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Research Article

ROLE OF TRANSRECTAL ULTRASOUND DERIVED PARAMETERS IN BENIGN PROSTATIC HYPERPLASIA

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A R T I C L E I N F O

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A B S T R A C T

Introuction: Benign prostatic hyperplasia (BPH) for decades has been a significant major problem for elderly men. BPH is associated with bothersome lower urinary tract symptoms (mild to severe) namely urinary frequency, urgency, feeling of incomplete bladder emptying, nocturia, and decreased force of their urinary stream. Many of the patients suffering from BPH undergo surgery for having one of the absolute indications for surgery (refractory urine retention despite adequate and effective medical treatment, presence of urinary tract infections, repeated episodes of infections, gross hematuria with multiple episodes, pathological and/or physiological changes of the organs directly or indirectly involved namely secondary to obstruction). However a large portion of patients undergo surgery for having a relative indication, namely sever LUTs not responding to efficient medical therapy. This relative indication is purely subjective, and although many diagnostic tools are present to aid in the assessment of such patients (uroflowmetry, postvoiding residual urine and pressure flow studies), none of them were totally reliable, either for their weak correlation or their invasiveness. **.** In this study, we tried to test the transition zone index and other derived parameters to determine if calculating such a figure would help in the assessment of prostatic patients.

Aim of the Study: The aim of this study is to derive and confirm the association between the transrectal ultrasonogram derived prostate measures and the development of acute urinary retention in symptomatic prostatic patients and trying to evaluate the clinical usefulness of calculating this index.

Materials and Methods: Cross sectional clinical study of Patients attending Urology OPD and in patients at Kilpauk Medical College Hospital and Govt. Royapettah Hospital in the age group between 45and 85 with lower urinary tract symptoms of benign prostatic hyperplasia. The study period is from June 2016 to March 2017. TRUS based calculation are the transition zone (TZ) volume, the transition zone index
(*TZ index = TZ volume/total prostate volume*), the total prostate volume, and presumed circle area ratio (PCAR). The study of association between these parameters and acute urinary retention was done using statistical analysis software.

Results: The maximum number of patients with urinary retention is found in the group with duration of symptoms of 4-6 yrs (32.10%), followed by the group with duration between 6-8 yrs. In the frequency distribution for total prostate volume, acute retention of urine was found to be maximum (43%) in the prostate volume group of 50 to 60 g. The largest group (59%) of acute retention of urine falls in the group with transition zone volume between 30 and 45g. On analysis of the distribution with PCAR, AUR was present in the maximum percentage (91%) in the group with ratio ≥0.8.In this study the TZI of ≥0.6 consists of the maximum patients falling under the Acute Urinary Retention group.

Conclusion: In this study it was found that age of the patient had a good association with the occurrence of AUR. The association between, total prostate volume, transition zone volume, transition zone index, PCAR and AUR was found to be statistically significant.

INTRODUCTION

Benign prostatic hyperplasia (BPH) for decades has been a significant major problem for elderly men. Approximately 50 percent in the 6th decade of their life classically exhibited clinical and histologic evidence of BPH. Close to ninety percent by 80 yrs of life developed histologic evidence [1]. BPH is associated with bothersome lower urinary tract symptoms (mild to severe) namely urinary frequency, urgency, feeling of incomplete bladder emptying, nocturia, and decreased force of their urinary stream.

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BPH, a clinical syndrome which is diagnosed with the onset of the previously mentioned symptoms and in the absence of other obvious causes. Many of the patients suffering from BPH undergo surgery for having one of the absolute indications for surgery (refractory urine retention despite adequate and effective medical treatment, presence of urinary tract infections, repeated episodes of infections, gross hematuria with multiple episodes, pathological and/or physiological changes of the organs directly or indirectly involved namely secondary to obstruction). However a large portion of patients undergo surgery for having a relative indication, namely sever LUTs not responding to efficient medical therapy. This relative indication is purely subjective, and although many

diagnostic tools are present to aid in the assessment of such patients (uroflowmetry, postvoiding residual urine and pressure flow studies), none of them were totally reliable, either for their weak correlation or their invasiveness A well known clinical fact is that the total prostatic gland volume poorly correlates with the degree of LUTs. The discrepancy among various studies could be an observational or interpretation error. Histologically BPH is also due to contribution of glandular enlargement from central zone and also with minor contribution from periurethral glands.

It was claimed that better than taking the transition zone volume, the transition zone index (Transition zone volume/ whole gland volume) had a good and direct correlation with the symptoms and the degree of urinary obstruction in the patients [3]. This study was followed by many other studies trying to evaluate the usefulness of this index, some ofwhich agreed and other not [2,5]**.** In this study, we tried to test the transition zone index and other derived parameters to determine if calculating such a figure would help in the assessment of prostatic patients.

