

(RESEARCH ARTICLE)



Clinical profile and outcomes of patients with clinical benign prostate hyperplasia treated by trans urethral resection of prostate at Bugando Medical Centre, Mwanza, Tanzania

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Abstract

Introduction: Benign Prostate Hyperplasia (BPH) is the most common prostatic pathology in elderly men with Trans Urethral Resection of the Prostate (TURP) still being considered as the gold standard surgical management. TURP is the commonest endoscopic surgery performed for BPH in developing countries including Tanzania, however its outcome in this part of the world has not been documented. Therefore, the study aimed to determine the clinical profile, outcome as well as predictors of outcome in patients with clinical BPH undergoing TURP at Bugando Medical Centre (BMC), a tertiary hospital in Mwanza, Tanzania.

Methods: This was a cross sectional longitudinal hospital based study to evaluate the clinical profile as well as the outcome of patients with clinical BPH treated by TURP at BMC from November 2018 to April 2019. All participants scheduled for TURP for the diagnosis of clinical BPH who signed informed consent for the study were included, their international prostate symptom score (IPSS) with the 8th question for quality of life (QoL) was scored, social demographic data and clinical profile information were obtained from their files. Participants were followed in the theatre to document any intraoperative complications and other necessary data required by this study.

Progress in the ward was recorded and following discharge, patient was scheduled for follow up at 6 and 12 weeks. During follow up, IPSS and QoL scores as well as complication was recorded.

Results: A total of 210 participants met the eligibility criteria. The median age was 69 (IQR 63-75) years. Prostate size ranged from 15 – 200 grams with median size of 77 (IQR 51-107) grams. Acute urine retention was the most common indication 69 (33%), followed by lower urinary tract symptoms 52 (25%). Urologist operated most of the patient 122 (58.1%) with the rest operated by either resident alone or finished up by urologist, and the median weight resected was 20 (IQR 13.5 –28.3) grams. About 66 (31.4%) developed perioperative complication with majority having clot retention. During follow up, the median IPSS score was 9 (IQR 7 – 12) and 2 (IQR 0 – 6) and median QoL score of 3 (IQR 1 – 3) and

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0 (IQR 0 – 1) with improvement of 93 (45.4%) and 184 (89.8%) on 1st and 2nd follow up visits respectively. There were a total of 9 (4.3%) patients whom developed Trans urethral resection (TUR) syndrome, with overall mortality of 3 (1.4%).

Conclusion: BPH is common from 6th decade of life onwards. Though most participants were operated because of either acute urine retention or severe lower urinary tract symptoms (LUTS), some presents late already with renal insufficiency. Despite the fact that most of the participants had severe symptoms and their quality of life was poor at presentation, TURP improved symptoms in most of the participants. The improvement is even better in the hands of experienced surgeon, for the participants with small prostate and in absence of UTI prior to surgery.

Keywords: Clinical Benign prostatic hyperplasia; Transurethral resection of prostate; Lower urinary tract symptoms; International prostate symptoms scores

1. Introduction

Benign prostate hyperplasia (BPH) is a medical condition characterized by enlargement of the prostate gland as a result of increase in both number of cells and glands within the prostate gland [1]. The increase in number is mostly due to decreased rate of cell death by apoptosis as compared to proliferation [1,2]. It is a common benign condition of the prostate in elderly male [3,4]. The incidence of histological BPH is relatively high compared to clinical BPH (5). The incidence of histologically proved BPH rise with age as 20, 50 and more than 90% in the ages of 41-50, 51-60, and over 80 years respectively [1,4,6].

Although BPH is common in elderly population not all of them will develop symptoms, of those, who are symptomatic, they will present with LUTS [7]. LUTS can be divided mainly into three groups, storage symptoms (frequency, urgency, nocturia, bladder pain and dysuria), voiding symptoms (hesitancy, weak stream, straining, intermittency, sense of incomplete emptying, excessive terminal dribbling) and other symptoms like, pyuria, hematuria, pneumaturia.

Some patients may present with complications like recurrent UTI, acute or chronic retention, renal failure, and some on top of LUTS especially those who are sexually active they present with ejaculatory dysfunction (8).

Patients with obstruction related complications tend to be of increasing age, larger prostates, and more resected tissues though there is no difference in terms of surgical complications between those with obstruction related complications and those without (9).

Evaluation of a patient with BPH centers on history, physical findings and laboratory investigations together with imaging with or without endoscopic studies [10]. Severity of symptoms is objectively measured by the symptom score system the most common being International Prostate Symptom Score (IPSS) which includes seven symptoms each with a score of 0-5, hence the sum being 0-35 and one questions for quality of life which has a score of 0-6.

