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# Transurethral Electrovaporization of the Prostate as an Alternative to Transurethral Resection: A Five-Year Follow-up

*Ehab Rifat Tawfiek*
Urology Department, El Minia University Hospital, El Minia City, Egypt
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## ABSTRACT

**INTRODUCTION**. The aim of the present study was to compare the safety and efficacy of transurethral electrovaporization of the prostate (TUVP) with conventional transurethral resection of the prostate (TURP) in the treatment of patients with moderate to severe bladder outlet obstruction due to benign prostatic hyperplasia (BPH).

**METHODS**. Between December 2001 and November 2003, 131 patients presented to the author's institution with moderate to severe bladder outflow symptoms due to BPH. The patients were randomly assigned to undergo TURP (n = 67) or TUVP (n = 64). Patients receiving TURP had a significantly larger mean prostate size ($P$ = .01) but were similar in all other evaluated characteristics. Using the hospital database, the author reports the available follow-up results after 1, 2, 3, and 5 years. The International Prostate Symptom Score (IPSS), uroflowmetry (Q-max), and postvoid residual volume (PVR) were used for evaluation. Operative time, catheterization time, hospital stay, and blood tests were also compared.

**RESULTS**. Of the 131 total patients, 51 patients receiving TURP and 50 patients receiving TUVP completed 5 years of follow-up; 21 patients died and the remaining 9 could not be contacted. No deaths were associated with either resection or vaporization of the prostate. Patients receiving TURP had a significantly longer mean postoperative catheterization time ($P$ < .001) and mean hospitalization time ($P$ < .001). Patients had significantly lower mean serum hemoglobin and hematocrit 1 hour following TURP ($P$ < .001). There were no significant group differences for any other measures.

**CONCLUSIONS**. To the author's knowledge, the present study is the largest reported comparison of TURP and TUVP over a 5-year follow-up period. The low intraoperative and perioperative morbidity, rapid convalescence time, short hospital stay, and simplicity of the procedure make TUVP a potentially suitable, safe alternative to TURP in the therapeutic armamentarium for BPH. Because of its unique electrosurgical properties, higher risk patients can be treated successfully with this technique. The main disadvantage of TUVP appears to be the unavailability of prostate tissue needed for pathologic examination. Additionally, although TURP and TUVP were found to be comparable for prostate sizes < 60 g for patients in the present study, TURP may be advantageous for patients with larger prostates.

**KEYWORDS**: Transurethral electrovaporization of the prostate (TUVP); Transurethral resection of the prostate (TURP).

**CORRESPONDENCE**: Ehab Rifat Tawfiek MD, Department of Urology, El Minia University Hospital, Elminia 16666, Egypt (ehabr1966@yahoo.com).

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original study

# Transurethral Electrovaporization of the Prostate as an Alternative to Transurethral Resection: A Five-Year Follow-up

## INTRODUCTION

For several decades, transurethral resection of prostate (TURP) was viewed as the most common surgical intervention for lower urinary tract symptoms due to benign prostatic enlargement [1]. Because of its high success rates, it was accepted among urologists as the gold standard treatment. However, the Agency for Health Care Policy and Research Review (AHCPR) reported that TURP was associated with a morbidity rate of 7% to 43% [2]. The major morbidities are perioperative bleeding, transurethral-resection syndrome, urinary incontinence, retrograde ejaculation, infection, and erectile dysfunction. TURP has well-documented complications, with an inpatient rate of 10% and a mortality rate of 0.2% [3]. Additionally, the relatively long hospital stay associated with the TURP operation adds to its cost.

In an attempt to reduce the complications of TURP, there has been a resurgence of interest in noninvasive or minimally invasive therapies in the last decade. These therapies have included pharmacological agents, transurethral needle ablation, Nd:YAG laser prostatectomy, and thermotherapy. Some of these new treatment options have fallen out of favour, while others continued to be evaluated.

Transurethral electrovaporization of the prostate (TUVP) is one of the recent promising alternatives to TURP. It combines tissue removal by vaporization with coagulation, thereby reducing the degree of bleeding.

