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Outcome of the TURP-TUVP sandwich procedure for minimally invasive surgical treatment of benign prostatic hyperplasia with volume larger than 40cc over a 4-year period in Nigeria

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KEYWORDS

TURP-TUVP sandwich procedure; minimally invasive BPH treatment

Abstract

Introduction: Transurethral resection of the prostate (TURP) remains the reference standard for the surgical treatment of infravesical obstruction due to benign prostatic hyperplasia (BPH). While TURP has proven long-term efficacy, it has some associated morbidities. This has fuelled the drive to develop alternative cost-effective options with comparable functional outcomes and a superior safety profile.

Objectives: The aim of this study was to evaluate transurethral electro-vaporization of the prostate (TUVP) combined with TURP as a “sandwich” procedure in relieving the obstruction caused by BPH with volume of 40–80cc.

Patients and Methods: The medical notes of 57 consecutive patients with moderate to severe bladder out-flow symptoms due to BPH who underwent TURP-TUVP as a sandwich procedure from April 2007 to March 2011 were reviewed for prostatic volume, duration of surgery, volume of irrigation fluid used intra-operatively and post-operative hospital stay. Similarly, the patients IPSS, Qmax and PVR were evaluated pre- and postoperatively.

Results: The mean patient age was 64.1 years (SD=9.1), mean prostatic volume was 56.8 cc (SD=8.9), mean resection time was 69.5 minutes (SD=23.9) and mean volume of irrigation fluid (1.5% Glycine)

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used was 21.5 L (SD = 4.9). The mean post-operative hospital stay was 3.5 days (range 3- 4 days). Overall, 11 (19%) patients had blood transfusion, there was no incidence of TUR syndrome and one mortality was recorded from primary plasminolysis. Compared with baseline values, on follow-up at 3 months the IPSS, Qmax and PVR had improved significantly. Bladder neck stenosis occurred in 3 patients and was successfully treated with bladder neck incision.

Conclusions: The sandwich combination of TURP and TUVP for the surgical treatment of BPH with volume larger than 40cc had satisfactory patient safety profile and resulted in significant improvement in IPSS, Qmax and PVR on follow-up at 3 months.

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1. Introduction

Benign prostatic hyperplasia (BPH) is present in about three-quarters of men by the seventh decade of life and constitutes a significant financial burden on the medical system [1]. Transurethral resection of the prostate (TURP) remains the reference standard for the surgical treatment of BPH, with proven long-term efficacy. However, the drive to develop more efficacious, cost-effective and less invasive treatment options continues.

TURP has well described morbidities, necessitating constant attempts at modification of the technique. This is especially so for larger prostates (>40cc) where the resection time, blood loss, irrigation fluid volume used and incidence of complications tend to be greater. The concept behind combining TURP and transurethral vaporization of the prostate (TUVP) is to extend the use of endoscopic relief of prostatic obstruction, regardless of the size of the prostate.

The objective of this paper was to demonstrate that the TURP-TUVP sandwich procedure minimizes blood loss and resection time in prostate adenomas larger than 40cc.

2. Patients and Methods

The medical records of 57 consecutive patients presenting between April 2007 and March 2011 with moderate to severe symptoms of BPH and assessed to have a prostatic volume > 40cc were reviewed. All patients had digital rectal examination (DRE), transrectal ultrasound of the prostate (TRUS), maximum urinary flow rate (Qmax), post-void urine residual (PVR) measurement, international prostate symptom score (IPSS) evaluation and serum prostate specific antigen (PSA) testing as part of preoperative assessment. Serum urea and electrolytes and other basic hematologic parameters were evaluated pre- and postoperatively.

The records were reviewed for the patients' demographics, comorbidities, prostate volume, duration of surgery, volume of irrigation fluid used intra-operatively and duration of hospital stay post-surgery. Data were analyzed with Paired t-test using the computer program for epidemiologists WINPEPI Version 4.0 [2]. Statistical significance was accepted at $p < 0.05$.

