

# COMPARISON OF OUTCOME OF BIPOLAR VERSES MONOPOLAR TRANS URETHRAL RESECTION OF PROSTATE IN PATIENTS WITH BENIGN PROSTATIC ENLARGEMENT

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## ABSTRACT

**Background:** The most prevalent condition affecting older men is benign prostate enlargement, or BPE. The most effective treatment for benign prostatic blockage is still transurethral resection of the prostate (TURP) combined with monopolar diathermy. Recently, a less invasive surgical technique for treating BPE was introduced: bipolar plasma kinetic TURP (BP-TURP) with isotonic saline irrigation. The benefits of bipolar TURP include the eradication of TURP syndrome, reduced risk of capsule damage, improved tissue orientation, and a self-cleaned loop.

**Objectives:** To compare the outcome of bipolar versus monopolar trans-urethral resection of prostate.

**Methods:** It is randomized controlled trial conducted at OPD of Department of Urology, Lahore General Hospital, Lahore for 12 months. 90 male patients aged >60 years presenting with BPE were admitted from. Patients were randomly divided in two groups by using lottery method. The Group A, patients underwent Monopolar TURP and the Group B, patients underwent Bipolar TURP. Outcome was noted in terms of blood loss and post-operative hospital stay. The collected data was entered and analyzed through SPSS version 25.0.

**Results:** The mean operative time was comparable between the two groups (55 minutes for M-TURP vs. 51 minutes for B-TURP). However, the post-operative hospital stay was significantly longer in the M-TURP group, averaging  $57.7 \pm 17.31$  hours, compared to  $37.2 \pm 15.03$  hours in the B-TURP group ( $p < 0.05$ ). Similarly, the mean duration of catheterization was higher in the M-TURP group ( $3.31 \pm 0.5$  days) than in the B-TURP group ( $2.55 \pm 0.4$  days), indicating a faster recovery profile with bipolar resection.

**Conclusion:** Operative time was comparable between Monopolar and Bipolar TURP, Bipolar TURP resulted in significantly shorter hospital stay and catheterization duration, indicating a faster recovery. These findings, along with the reduced risk of TUR syndrome and lower incidence of bleeding and late complications, suggest that Bipolar TURP is a safer and more effective alternative to Monopolar TURP in the surgical management of benign prostatic hyperplasia.

**Key words:** Benign prostatic hyperplasia, transurethral resection of the prostate, monopolar TURP, bipolar TURP, lower urinary tract

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## INTRODUCTION

Benign prostatic hyperplasia (BPH) is one of the most common histological findings of prostatic diseases in older men. Benign prostatic tissue development can result in glandular enlargement and urethral constriction, which can cause urine retention and symptoms related to the lower urinary tract.<sup>1</sup> A worldwide survey found that the

prevalence of benign prostatic hyperplasia was 36.8% in people aged 80 and above and 14.8% in those aged 40 and over.<sup>2</sup>

A worldwide survey found that the prevalence of benign prostatic hyperplasia was 36.8% in people aged 80 and above and 14.8% in those aged 40 and over.<sup>4</sup> It is the sixth most prevalent cancer in Asia among men, with an average mortality rate of 3.8 per 100,000.<sup>5</sup> Over the past 10 years, Pakistan has seen an increase in the number of prostate cancer cases reported. According to a recent survey, 5% of Pakistanis have prostate cancer overall.<sup>6</sup> Several surgical and minimally invasive procedures are commonly used to treat Benign Prostatic Hyperplasia (BPH). Invasive surgical options include open prostatectomy, laser prostatectomy techniques such as KTP laser vaporization and Holmium Laser Enucleation of the Prostate (HoLEP), as well as transurethral electrovaporization of the prostate (TUVP). Minimally invasive treatments comprise transurethral radiofrequency needle ablation (TUNA), transurethral microwave thermotherapy (TUMT), and high-intensity focused ultrasound (HIFU).<sup>7</sup>

Monopolar Transurethral Resection of the Prostate (TURP) is currently one of the most effective treatments for benign prostatic obstruction and is widely accepted in urological practice due to its high success rate.<sup>8-9</sup> It has long been considered the gold standard for managing benign prostatic hyperplasia (BPH). However, monopolar TURP is associated with a morbidity rate ranging from 7% to 43%, as reported by the Agency for Healthcare Policy and Research. Common complications include perioperative bleeding, TUR syndrome, retrograde ejaculation, urinary tract infection, and erectile dysfunction.

