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Histopathological Study of Lesions of Prostate in a Tertiary Care Centre in South India

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ABSTRACT

Background: A wide array of pathological disorders, encompassing both non-neoplastic and neoplastic lesions, are frequently observed in the prostate during everyday practice. The majority of prostatic neoplasms are benign, while the prostate is also a frequent location for malignancy, with the potential for metastasis. Prostatic carcinoma is the second most commonly diagnosed cancer worldwide and the sixth major cause of cancer mortality in males. Diagnosis is often conducted through histological analysis of transrectal core biopsies and transurethral resections.

Aim: The aim of present study was to study the age distribution and histopathological features of lesions of prostate and to analyse cases of adenocarcinoma of prostate according to Gleason grading system.

Material and methods: This was a retrospective and prospective study of 61 lesions of prostate during the period of January 2023 to December 2023.The gross specimens were in the form of transurethral resection of prostate (TURP) and trucut biopsies. The tissue was fixed in 10% formalin. Sections were cut at 3-5 micron thickness and were subsequently stained by haematoxylin and eosin (H&E) stain. All the cases were analysed according to age and microscopic examination. For retrospective cases the H&E stained slides were retrieved and reviewed. Histopathological diagnosis was given.

Results: The predominant age group studied was 61 to 70 years, comprising 24 patients (31.34%), with ages ranging from 43 to 87 years. Histopathological analysis revealed benign nodular hyperplasia (BPH) in 51 cases (83.6%), 1 case (1.6%) of prostatic

intraepithelial neoplasia (PIN), and 9 cases (14.8%) of malignant carcinoma of the prostate. The comparison of age with histological diagnosis indicated that prostate cancer was predominantly observed in the older age group, although this finding was not deemed statistically significant. p = 0.84. Prostatitis was observed together with nodular hyperplasia of the prostate.

Conclusion: Prostatic specimens exhibit a range of benign as well as malignant lesions. These must be distinguished and categorized. Benign nodular hyperplasia was the most prevalent benign lesion, while prostatic adenocarcinoma was the most frequent malignant lesion of the prostate. TURP can facilitate the early detection of premalignant lesions including incidental prostate cancer, hence enhancing patient treatment outcomes.

Keywords: Adenocarcinoma, Gleason score, Nodular Hyperplasia, Prostate.

INTRODUCTION

The prostate is an integral organ of the male genital system. It is made up of glandular as well as stromal components, and its secretions make up around 30–50% of the volume of the seminal fluid.[1] The prostate gland is a fibromusculo glandular structure that encircles the neck of the urine bladder and the urethra. The prostate gland is anatomically situated at the bladder's neck; hence, its enlargement may result in urinary symptoms such as hesitancy, retention, urgency, and dribbling.[2]

The diseases that affect the prostate account for a sizeable fraction of the cases that urologists encounter in males. These diseases are also significant contributors to morbidity and death among the adult male population from all over the world. Three pathological processes primarily impact the prostate gland: inflammatory conditions (prostatitis), benign prostatic hyperplasia (BPH), and neoplasms (premalignant as well as malignant lesions).[3]

Among these three, BPH is the most prevalent and occurs with such frequency in advanced age that it may be regarded as a "normal" aspect of the ageing process. Prostatitis affects between 10% to 15% of the male population. It can be categorized as acute, chronic, or granulomatous and is frequently observed in conjunction with BPH.[4]

Recognizing the biology of precancerous lesions is becoming increasingly relevant. Prostate cancer is thought to develop in multiple steps, which is explained by these precursor lesions. Two identified premalignant lesions include prostatic intraepithelial neoplasia (PIN) and atypical adenomatous hyperplasia (AAH).[5]

In men, prostate cancer is the second most common type of cancer that is diagnosed, and it is the fifth greatest cause of death from cancer among men.[6] Androgens are significant in the development of benign nodular hyperplasia and prostate cancer, and anti-androgen medication constitutes a crucial component of treatment.[7]

The assessment of individuals with prostatic disease includes pertinent medical history, clinical examination, particularly digital rectal examination (DRE), serum prostate-specific antigen (PSA) measurement, trans-rectal ultrasound (TRUS), and TRUS-guided needle biopsies. Transurethral resection of prostate (TURP) specimens constitutes a considerable proportion of diagnostically complex cases in surgical pathology. Clinically undetectable prostate tumors that are inadvertently identified in TURP specimens are termed incidental carcinoma in the prostate.[8,9]

For many years, establishing or ruling out a diagnosis of prostate cancer has been a significant challenge for pathologists. This issue has intensified recently due to advancements in medical technology, heightened disease awareness, an increase in biopsies, and a reduced incidence of carcinoma or ambiguous carcinoma in these samples.

