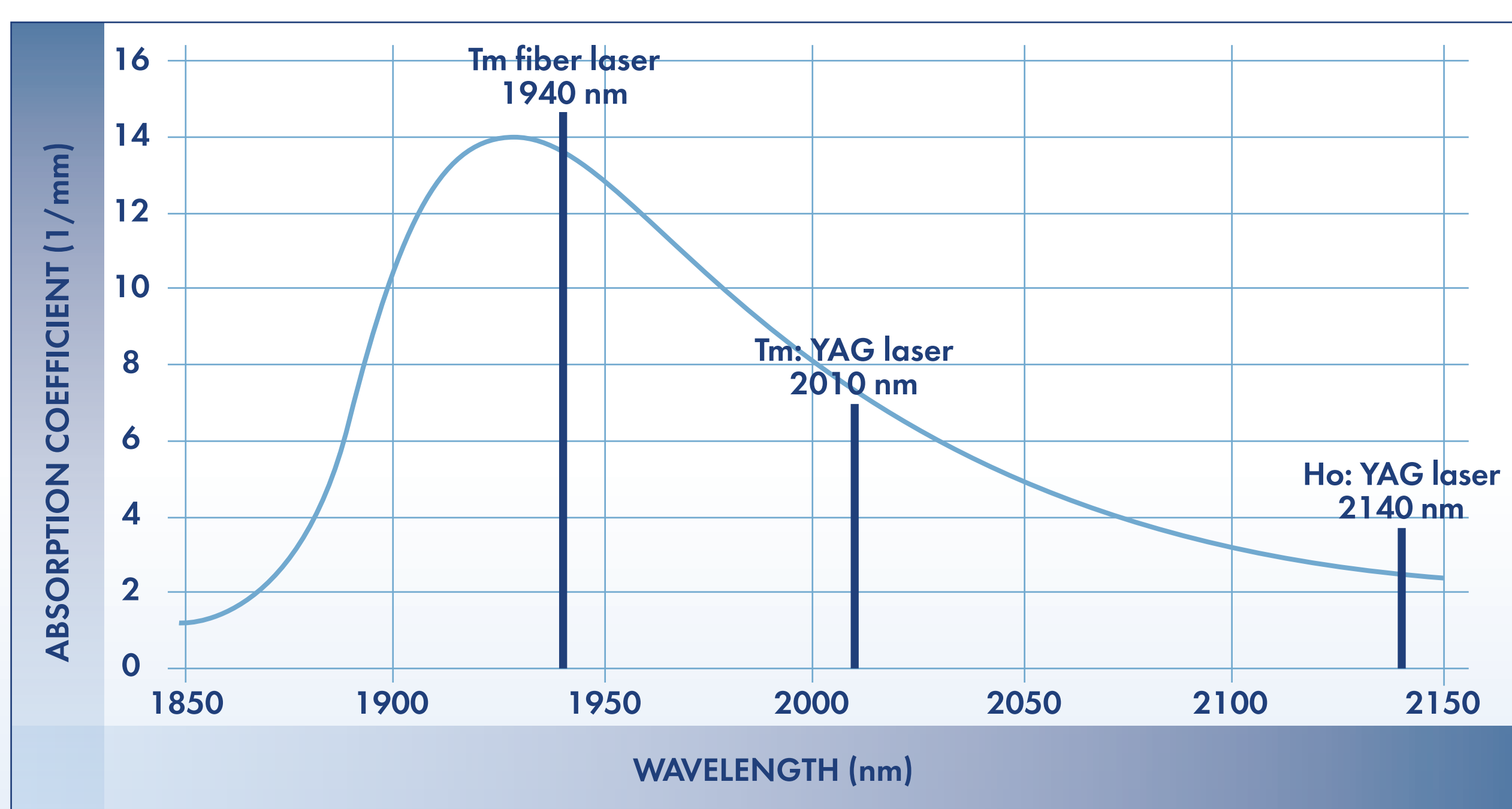
