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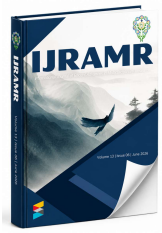

REVIEW ARTICLE

ROLE OF UROFLOWMETRY IN THE OUTCOME MEASURE OF OPEN SIMPLE PROSTATECTOMY

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ABSTRACT

Background: Open simple prostatectomy (OSP) remains a valuable surgical option for patients with benign prostatic hyperplasia (BPH) in developing countries, especially patients with significantly enlarged prostate. Uroflowmetry, a non-invasive urodynamic test, plays a key role in both pre-operative assessment and post-operative evaluation of such patients. This study examined the role of uroflowmetry in outcome measure following OSP and explores the clinical implications of these measures. **Methods**: Fifty patients who had open simple prostatectomy were recruited into the study. Each patient had uroflowmetry (Oakfield Flowmate 2, 2003). The Qmax in each patient was noted and documented. **Results**: 33 of the 50 patients (66%) studied were on urethral catheter pre-operatively. The mean preoperative Qmax of patients that were not on catheter pre-operatively was 6.4 ± 1.6 ml/s. Post-operatively, there was a marked improvement in uroflowmetry parameters: mean Qmax increased to 22.52 ± 5.16 mls/s ($p < 0.001$). The mean PVR reduced from 160 mls pre-operatively to 20 mls post-operatively. **Conclusion**: Open simple prostatectomy significantly enhances uroflowmetry outcomes in patients with benign prostatic hyperplasia, validating its role in the objective outcome measure following OSP.

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INTRODUCTION

Benign prostatic hyperplasia (BPH) is a common urological condition in aging men, characterized by non-malignant enlargement of the prostate gland. In cases with substantial prostatic enlargement or when transurethral resection of the prostate (TURP) is contraindicated, open simple prostatectomy (OSP) is often recommended[1]. Uroflowmetry is routinely employed in BPH management to assess urinary flow dynamics, particularly the maximum flow rate (Qmax), and voided volume. These parameters provide objective insight into the degree of bladder outlet obstruction and the effectiveness of surgical intervention[2]. Uroflowmetry is the measurement of voided urine (in milliliters) per unit time (in seconds). The important elements of the test are voided volume (which should be >150 mL), maximum urinary flow rate (Qmax), and the curve of the flow (which should be bell shaped). In men, a Qmax >15 ml/s is considered normal, whereas a Qmax <10 ml/s is considered abnormal.[3,4] Uroflowmetry is a valuable test that assesses voiding function. The urinary flow is calculated through a flow meter, usually fitted in a commode or urinal, based upon the power necessary to maintain a rotation speed. A graphic printout of the urinary flow is obtained. Time taken to reach maximum flow, maximum and average flow rates, and the voided volume are analyzed.[5] It is important that the patient performs the test with a comfortably full bladder, preferably voiding volumes of at least 150 ml. Privacy is essential and a spurious result may be obtained if the patient is not fully relaxed.[6,7]

Objectives: To determine the role of uroflowmetry parameters in outcome measure followiing open simple prostatectomy.

Study population: After approval had been obtained from the Ethical Committee of the University of Ilorin Teaching Hospital, patients who had open simple retropubic prostatectomy from November 2019 to October 2020 were enrolled after giving written informed consent to participate.

MATERIALS AND METHODS

This observational study analysed pre- and post-operative uroflowmetry data from 50 male patients aged 50–81 years who underwent OSP for BPH at University of Ilorin Teaching Hospital from November 2019 to October 2020. Data were analysed using paired t-tests to determine significant changes in uroflowmetry before and after surgery.

Patients' Evaluation: Patients were assessed with history taking and clinical examination and optimised for surgery. All patients underwent pre-operative prostate-specific antigen (PSA) determination and routine digital rectal examination (DRE). Uroflowmetry was done for patients that were not on catheter before the surgery. The procedure was performed according to the standard protocol as described in Hinman's Atlas of Urologic Surgery, 4th edition. Size 22Fr 3-way 30mls Silicon catheter was passed sterile through the urethral meatus to the bladder after OSP. Each patient had urethral catheter removed from post-operative day 3 to day 6 depending on the degree of clear urine achieved after the surgery. Following which the patients had uroflowmetry (Oakfield Flowmate 2, 2003). The Qmax in each patient was noted and documented.

Data analysis: Data gathered with the aid of the questionnaire were entered into the Statistical Package for Social Sciences software (SPSS version 21) for analysis. Categorical variables were computed with Chi-square, continuous variables were analysed with student's t-tests as appropriate. Results of analysis were presented with the aid of tables. P value was considered significant at ≤ 0.05

RESULTS

Mean PSA was 10.45 ± 6.80ng/ml (range 0.5 – 97.5ng/ml). Mean prostate volume was 90.62 ± 46.85g (range 25 – 300g). Table 1.

Table 1. Mean PSA and Volume of the Prostate

	Mean ± SD
PSA	10.45 ± 6.80
Prostate Volume	90.62 ± 46.85

Indication for surgery

The commonest indication for surgery was urinary retention with failed medical therapy in 41 (82%) patients followed by bleeding prostate in 5 (10%) patients. Fourteen patients (28%) had prostate biopsy on account of elevated PSA of >10ng/ml with histology confirmation of BPH before surgery. Table 2

Table 2. Indication of for surgery

Indication for surgery	
Bleeding prostate	5 (10.0)
BPH and Bladder stones	2 (4.0)
BPH and Hernia	2 (4.0)
Urinary retention with failed medical therapy	41 (82.0)

Urine volume and Qmax: Pre-operatively, majority of our patients (66%) were on urethral catheter; 56% had indwelling catheter due to urinary retention while 10% had hematuric catheter due bleeding prostate.

