Section: Urology

Original Research Article

ANESTHETIC CONSIDERATIONS IN BIPOLAR VERSUS MONOPOLAR TRANSURETHRAL RESECTION OF THE PROSTATE (TURP): A COMPARATIVE ANALYSIS

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Abstract

Background: Transurethral resection of the prostate (TURP) is the gold standard surgical treatment for benign prostatic hyperplasia (BPH). This study compares the anesthetic implications of bipolar and monopolar TURP, focusing on fluid absorption, hemodynamic stability, electrolyte disturbances, and postoperative recovery. **Materials and Methods:** A prospective study was conducted at Indraprastha Apollo Hospital between June 2018 and June 2020, including 110 patients randomized into two groups: monopolar TURP (n=55) and bipolar TURP (n=55). Anesthetic and perioperative parameters were analyzed to assess differences in safety and efficacy. **Results:** Bipolar TURP demonstrated significantly lower fluid absorption, reduced risk of dilutional hyponatremia, and greater hemodynamic stability. The mean sodium drop was significantly lower in the bipolar group (-1.8 mEq/L vs. -5.1 mEq/L, $p<0.05$). Blood loss and postoperative catheterization duration were also reduced in the bipolar group, leading to shorter hospital stays. **Conclusion:** Bipolar TURP offers superior safety over monopolar TURP by minimizing electrolyte disturbances and hemodynamic fluctuations, thereby improving postoperative recovery. Spinal anesthesia is preferable for enhanced intraoperative monitoring. Future research should focus on long-term functional outcomes and quality-of-life assessments post-TURP.

INTRODUCTION

TURP is commonly performed under either regional or general anesthesia. The anesthetic approach is influenced by patient comorbidities, expected fluid absorption, risk of TUR syndrome, and hemodynamic shifts. Monopolar TURP traditionally requires a non-conductive irrigation solution (e.g., glycine), which increases the risk of dilutional hyponatremia and TUR syndrome. Bipolar TURP, on the other hand, utilizes normal saline as an irrigant, reducing these risks and potentially altering anesthetic requirements.[1-5]

MATERIALS AND METHODS

This study was conducted at Indraprastha Apollo Hospital, New Delhi, between June 2018 and June 2020. A total of 110 patients undergoing TURP for BPH were enrolled in the study and randomized into two groups:

- Monopolar TURP Group (n=55)
- Bipolar TURP Group (n=55)

Sample Size Calculation: For a margin of error of 9% and a confidence level of 95%, a minimum of 110 patients is required to compare Monopolar and Bipolar TURP as treatment modalities for BPH. This sample size was calculated using the Raosoft sample size calculator and based on previous studies, which reported a pooled overall prevalence of BPH among men aged 40 years and older at 36.6%.Additionally, using a confidence level of 95% and a power of 80%, a minimum of 55 patients per group was required. The sample size calculation was performed using the following formula:

$$n = z^2 \times p(1-p)/e^2$$

where Z = 1.96 (for 95% confidence), p is the estimated proportion of patients developing electrolyte disturbances (based on prior studies), and e is the acceptable margin of error.

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Randomization: Patients were randomly assigned to either the monopolar or bipolar TURP group using a computer-generated randomization sequence. Allocation was concealed using sealed opaque envelopes, which were opened in the operating room just before the procedure.

Ethical Clearance: The study was approved by the Institutional Ethical Committee of Indraprastha Apollo Hospital. Written informed consent was obtained from all patients before enrollment in the study.

RESULTS & DISCUSSION

Benign prostatic enlargement (BPE) and related LUTS increase with age, with about 25% of men estimated to have received treatment for LUTS by the age of 80 years(1) . Despite advances in medical therapy, a significant proportion of patients require surgical intervention, with TURP being the most commonly performed procedure. Traditional monopolar TURP has been associated with higher intraoperative risks, particularly due to fluid absorption and electrolyte imbalances. The introduction of bipolar TURP has mitigated these risks, allowing for the use of normal saline as an irrigant, which has significantly reduced complications related to TUR syndrome.

Our findings align with several previous studies. A meta-analysis by Mamoulakis et al. (1) including 295 patients, found that bipolar TURP significantly reduces the risk of TUR syndrome (0% vs. 0.7%) and blood transfusion (1.3% vs. 2.3%). Similarly, Fagerström et al. (2) reported that bipolar TURP led to 34% less blood loss compared to monopolar TURP.

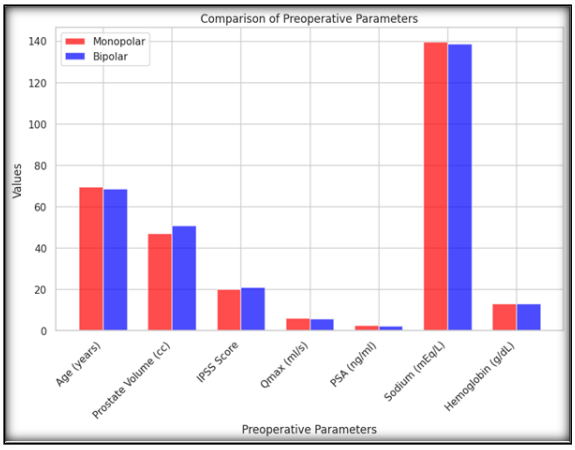
In contrast, Méndez-Probst et al. (3) in a multicenter study, reported no statistically significant differences in complication rates between bipolar and monopolar TURP, except for a reduced catheterization time in the bipolar group. They concluded that both techniques provide similar functional outcomes, but bipolar TURP may be preferable due to lower intraoperative complications.

