

# Transurethral Monopolar Versus Bipolar Resection Of The Prostate: A Prospective Randomized Study

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## **Abstract:**

**Background:** Transurethral Resection of the prostate (TURP) is a recently developed procedure. In which the prostate is transurethrally enucleated and resected using a bipolar and monopolar resectoscope. The aim of this study is to compare efficacy and safety of monopolar (M-TURP) versus bipolar (B-TURP) in medium volume prostate. **Methods:** The study was conducted in the Department of Urology, Zagazig University Hospitals, between the period of March 2018 and February 2019 on 24 patients divided into 2 groups (12 patients in monopolar group and 12 patients in bipolar group). **Results:** During the operative period, resected tissue was significantly higher in monopolar TURP group compared to bipolar TURP group. There was a significant increase in the catheter time and hospital stay among patients in monopolar TURP group compared to bipolar TURP group. Regarding post-operative follow up of patients, there was no significant difference in the mean values of IPSS, Qmax and PVR and IIEF between both groups.

**Conclusions:** Our study concluded that, monopolar Resection of prostate adenoma is feasible and effective, but associated with high complications, Moreover B-TURP associated with lower complications and hospital stay, catheter time and less Hg and Na loss than M-TURP, Moreover resected prostatic tissue was significant higher in M-TURP than B-TURP.

**Keywords:** Resection of The Prostate, benign prostatic hyperplasia, medium volume prostate.

## **I. INTRODUCTION**

Transurethral resection of the prostate (TURP) has long been considered the gold standard for treatment of symptomatic benign prostatic hyperplasia (BPH) when medical therapy fails<sup>[1]</sup>. TURP is characterized by immediate removal of the infravesical obstruction and a long-lasting improvement on the symptoms and voiding parameters<sup>[2]</sup>.

The ideal surgical treatment for moderate prostates (30–80 ml) by monopolar TURP (M-TURP) which considered as both clinically and cost effective<sup>[3,4]</sup>. However, the M-TURP procedure is associated with perioperative complications such as bleeding, bladder neck contractures or transurethral resection syndrome, urethral strictures<sup>[5]</sup>. However, despite of the improvement made for TURP surgical equipment, the principle of

this endoscopic surgery and some of the subsequent complications such as the high rate of postoperative recurrence remain unchanged, calling for a substantial innovation on the surgical technique<sup>[6]</sup>.

Another alternative of classic TURP, the endoscopic Resection, was developed in an attempt to overcome these problems. Bipolar transurethral Resection of the prostate (B-TURP) is consisting of the Resection of the adenoma by conventional bipolar energy and dedicated loops<sup>[7,8]</sup>. Bipolar Resection has its own advantage in that the equipment is easily accessible and highly cost-efficient<sup>[9]</sup>. However, this procedure has not been widely accepted and still a need to upgrade this technique to improve its efficacy and safety<sup>[10]</sup>.

In developing countries not all centers are equipped with bipolar machines, so the idea to use a commonly available power source like monopolar was raised as an alternative for bipolar in Resection, So in moderate sized glands which can be enucleated is monopolar Resection is possible as bipolar. This study aimed to compare the efficacy and safety of monopolar (M-TURP) versus Bipolar (B-TURP) in the management of medium volume prostate. The aim of the study is to compare monopolar versus bipolar TURP for management of male LUTS secondary to medium volume prostate.

## II. METHODS

The study was conducted in the Department of Urology, Zagazig University Hospitals, between the period of March 2018 and February 2019. Our study included a total of 24 patients with symptomatic benign prostatic hyperplasia. The patients divided randomly into two equal groups; Group (1): included 12 patients, treated by M-TURP and Group (2) also included 12 patients, treated by B-TURP. All male patients with LUTS due to BPH scheduled for endoscopic prostatectomy with prostate volume 50-80 cm on TRUS.