IPSS score is suitable, reliable, valid and sensitive tool for patients with BPH. Additionally, it has high sensitivity even following TURP, representing improvement of symptoms [11].

Indication for surgery in BPH patients include severe symptoms, urine retention, chronic complications (recurrent hematuria, recurrent UTI, bladder stone/diverticulum, renal function impairment and postvoidal residual volume of >100 ml) and failure of medical therapy [12].

Trans urethral resection of prostate (TURP) still plays a corner stone in management of BPH and it is a gold standard [3,13]. In experienced hands both TURP and open prostatectomy for larger prostates may lead to similar weight of resected tissues while keeping the complication rate low, shorter hospitalization and lower cost [6,11,14].

TURP is effective in subjective improvement of LUTS (IPSS <7), progressively by 81.4% and 88.6% from 1st and 2nd visit at 6 and 12 weeks respectively [12,14].

Outcome after TURP is better in those without UTI, or catheter, shorter duration of catheterization prior to surgery (less than 4months), and those with big prostates of more than >45gm and small Post Voidal Residual (PVR) (<60 mls) [12]. The amount of resected prostatic tissue and diabetes status are not determinant of outcome [15,16].

Although this procedure is a gold standard for management of BPH, it is associated with other complications other than TUR syndrome which occurs in up to 10% of patients [17]. These includes Bleeding requiring blood transfusion, capsular perforation, total incontinence, failure to void (18) and perioperative deaths [19]. Bladder neck contractures and urethral stricture can be the common late complications of this procedure [20,21].

Despite the fact that TURP is among the common procedure performed for BPH in various specialized centers in our country Tanzania, [10] there is a scarce of information regarding the outcomes, and complications. This study will then act as a self-assessment tool as well as identify those patients who are likely to develop complications necessitating individualization, early and careful intervention. It will also provide an evidenced based discussion between the patient and the doctor on expected outcome.

2. Material and methods

2.1. Study area and population

This cross sectional and longitudinal descriptive hospital-based study was conducted from November 2018 to April 2019 at Bugando Medical Centre (BMC). BMC is the tertiary and teaching hospital for the Catholic University of Health and Allied Sciences (CUHAS), located in Mwanza city in the northwestern Tanzania on the southern border of Lake Victoria. It's the only tertiary hospital in the northwestern zone with 890-bed capacity and serving a population of approximately 13million. BMC Urology department where this study was conducted has bed capacity of 59, where an average of 33 patients with clinical BPH undergoes TURP monthly.

All patients with clinical BPH who underwent TURP and consented for the study were recruited.

2.2. Inclusion and exclusion criteria

A total of 210 patients with clinical BPH consented for the study, interviewed and included in the final analysis. Patients who underwent previous prostate/urethral surgeries and those who were proved to have prostate cancer after TURP were excluded.

2.2.1. Sample size and sampling technique

Sample size was calculated by the formula by Yamane Taro (1967) for estimating minimum sample size for descriptive studies when studying proportions [22].

$$n = \frac{N}{1 + N(e^2)}$$

Where; n =sample size, N =is the population size = 360 (BMC data base), e = is the level of precision= 0.05

$$n = \frac{360}{1 + 360[0.05^2]}$$

This gives 189, but Gunda *et al* in his study on incidentally diagnosed prostate cancer at BMC, he found a prevalence of 21.71%, with addition of 10% loss to follow up then final minimal sample size was 250 [23].

Convenience sampling technique was used to recruit patients with clinical BPH where by all patients who fulfilled eligibility criteria were included in the study.

2.2.2. Data collection

The pre tested structured data questionnaire was used to collect required data from eligible participants. The questionnaire was tested in ten patients and errors were rectified prior to beginning of data collection. The ten patients used to test the questionnaire were not included in the final analysis. Social demographic data and preoperative clinical profile were obtained from patient's files.

IPSS score was obtained from all eligible participants with the help of trained research assistant and or principle investigator. Those who were catheterized, the score were sought from them by asking the symptoms experienced before catheterization.

Intraoperative data were also recorded and it included duration of surgery (time in minutes from the beginning of resection to insertion of urethral catheter), experience of the surgeon, need of blood transfusion, TUR syndrome, iatrogenic injuries (undermining at the bladder neck, capsular perforation and or bladder perforation), and weight of the resected prostate, all were entered in the questionnaire.

TUR syndrome was defined as presence of two or more circulatory or neurological symptoms with serum sodium level <125mmol/l. Once TUR syndrome was suspected based on circulatory and neurological signs/symptoms a 5mls venous blood was drawn, stored in appropriate container for serum electrolyte analysis. The sample was submitted to BMC laboratory within five minutes for analysis.