All patients had spinal anaesthesia in the dorsal lithotomy position with non-invasive cardiopulmonary monitoring. An Olympus 24F single-flow resectoscope with grooved electrode was used for TUVP and a regular loop electrode for TURP, while a 5 mm roller-ball electrode was used for coagulation. The Valleylab Electrosurgical

unit was set at 200 W in the pure cutting mode for TUVP, 100 W for TURP and 60 W for coagulation, while 1.5% glycine solution was used for irrigation.

The procedure commenced at the 12 o'clock position starting with vaporization from the bladder neck to the verumontanum and continuing circularly. This was followed by resection, and the procedure was concluded with vaporization again, especially in the apical lobe area. Adequate hemostasis at the end of the procedure was confirmed by the complete absence of visible blood in the irrigation fluid effluent. A 22F three-way simplastic Foley catheter was placed transurethraly to monitor postoperative irrigation.

All patients were discharged from hospital as soon as the urine mixed with irrigation fluid was clear. Follow-up at 6 weeks and 3 months included continence assessment by interview, IPSS, uroflometry, PVR measurement and recording of post-operative complications and their management.

3. Results

The mean patient age was 64.1 ± 9.1 years. Comorbidities were hypertension in 22 (38.5%) patients and a combination of diabetes mellitus and hypertension in 9 (15.7%) others. The mean prostatic volume was 56.8 ± 8.9 cc. The serum PSA was < 4 ng/ml in all patients. The mean resection time was 69.5 ± 23.9 minutes. The mean volume of irrigation fluid used was 21.5 ± 4.9 L. Blood transfusion was given in 11 patients (19%), of them 10 had one unit of blood each, while one patient had 4 units in our facility and 34 more units at the referral centre where he subsequently died of primary plasminolysis. All patients had their transurethral catheter removed within 48 - 72 hours of surgery and were discharged after 24 hours of catheter removal. The mean duration of urethral catheterization was 60 hours (range 48-72 hours) while mean post-operative hospital stay was 3.5 days (range 3 - 4 days). All patients were followed up at 3 months post surgery at which point each patient's IPSS, Qmax and PVR was measured. Compared with baseline values, the IPSS, Qmax and PVR for each patient had changed significantly.

The percentage change in IPSS and PVR was calculated for each individual following which the mean of the individual percentage change for both parameters were computed to demonstrate significant clinical improvement. However, because the values of the percentage change in the Qmax for the patients were asymmetric with a large standard deviation, the median with the interquartile range (IQR) was calculated instead (Table 1).

Table 1 Outcome of TURP-TUVP sandwich procedure.

	Mean for all patients at baseline	Mean for all patients at 3 months	Mean of the (individual patients) percentage change	p-value
IPSS	22.2 ± 4.9 (14-30)	9 ± 3.9 (3-16)	-56.9% (SD = 21.4)	0.01
PVR (ml)	314 ± 107.1 (150-520)	70.4 ± 21.5 (30-108)	-75.3% (SD = 13.1)	0.01
	Mean for all patients at baseline	Mean for all patients at 3 months	Interquartile range and Median of percentage change	p-value
Qmax (ml/sec)	8.8 ± 3.7 (4-15)	17.6 ± 4.5 (8-24)	23.1-225.0%; 100%	0.001

Bladder neck stenosis as postoperative complication occurred in 3 patients and was successfully treated with bladder neck incision. Urinary incontinence and erectile dysfunction did not occur in any patient.

4. Discussion

Morbidity and mortality from TURP are significant, because of the large number of procedures performed (about 40,000 per annum in the UK and over 400,000 per annum in the USA) [3,4]. There is a paucity of published data on the number of TURP's performed per annum in Nigeria. Minimally invasive surgical treatment alternatives for BPH to reduce bleeding and fluid absorption are constantly being sought.

TUVP was introduced in 1993 as one such alternative. The synergistic effect of cutting and coagulation achieved by combining high frequencies and increasing the loop-tissue contact area relies on the combination of vaporization and desiccation, with vaporization being greater in prostates with greater epithelial cell volume.

Poulakis et al. [5] performed a meta-analysis of 20 studies comparing the effectiveness and safety of TUVP and TURP for symptomatic bladder outlet obstruction secondary to BPH. The meta-analysis suggested that TUVP and TURP provide comparable improvements in primary outcomes (IPSS and Qmax) while both may offer distinct advantages in terms of secondary outcomes (blood transfusion, operative time, duration of catheterization, incidence of adverse events, hospital stay, re-operation rates and sexual dysfunction).