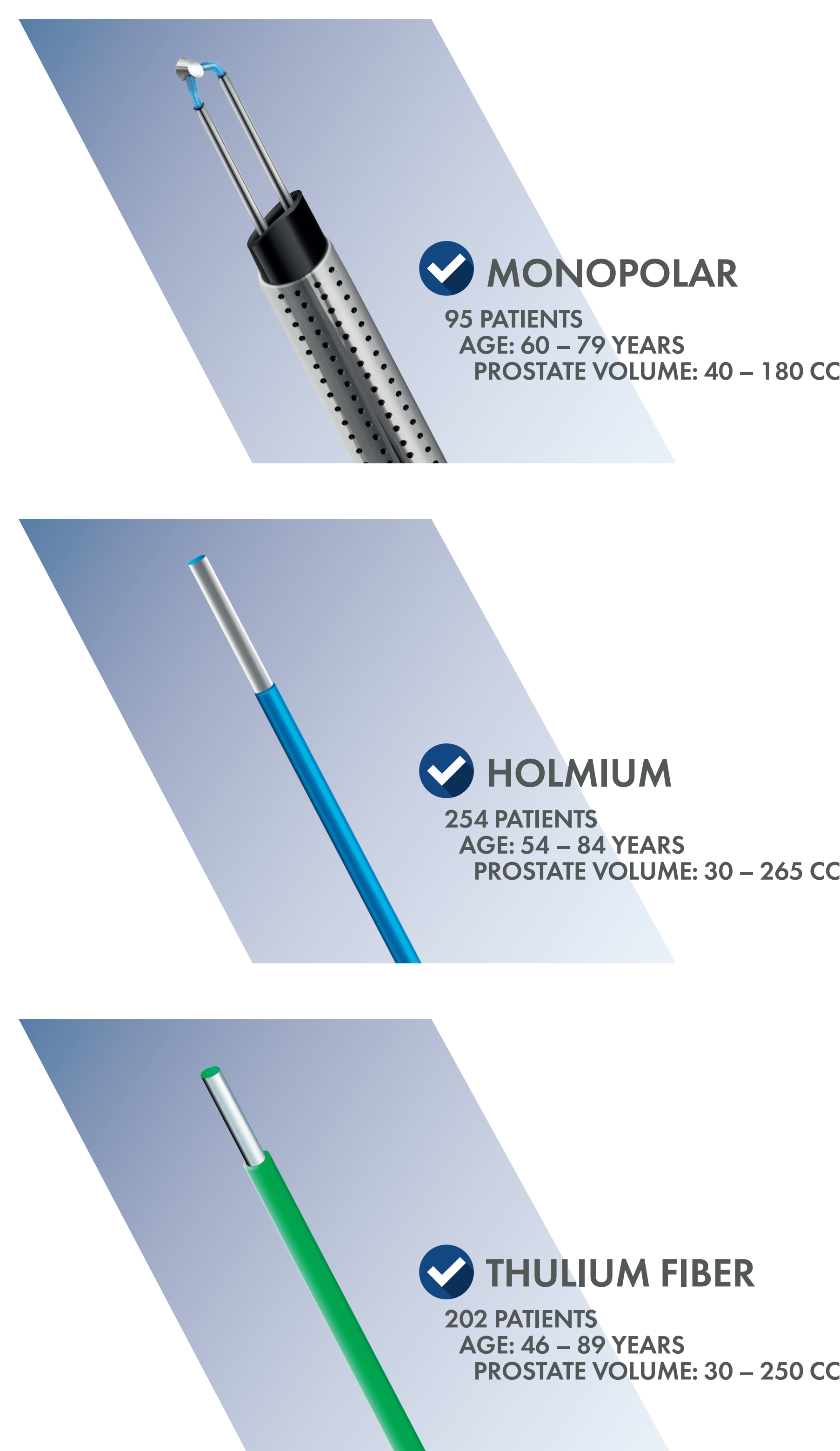