Immediately post-surgery, random blood sugar was checked by glucometer from all the participants. Close follow up was done for all participants to note any complications that arise while they were still in the ward for recovery.

The resected prostate tissue was measured (in grams) immediately after resection by the weighing machine available at the theatre with a maximum capacity of 5 kg. Thereafter, the tissues were collected in a container and fixed with 10% formalin in the ratio of 1:10 then taken to the histopathology laboratory by the research assistants or the principle investigator.

Two weeks post operatively the histology results were traced and those with proved prostate cancer were dropped out of the study. Those with BPH either alone or coexisted with other pathology like inflammation or ischemia were noted and followed up for any effects on the outcome. During follow up period which was at 6 (first follow up) and 12 weeks (second follow up), IPSS and QoL score were obtained and deemed favorable if it was <7 or decreased by ≥50% and QoL <3 otherwise unfavorable. Moreover, during these two follow ups, we enquire for possible complications and record them. All who were found to have complications were referred to attending physician for possible treatment/assurance.

In this study, clinical BPH refers to patients with symptoms and sign suggestive of prostatic obstructions with no signs suggestive of malignancy on examination but with no histological confirmation of BPH yet. Perioperative complications was defined as complications extending from intraoperative throughout hospital stay

2.3. Data quality control

During the whole process sample collection and analysis, standard operating procedures (SOPs) were highly observed.

To ensure internal validity of the study the following precautions were taken into considerations: Data-collecting tool was pre-tested, research assistants (urology residents) were trained on how to administer the questionnaire and to collect data. This was done at first with the presentation of the questionnaire and followed by demonstration on filling to all of them and individually. The principal investigator ensured completeness of the data collection by rechecking the data collection tool every evening of the preoperative day.

2.3.1. Data management and analysis

Data from the questionnaire were entered into Microsoft excel and analyzed using STATA version 15. The mean with their standard deviation (SD), and median with their interquartile range (IQR) were calculated for continuous variables. Results were summarised by frequency tables and pie charts.

To determine the predictors of outcome, univariate logistic regression analysis was used followed by multivariate logistic regression model for those factors which had significance from univariate regression. OR together with 95% C.I were computed and $P < 0.05$ was considered statistically significant.

2.4. Ethical issues

The clearance to carry out this study was obtained from the joint CUHAS/BMC ethics and review committee before commencement. Written informed consent was obtained from each participant, and every participant had the right to withdrawal from the study at any particular time. All patient's information was kept confidential during the whole process of conduction of this study.

3. Results

3.1. Characteristics of study participants

A total of 255 participants with clinical BPH scheduled for TURP were recruited, of these, 5 participants had previous history of trans urethral surgery and 40 had prostate cancer confirmed histologically and hence excluded from the study. Of the remaining participants (210), two were lost to follow up and 3 died. For those who died, two died during hospital stay post operatively and one died in the first week post discharge in different health facility for what was thought to be anemia. This makes the total participants analyzed in the follow-up visits to be 205.

Among 210 participants, the age at presentation ranged from 48 to 99 years with median age of 69 (IQR 63 – 75) years. Majority of the participants 111 (52.9%) were aged between 55-70 years, and most of them 94 (44.8%) were from Mwanza followed by Mara region 41 (19.5%). At presentation, 126 (60%) participants had symptoms < 12 months, and median IPSS score was 25 (IQR 20 – 29) and median QoL score of 6 (IQR 5 – 6) with majority 165 (78.6%) having severe symptom score, and 191 (91%) had >3score on the QoL question. Also, there were 109 (51.9%) participants with catheter, of which 100 (91.7%) were urethral with the remainder being at suprapubic site (Table 1).

Prostate size ranged from 15-200 grams with median size of 77 (IQR 51 – 107) grams, with the majority 97(46.2%) having prostate size >80 grams. Additionally, most of the participants 118 (56.2%), had eGFR of ≥ 90 (Table 1). There were 104 (49.5%) participants on medical therapy for BPH of whom only 33 (31.7%) used medications for ≥ 6 months before surgery and 64 (61.5%) used a combination of Tamsulosin and Finasteride (Table 1 and Figure 1 below). For those in combination therapy only 25 (37.9%) used the drugs for six months or more.

