

Intravesical Prostatic Protrusion as A Predictor of Need for Surgical Therapy in Benign Prostatic Hyperplasia Patients

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ABSTRACT

Intravesical prostatic protrusion (IPP) can predict disease progression and development of complications in benign prostatic hyperplasia (BPH). The aim was to determine if IPP at initial evaluation can predict need for surgical therapy in BPH patients. A retrospective study of BPH patients at ESUT Teaching Hospital, Enugu. Patients were involved in a previous prospective study in which they had abdominal ultrasonography measurement of IPP and prostate volume (TPV). IPP was measured in millimeter and divided into < 10 mm and ≥ 10 mm. The clinicians were blinded about the patients' IPP while making decision for therapy. After at least a 24-month follow up period, biodata, IPP, TPV, IPSS and therapy given/recommended were retrieved and analyzed. The odds ratio of having/awaiting surgery at IPP cut-off of 10 millimeters was calculated. $P < 0.05$ was considered significant. One hundred patients' records were reviewed. Forty-four patients (44%) were still on medical therapy, 20 (20%) were awaiting surgery and 36 (36%) had prostatectomy. Eight (19.05%) of 42 patients with IPP < 10 mm had or were recommended for surgical therapy while 48 (82.76%) of 58 patients with IPP ≥ 10 mm had or were recommended for surgical therapy ($p=0.000$). There was a statistically significant odd for surgical therapy when IPP at initial evaluation was ≥ 10 mm (OR=20.40, 95% CI [7.30,57.04]). IPP at initial evaluation ≥ 10 mm is a significant predictor of needing surgical therapy in BPH patients.

Keywords: BPH, IPP, need for BPH surgery.

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I. INTRODUCTION

Benign prostatic hyperplasia (BPH) is a common ailment in men as they age [1]-[3]. BPH causes lower urinary tract symptoms (LUTS) which includes frequent urination, urgency, urgency incontinence, nocturia, hesitancy, poor urinary stream, straining, intermittency, terminal dribbling of urine and feeling of incomplete bladder emptying [4]. These LUTS waxes and wanes at the onset of the ailment but with symptoms progression most men will require one form of treatment or other. These treatments become necessary to ameliorate the negative impact of these symptoms on the quality of life of BPH patients and to prevent or treat associated complications which may be life threatening [4],[5].

Even though watchful waiting and lifestyle modifications may suffice for patients with mild symptoms [2], patients with moderate to severe symptoms require either medical or surgical/ invasive therapies [6], [7]. The indications for surgical therapy in BPH are worsening of LUTS despite medical therapy, recurrent acute urinary retention, intractable haematuria, recurrent urinary tract infection and the presence of some BPH related complications like bladder stones, inguinal hernia and obstructive nephropathy [8], [9].

Studies have shown strong correlations between the

severity of LUTS and prostatic anatomical factors like intravesical prostatic protrusion (IPP), transitional zone volume (TZV), prostatic urethral angle (PUA) and prostatic urethral length (PUL) [10]-[13]. IPP is the measurement of the portion of the prostate that grows into the bladder. It has been found to be a good indicator for bladder outlet obstruction (BOO) with a perfect (100%) positive predictive value and specificity for diagnosing LUTS due to BPH [14]. IPP has also been found to be a good predictor of failure of watchful waiting and medical therapy [9].

Beyond being able to assess the severity of LUTS in BPH patients at initial evaluation, there is need for urologists to be able to predict those patients that are likely to require surgical intervention on follow up. This will help the urologist in counselling the BPH patient on the likely outcome (even at the initial evaluation) considering the fact that surgical therapy is often curative [15]. Although, total prostate volume (TPV) is not a good indicator of severity of BPH symptoms and those with large prostates will not necessarily require surgery [15], TZV and PUL have been found to be good anatomic predictors for need for surgery in BPH patients [15], [16]. IPP has not been extensively investigated as a noninvasive predictor of surgery in BPH patients even though it has proven to be a predictor of disease progression, severity of symptoms and development of complications in BPH patients [5], [17], [18]. The aim of this study is to investigate

if IPP (measured at initial evaluation) could be a useful predictor of the risk of the subsequent need for surgical therapy in BPH patients.