Bipolar TURP, on the other hand, has gained widespread adoption globally and is increasingly considered a gold standard alternative. It offers the advantage of a lower mortality rate (0.2%) and a 10% rate of extended hospital stay due to documented complications. Despite this, it may involve a longer hospital stay and higher out-of-pocket costs for patients.<sup>9</sup> Nevertheless, Bipolar TURP is now the most commonly used technique worldwide for BPH management. While generally safe, it still requires hospitalization and carries a low risk of complications such as intraoperative bleeding, clot retention, and TUR syndrome.<sup>10-11</sup>

## OBJECTIVES

To compare the outcomes of bipolar versus monopolar trans-urethral resection of prostate in terms of blood loss and post-operative hospital stay.

## METHODS

This randomized controlled trial was conducted at the Department of Urology, Lahore General Hospital, Lahore, over a 12-month period from 12 February 2022 to 15 February 2023. A total of 90 male patients aged

over 60 years with symptomatic benign prostatic hyperplasia (BPH), who were candidates for surgical intervention, were recruited through consecutive sampling and subsequently randomized into two equal groups using the simple randomization (lottery) method. The sample size was calculated with 80% power, assuming anticipated proportions of blood loss in the monopolar TURP group (Group A) as 0% and in the bipolar TURP group (Group B) as 13.3%, based on previous literature (Shien-Chung Chow et al., 2005). Patients with bladder or upper tract stones, neurogenic bladder, bladder neck contracture, urethral stricture, history of prostate surgery, carcinoma of the prostate (confirmed by TRUS biopsy), untreated urinary tract infections, bleeding disorders, or renal failure were excluded. After obtaining informed consent, demographic data including age, diagnosis, and prostate size were recorded. All procedures were performed under spinal anesthesia by the same surgical team. Monopolar TURP was performed using a 26Fr resectoscope (Storz) with a standard tungsten loop and monopolar diathermy (Erbe) set at 350W (cutting 160W, coagulation 80W), with glycine as the irrigant. Bipolar TURP was performed using a 26Fr resectoscope (Storz) with a bipolar loop, and normal saline (0.9%) as irrigant, using Plasma Edge bipolar diathermy (Lamidey Noury Medical) set at 120–140W for cutting and 100–130W for coagulation. In both groups, resection began at the middle or intravesical lobe, progressing in a 360° fashion to the bladder neck and lateral lobes until capsular fibers were visualized. Hemostasis was ensured with care to avoid external sphincter injury. Total volume of intra- and postoperative irrigant was recorded, and hemoglobin content (gm/L) in the fluid was analyzed to calculate blood loss using a standardized formula. Patients were discharged once urine was clear, and hospital stay duration was recorded. Data were analyzed using SPSS version 25, and group comparisons for blood loss and hospital stay were performed using independent samples t-test, with  $p < 0.05$  considered statistically significant.

## RESULTS

There were two treatment groups in this study, and no statistically significant differences were observed in baseline characteristics between them. The mean operative time was comparable in both groups (55 minutes in the monopolar group vs. 51 minutes in the bipolar group;  $p = 0.06$ ). Similarly, there was no significant difference in mean resection time (40 minutes vs. 36 minutes;  $p = 0.05$ ). The mean amount of resected tissue was also similar between the two groups (24 g in the monopolar group vs. 18 g in the bipolar group;  $p = 0.07$ ). The post-operative hospital stay was significantly longer in the M-TURP group ( $57.7 \pm 17.31$  hours) compared to the B-TURP group ( $37.2 \pm 15.03$  hours),

with a p-value of 0.03, indicating a statistically significant difference. Table 2 shows that the duration of catheterization was significantly longer in the M-TURP group ( $3.31 \pm 0.5$  days) compared to the B-TURP group ( $2.55 \pm 0.4$  days).

Table 1; Pre-operative Characteristics of patients enrolled in the study.

