

Original Research Article

A Study of Inflammation in Benign Prostatic Hyperplasia and its Correlation with International Prostate Symptom Score and Prostate Volume in a Tertiary Care Centre

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Abstract

Background & Objective: Benign Prostatic Hyperplasia (BPH) is a frequent benign neoplasm in elderly males. The objective of the study was to grade the inflammation in BPH by histopathological examination (HPE) and to correlate it with International Prostate Symptom Score (IPSS) and prostate volume. *Materials and methods:* 106 prostate chips and 2 prostate biopsies were included. Patients with proven urinary tract infection and malignancy were excluded. Inflammation, studied with Hematoxylin and Eosin (H&E) staining, was graded according to classification by Chronic Prostatitis Collaborative Research Network (CPCRN) and the International Prostatitis Collaborative Network (IPCN). Association between grade of inflammation and prostate volume as well as IPSS were assessed using chi square test. *Results:* Inflammation was present significantly in all cases. Inflammation significantly correlated with prostate volume and IPSS. Also IPSS and prostate volume showed strong correlation in our study. *Conclusion:* Our study highlights the association of inflammation with prostate enlargement and symptoms related to BPH.

Keywords: Benign Prostatic Hyperplasia; Inflammation; IPSS; Prostate Volume

Introduction

Benign Prostatic Hyperplasia (BPH) is a frequent urological disease among elderly males. The clinical incidence of this disease is 8% during fourth decade and thereafter increases to 50% in fifth decade and 75% in eighth decade [1]. Histologically it is an overgrowth of the epithelial and stromal components from the periurethral area and

transition zone [2]. Recent studies suggest the role of modifiable risk factors like prostatic inflammation in BPH in addition to non modifiable risk factors like aging and genetic predisposition [3]. So identifying patients with chronic prostatic inflammation would be crucial to prevent BPH progression [4]. The aim of the study is to grade the inflammation associated with BPH by histopathological examination and to correlate it with IPSS and prostate volume.

Materials and Methods

The present study was a cross sectional study done at Department of Pathology from June 2015 to June 2017. Trans Urethral Resection of Prostate (TURP) chips (12gm or 5 blocks) of 106 patients and Trans Rectal Ultrasound (TRUS) guided biopsy of 2 patients were included in the study. Clinical history, IPSS [5] and prostate volume were collected from the patient's case files. Prostate chips and prostate biopsy specimen were received in 10% formalin. In every case the standard protocol for surgical grossing of TURP specimen put forward by the College of American Pathologists was followed [6]. Paraffin sections of 5µm thickness were stained by H & E for histopathological study.

Prostate volume was assessed using Transabdominal ultrasonography (TAUS). Samples were obtained for the study by TURP as well as prostate biopsy. Transrectal ultrasonography (TRUS) guided biopsy was done with a biopsy gun having 18 gauge needles.

Histopathological classification of chronic prostatic inflammation by CPCRN and the IPCN [21] was followed in this study. The lower urinary tract symptoms (LUTS) were graded using IPSS [5] as mild (1-7), moderate (8-19) and severe (20-35). The prostatomegaly was graded as I (21-30ml), II (31-50ml), III (51-80ml) and IV (80 and above) [7].

SPSS software version 21.0 was used for statistical analysis. Association of grade of inflammation with prostate volume and IPSS were assessed using chi square test. Correlation between volume and IPSS were assessed using Spearman's rho. 'p'

value of less than 0.05 was considered statistically significant ($p < 0.05$).

Results

Patient Characteristics

The study subjects had a mean age of 66.48 ± 8.17 years with 43.5% belonging to the age group 60-69 years. Mean Prostatic volume of the study group was 46.5 ± 26.7 ml with only 8.3% of cases having prostate volume above 80 ml. Three fourth of the patients had an IPSS between 8 and 19 with a mean IPSS score of 10.48 ± 3.49 . Severe symptoms were reported only by 3% of the patients. Almost half of the cases (45.35%) studied had mild inflammation (Figure 1a), rest of the cases had moderate (Figure 1b) and severe (Figure 1c) inflammation in almost equal proportion (27.8% & 26.9% respectively).

Correlations

Prostate volume was found to have significant correlation with IPSS with p values of 0.0001 ($r=0.33$). The association between prostate volume and grade of inflammation shows a significant p value of 0.02. Thus moderate to severe inflammation is associated with higher grades of prostatomegaly (Table 1).

There was a significant association between IPSS and grade of inflammation with a p value of 0.04. Thus patients with higher grades of inflammation were more symptomatic in our study. Related data as well as result of analysis are given in Table 2.

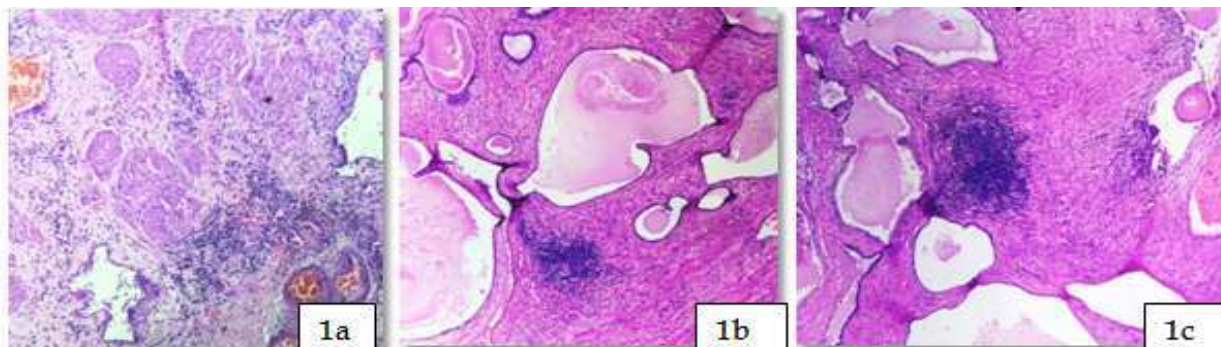


Fig. 1a: Grade I (mild) inflammation in BPH- Individual inflammatory cells most of them separated by intervening spaces H & E x 100