The aim of the present study was to compare the safety and efficacy of TUVP with conventional TURP in the treatment of patients with moderate to severe bladder outlet obstruction due to benign prostatic hyperplasia (BPH).

## METHODS

### *Participants*

Between December 2001 and November 2003, 131 patients presented to the author's institution with moderate to severe bladder outflow symptoms due to BPH. The patients were randomly assigned to undergo TURP (n = 67) or TUVP (n = 64). The mean age of the patients receiving TURP was 65.1 (SD = 2.9); the mean age of the patients receiving TUVP was 62.4 (SD = 3.7).

### *Evaluation*

All patients received an International Prostate Symptom Score (IPSS), physical examination, digital rectal examination, and focused neurological examination. Routine preoperative laboratory investigations included urine analysis, urine culture and sensitivity testing (when indicated), renal function assessment (blood urea nitrogen and serum creatinine), hemoglobin percent, coagulation profile, blood sugar, and liver functions. Serum prostate-specific antigen (PSA) was assessed in all patients. Abdominal ultrasonography (US) was used to assess upper tract lesions, if present. US was also used to measure residual urine and prostate size. Intravenous urography (IVU) was completed to visualize the urinary tract of all patients. Maximium flow rates (Q-max) were recorded (voided urine > 150 mL).

Patient characteristics before surgery for each group are contained in Table 1. There were no significant presurgery group differences in mean age, IPSS score, Q-max, or postvoid residual volume (PVR). Patients receiving TURP had a significantly larger mean prostate size (*P* = .01).

### *Surgical Procedures*

TURP was done using the same procedures described by Nesbit in 1943 [4]. TUVP was performed using the spike loop Storz electrode (Karl Storz GMBH & Co, Tuttlingen, Germany). Electrical current was applied at 240-300 W for cutting and 40-70 W for coagulation. The TUVP technique followed the same procedures described for TURP except that the loop motion was slower for maximal simultaneous vaporization and coagulation of the prostatic tissue. All of the operations were performed by the same surgeon (ERT).

At the end of the procedure, a 22 Fr 3-way Foley catheter was placed, with continuous saline irrigation. The catheters were removed from all patients when the urine became clear.

Table 1. Patient Characteristics Before Surgery for Each Group; Probability of Significant Group Differences (N = 131). doi: 10.3834/uij.1944-5784.2009.12.12t1

| Variable | Patients Receiving TURP | | Patients Receiving TUVP | | *P* |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Age (years) | 65.1 | 2.9 | 62.4 | 3.7 | .06 |
| IPSS (score) | 21.2 | 3.1 | 20.9 | 2.6 | .08 |
| Q-max (mL/s) | 8.4 | 2.9 | 8.7 | 2.3 | .09 |
| Prostate size (g) | 38.7 | 14.1 | 29.9 | 12.7 | .01 |
| PVR (mL) | 112 | 69.4 | 121.1 | 88.2 | .16 |

Abbreviations: IPSS, International Prostate Symptom Score; Q-max, maximum flow rate; PVR, postvoid residual volume; TURP, transurethral resection of the prostate; TUVP, transurethral electrovaporization of the prostate.

*Data Analysis*

The hospital database was used to report the follow-up results after 1, 2, 3, and 5 years. Group means were compared using multiple *t* tests. A power analysis was not conducted. Probability levels < .05 were considered statistically significant.

## RESULTS

Of the 131 patients who were randomly assigned to receive TURP (n = 67) or TUVP (n = 64), 51 patients receiving TURP and 50 patients receiving TUVP completed 5 years of follow-up. Thirty patients did not complete the follow-up period; 21 patients died and the remaining 9 could not be contacted. No deaths were associated with either resection or vaporization of the prostate.

Table 2 contains the mean operative time, catheterization time, length of hospital stay, and results of laboratory analyses for patients in both groups. There was no significant difference in mean operative time. Patients receiving TURP had a significantly longer mean postoperative catheterization time ($P < .001$) and mean hospitalization time ($P < .001$). Patients had significantly lower mean serum hemoglobin and hematocrit at 1 hour following TURP ($P < .001$). No group difference was seen for the serum sodium concentration.