**Inclusion criteria:** Absolute indication for active intervention for BPH. Bothersome urinary symptoms not responding to medical therapy with alpha blockers. Patients with BPH (50 – 80gm) scheduled for Endoscopic management. **Exclusion criteria:** Uncontrollable Bleeding tendency. Associated bladder or urethral pathology. Previous prostatectomy. Neurologic disease. Skeletal deformity Prevent lithotomy position. All patients undergone for complete history taking including IPSS, clinical examination including DRE, pelvic-abdominal U/S, PVR, TRUS. Some serum biochemical analysis as Hb, serum sodium and total PSA were performed pre and post operative techniques. Outcomes of preoperative parameters, intra-operative and post-operative measures were detected. Patients follow up were recorded post-operative at 1, 3 and 6 months. Also, changes assessment in the monopolar and bipolar TURP were identified.

Written Informed consent was taken from the patient and relative to participate in the study. Approval for performing the study was obtained from Urology Departments, Zagazig University Hospitals after taking Institutional Review Board (IRB) approval.

### Method of Study:

Institutional Ethics Committee approval was obtained. Informed consent was taken from all patients who underwent surgery. Patients were randomized closed method (1:1) into two groups of 12 each to undergo Transurethral Resection Prostate either with Monopolar TURP (Group 1) or saline bipolar transurethral Resection (Group 2). We used the Erbe Medical UK Ltd Electrosurgery System and used thick loop for Resection for bipolar

group. The settings we employed were 160W cutting and 80W coagulation for bipolar Resection. Erbe Medical UK Ltd Electrosurgery monopolar system was used for monopolar TURP and the setting used was 100W for cutting and 60W for coagulation in monopolar loops. (Figure 1)

### **Transurethral Technique Both Monopolar And Bipolar Resection:**

The process of Resection begin using 24fr-continuous flow resectoscope with saline irrigation and plasmakinetic device. In the presence of median lobe, the procedure starts with resection of few chips at 5 and 7 o'clock from the bladder neck to verumontanum and deep till reaching the prostatic capsule. The resectoscope tip was inserted into the cleavage plane between adenoma of the median lobe and capsule. The gland is dissected from the capsule in a retrograde fashion so the median lobe is detached and pushed to the bladder.

The next step started with deep longitudinal incision at 12 o'clock till reach the capsule to separate the two lateral lobes from each other, then from the 5 and the 7 o'clock at the apex of the prostate in upward and retro grade manner till the two lateral lobes are detached completely and pushed to the bladder. The process of Resection is accompanied with immediate electro cauterization of any source of bleeding at the capsule.

In the absence of median lobe, the procedure starts with deep longitudinal resection at 12 , 5 and 7 o'clock from the bladder neck till the veru and down to the capsule. Then both lobes were enucleated as mentioned before. Furosemide (20 mg /hour, IV) is administered after one hour of surgery to Correct the fluid absorption and provide clear vision.

Once the lobes have been enucleated into the bladder, hemostasis within the prostatic fossa is ensured. In the absence of a morcellator, the lobes have been left attached by their mucosal tags and resected *in situ* using the standard resection loop.

When resection was completed, all adenoma fragments were extracted using an Ellik evacuator, Following completion of the procedure, a 22-24 Fr 3 way Foley's urethral catheter is left in the bladder.

The Resection time of both procedures were calculated from the period of initiation of Resection to end procedure, any intraoperative complication were noted and irrigation was started and continued postoperatively, the irrigation fluid used in Bipolar Resection was saline. After the procedure specimens were packed properly and sent to pathology department for histopathological examination.

### **Postoperative:**

Continuous bladder irrigation with saline until hematuria clears. The specimen was measured then prepared to be sent for histopathological examination. Blood samples were taken for assessment of hemoglobin and serum Na immediately after the operation. The patient continues on parenteral antibiotic till catheter removal. Removal of the catheter was done according to the hospital protocol in both groups within 24 hours after urine becomes clear.

### **The following data were recorded:**

- 1) Any complications in the postoperative period [clot retention, postoperative bleeding, acute urinary retention, recatheterization... etc].
- 2) Catheter time.

3) Hospital stay: The patient was discharged on oral antibiotic (quinolones) and analgesic when needed. The patient was instructed to avoid straining and to come back after 1 week to receive the result of histopathology.