The issue arises from the similarity in presentation between malignant and benign prostate lesions, despite their differing therapy and prognosis; thus, histological identification is crucial in this context. The objective of tissue sampling is to optimize the detection of prostate cancer and to furnish information concerning its histological grade. The histopathological grade of the prostate is a critical prognostic predictor of prostate cancer.[10] A definitive diagnosis with tumor grade indication facilitates a logical management strategy.

AIMS AND OBJECTIVES:

- To study the age distribution and histopathological features of lesions of prostate
- To analyse cases of adenocarcinoma of prostate according to Gleason grading system.

MATERIALS AND METHODS:

Present study was conducted in Department of Pathology, Sree Mookambika Institute of Medical Sciences, Kulasekharam. This was a retrospective and prospective study of 61 lesions of prostate during the period of January 2023 to December 2023 (12 months).

Inclusion Criteria: All TURP and Trans rectal needle biopsy of prostate specimens.

Exclusion Criteria: Inadequate sample

A total of 61 cases were selected. The gross specimens were in the form of TURP and trucut biopsies. The clinical data was obtained from inpatient case files and biopsy requisition forms.

The tissue was preserved in 10% formalin and treated manually. Sections were sliced to a thickness of 3-5 microns and subsequently stained with H&E stain. All cases were evaluated based on age as well as microscopic examination. The H&E stained slides for retrospective instances were retrieved and examined. Acknowledged. In certain instances, fresh sections were extracted from tissue blocks as necessary and subsequently stained with H and E dye. Special stains, including 20% ZN staining and PAS, were conducted as necessary.

The slides were analysed using a light microscope, revealing diverse histological findings in all instances. Upon histological evaluation, the lesions were categorised as benign or malignant. The prostate tumours were diagnosed and categorised according to WHO classification. The adenocarcinoma cases were evaluated using the Gleason grading system.

All adenocarcinomas were classified according to the Gleason score.[11] The Gleason score derived from the sum of the two most predominant Gleason grades: primary and secondary, assigned based on distinct criteria for biopsy.

- Pattern 1: Circumscribed nodule of closely packed but separate, uniform, rounded to oval, medium-sized acini (larger glands than pattern 3)
- Pattern 2: Like pattern 1, fairly circumscribed, yet at the edge of the tumor nodule there may be minimal infiltration Glands are more loosely arranged and not quite as uniform as Gleason pattern 1
- Pattern 3: Discrete glandular units Typically smaller glands than seen in Gleason pattern 1 or 2 Infiltrates in and amongst nonneoplastic prostate acini Marked variation in size and shape Smoothly circumscribed small cribriform nodules of tumor
- Pattern 4: Fused microacinar glands, Ill-defined glands with poorly formed glandular lumina, Large cribriform glands, Cribriform glands with an irregular border and hypernephromatoid
- Pattern 5: Essentially no glandular differentiation, composed of solid sheets, cords, or single cells Comedo carcinoma with central necrosis surrounded by papillary, cribriform, or solid masses.

These Grade Groups are as follows:

- Grade Group 1: Gleason score ≤ 6
- Grade Group 2: Gleason score $3 + 4 = 7$
- Grade Group 3: Gleason score $4 + 3 = 7$
- Grade Group 4: Gleason score $4 + 4 = 8$, $3 + 5 = 8$, $5 + 3 = 8$

- Grade Group 5: Gleason scores 9-10.

Data entered in excel sheet. Statistical Analysis was carried out using SPSS version 20.0. Chi square test was done to assess statistical significance. A p value less that 0.05 was considered statistically significant.

OBSERVATION AND RESULTS:

The youngest patient in our study was of 43 years and the oldest was 87 years of age. Most common age group sampled was between 61 to 70 years seen in 24(31.34%) patients, followed by 71 to 80 years in 22(36.07%), 51 to 60 years in 9(14.75%), 81 to 90 years in 4(6.56%) and 41 to 50 years in 2(3.27%) patients.