Table 3 contains the mean IPSS, Q-max, and PVR scores for each group before surgery and at 1, 2, 3, and 5-year follow-up evaluations. There were no significant group differences for any of the measures.

Additional group similarities were reported without statistical comparisons. Blood transfusion was needed for 2 patients receiving TURP; no transfusions were needed for the patients receiving TUVP. Persistent hematuria affected 4 patients following TURP and 2 patients following TUVP. All cases resolved without treatment in the first month after the operation.

Postoperatively, fever was recorded in 11 patients (7 receiving TURP; 4 receiving TUVP). TUR syndrome was not observed in any patient. Postoperative irritative symptoms, usually in the form of urinary frequency, were more common after TUVP (n = 13) than after TURP (n = 10), but these symptoms lasted for an average period of 12 days for patients in both groups. Three patients in each group had a urethral stricture at the bulbomembranous region requiring direct visual internal urethrotomy. Two patients in each group experienced postoperative obstructive symptoms and required reoperation for residual adenoma. None of the patients in either group demonstrated bladder neck contracture or permanent incontinence.

Preoperatively, 58 patients receiving TURP and 53 patients receiving TUVP reported an erectile function sufficient to achieve penetration during sexual intercourse. Of those patients, 10 receiving TURP and 9 receiving TUVP had postoperative impotence. Additionally, 47 potent patients receiving TURP and 40 potent patients receiving TUVP complained of postoperative retrograde ejaculation.

## DISCUSSION

Despite the proven efficacy of TURP in the treatment of BPH, its morbidity and high cost have led to a universal search for acceptable alternatives [5]. Recently, a number of alternatives to conventional TURP have emerged. One that is demonstrating positive results is TUVP.

The TUVP technique uses the standard TURP equipment. Only

Table 2. Operative and Postoperative Results for Patients in Both Groups; Probability of Significant Group Differences (N = 131).
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| Variable | Patients Receiving TURP | | Patients Receiving TUVP | | *P* |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Operative time (min) | 29.2 | 9.1 | 33.1 | 6.4 | .06 |
| Catheterization time (days) | 2.8 | 1.1 | 1.2 | 1.4 | <.001 |
| Hospital stay (days) | 3.2 | 1.1 | 2.1 | 1.2 | <.001 |
| Hematocrit (%) | 42 | 7.2 | 49 | 2.8 | .001 |
| Serum Na (mEq/L) | 140 | 2.3 | 141 | 1.9 | .34 |

Abbreviations: TURP, transurethral resection of the prostate; TUVP, transurethral electrovaporization of the prostate.

Table 3. Mean IPSS, Q-max, and PVR Scores for Each Group Before Surgery and at Follow-up Evaluations; Probability of Significant Group Differences (N = 131). doi: 10.3834/uij.1944-5784.2009.12.12t3

| Variable | Patients Receiving TURP | | Patients Receiving TUVP | | *P* |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| **IPSS (score)** | | | | | |
| Presurgery | 21.2 | 3.1 | 20.9 | 2.6 | .8 |
| 1 y | 6.1 | 2.6 | 5.4 | 1.9 | .9 |
| 2 y | 5.8 | 1.7 | 5.1 | 2.3 | .3 |
| 3 y | 6.2 | 1.3 | 5.6 | 1.4 | .6 |
| 5 y | 6.5 | 2.1 | 5.9 | 4.2 | .3 |
| **Q-max (mL/s)** | | | | | |
| Presurgery | 8.4 | 2.9 | 8.7 | 2.3 | .9 |
| 1 y | 20.9 | 7.1 | 22.6 | 8.7 | .7 |
| 2 y | 21.7 | 8.1 | 22.8 | 9.2 | .4 |
| 3 y | 22.4 | 9.2 | 23.1 | 8.1 | .6 |
| 5 y | 19.3 | 6.9 | 20.9 | 7.6 | .3 |
| **PVR (mL)** | | | | | |
| Presurgery | 112 | 69.4 | 121.1 | 88.2 | .16 |
| 1 y | 28.9 | 25.6 | 26.3 | 24.8 | .2 |
| 2 y | 27.1 | 22.1 | 25.2 | 23.4 | .6 |
| 3 y | 19.1 | 25.8 | 20.2 | 23.7 | .3 |
| 5 y | 18.9 | 21.5 | 19.7 | 20.4 | .4 |