Table 1 Characteristics of study participants (N=210)

Patient's characteristics	n (%)
Age in years	
<55	13(6.2)
55-70	111(52.9)
>70yrs	86(41.0)
Residence	
Mwanza	94(44.8)
Mara	41(19.5)
Geita	18(8.6)
Shinyanga	14(6.7)
Kigoma	13(6.2)
Kagera	12(5.7)
Simiyu	9(4.3)
Others	9(4.3)
Pre-operative durations of symptoms in months	
<6	39(18.6)
6-12	87(41.4)
>12	84(40.0)
Pre-operative IPSS score	
Mild score	9(4.3)
Moderate	36(17.1)
Severe	165(78.6)
Pre-operative quality of life score	
0-2	6(2.9)

3	13(6.2)
4-6	191(91.0)
Preoperative prostate size (in grams)	
<40	27(12.9)
40-80	86(41.0)
>80	97(46.2)
Presence of catheter	
Yes	109(51.9)
No	101(48.1)
Medical therapy	
Yes	104(49.5)
No	106(50.5)
Renal status	
Stage 1	118(56.2)
Stage 2	71(33.8)
Stage 3A	10(4.8)
Stage 3B	6(2.9)
Stage 4	3(1.4)
Stage 5	2(1)
Duration of hospital stay (in days)	
0-3	136
4-7	64
>7	10

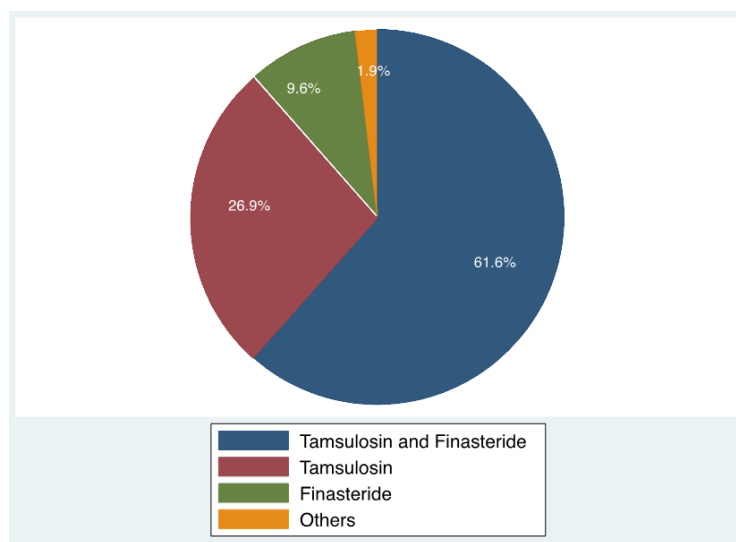


Figure 1 A pie chart showing distribution of medical therapy for BPH
* Others =local herbs, a mixture of local herbs and either Tamsulosin and or finasteride

3.2. Intraoperative characteristics of the participants

The most common indications of TURP was acute urine retention 69 (32.9%), followed by moderate to severe lower urinary tract symptoms 52 (24.8%), chronic complications of bladder outlet obstruction 50 (23.8%) which included

hematuria secondary to bleeding prostate 19 (9%), bladder stones 7 (3.3%), renal insufficiency 18 (8.6%), and inguinal hernia 6 (2.9%) (Figure2).

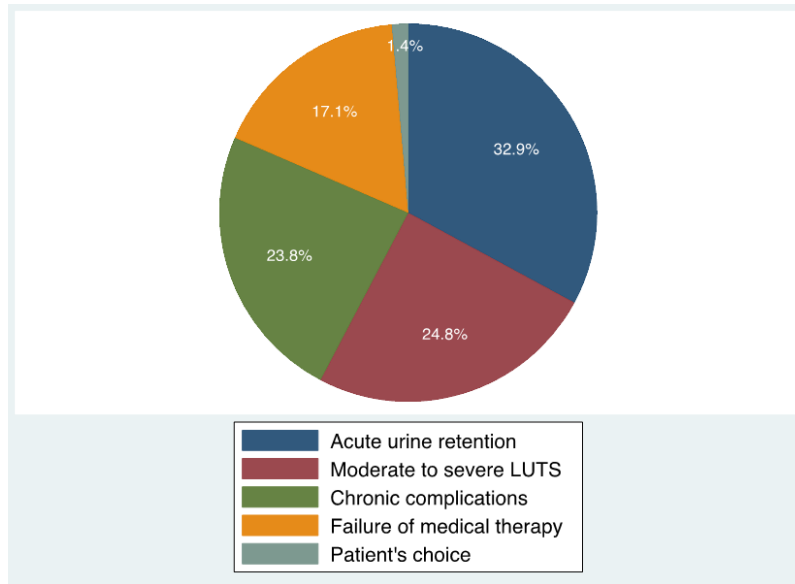


Figure 2 A pie chart showing indications of TURP for the participants

Table 2 Intraoperative characteristics (N=210)