FIGURE 2. WATER ABSORPTION

### TREATMENT GROUPS



## RESULTS

ACCORDING TO OUR RESULTS, MONOPOLAR ENUCLEATION TIME EXCEEDED MEAN HOLEP AND THUFLEP SURGERY TIMES

It is important to note that while the process of learning the three techniques was simultaneous, MEP was the most difficult. In contrast to thulium laser enucleation techniques with a learning curve of 8 to 30 surgeries, MEP required more surgeries to achieve proficiency. However, this may be caused by higher mean enucleation time in MEP ( $p < 0.01$ ).

THERE WERE NO SIGNIFICANT DIFFERENCES IN RADICALITY OF SURGERY WHICH IS INDICATED BY COMPARABLE POSTOPERATIVE PROSTATE VOLUME PARAMETERS (Table 1)

Amongst Clavien-Dindo grade III complications we observed one case of TURP-syndrome after monopolar enucleation which we believe may have been caused by a large adenoma (130 cc). The rate of immediate stress urinary incontinence (following catheter removal) [grade I] was 4.3% for HoLEP, 2.4% for ThuLEP, and 5.2% for MEP and decreased to 1.2%, 0.5%, and 2.1%, respectively, three months after surgery. Six months after surgery, this rate didn't change. In all cases it was considered mild, occurring only during coughing or sneezing. (Table 2). Six months after surgery, we evaluated IPSS, Qmax, quality of life (QoL), and post-void residual volume. All the groups showed statistically significant improvement after surgery (Table 3).

THIS, IN OUR OPINION, MAKES MONOPOLAR ENUCLEATION A SUITABLE AND EFFICACIOUS TECHNIQUE FOR THE MANAGEMENT OF PROSTATIC HYPERPLASIA >80 CC THAT MAY RIVAL OTHER METHODS OF EEP

Still, this aspect requires further study as the amount of available data on MEP is small.

	HoLEP (n = 254)	Monopolar Enucleation (n = 95)	ThuLEP (n = 202)	P
Mean Surgery Time (min)	75.9 ( $\pm$ 35.3)	85.9 ( $\pm$ 39.1)	71.6 ( $\pm$ 31.3)	$p < 0.01^*$
Enucleation Time (min)	50.1 ( $\pm$ 22.0)	59.9 ( $\pm$ 27.4)	49.0 ( $\pm$ 18.4)	$p < 0.01^*$
Morcellation Time (min)	24.5 ( $\pm$ 13.1)	26.5 ( $\pm$ 14.8)	26.6 ( $\pm$ 11.5)	0.28
Mean Mass of Extracted Tissue (g)	74.2 ( $\pm$ 35.9)	70.1 ( $\pm$ 28.6)	75.6 ( $\pm$ 26.6)	0.35
Catheterization Time (days)	1.3 ( $\pm$ 0.6)	3.8 ( $\pm$ 1.7)	1.3 ( $\pm$ 0.5)	$p < 0.01^*$
Hospital Stay (days)	3.3 ( $\pm$ 0.6)	6.9 ( $\pm$ 1.8)	3.4 ( $\pm$ 0.6)	$p < 0.01^*$
Preoperative haemoglobin (g/dL)	13.6 ( $\pm$ 1.0)	13.5 ( $\pm$ 1.1)	13.5 ( $\pm$ 0.9)	0.382
Postoperative hemoglobin (g/dL)	12.1 ( $\pm$ 1.3)	11.4 ( $\pm$ 1.5)	12.0 ( $\pm$ 1.0)	0.382
Haemoglobin Decrease (g/dL)	1.6 ( $\pm$ 0.8)	3.2 ( $\pm$ 1.0)	1.6 ( $\pm$ 0.3)	$p < 0.01^*$
Preoperative sodium (mmol/L)	139.6 ( $\pm$ 6.8)	138.9 ( $\pm$ 7.2)	140.0 ( $\pm$ 7.3)	0.539
Postoperative sodium (mmol/L)	138.2 ( $\pm$ 7.0)	134.9 ( $\pm$ 6.4)	138.7 ( $\pm$ 7.3)	$p < 0.01^*$
Sodium Decrease (mmol/L)	1.4 ( $\pm$ 1.2)	3.9 ( $\pm$ 1.7)	1.1 ( $\pm$ 1.1)	$p < 0.01^*$