Majority of the patients presents with urinary symptoms like Acute retention of urine (34.4%) and increased frequency of micturition (32.8%). Neurogenic bladder and nocturia were seen in 1.6% of the cases. (Fig-1)

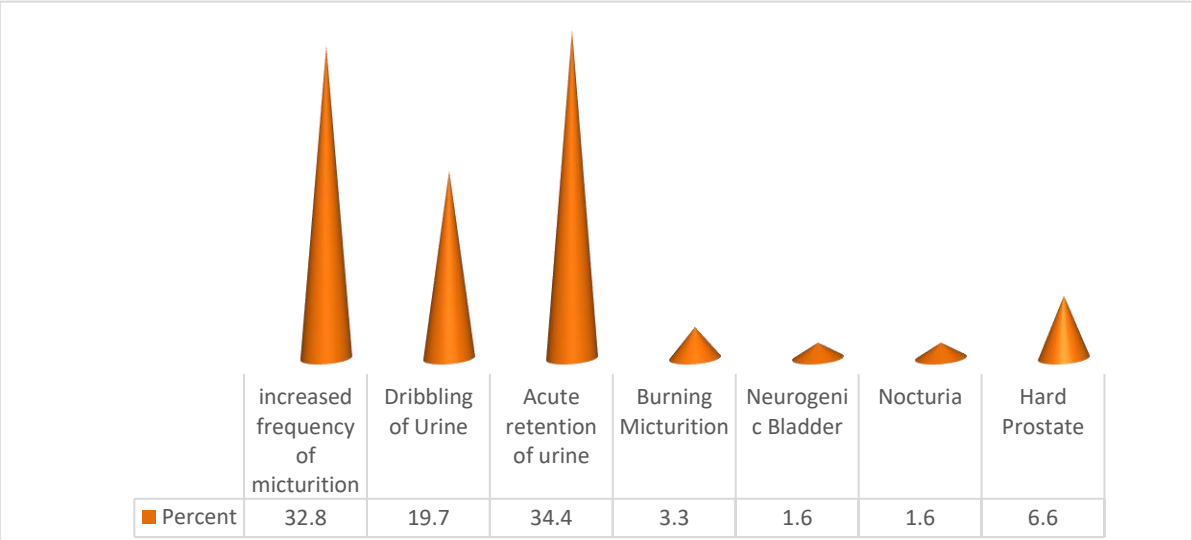

Fig-1: Clinical Presentation

Among 61 cases, 48 (78.7%) were TURP specimens and 13(21.3%) were needle biopsy specimens. Histopathological examination found nodular hyperplasia (BPH) in 51(83.6%), 1(1.6%) case was of PIN and 9(14.8%) were malignant (carcinoma prostate). (Fig 2) Comparison of age with histopathological diagnosis showed that carcinoma prostate was found in advanced age group and was not considered statistically significant. (p=0.84). (Table 1)