Parameters	No (%)
Experience of the surgeon	
Qualified urologist	122(58.1)
Resident	18(8.6)
Resident + urologist	70(33.3)
Duration of resection (in minutes)	
<60	148(70.5)
60-90	59(28.1)
>90	3(1.4)
Weight resected (in grams)	
<21	109(51.9)
21-40	75(35.7)
>40	26(12.4)
Percent of resected tissue	
<20	61(29.1)
20-30	66(31.4)
>30	83(39.5)
Histology	
BPH	181(86.2)
BPH+ chronic inflammation	12(5.7)
Others	17(8.1)

Others= BPH with atypia, basal cell metaplasia and dysplasia

All participants were operated under spinal anesthesia with the majority 122 (58.1%), been operated by qualified urology surgeon, the rest were operated by resident either alone 18 (8.6%) or finished up by qualified urology surgeon in 70 (33.3%) of participants. Duration of resection ranged from 10 – 95 minutes with median resection time of 50 (IQR 40 – 63) minutes with majority 148 (70.5%) of resections taking <60minutes. Weight of resected prostate ranged from 5 – 72 grams with median weight of 20 (IQR 13.5 – 28.3) grams, median percentage weight resected of 27.5 (IQR 19.7 – 35.6) % and the majority of the resected tissue 109(51.9%) were less than 21 grams. (Table2).

3.3. Outcomes and complications

During first visit, the median IPSS was 9 (IQR 7 – 12) with majority 129 (63.6%) having moderate symptom score (8 – 19), and median QoL score of 3 (IQR 1 – 3) and 83 (40.8%) of patients had QoL score of 3. While during the second visit, the median IPSS score was 2 (IQR 0 – 6) with majority 180(87.8%) having mild score (0 – 7) and 182 (88.9%) had QoL score of ≤ 2 . Overall improvement in the 1st and 2nd visit was 93 (45.4%) and 184 (89.8%) respectively as summarized in table 3.

Table 3 Outcomes and complications (N=205)

Parameters	No (%)
IPSS score in the first visit	
Mild score	71(35)
Moderate score	131(63.6)
Severe score	3(1.5)
IPSS score in the second visit	
Mild score	180(87.8)
Moderate score	20(9.8)
Severe score	5(2.4)
Quality of life in the first visit	
0-2	93(45.4)
3	83(40.5)
>3	29(14.2)
Quality of life in the second visit	
0-2	182(88.9)
3	14(6.8)
>3	9(4.4)
Improvement	
1st visit	
Yes	93(45.4)
No	112(54.6)
2ndvisit	
Yes	184(89.8)
No	21(10.2)

3.4. Complications experienced during perioperative period

The overall perioperative complication rate was 66 (31.4%), the most common intraoperative complications was injuries which accounted for 25 (11.9%) on the other hand, clot retention was the most common during 28 (13.3%) the hospital stay period.

There were a total of 9 (4.3%) participants who developed TUR syndrome and 8 (88.9%) of them were operated by a resident then finished up by the urologist. Likewise of those with TUR syndrome, 3 (33.3%) had prostate capsule injuries and 4 (44.4%) had deranged renal function. The sodium level in these participants with TUR syndrome had median serum sodium level of 120 mmol/l (IQR 109 – 122).

Table 4 Complications experienced by participants intraoperative and during hospital stay (N=210)

Complications	Intraoperative No (%)	During hospital Stay No (%)
Injuries		
Yes	25(11.9)	-
No	185(88.1)	-
TUR syndrome		
Yes	9(4.3)	-
No	201(95.7)	-
Clot retention		
Yes		28(13.3)
No		182(86.7%)
Persistent/recurrent LUTS		
Yes		6(2.9)
No		204(97.1)
Transient incontinence		
Yes		7(3.3)
No		203(96.7)
Retention requiring re-catheterization		
Yes		1(0.5)
No		209(99.5)
Death		
Yes		2(1)
No		208(99)
Others		
Yes		14(6.7)
No		194(93.3)
Need of blood transfusion		
Yes		16(7.6)
No		194(92.4)

Others: dysuria, septicemia and or hyperglycemia

During 1st and 2nd visit follow-ups, the complications were 118 (57.3%) and 56 (27.3%) respectively. About 5 (2.4%) participants developed urethral stricture all during 2nd visit (Table 5). Rate of re-intervention was 13 (6.3%), including redo TURP 4 (1.9%), DVIU 5 (2.4%), and medical therapy for persistent LUTS 4 (1.9%)

Table 5 Complications experienced by participants post TURP during follow up visits, N=205

