Non-obstructive Lower Urinary Tract Symptoms Versus Prostate Volume in Benign Prostatic Hyperplasia

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Abstract: This study was aimed to determine the relation between sonographically measured prostate volume and the severity of non-obstructive Lower Urinary Tract Symptoms (LUTS) in Benign Prostatic Hyperplasia (BPH). This was an analytic-descriptive, cross-sectional and prospective study which was carried out on a sequential sample of 60 male patients since 2006 to 2008. The patients were divided to three groups (prostate volume < 40 cc; 40 cc ≤ prostate volume ≤ 59 cc; prostate volume ≥ 60 cc) based on the ultrasonographic volume of the prostate. The American Urological Association scores of frequency, urgency, nocturia and dysuria were compared between three groups. The mean age and the mean total score of non-obstructive symptoms of BPH of the patients were 71.18±8.74 and 13.38±4.96, respectively. According to our findings there was no statistical significant difference between three groups in the scores of frequency (p = 0.369), dysuria (p = 0.85) and nocturia (p = 0.861). A statistically significant difference between three groups was found in urgency score (p = 0.037). Only a significant correlation between urgency and the prostate volume was found (p = 0.024, r = 0.291). According to our findings in this work on relation between the non-obstructive symptoms and prostate volume in BPH patients we found that urgency was the only non-obstructive symptom that may be associated with prostate volume. Prospective studies are required in this regard to elucidate the symptom-related causes of LUTS in the patients with BPH.

Key words: Urinary tract, prostatic hyperplasia, nocturia, dysuria, urgency, symptoms

INTRODUCTION

Benign prostatic hyperplasia (BPH) is a chronic frequent disease in men and is often associated with troublesome Lower Urinary Tract Symptoms (LUTS) (Pinto et al., 2009). BPH is the main common urological disease of elderly men, which has the presentation of obstruction in urinary flow with discomfort and pain. BPH is a complex disease from the etiological and pathogenesis point of view (Konwar et al., 2008). The incidence of BPH has increased and it is estimated that more than 50% of men by the age of 60 will have microscopic evidence of the disease and by the age of 85 years, as many as 90% of men will be affected (AUA Practice Guidelines Committee, 2003). The prevalence of BPH was 23.1% in Croatia (Galic and Simonovic, 2008). However, Mittal et al. (1989) reported that from 185 consecutive prostate specimens in India the predominant lesion noted was BPH with the rate of 92.97%.

LUTS associated with BPH are regarded as a common patients complaints managed by urologists. The harshness of LUTS, fright of prostate cancer, meddling with normal and activities, complications of BPH and diminished quality of life result in referrals to urologists. Perez et al. (2009) revealed that Prevalence of moderate/severe LUTS was 16.6% among 1,804 men aged 40 or older who were living in Madrid and also proved that men aged 70 or older had a threefold increased frequency of serious symptoms compared to younger men (Perez et al., 2009), however Li et al. (2008) showed that in 994 men aged 40-88 years from Singapore [details of symptoms of BPH were collected through the International Prostate Symptom Score (IPSS)] about 90% of the men had moderate-to-severe LUTS and the severity increased with age.

LUTS symptoms cannot discriminate obstructed from non-obstructed BPH cases, not all severely symptomatic BPH patients will have outlet obstruction, a significant percentage of mildly symptomatic BPH patients can have outlet obstruction and voiding dysfunctions in aged men, apart from the etiology, make related symptoms (Yalla et al., 1995). Eckhardt et al. (2001a) investigated
the associations of symptoms and prostate volume a large
group of strictly selected men with LUTS suggestive of
benign BPH and finally concluded that Prostate volume
and obstruction grade were not associated with the
symptom index (Eckhardt et al., 2001b).
This study was aimed to evaluate the relation
between sonographically measured volume of prostate
and the severity of non-obstructive symptoms.

