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RESEARCH ARTICLE

ROLE OF MEASUREMENT OF LENGTH OF INTRAVESICAL PROSTATIC PROTRUSION WITH SERUM PROSTATE SPECIFIC ANTIGEN IN THE DIAGNOSIS OF PROSTATIC CANCER

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ABSTRACT

Background: The Prostate-specific antigen level is used to diagnose prostate cancer in last decades. However, its specificity is low in patients with a PSA level ranging from 4 to 10 ng/ml. This study aims to investigate the value of the length of intravesical prostatic protrusion (IPP) combined with serum prostate specific antigen on diagnosis of prostatic cancer (PCa). **Methods:** Data of 51 patients with prostate biopsy indications who came to the urology OPD at Stanley Medical College from October 2016 to July 2018 were collected. Clinical data include prostatic volume and IPP measured by TRUS and Serum PSA. Patients were divided into BPH group or PCa group based on the results of TRUS guided biopsy results. IPP, PSA Density(PSAD) in the two groups were analyzed. Their Sensitivity and specificity rate at different levels were respectively calculated to make sure the bestcut–off point in the diagnosis of PCa. **Results:** Among 51 cases, 15 patients had PCa and 36 patients had BPH. The PCa positive rate was 30.99%. Between PCa and BPH groups, there was statistical difference in IPP, PV and PSAD (P< 0.05). If taking IPP 7.5mm as the cut-off point, PCa can be diagnosed with highest specificity and sensitivity. **Conclusion:** The diagnosis of PCa in patients with tPSA ranging from 4.0 to 10.0 ng/ml, is a diagnostic 'grey zone'. IPP and PSAD will help deciding which group of patients in the grey zone need to be investigated with prostatic biopsy. Further studies are needed for a better conclusion.

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INTRODUCTION

The Prostate-specific antigen (PSA) level is largely used to diagnose prostate cancer (PCa) in last decades (Stephan, 2007). Unfortunately, the serum PSA level is also raised in benign prostatic conditions, such as benign prostate hyperplasia (BPH) and prostatitis (Tchetgen, 1997). However, its specificity is low in patients with a PSA level ranging from 4.0 to 10.0 ng/ml (Schroder, 2009). Intravesical prostatic protrusion (IPP) is a morphological change due to overgrowth of prostatic median lobe into the bladder (Lee, 2012). IPP is graded as: Grade 1 (IPP≤5 mm), Grade 2 (6 mm to 10 mm) and Grade 3 (IPP>10 mm). IPP was positively correlated with prostate volume, with Pdet.max and with BOOI, while it was negatively correlated with Qmax. Previous studies have investigated the correlation between IPP and PSA. Lim *et al*. (Lim, 2006), found a positive correlation was present with IPP and PSA in BPH patients. Many studies have shown that IPP is can be used as a predictor for evaluating bladder outlet obstruction (BOO) (Lim, 2006; Reis, 2008; Chia, 2003; Nose, 2005 and Keqin *et al*. 2007).

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Laniado *et al*. (2004), and van Renterghem *et al*. (vanRenterghem, 2009), found that patients with raised tPSA was more likely to have Bladder outlet obstruction. This study aims to define the correlation between intravesical prostatic protrusion (IPP) and PSA to establish a diagnosis of Prostatic Cancer.

MATERIALS AND METHODS

All cases presenting with Lower Urinary Tract Symptoms were evaluated in our OPD, during a period from OCT 2016 to JUL 2018 at Stanley medical college Hospital and those cases with positive inclusion criteria were included in our study after institutional Ethical committee approval. Inclusion criteria for including patients in our study were Age> 45years, Presence of IPP, Serum PSA ranging from 4.0 to 10.0 ng/ml. Exclusion criteria by which patinets were excluded from our study were Age ≤45 years old, previous surgeries in bladder, prostate or urethra, any recent history of acute urinary retention, inflammatory conditions of the prostate, stricture urethra, vesical calculus, neurogenic bladder and Chronic cystitis. According to this eligibility criteria, Fifty one patients were enrolled in our study.