Complications	First follow up No (%)	Second follow up No (%)
Any complication		
Yes	118(57.3)	56(27.3)
No	87(42.7)	149(72.7)
Urinary tract infection (UTI)		
Yes	17(8.3)	6(2.93)
No	188(91.7)	199(97.1)
Persistent LUTs		
Yes	45(22.1)	12(5.9)
No	160(77.9)	193(94.1)
Dysuria		
Yes	79(38.5)	24(11.7)
No	126(61.5)	181(88.3)
Urge incontinence		
Yes	32(15.6)	6(2.9)
No	173(84.4)	199(97.1)
Haematuria		
Yes	16(7.8)	2(1)
No	28(13.6)	203(99)
Urethral stricture		
Yes	-	5(2.4)
No	-	200(97.6)
Others		
Yes	28(13.6)	10(4.9)
No	177(86.4)	195(95.1)

Others: tissue retention, dysuria, septicaemia and or hyperglycaemia

3.5. Predictors of improvement of symptoms following TURP

On univariate analysis we found that, participants with prostate of ≤ 80 mls had more than thrice chance of improvement of symptoms compared those with larger prostate gland (OR 3.1; 95% CI 1.7 – 5.5, p-value <0.001), those operated by a urologist had about twice likely hood of improvement of symptoms compared to their counter parts (OR 1.9; 95% CI 1.1 – 3.3, p-value 0.01), and not having UTI had about three times higher chance of improvement of symptoms compared to those who had UTI (OR 2.9; 95% CI 1.2 – 7.1, p-value 0.02)., When these factors were subjected to multivariate logistic regression, all remained statistically significant (Table 6).

Table 6 Predictors of improvement, N=210

Predictors	Improvement		Univariate			Multivariate		
	Yes (%)	No (%)	OR	95%CI	P-value	OR	95%CI	P-value
Age								
<70	46(40.4)	68(59.6)	1					
≥70	47(49)	49(51)	1.4	0.8 – 2.5	0.2			
Presence of Catheter								
Yes	48(44)	61(56)	1					
No	45(44.5)	56(55.5)	1.02	0.6 – 1.8	0.9			
Duration of catheter								
≤4	33(41.8)	46(58.2)	1					
>4	15(50)	15(50)	1.4	0.6 – 3.2	0.4			
Duration of symptoms								
<12	53(45.7)	63(54.3)	1					
≥12	40(42.6)	54(57.5)	0.9	0.5 – 1.5	0.6			
Use of medical therapy								
Yes	55(51.9)	51(48.1)	1.0	1.0 – 3.0	0.05			
No	38(36.5)	66(63.5)	1.7					
Size of the prostate								
>80	28(29.5)	67(70.5)	1					
≤80	65(56.5)	50(43.5)	3.1	1.7 – 5.5	<0.001	3.4	1.9 – 6.4	<0.001
Experience of surgeon								
Resident/&Urologist	31(35.2)	57(64.8)	1			1		
Urologist	62(50.8)	60(49.2)	1.9			2		
Presence of UTI								
Yes	8(22.9)	27(77.1)	1			1		
No	43(46.2)	50(53.8)	2.9	1.2 – 7.1	0.02	3.5	1.3 – 9.1	0.01
Unknown	42(51.2)	40(48.8)	3.5	1.4 – 8.7	0.006	3.3	1.3 – 8.6	0.01

4. Discussion

Despite the novel minimal invasive surgeries in the developed world, TURP still remain a gold standard for surgical management of BPH. In developing countries it is almost the only available endoscopic management of BPH since minimal invasive surgeries are not widely available. In our setting TURP it is the most common urological surgery performed for BPH followed by far with TUIP and rarely open prostatectomy.

In the present study, the mean age at presentation for patients with BPH was 69.4 years with about half of the patients in the age group 55 – 70 years. This is similar to other two studies done in Tanzania but in different health facility where the mean ages were 65.4 and 69.7 years [24,25] same findings has been reported in other parts of Africa [19] and Asia [10,26,27]. This might be because of the fact that Prostate pathology including BPH is the disease of elderly people and its incidence increases with age. In this study, majority of the participants had median IPSS score of 25 (IQR 20-29) with most having severe score at presentation and median quality of life score of 6(IQR5-6). These concur with other studies

where the means IPSS preoperatively ranged from 22 to 29 and mean quality of life was >3 (28), and keeping with the fact that most patient will undergo surgery if their symptom score is in the severe range. But on the other hand it may reflect the poor health seeking behavior in which people seek medical care when they develop severe symptoms.

Preoperatively, prostate size in this study as measured by trans abdominal ultrasound, ranged from 15 – 200 grams with median size of 77grams. Majority of the patients had prostate size in the range of 40 – 80grams, which is higher than average of 42.8 grams and 59 grams reported in other studies done in other parts of Africa [18,29] However a study by Charalampos *et al* in the monopolar arm showed the mean prostate size was 63.2 mls (6). These differences may be explained by several factors like; differences in the study setting were the two Nigeria's study had small sample size compared to the present. Moreover USS itself is operator dependent, but also a type of USS probe being trans abdominal (TAUS) or TRUS might have an effect of over or underestimating or no difference as shown in various studies.