Fig. 1b: Grade II (moderate) inflammation in BPH- showing confluent sheet of inflammatory cells with no tissue destruction or lymphoid nodule/follicle formation H & E x 100

Fig. 1c: Grade III (severe) inflammation in BPH- showing confluent sheet of inflammatory cells with lymphoid nodule/follicle formation H & E x 100

Table 1: Association of prostate volume and grade of inflammation

Volume (ml)	Grade of Inflammation			Total	Chi square	p value
	Mild	Moderate	Severe			
21 - 30 (Grade I)	14	9	7	30	15.5	0.02
31-50 (Grade II)	20	7	14	41		
51-80 (Grade III)	14	8	6	28		
>80 (Grade IV)	1	6	2	9		
Total	49	30	29	108		

Table 2: Association between IPSS and grade of inflammation

IPSS	Grade of Inflammation			Total	Chi square	p value
	Mild	Moderate	Severe			
1 - 7 (Mild)	14	6	4	24	10.24	0.04
8 - 19 (Moderate)	35	24	22	81		
20 - 35 (Severe)	0	0	3	3		
Total	49	30	29	108		

Table 3: Mean Prostate Volume in Various Studies

Studies	Robert et al. ^[2]	Basawaraj et al. ^[7]	Gnyawali et al. ^[9]	Our study
Sample Size	282	126	98	108
Method used	TRUS	TAUS	TAUS	TAUS
Mean Prostate Volume (ml)	69	36.98±18.05	47.5±16.63	46.5±26.7

TRUS - Trans Rectal Ultrasonogram, TAUS- Trans Abdominal Ultrasonogram

Discussion

In our study two third of the patients studied were moderately symptomatic with IPSS between 8 and 19. The mean IPSS was 10.48±3.49 in our study. Similar moderate level of IPSS mean was noted by the studies done by Meert et al [8] (mean IPSS - 15.7±6.9), Robert et al. [2] (mean IPSS - 14) and Basawaraj et al. [7] (mean IPSS - 18.30). Radiological assessment of prostate volume showed that majority of patients (38%) studied had grade II prostatomegaly. The mean prostate volume in our study was 46.5±26.7ml. These observations are in concurrence with the studies done by Basawaraj et al. [7] and Gnyawali et al. [9] but disagrees with the study by Robert et al. [2] (Table 3). The variation in observation by Robert et al. [2] may be explained by the difference in sample size as well as different methods used to (transabdominal Vs transrectal) assess of prostate volume. All the cases in our study showed significant inflammation similar to the studies done by Nickel et al. [10] and Song et al. [11]. Yang et al. [12] also showed inflammation in 142 out of the 143 cases of BPH they studied. The predominant grade of inflammation noted was mild (45.4%) followed by moderate (27.8%) and severe (26.9%) in our study.

Prostate volume and IPSS showed a significant Spearman's correlation coefficient with p value of

0.0001 which is supported by the study done by Basawaraj et al. [7]. This is contrary to the frequent observation that LUTS correlated more with urinary obstruction rather than prostate size [13]. IPSS scoring also showed correlation with grade of inflammation (p = 0.04) similar to the study done by Robert et al. [2] (p < 0.0001). However Meert et al [8] (p = 0.125) and Yi et al. [14] failed to demonstrate the same. Prostate volume was found to correlate with grade of inflammation in our study (p = 0.02). Similar conclusion was drawn by Robert et al. [2] & Song et al. [11]. Meert et al. [8] showed a deviation from our finding but they correlated inflammation with resected prostate tissue weight instead of prostate volume which may lead to underestimation of prostate size.

Conclusion

Grade II prostatomegaly (31-50 ml) showed the highest frequency (38%) among the cases studied. Two third of the patients studied were moderately symptomatic (IPSS 8-19). Prostate enlargement (volume) was found to correlate with IPSS. Inflammation was present in all the cases of BPH studied with mild (grade I) inflammation as the predominant grade. Prostate volume and IPSS were found to increase with increase in

grade of inflammation. Even though the grade of inflammation predominated in our study was mild, its strong correlation with prostate volume and IPSS emphasizes the role of inflammation in prostate enlargement related to BPH. More studies to elucidate the probable etiology behind this inflammation is required for lifting the fog over this commonly encountered urological disease.

Abbreviation

BPH- Benign prostatic Hyperplasia

IPSS- International Prostate symptom Score

HPE- Histopathological Examination

CPCRN- Chronic Prostatitis Collaborative Research Network

IPCN- International Prostatitis Collaborative Network

TURP- Transurethral resection of the prostate

H&E- Haematoxylin and Eosin

TRUS- Transrectal ultrasound

TAUS- Transabdominal ultrasound

SPSS- Statistical package for the social sciences

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