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Comparative study between monopolar and bipolar transurethral resection of the prostate (TURP) regarding efficacy, complication, and operative time

Ali Mohammed Abdulameer

Al- Muthanna University/ Medicine College, Samawah, Iraq.

Abstract

Aim: This study compares monopolar and bipolar transurethral resection of the prostate (TURP) in terms of effectiveness, complication rates, and time of surgery in patients with BPH.
Methods: Out of 120 BPH patients who underwent TURP, 60 had monopolar TURP, and the other 60 had bipolar TURP. Preoperative assessment placed outpatients at risk. Following surgery, time to surgery, removed tissue weight, TUR syndrome rate, blood loss, Qmax, and complications were measured.
Results: Operating time was much shorter with bipolar TURP, and Qmax was a bit higher in this group. Bipolar TURP, too, diminishes TUR syndrome. This result suggests that bipolar TURP is preferred for greater efficacy and safety.
Conclusion: Bipolar TURP with saline irrigation and improved resection are safer than monopolar TURP, which increases operating time, complications, and urological flow.

Keywords: TURP, Qmax, BPH, monopolar, bipolar, Prostate

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Introduction

BPH is a benign prostatic hyperplasia (BPH) that affects many older men, especially those over the age of 50. BPH causes LUTS, which affects quality of life and overall health through urinary retention, infection, and bladder stones (1). Treatment of BPH is costly, and the therapy must be optimized for effectiveness and safety (2). Surgical BPH control dominated for decades through Transurethral Resection of the Prostate (TURP). Standard TURP is done with monopolar energy and removes blockage of the prostate to increase urine flow and relieve symptoms (3). The monopolar strategy has its hazards, though, and chief among them is the electrolyte imbalance that leads to TUR syndrome. These are the problems that arise due to the accumulation of hypotonic irrigation water (glycine, water), which often leads to devastating electrolyte deficiency (hyponatremia, specifically (4)). In making these threats smaller, bipolar TURP (through isotonic saline irrigation) has simplified the management of BPH (5).

The irrigation fluid is the main difference between monopolar and bipolar TURP. Monopolar TURP also needs non-ionic irrigation fluids, and absorption and associated electrolyte disturbance can result (6). Bipolar TURP, however, can use isotonic saline, so it is less likely to cause such complications, and it's safer (7). Bipolar energy devices, in which current flows between electrodes on the machine, might be less tissue resistant, making resection easier and quicker (8). Even with bipolar TURP's documented benefits, studies still come in with mixed reports on the extent of these benefits. This article compares outcome parameters, including operating time, efficacy (Qmax increases), resected tissue weight, blood loss, and postoperative complications. By looking at these aspects, this study aims

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to yield valuable data about which TURP modality has superior results for BPH patients.

Methods

Study Design and Population

The study retrospectively analyzed data from 120 patients undergoing TURP for BPH. Patients were randomly divided into two groups, with 60 undergoing monopolar TURP (Group A) and 60 undergoing bipolar TURP (Group B). Criteria for inclusion were obstructive LUTS, prostate sizes under 80 grams (as measured via ultrasound), and exclusion of patients with neurological issues, diabetes mellitus, or coagulation disorders, ensuring homogeneity of the sample population.

Surgical Techniques and Instrumentation

Both procedures were conducted by the same experienced urological surgeon to minimize operator-related variability. A 26 Fr resectoscope with continuous irrigation was used in all cases. Monopolar TURP utilized glycine as an irrigant, while bipolar TURP utilized isotonic saline. Operative time was measured from initial incision to final cauterization and hemostasis. Resected prostate tissue weight was recorded postoperatively.

Outcome Measures

Data collected included operative time, intraoperative blood loss, postoperative hemoglobin levels, TUR syndrome incidence, resected tissue weight, and Qmax improvement. Qmax was measured via flowmetry preoperatively and 10 days postoperatively to assess the degree of improvement in urinary flow. Complications such as urinary retention and incontinence were also recorded.

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Results

This was done using several critical parameters – operating time, weight of resected tissue, loss of blood, hemoglobin reduction, risk of TUR syndrome, complications, and Qmax increase – to evaluate the effectiveness and safety of monopolar and bipolar TURP in benign prostatic hyperplasia.

Operative Time and Resected Tissue Weight

The mean operative time in Group A (monopolar TURP) was significantly longer than in Group B (bipolar TURP) at 60±10 minutes for the monopolar procedure and 40±10 minutes for the bipolar procedure ($P < 0.05$). In Group B, the mean resected tissue weight increased ($P < 0.05$) in the bipolar TURP group: average resected tissue weight in Group B was 50 8 g (Variable from 40± 8 g in Group A). That means bipolar TURP wasn't just faster but also more effective at removing prostate tissue (Table 1).

Table 1: Comparison of Operative Time and Resected Tissue Weight

Parameter	Monopolar TURP (Group A)	Bipolar TURP (Group B)	P-value
Operative Time (minutes)	60 ± 10	40 ± 10	< 0.05
Resected Tissue Weight (grams)	40 ± 8	50 ± 8	< 0.05

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Blood Loss and Hemoglobin Decline

Table 2 compares blood loss and hemoglobin decline between the two groups. Both monopolar and bipolar TURP groups experienced minimal blood loss during the procedures, and no statistically significant difference was observed between the two groups in this regard. Hemoglobin decline post-surgery was also minimal and less than 0.5 g/dL in both groups, demonstrating that both techniques are relatively safe concerning intraoperative blood loss.