II. PATIENTS AND METHODS

A retrospective review of records of BPH patients at Enugu State University of Science and Technology Teaching Hospital, Enugu, Nigeria was carried out. This study conformed to the Declaration of Helsinki on biomedical research. Patients were involved in a previous prospective study (Ethical approval- ref: ESUTH/C-MAC/RA/034/vol.11/269) [5] in which they had abdominal ultrasonography measurement of IPP and prostate volume (TPV). IPP was assessed via abdominal ultrasonography (figure 1) from midline sagittal images of the prostate (at bladder volumes ≥ 200 mls). The ultrasound machine used was Sonoscape S11 (Sonoscape Co Ltd, Shenzhen, China) with abdominal probe frequency of 3.5 MHz. To ensure quality control, ultrasound assessment was done by a single dedicated consultant radiologist. IPP was measured in millimeter and divided into two groups: those patients whose IPP was < 10 millimeters (nonsignificant IPP, group I) and those whose IPP was ≥ 10 millimeters (significant IPP, group II), similar to what has been done by other researchers [19], [20]. The clinicians were blinded about the patients' IPP while making decision whether to commence/ continue patients on medical therapy (tamsulocin 0.4 mg \pm 0.5 mg dutasteride) or to recommend for prostatectomy. This blinding was ensured by recording the patients IPP in the study proforma (the IPP was not available in the participants medical records). After at least a 24-month follow up period (after initial evaluation and measurement of IPP), the patients' biodata, IPP, TPV, initial international prostate symptom score (IPSS) and therapy being given/ recommended were retrieved and analyzed using SPSS version 23 (IBM, SPSS, Chicago, USA). Quantitative variables were subjected to one-way ANOVA and categorical variables to Chi square. The odds ratio of having/awaiting prostate surgery at IPP cut-off of 10 millimeters after at least 24 months of follow up from date of initial evaluation was calculated using logistic regression. $P < 0.05$ was considered significant.

A. Research Hypothesis

1) Null hypothesis

There is no relationship between grade of IPP and odds for surgical therapy in BPH patient.

2) Alternative hypothesis

There is a significant relationship between grade of IPP and odds for requiring surgical therapy in BPH patients.

III. RESULTS

Out of a total of 118 patients that met the inclusion criteria and were recruited for the previous study [5], only 100 patients had complete record for retrospective analysis and had their records reviewed. This gave an attrition rate of 15.25 % (18 of 118). The mean age, mean prostate volume, mean IPP and IPSS of reviewed patients were 64.11 ± 10.91

years, 70.09 ± 46.72 milliliters, 14.17 ± 10.57 millimeters and 23.36 ± 10.26 respectively. Forty-two patients (42%) had IPP < 10 mm while 58 patients (58%) had IPP ≥ 10 mm. The comparison of mean age, TPV, IPP and IPSS between group I and group II patients are shown in Table I.

Out of 100 patients reviewed, 44 patients (44%) were still on medical therapy, 20 (20%) were awaiting surgery and 36 (36%) had transvesical prostatectomy. The treatment status of the two IPP groups were as shown in Table II.

The comparison of the mean values of parameters of patients who had or were recommended for surgical therapy and those patients who were still doing well on medical therapy is shown in Table III.

TABLE I: COMPARISON OF MEAN AGE, TPV, IPP AND IPSS BETWEEN GROUP I AND GROUP II PATIENTS

	Group I IPP < 10 mm	Group II IPP ≥ 10 mm	P value
Mean Age (years)	61.10	66.30	0.099
Mean IPSS	17.50	27.60	0.238
Mean TPV (millimeters)	42.41	90.13	0.001*
Mean IPP (millimeters)	5.45	20.48	0.000*

IPP= intravesical prostatic protrusion, IPSS= International prostate symptom score, TPV= total prostate volume. * = $p < 0.05$ (statistically significant).

TABLE II: TREATMENT STATUS OF THE TWO GROUP OF PATIENTS: GROUP I (WITH IPP < 10) MILLIMETERS AND GROUP II (WITH IPP ≥ 10 MILLIMETERS)

IPP	Treatment Status		
	Medical Therapy	Awaiting Prostatectomy	Prostatectomy Done
<10mm	34	5	3
≥ 10 mm	10	15	33

IPP= intravesical prostatic protrusion.