Abbreviations: IPSS, International Prostate Symptom Score; Q-max, maximum flow rate; PVR, postvoid residual volume; TURP, transurethral resection of the prostate; TUVP, transurethral electrovaporization of the prostate.

the loop is changed during the application in order to destroy prostate tissue by vaporization with high cutting current [6]. Previous pilot studies on TUVP reported improvement in both symptoms and flow rate with minimal complications [7-9]. In the present study, the efficacy and morbidity of TUVP were compared with those of TURP, and results were evaluated over 5 years.

The rationale for surgical management of BPH is the removal of prostate tissue to relieve infravesical obstruction. In the present study, IPSS, Q-max, and PVR were measured to evaluate the infravesical obstruction. No significant group differences were found in these variables for the entire 5-year follow-up period.

In the present study, the mean operative time was 29.2 minutes and 33.1 minutes for TURP and TUVP, respectively. The relatively longer TUVP operative time may be attributed to the fact that resection time is directly proportional to the size of the adenoma and inversely proportional to the experience of the operator. The earlier TUVP procedures took as long as 70 minutes. This operative time was reduced to an average of 30 minutes in later procedures, probably due to a learning curve. Additionally, it should be noted that the prostatic adenoma was significantly larger in the patients receiving TURP than in patients receiving TUVP.

One of the attractive advantages of TUVP is fewer occurrences of bleeding during the procedure, offering better field exposure and minimizing the incidence of complications. This advantage has been observed in other studies [7-10]. In the present study, patients receiving TUVP had less bleeding; 2 patients receiving TURP required blood transfusion.

The mean catheterization time in the present study was significantly shorter following TUVP (1.2 days) than following TURP (2.8 days). Therefore, the average hospital stay was significantly shorter (2.1 days following TUVP; 3.2 days following TURP). These results were consistent with other studies in the literature [5-9].

There was a higher rate of postoperative irritative symptoms

after TUVP (20.3%) than after TURP (14.9%), but these symptoms lasted for an average period of 12 days in both groups. Hammadeh et al [5] reported more bothersome symptoms in the patients receiving TURP, but Kaplan et al [6] reported a comparable incidence of irritative symptoms after TURP and TUVP.

No cases of permanent incontinence were reported in the present study. Similar results were obtained by Küpeli et al [11]. In their study of 104 patients receiving TURP and TUVP, Hammadeh et al [5] found that sexual activity and retrograde ejaculations were comparable in both groups. Similar results were found in the present study.

In the author's opinion, the main disadvantage of TUVP is the lack of prostate tissues needed for pathologic evaluation. When the surgeon needed to get a biopsy from a suspected area, the loop of the standard transurethral resection was attached to the resectoscope for that purpose. However, the author hypothesizes that a specimen could be available during TUVP if the enucleation technique was used.

**CONCLUSIONS**

To the author's knowledge, the present study is the largest reported comparison of TURP and TUVP over a 5-year follow-up period. The low intraoperative and perioperative morbidity, rapid convalescence time, short hospital stay, and simplicity of the procedure make TUVP a potentially suitable, safe alternative to TURP in the therapeutic armamentarium for BPH. Higher risk patients, especially those on anticoagulation therapy, can be treated successfully with this technique because of its unique electrosurgical properties. The main disadvantage of TUVP appears to be the unavailability of prostate tissue needed for pathologic examination. Additionally, although TURP and TUVP were found to be comparable for prostate sizes < 60 g for patients in the present study, TURP may be advantageous for patients with larger prostates. Additional multicenter randomized trials with longer periods of follow-up and larger numbers of patients are essential to establish the durability of TUVP in the treatment of BPH.

**Conflict of Interest**: none declared.

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