MATERIALS AND METHODS

This was an analytic-descriptive, cross-sectional and
prospective study which was carried out on a sequential
sample of 60 male patients that was conducted in one year
period at Imam Khomeini and Siran Hospital in Tabriz since
2006 to 2008.

The patients were divided to three groups based on
the volume of the prostate which measured based on
trans-rectal ultrasonography:

- **Group 1**: Patients with prostate volume < 40 cc
- **Group 2**: Patients with 40 cc = prostate volume =
  59 cc
- **Group 3**: Patients with prostate volume = 60 cc

**Data selection**: Interview and observation were the
methods of data gathering from the patients. All the
patients were referred to the centers because of BPH and
were the candidates of open surgery or transurethral
resection prostatectomy. The investigators recorded the
non-obstructive symptoms of the patients.

From the 7 symptoms of American Urological
Association (AUA), three of them (non-obstructive) were
considered: frequency, urgency and nocturia. Dysuria
was the fourth considered symptom. The scores of the
considered symptoms were as below:

- **Zero score**: The symptom was not presented in the
patient
- **One score**: The symptom was presented in less than
  1/5th of the duration of the life of the patient
- **Two score**: The symptom was presented in less than
  half of the duration of the life of the patient
- **Three score**: The symptom was presented in about
  half of the duration of the life of the patient
- **Four score**: The symptom was presented in more
  than half of the duration of the life of the patient
- **Five score**: The symptom was presented almost in all
  time of the duration of the life of the patient

Finally, all the scores of non-obstructive symptoms
were summarized. Due to the scoring system which was
selected in this work the score of each patient was
between 0 and 20.

**Statistical analysis**: The data were subjected to statistical
evaluation, using SPSS II, with descriptive statistics
(mean, median, standard deviation [SD]) being determined
for all variables. In our comparisons t-tests and chi-square
tests were used for quantitative and qualitative variables.
Correlations were assessed using Pearson correlation
coefficients. p-values less than 0.05 were considered
significant.

**Medical ethics considerations**: Trans-rectal
ultrasonography is a necessary procedure in the approach
of the patients with BPH. Each patient gave informed
written consent to participate in the study, which was
approved by Tabriz University of Medical Science Ethics
Committee.

RESULTS

**General characteristics of the patients**: The mean age of
the patients was 71.18±8.74 (Min: 52 Max: 86). The
average of the volume of the prostates of the patients was
45.75±7.84 cc (Min: 31 cc Max: 78 cc) (Table 1).

The mean calculated scores of each non-obstructive
symptoms of the patients for frequency, urgency, dysuria,
noceturia, were: 3.78±1.22, 3.45±1.19, 3.06±1.19, 3.08±1.42,
respectively. The total score of non-obstructive symptoms was 13.38±2.96 (Table 1).

Comparison of non-obstructive symptoms between
three groups of the patients (group 1, 2 and 3): According to our findings there was no statistical
significant difference between three groups in frequency
score (F = 1.015, p = 0.369) (Fig. 1).

A statistically significant difference between three
groups was found in urgency (F = 3.508, p = 0.037); this
score was the lowest in group 1 and was the highest in
group 3 (Fig. 2).

Based on the results there were no statistical
significant difference between three groups in dysuria
(F = 0.217, p = 0.85; Fig. 3) and nocturia (F = 0.150,
p = 0.861; Fig. 4) score.