TABLE 1. PRE-, INTRA- AND POSTOPERATIVE PARAMETERS IN ALL THREE COHORTS OF PATIENTS

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Complication	Treatment	HoLEP (n = 254)	MEP (n = 95)	ThuLEP (n = 202)	P
CLAVIEN-DINDO GRADE I COMPLICATIONS					
Postoperative Bleeding, n (%)	Prolonged bladder irrigation	3 (1.2)	4 (4.2)	2 (1.0)	0.07
Clot Retention, n (%)	Evacuation of clots through the catheter	12 (4.7)	8 (8.4)	9 (4.4)	0.12
Ureteral orifices damage, n (%)	Upper urinary tract stenting/ Observation	2	0	1	0.41
CLAVIEN-DINDO GRADE II COMPLICATIONS					
Bleeding, Required Blood Transfusion, n (%)	Blood transfusion	0	1 (1.1)	0	0.32
Severe Urinary Tract Infection, n (%)	Prolonged antibiotics therapy (more than 2 weeks)	5 (1.9)	1 (1.1)	3 (1.5)	0.35
CLAVIEN-DINDO GRADE III COMPLICATIONS					
Incomplete Morcellation (due to Bleeding), n (%)	Repeat morcellation	8 (3.1)	5 (5.2)	5 (2.4)	0.26
Bladder Tamponade, n (%)	Cystoscopy with clot evacuation, coagulation of bleeding vessels	2 (0.8)	1 (1.1)	1	0.47
TURP-Syndrome, n (%)	Additional treatment in intensive care unit	0	1 (1.1)	0	0.32

TABLE 2. SHORT-TERM POSTOPERATIVE COMPLICATIONS IN PATIENTS IMMEDIATELY FOLLOWING SURGERY

	HoLEP	MEP	ThuLEP	P
IPSS Pre-Op, score	21.9 ( $\pm$ 1.1)	21.5 ( $\pm$ 1.3)	21.8 ( $\pm$ 1.6)	0.19
IPSS Post-Op, score	10.3 ( $\pm$ 2.5)	11.3 ( $\pm$ 3.1)	10.9 ( $\pm$ 3.0)	0.46
P	$p < 0.01$	$p < 0.01$	$p < 0.01$	
QoL Pre-Op, score	4.1 ( $\pm$ 0.8)	4.0 ( $\pm$ 0.8)	4.0 ( $\pm$ 0.8)	0.47
QoL Post-Op, score	1.7 ( $\pm$ 0.7)	1.6 ( $\pm$ 0.6)	1.8 ( $\pm$ 0.6)	0.09
P	$p < 0.01$	$p < 0.01$	$p < 0.01$	
Qmax, Pre-Op, mL/s	7.5 ( $\pm$ 1.7)	7.9 ( $\pm$ 1.8)	7.6 ( $\pm$ 1.9)	0.15
Qmax, Post-Op, mL/s	16.1 ( $\pm$ 4.0)	16.6 ( $\pm$ 3.0)	16.2 ( $\pm$ 3.3)	0.23
P	$p < 0.01$	$p < 0.01$	$p < 0.01$	
PVR Pre-Op, mL	72.4 ( $\pm$ 28.6)	69.5 ( $\pm$ 25.4)	70.1 ( $\pm$ 28.7)	0.62
PVR Post-Op, mL	17.3 ( $\pm$ 12.1)	18.0 ( $\pm$ 11.0)	17.3 ( $\pm$ 11.7)	0.55
P	$p < 0.01$	$p < 0.01$	$p < 0.01$	

TABLE 3. POSTOPERATIVE PARAMETERS AT 6 MONTHS FOLLOW-UP AFTER SURGERY

## CONCLUSION



EET techniques are highly effective in management of BPH



Laser EEPs had lowest complication rates



ThuFLEP was as effective as HoLEP



MEP took more time than laser EEPs



MEP required longer catheterization and hospital stay