About half of the participants in this study had catheter at presentation and the majority was urethral. These findings are not much different from another study done in India where by 42.5% of the patients were catheterized [26]. This is not a surprise as one of the complications of BPH in the long run is urine retention, which is even more common in patients not on medication especially 5-alpha reductase inhibitors. There were 32.5% of the participants with comorbidities and majority had hypertension which is also a common disease affecting elderly population [19].

In this study the most common indication for TURP was, acute urine retention (32.9%) followed by lower urinary tract symptoms (LUTS) (24.8%), and chronic complications (23.8%) (Which included hematuria bladder stone, renal insufficiency, and hernia). LUTS was the most common indications especially in the study done in USA [30,31] and Korea [3,10] highlighting the possibility of better health seeking behavior as well as use medications especially five Alfa reductase inhibitors prior to surgery compared to our setting.

In this study patient with renal insufficiency as an indication for TURP were a little higher compared to other studies (8.6% versus 1.8%). The explanation could be a late presentation to the hospital due to knowledge, costs and accessibility to health facility among other reasons [3,31]

In this study urologist operated most patients and the rest were operated by residents either alone or urologist did finish up. The median resection time was 50(IQR40-63) minutes, which is shorter almost by half than in a study done by Eziyi *et al* as well as Chukwujama *et al* [18,29]. This might be because of the big number of patients operated at our center hence the surgeons more used to the art as a result they become faster.

The median weight resected was 20 (IQR 13.5-28.3) grams with median percentage resected of 27.5(IQR19.7-35.6) %. This is in agreement with the study done in UK by Young *et al*, but lower than Alhassan *et al* and higher than other studies in Asia[10,15,19,31]. This signifies the fact that weight resected is affected by several factors including preoperative prostate size, experience of the surgeon, whether the prostate is bleeding excessively or not, speed of resection as well as the familiarity with instruments used.

Perioperative, one third of the patients developed various complications, among those with complications, clot retention accounted for 28 (42.4%), followed by prostate capsular injury in 16 (24.2%) that is slightly higher than studies done in Nigeria[18,29]. This may be because, in this study there were resident involved unlike the above Nigeria studies and most of the clot retention and injuries were seen more commonly in this group of participants and control of bleeding and depth of resection being among the difficult aspect of TURP to master.

TUR syndrome occurred in 9 (4.3%) patients and 1 (11.1%) died. This slightly lower than in a study done earlier by Chukwujama *et al* of 4.7% [18] but it is considerably lower than what is reported by Joshi *et al* (5.7%) [28] This may be because of the difference in study setting in which all of the above studies had smaller sample size than the current study.

Overall, it is higher than many studies on the subject especially in developed countries some reporting no TUR syndrome at all [32–34] This could be because of the large number of patients operated per unit time as well as being a teaching hospital for the residents, as TURP procedure has a steep learning curve.

Additionally 7(10.6%) had transient incontinence on catheter removal, which on follow up visits they all got better, this may be because of the oedema of the sphincter post TURP which explains its disappearance as the oedema subsides. This is similar to findings by other studies [17,29]

A total of 16 (6.4%) of the participants needed blood transfusion, this was higher almost approaching that of open prostatectomy. Most 13(82.3%) of those who needed blood had prostate >80grams. This high rate may be explained by excessive bleeding which is even worsened by larger prostate and inexperience of the surgeon. However, this was far lower than the two other studies done in Tanzania, where the rate were 58.2% and 68.1% [24,25] of which most of it was deemed unnecessary could be avoided especially in this era of high prevalence of sexually transmitted diseases (STD'S) including HIV/AIDS. Moreover, the authors from one of the Tanzanian study emphasized on streamlining the indication for BT and not transfusing merely because of autologous donation prior to surgery.

In this study, we had two participants who developed transient hyperglycemia with no prior history of diabetes, and the reading normalized prior to discharge. All of them had injuries during resection, one had prostate capsule perforation and the other had perforation of the bladder requiring laparotomy for repair and removal of the extravagated fluid. This finding has been observed in previous studies when using dextrose 5% as irrigation fluid [35,36]. These injuries might explain the increased absorption of the dextrose 5% into the circulation leading to transient hyperglycemia.