<table>
<thead>
<tr>
<th>Table 1: General symptom characteristics of the patients</th>
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<tr>
<td>Characteristics (N = 60)</td>
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<tr>
<td>Values</td>
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<tr>
<td>The mean calculated scores of the non-obstructive symptoms of the patients</td>
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<tr>
<td>Age (year)</td>
</tr>
<tr>
<td>Frequency</td>
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<tr>
<td>Urgency</td>
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<tr>
<td>Dysuria</td>
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<tr>
<td>Nocturia</td>
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<tr>
<td>The total score of non-obstructive symptoms</td>
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Values are expressed as Mean±SD
Fig. 1: The mean score of frequency symptom in three groups of patients with different volume of prostate. Group 1: Patients with prostate volume < 40 cc, Group 2: Patients with 40 cc = prostate volume = 50 cc, Group 3: Patients with prostate volume = 60 cc

Fig. 3: The mean score of dysuria symptom in three groups of patients with different volume of prostate. Group 1: Patients with prostate volume < 40 cc, Group 2: Patients with 20 cc = prostate volume = 59 cc, Group 3: Patients with prostate volume = 60 cc

Fig. 2: The mean score of urgency symptom in three groups of patients with different volume of prostate. Group 1: Patients with prostate volume < 40 cc, Group 2: Patients with 40 cc = prostate volume = 50 cc, Group 3: Patients with prostate volume = 60 cc

Fig. 4: The mean score of nocturia symptom in three groups of patients with different volume of prostate. Group 1: Patients with prostate volume < 40 cc, Group 2: Patients with 20 cc = prostate volume = 59 cc, Group 3: Patients with prostate volume = 60 cc

The total scores of the non-obstructive symptoms did not represent any significant difference between three groups (F = 1.314, p = 0.227) (Fig. 5).

Comparison of non-obstructive symptoms between group 1 and 2: Upon to the results of this work no significant difference was found between group 1 and 2 in frequency score (t = -0.127, p = 0.900, Fig. 1), urgency (t = 0.373, p = 0.711, Fig. 2), dysuria (t = -0.377, p = 0.708, Fig. 3), nocturia (t = 0.314, p = 0.755, Fig. 4) and total score of non-obstructive symptoms (t = -0.200, p = 0.843, Fig. 5).

Comparison of non-obstructive symptoms between group 1 and 3: Upon to the results of this work no significant difference was found between group 1 and 3 in frequency score (t = -1.344, p = 0.187, Fig. 1), dysuria (t = -0.240,
DISCUSSION

We found that urgency was the only non-obstructive LUTS that may be associated with prostate volume. There is no association between other non-obstructive LUTS and prostate volume that is consistent with previous reports (Sirls et al., 1996; Kojima et al., 1997).

BPH is a hyperplastic enlargement of prostate resulting in growth of glandular-epithelial and stromal/muscle tissue in the prostate, leading to frequently quantifiable growth taking on different shapes and configurations which may impact symptoms and secondary results. It is imperative to recognize that BPH is a histological condition, which is one not but not the only cause of lower urinary tract symptoms and may or may not be associated with prostate enlargement and bladder outlet obstruction (Roehrborn, 2008). LUTS are the most common problem that affects BPH patients (Tnæman et al., 1999; Wu et al., 2006). It is a general concern that LUTS that are associated with BPH to urinary obstruction caused by enlarged prostate, but there are some controversies in this regard (Bosch et al., 2008). Several studies have indicated that there are correlations between urinary symptoms and prostate volume, peak flow rate or residual urine volume (Barry et al., 1992; Madersbacher et al., 1997). However, others have proved that prostate volume is not associated with LUTS and objective parameters cannot predict the severity of symptoms in BPH patients (Ezz el Din et al., 1996; Eckhardt et al., 2001).

Tubaroa and Vecchia (2004) in an investigation of 802 patients reported that the association between LUTS and prostate volume remains questionable. Yalla et al. (1995) indicated that there is no correlation between the severity of obstruction and the AUA symptom index in the patients with BPH. Kok et al. (2009) in a study with follow up of 6.5 years in 1,688 men who were 50 to 78 years old from Netherlands clarified that 1 of 3 men without the risk factors of LUTS will still be diagnosed with lower urinary tract symptoms suggestive of BPH between ages 50 and 80 years. Loeb et al. (2009) from Baltimore study reported that changes in prostate size are highly variable among aging men. Although benign prostatic hyperplasia is common, a considerable proportion of aging men have a stable or decreasing prostate size. The volume of prostate is essential in medical approaches but it could not be