### Statistical analysis

Data collected throughout history, basic clinical examination, laboratory investigations and outcome measures coded, entered and analyzed using Microsoft Excel software. Data were then imported into Statistical Package for the Social Sciences (SPSS version 20.0) (Statistical Package for the Social Sciences) software for analysis. According to the type of data qualitative represent as number and percentage, quantitative continues group represent by mean  $\pm$  SD, the following tests were used to test differences for significance: difference and association of qualitative variable by Chi square test (X<sup>2</sup>). Differences between quantitative independent groups by t-test or Mann Whitney, paired by paired t or sign. P value was set at  $< 0.05$  for significant results and  $< 0.001$  for high significant result.

## III. RESULTS:-

### Consort flow chart of the participant

Age was distributed between groups as  $66.91 \pm 5.86$  and  $67.16 \pm 5.5$  with no significant difference between groups regard age, also there was no significant difference between groups regard all other parameters.

### Table (1)

Significant change except in K and International Index Erectile functional **Table (2)**

Resected tissue was significantly larger in monopolar group, No significant difference in operation time between groups. **Table (3)**

Catheter time and Hospital stay significantly longer in Monopolar group which were  $3.08 \pm 0.66$  in monopolar Versus  $2.41 \pm 0.66$  in bipolar and  $43.0 \pm 6.17$  in monopolar Vs  $33.0 \pm 9.04$  in bipolar. Prostate size no significant different between both groups, which was a little larger in bipolar group. **Table (4)**

There were statistically significant differences between the both groups regarding intra and post-operative complications, 2 cases (16.7%) needed blood transfusion (one unit of packed RBCs) due to intraoperative bleeding in M-TURP group. 1 case (8.3%) with TUR syndrome in M-TURP group, due to the decreased serum sodium (Na<sup>+</sup>) levels. There are 3 cases (25.0%) with capsular perforation in M-TURP group VS 2 cases (16.7%) in B-TURP group during Resection which no significant different between to group. The cases with urge incontinence in both groups resolved within 3 months with the aid of anti-mascarinic drugs. **Table (5)**

**Table (1): Basal preoperative demographic and clinical data distribution between studied groups**

|  | Monopolar Group<br>(N=12) | Bipolar Group<br>(N=12) | t/ Mann<br>Whitney | P |
|--|---------------------------|-------------------------|--------------------|---|
|--|---------------------------|-------------------------|--------------------|---|

|                 |             |            |        |       |
|-----------------|-------------|------------|--------|-------|
| Age             | 66.91±5.86  | 67.16±5.5  | -0.108 | 0.915 |
| PVR (ml)        | 133.75±3.53 | 135.0±3.77 | -0.683 | 0.506 |
| TRUS Value (gm) | 68.33±9.95  | 69.0±9.54  | -0.167 | 0.869 |
| Qmax Pre        | 7.08±0.51   | 6.91±0.66  | 0.684  | 0.501 |
| Pre IPSS        | 32.08±2.31  | 33.0±1.85  | -1.070 | 0.296 |
| Pre IIEF        | 21.58±1.33  | 21.91±1.24 | -0.658 | 0.517 |

**Table (2) : Change assessment in monopolar and bipolar group at 6 month**

|                 | Mean      |           | Paired t | P      |
|-----------------|-----------|-----------|----------|--------|
|                 | Pre       | Post      |          |        |
| Monopolar Group |           |           |          |        |
| HB              | 12.1±0.7  | 9.8±0.4   | 12.186   | 0.00** |
| HTC             | 49.9±1.1  | 43.1±1.0  | 11.095   | 0.00** |
| Na              | 140.4±2.8 | 120.2±2.1 | 20.136   | 0.047* |
| K               | 3.9±0.2   | 4.0±0.2   | 0.506    | 0.623  |
| Qmax            | 7.0±0.5   | 22.6±0.7  | -74.630  | 0.00** |
| IPSS            | 32.0±2.3  | 8.1±0.9   | 47.501   | 0.00** |
| IIEF            | 21.5±1.3  | 20.6±1.2  | -0.432   | 0.674  |
| TRUS            | 68.3±9.9  | 25.0±4.3  | 32.136   | 0.049* |
| Bipolar Group   |           |           |          |        |
| HB              | 12.3±0.7  | 10.6±0.8  | 9.974    | 0.00** |
| HTC             | 50.4±1.3  | 44.5±1.0  | 5.461    | 0.00** |
| Na              | 140.5±2.5 | 135.1±1.7 | -2.071   | 0.049* |
| K               | 4.0±0.2   | 3.9±0.2   | 1.121    | 0.286  |