Our mortality was 3(1.4%) which is similar to result of Alhassan *et al* (1.2%) [19], however this is slightly higher than acceptable mortality of 1% following TURP [29]. This might be because of the comorbidity as one death was seen in a 99-year old man who developed TUR syndrome with severe hyponatremia despite the fact that only 5gm were resected, and another patient died in the peripheral due to what was thought to be severe anemia, a likely result of early discharge especially for the one we resected more than 30grams. Additionally, it might be an over estimation as many studies done on mortality post TURP were retrospective population based series with larger sample size in the order of thousands unlike the index study [37,38].

In this study, the duration of hospital stay ranged from 2 – 18 days with a mean stay of 3.8 days, and most were discharged on day 3. Those who developed complications were likely to stay longer, and this is not much different from other studies [18,29]. This is strong evidence warranting a TURP to be a day surgery.

During follow up, the mean IPSS score were 9.1 and 3.8, and the QoL score were 2.3 and 0.7 with improvement of 44.9% and 87.6% on first and second visit respectively. These results show substantial improvement similar to what has been documented by Bozdar *et al* and other previous studies [12,21,28]. The index study had lower improvement seen during first visit and this may be attributed by many complications experienced by our patient during the first visit compared to second visit. This signifies that despite difficulties and challenges, TURP produces improvement of symptoms to most of our patients.

On first visits the rate of complication was high 118 (57.3%), mostly were dysuria 79 (38.5%), followed by persistent LUTS 45 (22.1%), and urge incontinence 32 (15.6%), and most of them improved. This is same as in other studies in which mostly they develop dysuria as a result of urine passing through a raw prostatic bed or because of infection which usually improve [13].

The rate of complications on the 2nd visit decreased to 27.3%, and majority had dysuria. Five (2.4%) participants developed urethral stricture in this follow up, the rate similar to other studies except for the early occurrence in the index study though some case series reports stricture as early as two months but mostly are seen within the first 6months post TURP [39,40].

In this study having a small prostate was significantly associated with improvement of symptoms. This is in contrary to the study by Suhani *et al* who found that larger prostate have better outcome [41]. The difference might be because of the difference in categorization of the prostate volume (80 versus 45) but also the type of ultrasound used to estimate the size. Moreover, with big prostate TURP is associated with more complications like prolonged resection, chances of residual prostate, excessive bleeding that might cause poor vision and hence injuries like capsular perforation which might contribute in improvements of symptoms.

In the index study, absence of urinary tract infection (UTI) was significantly associated with improvement of symptoms, a finding similar to other studies. This is due to the fact that irritative symptoms can be from either UTI, BPH or both, hence treating BPH with TURP in patient with concomitant UTI will result into persistence of irritative voiding symptoms [11,28,41].

Furthermore, an operation done by the qualified urology surgeon was significantly associated with a good outcome compared to the one done by a resident alone or finished up by qualified urology surgeon. This finding could be explained by the fact that inexperienced surgeon (resident) is more likely to cause injuries and incomplete resection

leading to prolonged duration even when experienced surgeon take over. Moreover, this gives a picture of the steep learning curve of TURP as evidenced by previous studies and this is similar to many studies on the experience of surgeon on TURP [24,34].

4.1.1. Study limitation

The result of this study should be discussed in the light of the following limitations. First, this study didn't include urodynamic studies, which might help in selecting patient whom have concomitant detrusor abnormality and whom might benefit less from the operation. Also it might have given as the objective arm of improvement rather than relying completely on the symptom score. Second, this was a single centered study hence the results cannot be generalized to all health facilities but to health facility with similar contexts. Finally, the size of sheath was not recorded in this study as it may have effect on the occurrence of urethral stricture. Moreover, the type of the sheath whether continuous or standard flow was also not documented and this is known to have effect on the rate of TUR syndrome although our rate was low. Despite these limitations, our findings remained comparable to some of other similar studies.

5. Conclusion

BPH is common from 6th decade of life onwards. Though most participants were operated because of either acute urine retention or severe LUTS, some presents late already with renal insufficiency. Despite the fact that most of the participants had severe symptoms and their quality of life was poor at presentation, TURP improved symptoms in most of them. The improvement is even better in the hands of experienced surgeon, for the participants with small prostate and in absence of UTI prior to surgery.

Recommendations

- Investigate for UTI in all patients with clinical BPH before surgery; treat those proven to have UTI prior to performing TURP.
- Special care for larger prostate of >80grams perhaps adoption of staged TURP, or operated only with experienced.
- Further studies are warranted to develop the best model for acquisition of TURP skills for residents at higher capacity in order to improve outcome.
- A large study if possible multicenter to assess the long-term outcome of TURP

Compliance with ethical standards

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Disclosure of conflict of interest

All authors listed in this article declare that there is no conflict of interests of any kind.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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