Variable	M-TURP	B-TURP	p - value
N	45	45	0.
Age	61 $\pm$ 5.5	69 $\pm$ 5.6	0.08
Prostate Volume (cm <sup>3</sup> )	51.2 $\pm$ 5.1	53.4 $\pm$ 3.8	0.12
PSA (ng/ml)	2.2 $\pm$ 0.7	2.5 $\pm$ 1.0	0.18
Patient's IPSS	26.4 $\pm$ 5	26.5 $\pm$ 4.0	0.91
Patient's QoL	3.8 $\pm$ 1	4.1 $\pm$ 1.0	0.36

Table 2: Post-operative Characteristics of patients in both groups

Variables	M-TURP (SD)	B-TURP (SD)	p-value
n	45	45	
During TURP	350 (175-660)	235 (127-415)	<0.0001
Blood loss			
Post TURP	13.5 (2.0-54.)	8.9 (0-34.0)	0.0513
Blood loss			
Total blood loss (ml)	399 (186-855)	262 (150-472)	<0.0001
Duration of catheter (d)	2.55 (0.4)	3.31 (0.5)	<0.0001
Post op	57.7 (17.31)	37.2 (15.03)	<0.0001
Hospital Stay (H)			
Re-catheterization	0	1	>0.999

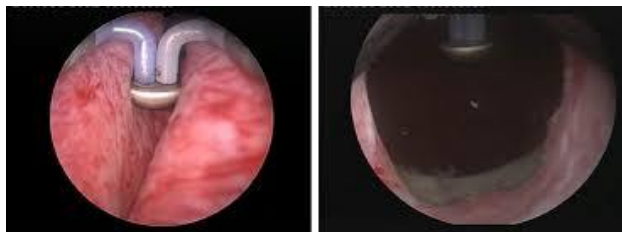


Figure I: Bipolar TURP procedure

## DISCUSSION

A study found that the M-TURP group's resection time was significantly shorter than that of the B-TURP group (31.20 vs. 43.10 min) ( $P < 0.001$ ), suggesting that monopolar surgery takes less time.<sup>31</sup> Our results showed that the average gland resection time for the M-TURP group was 53.8 minutes, while the B-TURP group took 51.51 minutes. However, because B-TURP was initially made available at our facility, there may have been a lack of familiarity with the technology in the early instances. The amount of time needed for surgery is similar in the later situations. This study's results contradict several other investigations that demonstrated no appreciable difference in operation time between M-TURP and B-TURP.<sup>12</sup>

Nonetheless, the current research is supported by the findings of other investigations that found that bipolar patients had significantly longer operating durations than monopolar patients.<sup>13</sup> The bigger loop size of the monopolar resectoscope in comparison to the bipolar resectoscope, the noticeably larger size of the gland removed with bipolar technology, the skill of surgeons trained in M-TURP, and other factors are all responsible for the observed trend of longer operating times, and the smaller diameter of the resection loop associated with the 24 French bipolar resectoscope.<sup>13, 14</sup>

According to a research, the B-TURP group's mean operating time was  $72.6 \pm 31.8$  minutes, whereas the M-TURP group's was  $74.2 \pm 26.6$  minutes.<sup>15</sup> In a different research, the average time for resection for M-TURP was  $59 \pm 18$  minutes, while the same treatment took  $58 \pm 14.6$  minutes for B-TURP.<sup>16</sup> Although previous studies reported shorter resection times for M-TURP compared to B-TURP<sup>31</sup>, in our study, the B-TURP group had a slightly longer resection time, which may be attributed to the larger average prostate volume resected ( $53.4 \pm 3.8$  cm<sup>3</sup> vs.  $51.2 \pm 5.1$  cm<sup>3</sup>).

According to Yoon et al., the M-TURP group's mean catheter length was  $3.12 \pm 0.69$  days, whereas the B-TURP group's mean was  $2.28 \pm 1.37$  days.  $P = 0.012$  indicates that this difference was statistically significant. According to Giulianelli et al., the M-TURP group's catheter times were  $48 \pm 48$  hours, whereas those for the B-TURP group were  $24 \pm 12$  hours.<sup>16</sup>