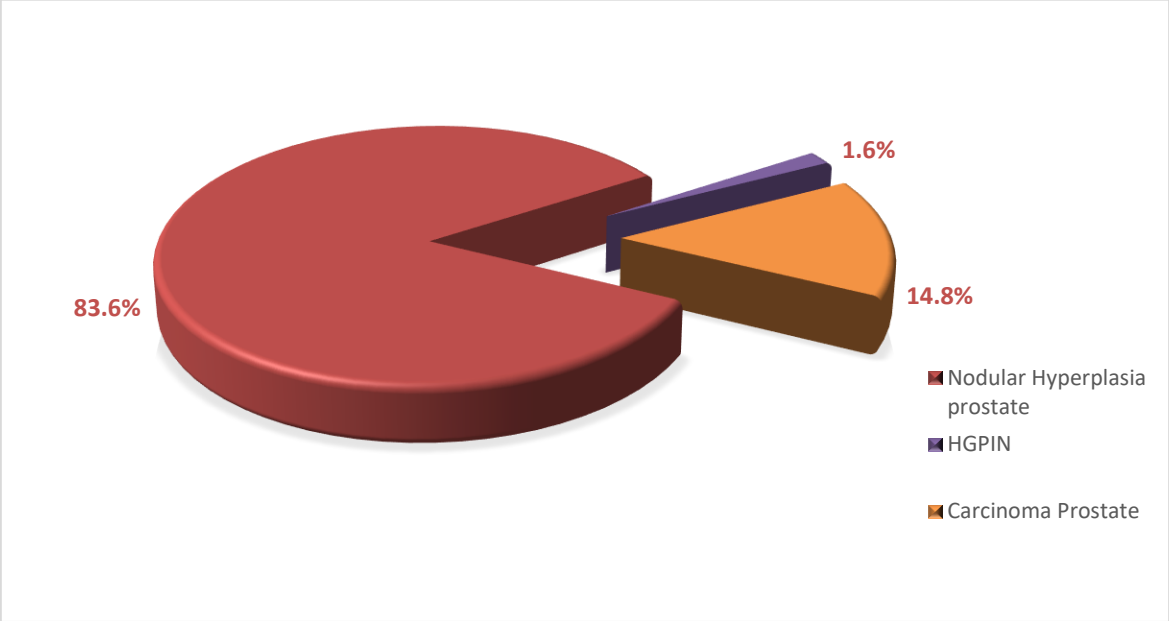

Fig 2: Histopathological diagnosis

Age	Nodular Hyperplasia Prostate	PIN	Carcinoma Prostate	p value
41-50	2 (3.9%)	0 (0%)	0 (0%)	0.84
51-60	9 (17.6%)	0 (0%)	0 (0%)	
61-70	20 (39.2%)	0 (0%)	4 (44.44%)	
71-80	16 (29.5%)	1(100%)	5 (55.56%)	
81-90	4 (7.8%)	0 (0%)	0(0%)	
Total	51	1	9	

Table 1: Age-wise distribution of Prostatic lesions.

Inflammation of prostate was seen in association with Nodular hyperplasia of prostate. Prostatitis being the most common type accounting for 31(50.8%) of the cases followed by abscess in 8(13.1%) of the cases. Granulomatous prostatitis was rare and accounts for 3(4.9 %). Inflammation was absent in 18(29.5%) of the cases. (Fig 3)

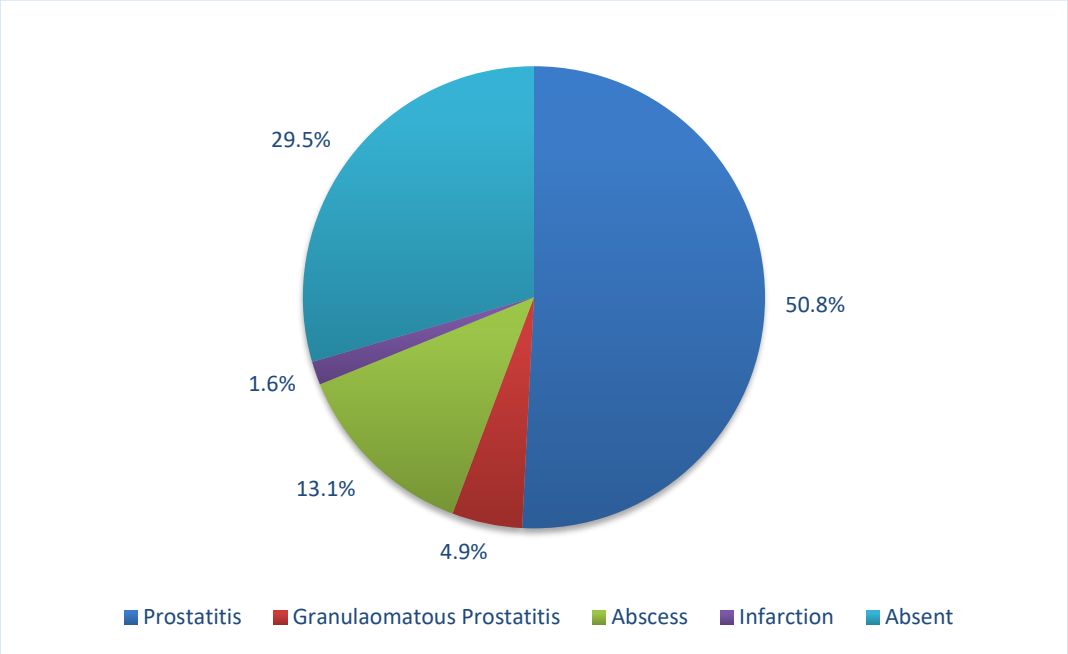

Fig 3: Distribution of inflammatory lesions in prostate

Prostatic carcinoma was diagnosed in 9(14.8%) patients. All these were histologically adenocarcinomas. These cases were previously not suspected of malignancy and were detected incidentally on TURP specimens. Among the 9 cases of carcinoma prostate, 2 was in grade group 2, one case in grade group 3, 4 cases in grade group 4 and 2 cases in grade group 5.

DISCUSSION:

The prostate is a fibromuscular organ including three principal glandular regions: the peripheral zone, central zone, and transitional zone. Prostatic hyperplastic lesions frequently occur in the transition zone, while the peripheral zone is the primary site for carcinomas. Significant diseases related to the prostate include benign prostatic hyperplasia, prostatitis, and neoplasms. The prevalence of prostate illnesses escalates with advancing age.[12]

The predominant age group in the current study was 61 to 70 years, comprising 24 individuals (31.34%). Shafique S et al.[13] observed that the ages of patients ranged from 22 to 91 years, with a mean age at presentation of 64.3±12.8 years. The majority of cases were in the age range of 60 years and above (69.8%). This was analogous to the current study.