|      |          |          |         |        |
|------|----------|----------|---------|--------|
| Qmax | 6.9±0.6  | 22.7±0.9 | -56.625 | 0.00** |
| IPSS | 33.0±1.8 | 7.0±0.9  | 46.382  | 0.00** |
| IIEF | 21.9±1.2 | 20.5±1.1 | 1.541   | 0.152  |
| TRUS | 69.0±9.5 | 29.0±3.1 | 24.136  | 0.00** |

**Table (3) : Resected tissue and operative time**

|                          | <b>Monopolar Group<br/>(N=12)</b> | <b>Bipolar Group<br/>(N=12)</b> | <b>t</b> | <b>P</b> |
|--------------------------|-----------------------------------|---------------------------------|----------|----------|
| Resected tissue (gm)     | 45.5±3.94                         | 33.5±2.01                       | 4.127    | 0.001**  |
| Operative time (minutes) | 75±3.09                           | 72±3.0                          |          | 0.09     |

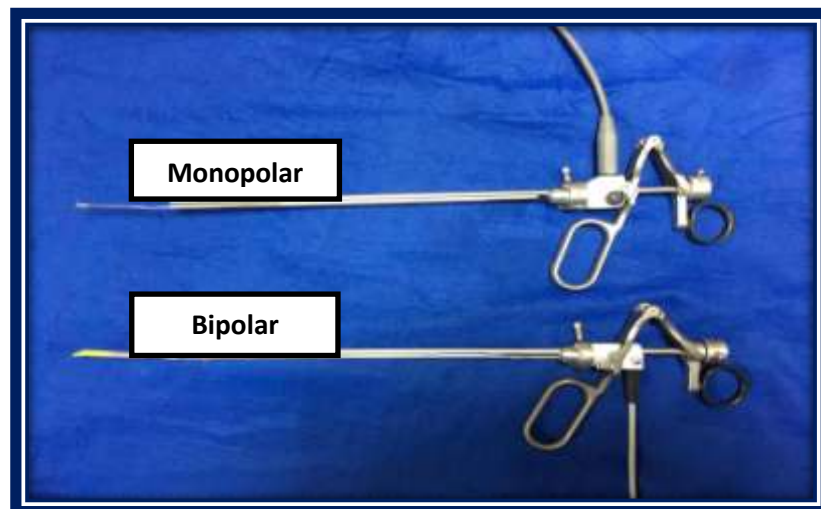
**Table (4) : Catheter time , hospital and prostate size determined by TRUS at 6 month**

|                                                  | <b>Monopolar Group<br/>(N=12)</b> | <b>Bipolar Group<br/>(N=12)</b> | <b>T</b> | <b>P</b> |
|--------------------------------------------------|-----------------------------------|---------------------------------|----------|----------|
| Catheter time (days)                             | 4.08±0.66                         | 2.41±0.66                       | 2.443    | 0.023*   |
| Hospital stay (hours)                            | 43.0±6.17                         | 33.0±9.04                       | 3.162    | 0.005*   |
| Estimate prostate weight (gm) by TRUS at 6 month | 25±4.3                            | 29±3.1                          |          | 0.070    |