AIM OF THE STUDY

The aim of this study is to derive and confirm the association between the transrectal ultrasonogram derived prostate measures and the development of acute urinary retention in symptomatic prostatic patients and trying to evaluate the clinical usefulness of calculating this index.

MATERIALS AND METHODS

Study group

Patients attending Urology OPD and in patients at Kilpauk Medical College Hospital and Govt. Royapettah Hospital in the age group between 45and 85 with lower urinary tract symptoms of benign prostatic hyperplasia. The study period is from June 2016 to March 2017.

Study design

Cross sectional clinical study

METHODS

The patients will be men aged 45-85 years with moderate to severe LUTS suggestive for BPH. The patients are categorized into two groups. One set of patients presented with only lower urinary tract symptoms of BPH. The other set of patients presented with episodes of acute urinary retention requiring intervention at a clinical setup. TRUS based calculation the transition zone (TZ) volume, the transition zone index (*TZ index = TZ volume/total prostate volume*), the total prostate volume, and presumed circle area ratio (PCAR). The study of association between these parameters and acute urinary retention was done using statistical analysis software.

Inclusion criteria

- Age group-45 to 85 years
- Moderate to severe LUTS (lower urinary tract symptoms-obstructive & irritative)
- subjects with International Prostate Symptom Score (IPSS) not less than 7

Exclusion criteria

- Patients with prior lower urinary tract surgery
- Patients with carcinoma prostate
- Patients with high PSA (>10ng/ml)
- Patients with bladder stones, recurrent urinary tract infection
- Patients with history of urethral stricture disease
- Patients with evidence suggestive of neurogenic bladder

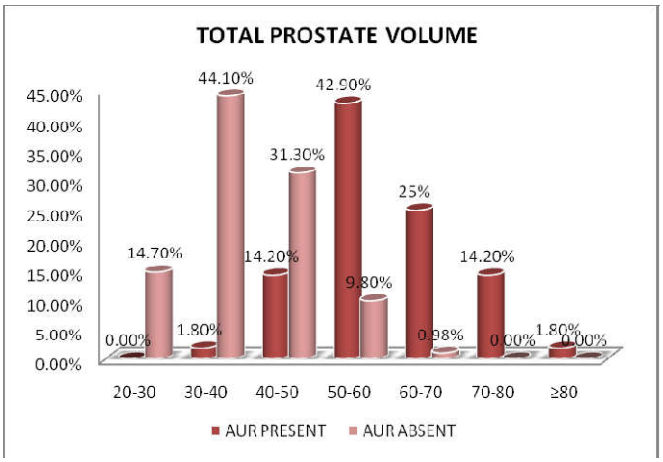
The ultrasonogram machines used were SONORAY and PHILIPS made, and imaging was done in the department of urology with radiologist guidance.

RESULTS AND ANALYSIS

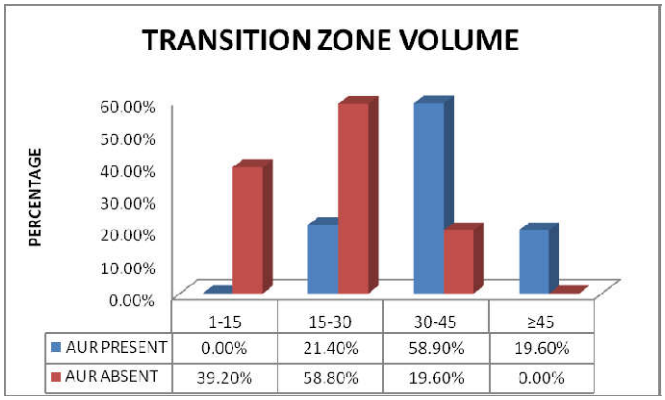
Data Analysis

Statistical analysis was done for all data and were reported in terms of mean values and percentages. Suitable statistical tests of comparison were done. Continuous variables were analysed with the unpaired t test.. Categorical variables were analysed with the Chi-Square Test. Statistical significance was taken as $P < 0.05$. The data was analysed using SPSS version 16 and Microsoft Excel 2007.