TABLE III: COMPARISON OF PARAMETERS BETWEEN PATIENTS ON MEDICAL THERAPY AND THOSE WHO HAD/ SCHEDULED FOR SURGERY.

	Medical Therapy	Surgical Therapy	P value
Age (years)	60.25	67.14	0.001*
IPSS	17.50	27.96	0.001*
TPV (milliliters)	39.36	94.23	0.000*
IPP (millimeters)	7.65	19.29	0.000*

IPP= intravesical prostatic protrusion, IPSS = international prostate symptom score, TPV= total prostate volume * = $p \leq 0.05$ (statistically significant).



Fig. 1. Abdominal ultrasound measurement of intravesical prostatic protrusion.

Eight (19.05%) of 42 patients with IPP < 10 mm (group I) had or were recommended for surgical therapy while 48 (82.76%) of 58 patients with IPP ≥ 10 mm (group II) had or were recommended for surgical therapy (p=0.000). Using logistic regression, there was a statistically significant odd for surgical therapy when IPP at initial evaluation was ≥ 10 mm (OR=20.40, 95% CI [7.30,57.04]).

IV. DISCUSSION

Reference [21] in their review of 172 BOO patients that had prostatectomy found that shorter duration of medical therapy and increased pre-operative bladder contractility index can predict successful outcome of BPH surgery. Furthermore, [22] has reaffirmed the fact that severity of preoperative symptoms is an important determinant in favorable outcome of BPH surgery, even when performed by young and not much experienced urologist. Hence, patients with BPH and severe lower urinary tract symptoms are more likely to benefit from surgical therapy and the surgery is better performed earlier than later before the onset of irreversible bladder changes and impairment of bladder contractility that will make the outcome of subsequent surgical therapy suboptimal.

Reference [23] in a study in 4,510 men with first time primary diagnosis of BPH followed up over a 5-year period on medical therapy found that 460 men (10.2%) had BPH surgery. In this study (over a 24 month follow up period) 56 patients (56%) were found to have required or had prostatectomy. The higher percentage requirement for BPH surgery in this study could be due to the fact that the risk for BPH surgery may be underappreciated in the previous study as opined by the authors or the mean age in this study being higher than the study by [23] (64 years versus 54 years). Old age has been found to be an independent predictor of the risk for BPH surgery [23].

In this study, those who had or were recommended for prostate surgery had significantly higher mean age, mean TPV, mean IPSS and mean IPP. This is not out of place as it is already established that severity of lower urinary tract symptoms is one of the things to consider in making decisions about treatment of LUTS from BPH. Those in the surgical therapy group having significantly higher mean IPSS and higher mean IPP meant they had significantly more severe symptoms which will predispose them to needing a more aggressive/invasive therapy (surgery); not just medical therapy. Reference [15], in line with the findings of this study, found significantly higher mean TPV and IPSS in their group of patients that had BPH surgery.

Furthermore, patients with IPP at initial evaluation ≥ 10 mm were found to be 20 times more likely to require/ have prostate surgery on follow up. This was in contrast to the study by [15] that found only prostatic urethral length and transitional zone urethral length as the only prostatic anatomic factors predictive for surgery. This difference in findings may be due to the fact that a small percentage of patients in their study (37 of 675: 5%) had BPH surgery and they did not group their IPP measurement. The finding that IPP ≥ 10 mm is predictive of the risk for BPH surgery might help urologist to sort patients and highlight the need for surgical BPH procedures in patients with favorable risk-to-

benefit profiles at the point of initial evaluation. The limitations of this study include the limitation of sample size and duration of follow up. Increasing the sample size and increasing the duration of follow up to up to five years would have presented a more robust data.

V. CONCLUSION

BPH patients with IPP ≥ 10 millimeters at initial evaluation have higher risk for BPH related surgeries. In practice, it is important to routinely measure IPP during the initial evaluation of BPH patients and to determine whether the IPP is ≥ 10 mm or not. This will help distinguish patients with high risk for BPH surgery who will ultimately need surgery and offer surgical treatment earlier to relieve bothersome LUTS and give a higher possibility of cure.

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