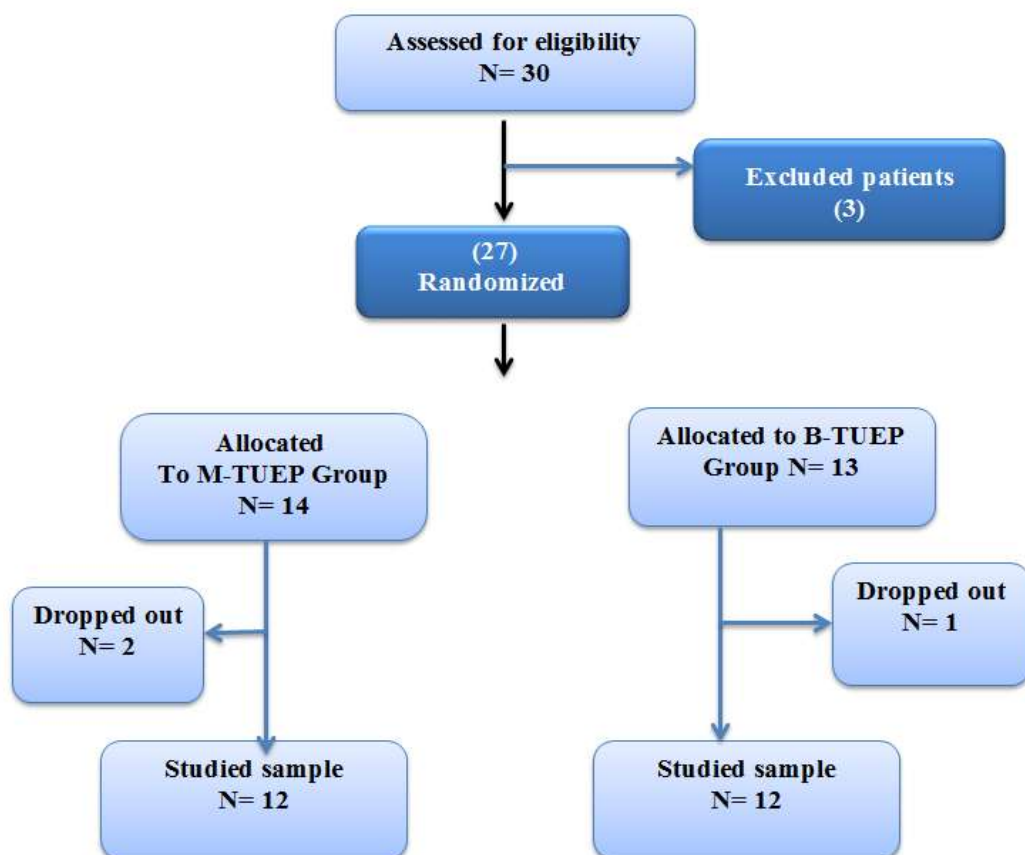
**Table (5) : Intra and post operative complications**

|                         | <b>Mono-polar<br/>(group)</b> |          | <b>Bipolar (group)</b> |          | <b>X<sup>2</sup></b> | <b>P</b> |
|-------------------------|-------------------------------|----------|------------------------|----------|----------------------|----------|
|                         | <b>N</b>                      | <b>%</b> | <b>N</b>               | <b>%</b> |                      |          |
| Intraoperative bleeding | 2                             | 16.7     | 0                      | 0.0      | 14.7                 | 0.0001** |
| Blood transfusion       | 2                             | 16.7     | 0                      | 0.0      | 14.7                 | 0.0001** |
| Capsular perforation    | 3                             | 25.0     | 2                      | 16.7     | 1.65                 | 0.19     |
| UTI                     | 2                             | 16.7     | 3                      | 25.0     | 1.65                 | 0.19     |

|                                     |   |      |   |      |      |      |
|-------------------------------------|---|------|---|------|------|------|
| Urge incontinence at first 3 months | 5 | 41.6 | 4 | 33.3 | 0.99 | 0.31 |
| TUR syndrome                        | 1 | 8.3  | 0 | 0.0  | 31.1 | 0.11 |



**Figure 1:** Working Elements With Bipolar And Monopolar loops



**Consort flow chart of the participant**

#### IV. Discussion:

Operative time is an important efficacy parameter that should be discussed when comparing M-TURP and B-TURP. In our study the mean operative time was  $75 \pm 3.09$  minutes in M-TURP group and  $72 \pm 3.0$  minutes in B-TURP group it was little shorter in B-TURP group which was not significant.