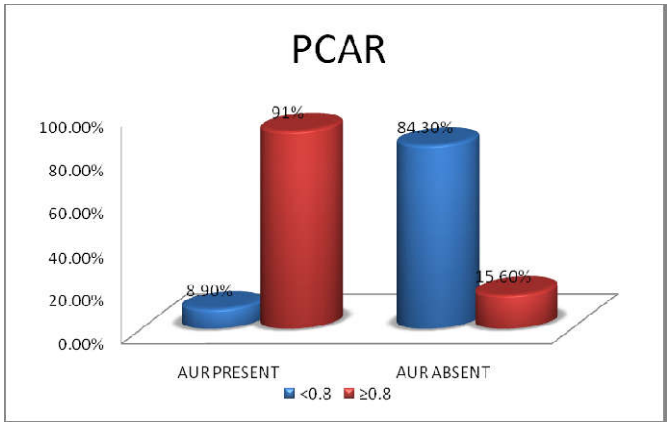
44.9% were in the age goup of 60-69, 37.3 % were in between 70 and 79, 12.6% in the group of 50-59 and only 5.1% in greater than 80 years. On analysis of the study data it was interpreted that the maximum number of BPH patients with symptoms was in the age group of 60-70 years. 44.9% were in the age goup of 60-69, 37.3 % were in between 70 and 79, 12.6% in the group of 50-59 and only 5.1% in greater than 80 years Among these patients the maximum percentage(48.7%) of patients with acute urinary retention was in the age group of 70 -80 yrs. On frequency analysis of prostatic symptom scoring with the presence or absence of acute urinary retention its was found that majority of the patients (62.5%) with urinary retention was within the group with IPSS score between 8 and 19 indicative of moderate symptoms. The maximum number of patients with urinary retention is found in the group with duration of symptoms of 4-6 yrs (32.10%), followed by the group with duration between 6-8 yrs.



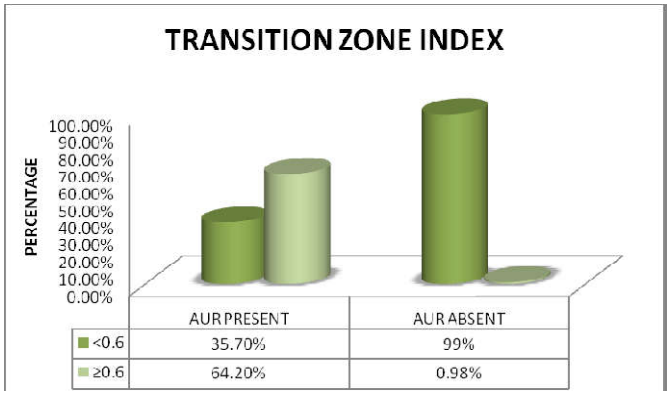
In the frequency distribution for total prostate volume, acute retention of urine was found to be maximum (43%) in the prostate volume group of 50 to 60 g.



The largest group (59%) of acute retention of urine falls in the group with transition zone volume between 30 and 45g



On analysis of the distribution with PCAR, AUR was present in the maximum percentage (91%) in the group with ratio ≥0.8



In this study the TZI of ≥0.6 consists of the maximum patients falling under the Acute Urinary Retention group

DISCUSSION

BPH is characterized by the obstruction of urine outflow from the bladder caused by an enlarged prostate. Data from clinical trials shown that BPH is a progressive disease associated with an increase in prostate volume and risk of serious complications such as AUR. *Kaplan et al*. first demonstrated a significant correlation of the TZ index with obstruction, symptom score and peak flow rate[3]. On the other hand, *Lepor et al*. reported that the total prostate and TZ volume and TZ index were not directly related to the symptom score and were only weakly related to the peak flow rate[4]. The discrepancies between the two reports are possibly explained by different inclusion criteria.

Kurita et al. showed that TZ index was more potent predictor of AUR than total prostate volume and its indices, using an ROC curve analysis **5**. These results seem to be related to the significant correlation of TZ index with bladder outlet obstruction, as reported by *Kaplan et al*. *Jin Liang et al.* study showed TPV and TZI of TRUS-P play important roles in the degree of bladder outlet obstruction in elderly men with BPH and LUTS[6]. They also showed that TZI had stronger correlation with the degree of BOO than TPV. Darius *et al* study inferred that TPV and peak flow rate can be combined to predict obstruction 48.

Daimantus et al concluded that TZI and PSA are accurate predictors of AUR[8]. In this study the association of various transrectal ultrasound derived parameters with the occurrence of acute urinary retention was studied. The data analysis of the study showed that, the presence of lower urinary tract symptoms had a definite association with the occurrence of AUR. With progressively increasing LUTS score from moderate to high, the frequency of occurrence of AUR was found to consistently increase as well.

The results of this study showed that TPV and TZI were significantly larger in men with urinary retention than in those without. However there was no statistical significance between the duration of symptoms and retention of urine. In contrast to the study by Jin *Liang et al*, our study showed statistically significant association of TPV with AUR as suggested by *Darius et al*.[**7]** TZI ws found to have a higher degree of association with AUR in our study and was correlating with the study conducted by *Daimantus et al.***8** Association analysis indicates higher obstruction dependence on TPV
($p < 0.001$), TZI ($p<0.001$), PCAR ($p<0.001$).

CONCLUSION

In this study it was found that age of the patient had a good association with the occurrence of AUR.
The association between, total prostate volume, transition zone volume, transition zone index, PCAR and AUR was found to be statistically significant.
Duration of symptoms was not significantly associated with the occurrence of AUR
As the values of TZI and PCAR increased, the association with acute retention of urine was inferred to be more significant, thereby suggesting that these indices can be used as strong predictors of AUR.
Larger studies are warranted to detect if these parameters can be useful in deciding the mode of management.

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