In our research, the length of hospital stay after surgery was higher for M-TURP ( $57.7 \pm 17.3$ ) than B-TURP ( $37.2 \pm 15.03$ ). Compared to M-TURP, which is longer than the findings of our research, Research has shown that the average length of hospital stay for B-TURP patients was shorter. According to Botto et al., the average hospital stay for B-TURP was just 2.2 days. Eaton and Francis were able to discharge 85% of patients the same day while doing B-TURP. At 48 hours, these individuals had their catheters removed. Catheterization for the B-TURP group was 1.4 days shorter than that of the conventional TURP group.<sup>15, 17</sup>

In studies done before to 2010, the incidence rate of bleeding that required transfusion after M-TURP ranged from 0.4% to 7.1%.<sup>11</sup> The recommended TURP technique may be the cause of bleeding in addition to all of these other considerations. Numerous studies show that M-TURP is more likely than bipolar TURP to have bleeding, clot retention, and transfusion needs.<sup>18, 19</sup> Perioperative bleeding represents a significant complication in TURP leading to anemia and clot retention. During TURP operations, venous bleeding appears as open sinuses, and the hemorrhage is made worse by capsule perforation. The bipolar approach decreases blood loss while improving hemostasis and vision.<sup>20</sup> This study revealed significant blood loss during

TURP, with M-TURP averaging 350 ml and B-TURP averaging 235 ml (p-value < 0.001). No significant blood loss was observed post-TURP in either the M-TURP or B-TURP groups. Similar findings were also shown in a recent research by Al-Rawashdah et al., indicating a significant advantage of B-TURP in relation to bleeding problems.<sup>21</sup>

Bipolar TURP's primary benefit is that it reduces the risk of burn by avoiding reverse current and allowing the use of regular saline for irrigation.<sup>22, 23</sup> Blood loss peri-operatively and post-operatively is the most common complication of TURP procedure whether it is monopolar or bipolar. It is reported that, blood transfusion rate has been recorded 2.51% to 9%.<sup>24, 25</sup> The monopolar group's mean hemoglobin level differential was noticeably greater. Although it only happens in rare instances, certain severe hemorrhagic episodes may occur.<sup>26</sup>

Electrolyte imbalance is also the rare complication that occurs peri-operatively in both monopolar and bipolar procedures. If resection time is less than 90 minutes then the incidence of transurethral resection syndrome which we called TUR syndrome will be low, approximately 0.5% and if resection time is more than 90 minutes then it is 2%.<sup>27</sup> The neurological and cardiac symptoms are quite severe. Once serum level achieved normal level, patients are treated with furosemide usually after TURP. It is also suggested that, no difference of furosemide intervention in both groups were significant.<sup>27</sup> The incidence of blood transfusion has been reported from 2.6 to 37% and TUR syndrome has been reported to be 0.18 to 11%.<sup>28, 29</sup>

Bipolar TURP offers several theoretical advantages over monopolar TURP. To evaluate its effectiveness across varying prostate sizes, numerous randomized controlled trials have been conducted, including in both small and large prostate glands. The following formula was used to estimate blood loss: Hemoglobin in fluid/patient hemoglobin \* amount of fluid irrigation in milliliters (mL) equals blood loss. Bipolar TURP has been promising in minimizing the morbidities associated with this procedure comparable to monopolar TURP.<sup>30</sup>

## CONCLUSION

We found significant difference in mean blood loss and hospital stay between Bipolar TURP and Monopolar TURP. Bipolar TURP found more safe and effective endoscopic procedure as compared to monopolar TURP for management of benign prostate hyperplasia that is also supported by previous studies. The risk of blood loss can be prevented by using bipolar TURP device followed by shorter hospital stay. Bipolar TURP is a safe and effective endoscopic procedure compared to monopolar TURP for the management of benign prostate hyperplasia, in context of intraoperative and peri-operative advantages. This study reported significant reduction in complications. Large prospective clinical

trial is needed to be designed to get desired results, need long term follow up which is missing in our study.

## ETHICAL APPROVAL

Ethical approval of synopsis was granted by the Institutional Ethical Committee of AMC/PGMI/LGH;

## CONFLICT OF INTEREST:

Authors declare no conflict of interest.

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## AUTHOR'S CONTRIBUTIONS

**KA:** Concept, design, manuscript writing

**KZ:** Data collection, manuscript writing

**AA:** Data analysis and critical review

**ZA:** Critical analysis, manuscript writing

**AH:** Data analysis and interpretation

**ALL AUTHORS:** Approval of the final version of the manuscript to be published

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