The removed prostatic weight is another important efficacy parameter that should be discussed when comparing (M-TURP) and (B-TURP). In our study, the mean prostate gland size as measured by TRUS was  $68.33 \pm 9.95$  gm. in monopolar group and  $69.0 \pm 9.54$  gm. in bipolar group. The mean removed prostatic weight was  $45.5 \pm 3.94$  and  $33.5 \pm 2.01$  gm.

In our study two case (16.7 %) in the M-TURP group needed blood transfusion due to intra operative bleeding, but no cases needed that in the B-TURP group, However there was a significant difference between the two groups. Post-operative HB was significantly lower in M-TURP group ( $9.88 \pm 0.46$  gm./dl in M-TURP VS  $10.69 \pm 0.83$  gm./dl in B-TURP) ( $P=0.008$ ). The post-operative haemoglobin loss was significantly higher in the same group ( $2.27 \pm 0.3$  in M-TURP VS  $1.66 \pm 0.1$  in B-TURP) ( $P=0.00$ ).

Concerning hospital stay, in our study M-TURP group was significantly longer which was  $43.0 \pm 6.17$  hrs. In M-TURP vs  $33.0 \pm 9.04$  hrs. In B-TURP ( $p=0.005$ ). In study done by Pansadoro and colleges (2017) hospital stay duration was  $3.72 \pm 1.44$  days respectively in monopolar Resection prostate.

In our study TUR syndrome occurred in 1 patient of M-TURP group. Post-operative Na level was lower in M-TURP group ( $120.25 \pm 2.17$  mmol/l in M-TURP VS  $140.1 \pm 1.78$  mmol/l in B-TURP) ( $P=0.070$ ). The post-operative loss was significantly higher in M-TURP ( $20.16 \pm 0.67$  in M-TURP VS  $0.1 \pm 0.79$  in B-TURP) ( $P=0.00$ ).

In our study we found the preoperative values of IPSS, Qmax, PVR, and IIEF were  $34.08 \pm 2.31$ ,  $9.08 \pm 0.51$ ,  $133.75 \pm 3.53$ , and  $18.58 \pm 1.33$ , respectively among patients in monopolar TURP group and the mean of this parameters were  $33.0 \pm 1.85$ ,  $9.91 \pm 0.66$ ,  $135.0 \pm 3.77$ ,  $69.0 \pm 9.54$  and  $18.91 \pm 1.24$ , respectively in bipolar TURP group which was not significant.

The obtainable Follow up data regarding the mean values of post-operative Qmax in 1st, 3rd, 6th months ( $19.33 \pm 1.3$ ,  $21.5 \pm 0.79$  and  $22.16 \pm 0.71$  in monopolar group vs  $19.58 \pm 1.44$ ,  $21.75 \pm 1.05$  and  $22.17 \pm 0.93$  in bipolar group) showed no significant difference between M-TURP and B-TURP groups respectively. The mean values of IPSS follow up are ( $10.08 \pm 0.66$ ,  $9.41 \pm 0.51$  and  $8.16 \pm 0.93$  vs  $9.21 \pm 0.9$ ,  $9.25 \pm 0.62$  and  $7.08 \pm 0.9$ ) showed no significant difference between M-TURP and B-TURP groups at 1, 3 and 6 months, respectively. Also, IIEF showed no significant difference between M-TURP and B-TURP groups at 1, 3 and 6 months.

In our study regarding prostate size measured by TRUS at 6 months post-operative was no significant different between the both groups ( $25 \pm 4.3$  gm. in M-TURP group VS  $29 \pm 3.1$  gm. In B-TURP group).