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Table 2: Correlations between non-obstructive symptoms and prostate volume

<table>
<thead>
<tr>
<th>Variables</th>
<th>Prostate volume</th>
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<tbody>
<tr>
<td>Frequency</td>
<td>0.194</td>
</tr>
<tr>
<td>Urgency</td>
<td>0.291</td>
</tr>
<tr>
<td>Dysuria</td>
<td>0.065</td>
</tr>
<tr>
<td>Nocturia</td>
<td>0.010</td>
</tr>
<tr>
<td>The total score of non-obstructive symptoms</td>
<td>0.166</td>
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</table>

Correlations were assessed using Pearson correlation coefficients

p = 0.812, Fig. 3), nocturia (t = 0.225, p = 0.823, Fig. 4) and total score of non-obstructive symptoms (t = -1.619, p = 0.114, Fig. 5).

The scores of the patients in group 3 in urgency was significantly higher than group 1 (t = -2.538, p = 0.015, Fig. 2).

Comparison of non-obstructive symptoms between group 2 and 3: Upon the results of this work no significant difference was found between group 2 and 3 in frequency score (t = -1.148, p = 0.258, Fig. 1), dysuria (t = 769, p = 0.447, Fig. 3), nocturia (t =-0.585, p = 0.551, Fig. 4) and total score of non-obstructive symptoms (t = -1.290, p = 0.205, Fig. 5).

The scores of the patients in group 3 in urgency was significantly higher than group 2 (t = -2.263, p = 0.029, Fig. 2)

Correlations between non-obstructive symptoms and prostate volume: Table 2 shows the correlations between non-obstructive symptoms and prostate volumes of the patients. Only there was a significant correlation between urgency and the prostate volume (p = 0.024, r = 0.291).
considered every time as an associated with LUTS. Patients who had a prostate volume $>or=30 \text{ mL}$, a severe International Prostate Symptom Score and a Prostate Specific Antigen level $>or=1.5 \text{ ng mL}^{-1}$ at baseline, were more likely to have surgical intervention during the follow-up period (Tsukamoto et al., 2009).

The degree to which the patient is troubled is more significant than symptom score. More than a third of all elderly men have moderate or severe LUTS and not all of them should receive treatment (Jepsen and Bruskewitz, 1998). It is very important to assess the impact of BPH symptoms rather than the increase in prostate volume during the management of BPH (Liu et al., 2004).

According to our findings there was an association between urgency and prostate volume that is not consistent with previous studies (Loh et al., 2009; Zhang et al., 2003). Yoshimura et al. (2003) investigated a total of 505 consecutively selected, newly diagnosed patients with symptomatic BPH and finally concluded that the frequency of nocturia in patients with BPH was higher than that in community-based studies and score of urgency and functional bladder capacity were each significantly associated with nocturia.

Generally it is imperative to point out that the symptoms of BPH are frequently attributed to simple mechanical obstruction of the prostatic urethra by an enlarged prostate gland, the pathophysiology of this common urologic disorder actually involves multiple factors that may conclude abnormalities of detrusor function, neuromuscular abnormalities of the prostatic urethra and sensory abnormalities of the bladder wall (Blaivas, 1988). The diagnostic evaluation of patients with clinical prostatism must take these factors into account. It is of high importance to mention that a decreased urinary flow rate and/or increased post-void residual urine volume may be caused by either bladder outlet obstruction or impaired detrusor contractility.

CONCLUSION

Based on the results of this study it is concluded that urgency was the only non-obstructive LUTS that may be associated with prostate volume and there is no relation between the other non-obstructive LUTS and prostate volume in BPH patients. Further studies with multiple subjective and objective measurements are required in this regard to clarify the symptom-related causes of LUTS in the patients with BPH.

REFERENCES