In a report of early results of TUVP in Nigeria, Akporiaye [6] observed that TUVP using the 5 mm roller-ball electrode instead of the recommended vaportrode conferred all the benefits of TURP with less morbidity and was effective for benign or malignant prostates less than 40gm in size. However, where the prostate volume is larger, as seen in this series where the mean prostate volume was 56.8cc, the challenge is to offer an efficacious minimally invasive procedure with minimal peri-operative haemorrhage and fluid absorption.

Shokeir et al., [7] prospectively randomized patients with prostate volume < 60 cc (their mean prostate volume was not mentioned) between TURP and TUVP and concluded that TUVP was as effective as TURP, and had the advantages of less blood loss, less absorption of irrigant fluid and shorter hospital stay, although it had a significantly longer operative duration.

Gupta et al. [8] used a thick vapor resection loop for TURP coupled with higher electrosurgical generator power settings for prostates larger than 40 cc (median prostate volume = 63cc) and found that it significantly reduced operating time, blood loss, irrigant requirement, nursing contact time, and duration of catheterization, besides providing clear vision during surgery.

In none of the published reports was TURP and TUVP combined in a single sandwich procedure as in this study. The mean operative time of 69.5 minutes in this study is however longer than the 52 minutes reported by Shokeir et al. [7] and the 45 minutes reported by Gupta et al. [8], who used TUVP alone. This is so even where the mean prostatic volume in our study (56.8cc) was less than those treated by Gupta et al and Shokeir et al as mentioned above.

Intra-operative absorption of irrigation fluid during TURP or TUVP increases the risk of the transurethral resection (TUR) syndrome. Glycine has an osmolality of approximately 200mOsm/Kg (compared to serum osmolality of 290mOsm/Kg) and is therefore not truly isotonic, but is essentially non-hemolyzing. Its metabolism into glycol and ammonia when absorbed may contribute to serious adverse effects if more than 3L is absorbed.

Gray et al. [9] examined vesical pressure and fluid absorption during TUVP in 35 patients with BPH and observed that the incidence of absorption during TUVP was 34%. Comparing data from this study to a previous study of TURP [10], they reported that mean vesical pressures were higher and operative times were longer for urological trainees compared with consultants, so their resections were significantly more likely to result in irrigation fluid absorption, but this appeared to be less during TUVP than TURP.

The mean irrigation fluid volume of 21.5L used in this study, considering the mean resection time of 69.5 minutes, is comparable to the findings of Gupta et al. [8], who reported a mean operative of 60 minutes with a mean irrigation fluid volume of 21L for TURP while the mean operative time and mean irrigation fluid volume for TUVP was 45 minutes and 15L respectively.

The blood transfusion rate of 19% in this study is fairly high, but this may simply reflect the small number of patients studied. Consideration was not given to the number of day's patient spent in hospital before surgery. Only the period after surgery till discharge home were analyzed. The mean post-operative hospital stay was therefore 3.5days (range 3- 4 days) while the mean duration of urethral catheterization was 60 hours (range 48-72 hours).

The only mortality from primary plasminolysis had been promptly referred on the 4th post operative day after he had had a total of four units of blood.

We wish to highlight that we had no need to procure extra equipment to carry out the TURP-TUVP sandwich procedure. Using the same loop and roller-ball electrodes as for TURP, the only additional requirement was to set the electrosurgical generator to the desired power settings as described above.

The significant improvements in the mean values of IPSS, Qmax and PVR at 3 months after the procedure observed in this study are similar to the findings of earlier studies by Hammadeh et al. [11], Nelson et al. [12], and Fowler et al. [13], although these workers compared TURP with TUVP as individual procedures. This is similar to the meta-analysis of Poulakis et al.⁵ which showed that TURP and TUVP provided comparable improvements in IPSS, Qmax and PVR.

This preliminary analysis of the TURP-TUVP sandwich technique shows that it can be used to extend transurethral resection for prostates as large as 73cc where open enucleative prostatectomy would have been indicated although the technique can be attended with some complications. Further studies with larger numbers of patients are required to confirm that it is safe and cost effective.

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