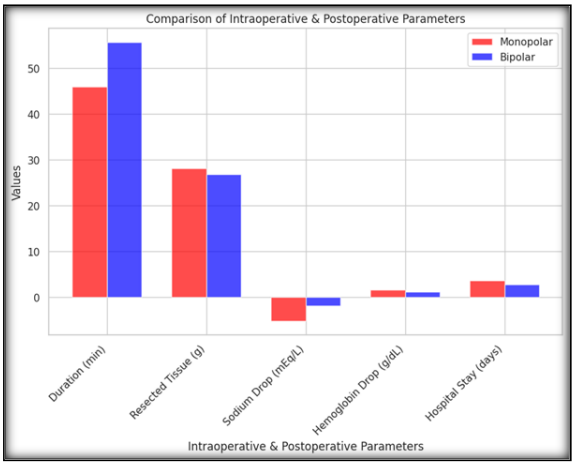
Table 1: Comparison of Preoperative parameters in both groups

Parameter	Monopolar TURP (n=55)	Bipolar TURP (n=55)	p-value
Mean age (years)	69.6 ± 7.2	68.7 ± 7.1	0.523
Mean prostate volume (cc)	47 ± 8.91	51 ± 9.85	0.0417
Mean IPSS score	20 ± 2.41	21 ± 2.68	0.390
Mean Qmax (ml/s)	6.1 ± 2.53	5.8 ± 2.29	0.482
Mean PSA (ng/ml)	2.7 ± 0.77	2.5 ± 0.73	0.108
Preoperative sodium (mEq/L)	139.4 ± 2.8	138.6 ± 3.7	0.1927
Preoperative hemoglobin (g/dL)	13.2 ± 1.76	13.0 ± 2.23	0.5987

Table 2: Comparison of Postoperative parameters in both groups

Parameter	Monopolar TURP	Bipolar TURP	p-value
Mean duration of resection (min)	45.9 ± 13.98	55.7 ± 13.46	0.0003
Mean weight of resected tissue (gm)	28.19 ± 5.02	26.86 ± 5.12	0.6267
Mean irrigation fluid used (liters)	24.0 ± 3.70	21.9 ± 3.15	0.5987
Mean sodium drop (mEq/L)	-5.1 ± 2.61	-1.8 ± 2.43	<0.05
Mean fall in hemoglobin (g/dL)	1.6 ± 0.48	1.3 ± 0.52	0.0916
Mean postoperative irrigation used (liters)	18.3 ± 4.87	14.3 ± 5.98	0.0002
Mean catheter duration (days)	3.1 ± 0.8	2.6 ± 0.7	0.003
Mean hospital stay (days)	3.7 ± 0.9	2.8 ± 0.8	0.005





Fluid Absorption and TUR Syndrome Risk:

- Monopolar TURP: Our study demonstrated a significantly higher mean sodium drop in the

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Fluid Absorption and TUR Syndrome Risk:

- Monopolar TURP (-5.1 mEq/L vs. -1.8 mEq/L, $p < 0.05$). This is consistent with the findings of Michielsen et al,[4] who reported an average sodium drop of 4.9 mEq/L in the monopolar group compared to 1.5 mEq/L in the bipolar group.
- Bipolar TURP: The use of saline irrigation eliminates the risk of dilutional hyponatremia, a finding also corroborated by Singhania et al,[5] who observed a significantly lower incidence of postoperative electrolyte disturbances in the bipolar TURP group.

Hemodynamic Considerations:

- Monopolar TURP: The higher irrigation fluid absorption in the monopolar group was associated with a greater mean fall in hemoglobin levels (1.6 g/dL vs. 1.3 g/dL, $p = 0.0916$). This is similar to the observations of Bhansali et al,[6] who found that patients undergoing monopolar TURP had a 20% higher blood loss compared to the bipolar group.
- Bipolar TURP: Enhanced intraoperative visibility due to better coagulation and reduced blood loss allows for a more controlled procedure, leading to fewer intraoperative hemodynamic fluctuations.

Postoperative Recovery:

- Mean catheter duration was significantly shorter in the bipolar TURP group (2.6 days vs. 3.1 days, $p = 0.003$). This finding is in agreement with Sugihara et al. (2012), who noted a shorter catheterization time and lower incidence of clot retention in bipolar TURP patients.[6]
- Hospital stay was also significantly lower in the bipolar group (2.8 days vs. 3.7 days, $p = 0.005$), supporting the conclusions of Abascal Junquera et al,[7] who reported a 25% reduction in hospital stay duration with bipolar TURP.

CONCLUSION

Bipolar TURP offers significant anesthetic and surgical advantages over monopolar TURP by reducing the risk of TUR syndrome, maintaining hemodynamic stability, and shortening postoperative recovery. The findings of our study are consistent with multiple previous reports demonstrating the safety and efficacy of bipolar TURP. Anesthetic planning should consider these factors, with spinal anesthesia being the preferred choice for better intraoperative monitoring. Future research should focus on long-term functional outcomes and quality-of-life measures following TURP.

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