In our study, there were statistically significant differences between the both groups regarding intra and post-operative complications such as intra-operative bleeding 2 patients (16.7%) in M-TURP group VS no patient in B-TURP group which was significant higher in M-TURP group. Two cases (16.7%) had blood transfusion in M-TURP group VS no case in B-TURP group which was significant higher in M-TURP group. Moreover 1 patient (8.3%) had TUR syndrome in M-TURP group VS no patient in B-TURP group these

outcomes were due to the decreased serum sodium (Na<sup>+</sup>) levels. And two cases (16.7%) intraoperative shifted to open surgery to remove the adenoma in M-TURP group VS no patient in B-TURP group .

Three cases (25%) had capsular perforation in M-TURP group during Resection versus two cases (16%) in B-TURP which no significant difference. And five (41.6%) patients had urge incontinence in M-TURP VS 4 (33.3%) in B-TURP which no significant difference. Two patients (16.7%) had fever due to urinary tract infection in M-TURP VS 3 (25.0%) in B-TURP which no significant difference.

## **V. CONCLUSION:**

Our study concluded that, monopolar Resection of prostate adenoma is feasible and effective, but associated with high complication, Moreover B-TURP associated with lower complication and hospital stay, catheter time and less Hg and Na loss than M-TURP, Moreover resected prostatic tissue was significant higher in M-TURP than B-TURP. Our study had certain limitations small sample size which necessitate further studies with large number of cases. Absence of morcellator that Prolonged the procedure time.

## **VI. RECOMMENDATIONS**

Although both monopolar and bipolar TUR Resection are available, (Bipolar) Resection should be used instead of (Monopolar) Resection to reduce the complication rate.

## **REFERENCES**

- 1- **Muslumanoglu AY, Yuruk E, Binbay M, Akman T.** Transurethral resection of prostate with plasmakinetic energy: 100 months results of a prospective randomized trial. *BJU Int.* 2012;110:546-9.
- 2- **Xu P, Xu A, Chen B.** Bipolar transurethral enucleation and resection of the prostate: Whether it is ready to supersede TURP?. *Asian J Urol.* 2017;5(1):48-54.
- 3- **Lourenco T, Pickard R, Vale L, Grant A, Fraser C, MacLennan G, et al.,** Alternative approaches to endoscopic ablation for benign enlargement of the prostate: systematic review of randomised controlled trials. *Bmj*, 2008; 337, a449.
- 4- **Gratzke C, Bachmann A, Descaseaud A, Drake MJ, Madersbacher S, Mamoulakis C.** EAU guidelines on the assessment of non-neurogenic male lower urinary tract symptoms including benign prostatic obstruction. *Eur Urol.* 2015;67:1099.
- 5- **Rassweiler J, Teber D, Kuntz R, Hofmann R.** Complications of transurethral resection of the prostate (TURP) incidence, management, and prevention. *Eur Urol* 2006; 50:969–80.
- 6- **Xu P, Xu A, Chen B, Zheng S, Xu Y, Li H, et al.,** Bipolar transurethral Resection of the prostate: Whether it is ready to supersede TURP? *Asian journal of urology* 2018; 5(1), 48-54.

- 7- Xu A, Zou Y, Li B, Liu C, Zheng S, Li H.** A randomized trial comparing diode laser Resection of the prostate with plasmakinetic Resection of the prostate for the treatment of benign prostatic hyperplasia. J Endourol. 2013; 27:1254–60.
- 8-Luo YH, Shen JH, Guan RY, Li H, Wang J.** Plasmakinetic Resection of the Prostate vs Plasmakinetic Resection of the Prostate for Benign Prostatic Hyperplasia: Comparison of Outcomes According to Prostate Size in 310 Patients. Urology 2014; 84:904–10.
- 9-Chen Y, Xu H, Xu H, Gu M, Zhou J, Cai Z.** Comparison of plasmakinetic Resection of the prostate with holmium laser Resection of the prostate in the treatment of benign prostate hyperplasia. Int J ClinExp Med. 2016; 9: 7328.
- 10-Wei Y, Xu N, Chen SH, Li XD, Zheng QS, Lin YZ, et al.,** Bipolar transurethral Resection of the prostate versus bipolar resection of the prostate for prostates larger than 60gr: A retrospective study at a single academic tertiary care center. International braz j urol, 2016; 42(4), 747-6.