The majority of patients have urinary symptoms, including urinary retention (34.4%) and increased micturition frequency (32.8%). In the study by Farooq S et al.[14], the

predominant presenting symptom was an elevated frequency of micturition, succeeded by challenges in initiating and terminating the urinary stream.

Of the 61 patients, 13 (21.3%) had needle biopsy specimens and 48 (78.7%) had TURP specimens. A study by Satyasri K et al.[15] observed that among 321 prostatic specimens, there were 2 prostatic biopsies, 318 TURP chips, and 1 prostatectomy specimen.

The current study revealed that the majority of cases were identified as nodular hyperplasia in 51 (83.6%), whereas 9 (14.8%) were diagnosed as prostate cancer. Thapa N et al.[16] reported that 92.2% of cases were BPH, whereas 4.8% were prostatic malignancies, and these results were consistent with the current findings. In the study conducted by Sultana SS et al.[17] out of 178 instances were identified, with 159 (89.32%) diagnosed as benign lesions, the most prevalent being nodular hyperplasia. Prostatic adenocarcinoma was identified in 16 patients (9%). This was similar to the current study.

The comparison of age with histological diagnosis indicated that prostate cancer was prevalent in the older age group, although this finding was not deemed statistically significant. $p > 0.05$. Bhatta S et al.[18] similarly observed no significant difference in the mean age of patients with benign versus malignant tumors (p value 0.27). Malignant lesions ranged in age from 68 to 83 years old, with a mean of 72.9 ± 5.2 years old.

Prostatitis accompanied by benign prostatic hyperplasia was observed in 41 (67.21%) instances. The majority of instances of BPH had chronic non-specific inflammation accompanied with prostatitis. Granulomatous prostatitis is uncommon, constituting 4.9% of cases. In the present study, one case had infarction. In the study conducted by Farooq S et al.[14], the predominant co-existing condition associated with BPH was chronic prostatitis, observed in 8.31% of patients, along with the identification of two cases of granulomatous prostatitis. Prostatic infarcts exhibit considerable variation in size. They exhibit a mottled, grayish-yellow hue. The peripheral borders are typically sharp and hemorrhagic.

PIN is characterized as a cytological modification in structurally normal glands. In the literature from around the world, there has been a wide range of reports on the prevalence and frequency of PIN in nodular hyperplasia. These reports range from 12.8% to 43% throughout the various research. In the current study, a single instance of PIN was identified. Consistent with the current study, Bhatta S et al.[18] identified 2 cases (2.08%) with high-grade PIN in their research.

The second most frequent cancer in men is prostate cancer. The incidental identification of cancer of the prostate during TURP has markedly diminished in the PSA

screening era. In the current investigation, prostatic cancer was identified in 9 (14.8%) participants.

In 1966, Donald F. Gleason developed a distinctive grading system for prostatic cancer that relies exclusively on the tumor's architectural layout. The Gleason grading system, based on microscopic evaluation, is presently the preferred grading methodology. The extent of glandular differentiation and the development pattern of the tumor in relation to the stroma, as determined by low power inspection, are the two factors that provide the basis for this determination.[19]

In the current study, moderately differentiated carcinoma (GSs 5-7) comprised 3 cases, whereas poorly differentiated tumors (GSs 8-10) comprised 6 cases. In the study conducted by Bhatta S et al.[18] out of 8 cases of prostate cancer were incidental, representing 7.29% of all prostatic lesions. The Gleason score of 9 was the most prevalent, observed in 3 out of 8 cases (37.5%). Chakma S et al.[20] noted that 16% of the prostatic lesions in their study were incidental carcinomas, with all malignant lesions being adenocarcinomas. The majority exhibited a Gleason score ranging from 8 to 10.

CONCLUSION

Prostatic specimens exhibit a range of lesions that are both benign and malignant. These must be distinguished and categorized. BPH was the most prevalent benign lesion, while prostatic adenocarcinoma was the most frequent malignant lesion of the prostate. In the present study, all prostate carcinomas occurred incidentally. To enhance the likelihood of identifying incidental cancer, a greater number of TURP chips must be subjected to histological analysis. In such instances, a needle biopsy needs to be performed to investigate for supplementary malignancy in the peripheral zone. It is possible to enhance the treatment success of patients by identifying premalignant lesions and even incidental prostate cancer.

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