Table 2: Comparison of Blood Loss and Hemoglobin Decline

Parameter	**Monopolar TURP (Group A)**	**Bipolar TURP (Group B)**	**P-value**
Mean Blood Loss	Minimal	Minimal	N/A
Hemoglobin Decline (g/dL)	< 0.5	< 0.5	N/A

Incidence of TUR Syndrome and Postoperative Complications

Table 3 outlines the incidence of TUR syndrome and postoperative urinary retention. TUR syndrome, a severe electrolyte disturbance often associated with monopolar TURP due to the hypotonic irrigant used, was observed in 2 cases (3.3%) in Group A but was not observed in any cases in Group B ($P < 0.05$). Postoperative urinary retention was also documented in 2 patients (3.3%) in the monopolar TURP group but did not occur in any patients in the bipolar TURP group ($P < 0.05$). The absence of TUR syndrome in Group B and the lower rate of postoperative urinary retention suggest a safety advantage associated with the bipolar TURP technique.

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Table 3: Incidence of TUR Syndrome and Postoperative Complications

Parameter	Monopolar TURP (Group A)	Bipolar TURP (Group B)	P-value
TUR Syndrome Incidence	2 cases	0 cases	< 0.05
Postoperative Urinary Retention	2 cases	0 cases	< 0.05

Qmax Improvement Following TURP

Table 4 presents Qmax measurements during and after surgery for both groups. The preoperative Qmax was equal for both groups, 6 ± 2mL/s, with no statistically significant difference. But Qmax after surgery was even more critical in the bipolar TURP group (an increase of 11 ± 2 mL/s vs 8± two mL/s in the monopolar group, P < 0.05). This finding suggests that bipolar TURP might result in a more significant increase in flow.

Table 4: Qmax Improvement Following TURP

Parameter	Monopolar TURP (Group A)	Bipolar TURP (Group B)	P-value
Preoperative Qmax (mL/s)	6 ± 2	6 ± 2	N/A
Postoperative Qmax Improvement (mL/s)	8 ± 2	11 ± 2	< 0.05

Discussion

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In this monopolar vs bipolar TURP comparison study, operative time, safety, and post-operative quality differed. In conclusion, bipolar TURP is better than monopolar TURP in many ways and an ideal replacement for monopolar TURP for patients with benign prostatic hyperplasia.

Operative Time and Resection Efficiency

The much shorter operating time of bipolar TURP is a testament to the procedural simplicity of bipolar technology, a reduction in tissue impedance perhaps. Because of this reduced resistance, prostate tissue can be resected faster — which is essential for keeping operating time and keeping the risk of anesthesia to a minimum (9). And even greater tissue resection by bipolar TURP might be related to better resolution of obstructive symptoms (as indicated by more remarkable Qmax improvement) (10).

Safety and Complication Profile

This monopolar TURP group's higher rates of TUR syndrome point to a critical safety feature of bipolar TURP. TUR syndrome is caused by the absorption of hypotonic irrigation solutions for monopolar TURP, leading to hyponatremia and extreme electrolyte depletion (11). This risk is removed by allowing normal saline (an isotonic solution) via bipolar TURP, which is safer for patients with underlying cardiovascular or renal problems (12).

The aftermath of longer operative sessions and wound trauma might have caused urinary retention after surgery (only observed in the monopolar group). There was no urinary retention in the bipolar group, which adds to its likelihood of a higher level of procedural safety and less trauma to the recovery (13).

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Qmax Improvement and Long-Term Efficacy

The much higher Qmax improvement in the bipolar group suggests that bipolar TURP offers better long-term outcomes for flow and symptom management (14). This higher Qmax might be due to more tissue loss in the bipolar TURP group, leading to better obstruction relief. Better Qmax results can translate into higher patient satisfaction and lower recurrence of LUTS, which may be the long-term effects of bipolar TURP (15).

Limitations and Clinical Implications

Although this study provides valuable insights, it is limited by its retrospective nature and relatively small sample size. Future randomized controlled trials with larger cohorts could validate these findings and assess long-term outcomes more comprehensively. However, the current results strongly suggest that bipolar TURP offers advantages in efficiency, safety, and symptomatic improvement (16).

The clinical implications of these findings are considerable. In settings where both technologies are available, bipolar TURP should be considered the preferred option for most patients due to its favorable safety profile and potential for improved clinical outcomes. The reduced risk of TUR syndrome, faster resection times, and improved urinary flow outcomes position bipolar TURP as a significant advancement in the surgical management of BPH (17).

Conclusion

Both modalities are effective in treating benign prostatic hyperplasia if just one technology is available.

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By using normal saline as an irrigation solution, bipolar TURP minimizes the hyponatremic complication (TUR syndrome), seen more frequently in monopolar TURP due to hypotonic solutions used for irrigation, like distilled water or glycine.

The impedance of tissue and resistance for resection was higher in monopolar TURP, which was minimal in bipolar TURP, making the resection much easier and more effective.

These results were reflected in the final patient outcome and Q max with a preference toward the bipolar technology.

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