The mean pre-operative Qmax of those that were not on catheter was 6.4 ± 1.6 ml/s with the range of 0 – 9mls/s. The mean post-operative Qmax was 22.52 ± 5.16mls/s with range of 16 – 37 mls/s. P value was <0.001. The mean PVR reduced from 160 ml pre-operatively to 20 ml post-operatively. Table 3

Table 3. Mean differences in urine volume, Qmax and post void residual

Variables	Pre op (Mean ± SD)	Post op (Mean ± SD)	P
Urine volume	225.31 ± 52.48	219.24 ± 61.00	0.657
Qmax	6.40 ± 1.70	22.52 ± 5.16	<0.001
Post void residual	160 ± 32	20 ± 12	<0.001

DISCUSSION

Majority of our patients (66%) were on urethral catheter before the surgery. 56% had indwelling catheter due to urinary retention while 10% had hematuric catheter due bleeding prostate. This corroborate the findings by Salako *et al,*[8] which shows that many patients in developing world do not present for treatment until they have reasons for urethral catheterization. The commonest indication for surgery was urinary retention with failed medical therapy in 41 (82%) patients, followed by bleeding prostate in 5 (10%) patients. This is similar to a study at a teaching hospital in Nigeria where the commonest indication for surgery were urinary retention and hematuria.[9] Studies in Liberia showed that the commonest indication for simple prostatectomy was chronic urinary retention.[10,11] This may be due to inadequate urological screening in this part of the world making detection of prostate pathology unlikely until patients are symptomatic. The mean PSA was 10.45 ± 6.8045ng/ml (range 0.5 – 97.5ng/ml)

Similar elevated mean PSA values of 17.1ng/ml in patients with benign prostate has been reported by Kyei *et al.*[12] Salako et al.[8] and Suer et al.[13] respectively recorded average PSA of 8.4ng/ml and 9.6 ng/ml. This validates the existence of other benign causes of elevated PSA. Fourteen patients (28%) had prostate biopsy on account of elevated PSA of >10ng/ml with histology confirmation of BPH before surgery. This infers about 30% of patients with benign prostatic enlargement will need prostate biopsy at one point or the other due to elevated PSA. For this reason, more effective non invasive prostate screening method is needed to reduce the rate of prostate biopsy and its attendant complications in benign prostate. The mean weight of the prostate after prostatectomy was 90.62 ± 46.85g (range 25 – 300g). Fourteen patients (28%) had prostate weight of ≤ 60g, while 32% had ≥ 100g. This corroborate the study by Olapade-Olaopa *et al*[14] who noted that most African men have larger prostate weight that may not be amenable to TURP. Additional procedures were performed in 4 (8%) of the patients. Two patients (4%) had inguinal herniorrhaphy and two patients (4%) had bladder stone removal. This is comparable to study by Ajape *et al*[15] who noted that 14% of their patients have inguinal herniorrhaphy and bladder stone removal. Pre-operative assessments showed 66% of our patients on urethral catheter before surgery. There was significantly reduced urinary flow rates in the remaining patients that were not on urethral catheter: Pre-operative mean Qmax was 6.4 ± 1.6 ml/s. Post-operatively, there was a marked improvement in uroflowmetry parameters: mean Qmax increased to 22.52 ± 5.16 mls/s ($p < 0.001$). The mean PVR reduced from 160 ml pre-operatively to 20 ml post-operatively. This is similar to studies by Ajape *et al*[15] who reported Qmax of 25.59 ml/s following open simple retropubic

prostatectomy. Similar studies also noticed significant improvement in Qmax following OSP[8,16]. Our findings are consistent with prior studies demonstrating that OSP significantly improves urinary flow rates in BPH patients. Uroflowmetry proved to be a reliable indicator of surgical success, correlating with symptom resolution and improved quality of life. The improvement in uroflowmetry parameters highlight the efficacy of OSP in relieving bladder outlet obstruction caused by enlarged prostate and this can be extrapolated as routine outcome measure for the success of OSP.

CONCLUSION

Open simple prostatectomy significantly improves uroflowmetry outcomes in patients with benign prostatic hyperplasia, validating its role in the objective measure of outcomes following OSP. Uroflowmetry remains an essential tool in evaluating both the need for surgical intervention and efficacy of surgical outcomes. We recommend all qualified patients undergoing surgical interventions for prostate enlargements to have routine pre and post-operative uroflowmetry evaluation to objectively determine the needs and outcomes of surgical intervention.

DECLARATIONS

Abbreviations

BPH - Benign Prostatic Hyperplasia
TURP - Transurethral resection of the prostate
AUA - American Urological Association
OSP-Open Simple Prostatectomy
UC- Urethral Catheter
PSA - Prostate Specific Antigen
ERC - Ethical Review Committee
Q_{max} - Maximum urinary flow rate

Ethics approval and consent to participate

Ethical Clearance: This research was extracted from part 2 fellowship dissertation submitted to West African College of Surgeons and was carried out in accordance with Helsinki declaration for medical research involving human subjects. Ethical clearance for this work was sought and obtained from the Ethical Review Committee (ERC) of the University of Ilorin Teaching Hospital. ERC PAN/2019/11/1971. 26/11/2019.

Consent to participate: Informed consent to participate was obtained from all of the participants in the study

Consent for publication: All authors approved the publication of the manuscript in IJRAMR

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Competing Interests: Non

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