Data collection: IPP was calculated by measuring vertically from the tip of the prostatic protrusion to the base of the bladder in the midsagittal plane on transrectal ultrasonography (TRUS). Based on this, IPP was categorized into three groups which included Grade 1 (IPP≤5 mm), Grade 2 (5 mm<IPP≤10 mm) and Grade 3 (IPP>10 mm). Total prostate volume (TPV) were calculated by using the following formula: = π/6×transverse diameter (mm)×anteroposterior diameter (mm)× superoinferior diameter (mm). Ultrasonography (TRUS)-guided prostate biopsies were taken after measuring the total prostate volume (TPV) and IPP and serum PSA. Patients were divided into BPH group or prostatic cancer group (PCa) based on the results of TRUS guided biopsy. IPP, Total prostatic volume, PSA in the two groups were analyzed. Their Sensitivity and specificity rate at various levels were respectively calculated to make sure the best cut–off point in the diagnosis of prostatic cancer.

Statistical Analysis: Clinical data were statistically analysed using SPSS version 21.0, all values are presented as mean ± standard deviation, it was considered statistically significant if *P*-value <0.05.

RESULTS

In a total of 51 cases, there were 13 patients with PCa and 38 patients with BPH. The PCa positive rate was 25.4%. Among 51 patients, IPP Grade I(18), Grade II(11) and Grade III(22). The IPP average value were 9.3±7.3mm among 51 patients, 6.6±5.0mm in PCa patients and 11.5±8.4mm in BPH patients.

Table 1. Classification of patients based on IPP grade

IPP	No. of patients
Grade I (≤5mm)	18
Grade II(6-10mm)	11
Grade III(≥10)	22

Between PCa and BPH groups, there was statistical difference in IPP, PV and PSA Density(PSAD) (P < 0.05). There was no significant difference in P value between the BPH and CA prostate group in terms of Age and tPSA.

Table 2. Comparison of Age, tPSA, TPV, IPP and PSAD between the two groups

	BPH (n=36)		PCa (n=15)		
	Mean	SD	mean	SD	P value
Age	68.2	8.6	71.2	7.6	0.091
tPSA	6.71	1.52	7.10	1.48	0.311
TPV	74.5	25.5	52.6	18.22	<0.001
IPP	11.5	8.4	6.6	5.0	0.005

If taking IPP 7.5mm as the cut-off point, PCa can be diagnosed with highest specificity and sensitivity. Among 25 patients whose IPP were less or equal to 7.5 millimeter there were 10 cases with prostatic cancer. The PCa positive rate was 40%, while there were only 3 patients of PCa with the PCa positive rate of 11.5% among 26 cases with IPP more than 7.5mm. The PCa positive rate of patients with IPP less or equal to 7.5mm was statistically different from that of patients with IPP more than 7.5mm. The best sensitivity on diagnosing PCa was 96.7% when IPP was combined with PSAD for a parallel test.

Table 3. Classification of patients into two groups based on cutoff point

IPP	CaP	BPH
≤7.5	10	15
>7.5	3	23

DISCUSSION

On extensive literature search only a few studies could be found regarding correlation between the IPP and prostatic carcinoma. The data collected was analysed with other studies to come to a final verdict. In the 51 patients with IPP whose tPSA level ranging from 4.0 to 10.0 ng/ml, 13 patients were diagnosed as PCa. The diagnostic accuracy was 25.4 %, which was similar to other study (Catalona WJ *et al*., 2011). In our study group, TPV and IPP of PCa patients were significantly lower than those of BPH patients while tPSA had no significantly difference. This result indicated that the increase of PV and IPP may play an important role in elevation of tPSA ranging from 4.0 to 10.0 ng/ml. Hammerer *et al*. confirmed that majority of the PSA leakage into the serum from the prostate comes from the Transitional zone(TZ) and BPH results almost exclusively from hyperplasia of the TZ (Hammerer, 1995). In our study the predictive accuracy of IPP(≤7mm) and PSAD (>0.15) was higher than that of tPSA, indicating that IPP could be a valid predictor of Pca when the patient had the PSA of 4.0–10.0 ng/ml. The main limitation of current study is the relatively lower sample size, especially in the group with PSA 4.0–10.0ng/ml. We will continue to collect more patients in further studies.

Conclusion

The diagnosis of PCa in patients with tPSA ranging from 4.0 to 10.0 ng/ml, is a diagnostic 'grey zone'. IPP and PSAD will help deciding which group of patients in the grey zone need to be investigated with prostatic biopsy. Further studies are needed for a better conclusion.

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