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Research Article

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Histopathologic Spectrum of Prostatic Lesions in TURP Specimens

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ABSTRACT

Background: Prostate cancer and "benign prostatic hyperplasia (BPH)" are serious health problems for older men. To diagnose, diagnostic procedures like Prostate-specific antigen (PSA) screening and biopsy are utilised. The presence of premalignant lesions such as PIN and AAH can identify cancer progression. For diagnosis transurethral resection in the prostate (TURP) specimens are helpful because they reveal patterns in the incidence of cancer, particularly in older age groups. This study examines the histopathologic spectrum of prostatic lesions in TURP specimens to identify and assess benign and malignant diseases.

Methods: At Karpagam Faculty of Medical Sciences & Research, 128 TURP specimens from September 2022 to September 2023 were taken for analysis. TURP samples were more relevant than prostatectomy and needle core biopsies. The histopathological investigation, which employed Gleason's scoring system, classified tumors according to glandular development patterns; this helped with both treatment choices and prognosis assessments.

Results: This study focuses on 128 TURP specimens to show the big and small traits of different prostatic lesions. When viewed under a microscope, TURP tissues always appear gray-white to tan in color. The histological features of benign and malignant diseases can be better identified and treated using microscopic analysis. PSA correlation and age-specific distributions provide additional information for use in clinical decision-making. This work adds to existing knowledge of how to treat prostatic diseases.

Conclusion: This study concluded that comprehensive TURP tests can diagnose and characterise prostate problems, with macroscopic and microscopic investigations showing pathological characteristics. PSA correlates with prostatic pathology, guiding treatment.

Key-words: Benign prostatic hyperplasia, Transurethral resection of the prostate, Digital rectal examination, Prostate cancer screening, Histopathologic Spectrum

INTRODUCTION

One of the organs that affects men the most frequently as they age is the prostate, which is responsible for a considerable amount of illness and mortality. Prostate lesions show a proportional rise in frequency as age increases. Prostate cancer is also the second most frequent cancer globally in terms of diagnoses, and it is the fifth leading cause of death for men. Prostate cancer incidence is rising in India due to the increased life expectancy of males [1].

Men are disproportionately affected by BPH, a common urological condition. The most often utilized techniques for prostate cancer screening are PSA, transrectal ultrasonography, and digital rectal examination (DRE). However, biopsy remains the most reliable method for reaching a definitive diagnosis. Prostate cancer is typically diagnosed histologically by examining morphological characteristics such as nuclear atypia, growth patterns, and the lack of basal cells [2].

The primary categories of prostatic disorders are malignancy, inflammatory lesions (prostatitis), and

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nodular hyperplasia (benign prostatic hyperplasia). A significant fraction of diagnostically complicated cases within surgical pathology includes TURP specimens. TURP is a common urological operation used to treat BPH surgically [3].

The histologic diagnosis of BPH is indicated by the prostatic transition zone with excessive development of glandular epithelium, smooth muscle, and connective tissue. There are rare cases of non-specific granulomatous prostatitis in the prostate samples. Tanner and McDonald initially characterized it in 1943, reporting a frequency 3.3% of inflammatory lesions with granulomatous prostatitis [4]. Harsh Mohan and colleagues examined 20 cases of granulomatous prostatitis, two of which were tuberculous prostatitis cases. Epithelial proliferative alterations are associated with cancer development in nearly all epithelial tumors. Proliferative regenerative alteration in the prostate, known as proliferative inflammatory atrophy (PIA), is considered a potentially precancerous condition [4-8].

Understanding the biology of premalignant lesions is becoming more crucial. These early abnormal tissue changes are now associated with the idea of the prostate cancer's multi-step progression. The two precancerous lesions found are prostatic intraepithelial neoplasia (PIN) & atypical adenomatous hyperplasia (AAH). The first person to describe premalignant changes in the prostate was Orteil. PIN is the officially recognized word. It describes a cellular alteration in glands with normal anatomical characteristics, categorized as low-grade (LGPIN) or high-grade (HGPIN). McNeal first described AAH as an architectural alteration in cytologically normal glands [5,9].

The revised Gleason method forecasts survival more accurately without progression after radical prostatectomy in contrast to the originally developed Gleason system. Before the PSA era, as many as 27.2% of prostate malignancies were found accidentally during TURP. Prostate histochemical analysis mucins have been extremely beneficial, particularly in identifying acid mucin unique to malignancy [4].

DRE and Trans Rectal Ultrasonogram, needle biopsy, PSA density calculation, Serum PSA estimation, and biopsy procedures are crucial diagnostic methods for identifying benign and malignant prostate lesions. Furthermore, there is limited research on prostatic lesions conducted in India [6].

Prostate tissue is commonly collected for histological identification of benign disorders of the prostate gland, including BPH, by TURP as well as prostatectomy. An Indian study's statistics identified other premalignant diseases and intriguing connections between Prostatic cancer, BPH, the Gleason scoring system, and various age groupings [10]. Prostate cancer in the Chinese population studied with TURP specimens showed a rising trend. Research on Prostatic Cancer found that older age groups were positively correlated with increased tumor incidence when histopathological samples were collected using TURP. TURP primarily focuses on the prostate gland's transitional zone, where around 25% of cancers are found. The majority are found in the peripheral zone [7,11]. To evaluate the histopathological spectrum of prostrate lesions in TURP specimens and to correlate with PSA levels.

MATERIALS AND METHODS

Research Design- A retrospective study conducted at Karpagam Faculty of Medical Sciences & Research in Coimbatore examined 128 TURP specimens from September 2022 to September 2023. Histological st udies of prostate diseases frequently make use of specimens collected through TURP. The study focused exclusively on TURP samples to shed light on the frequency and features of prostatic disorders within the given timeframe. The study concentrated on TURP-derived data by excluding prostatectomy specimens and needle core biopsies, potentially improving its relevance and accuracy in diagnosing prostatic diseases in the examined population. Tissue blocks and slides from the study's TURP specimens were treated with H&E. A collection of clinical information and PSA readings was obtained from the request forms for the available cases. Histopathological examination (HPE) prostate tumours were rated using Gleason's scoring system, classifying tumor architecture from 1 to 5 based on glandular development patterns. Well-formed, tightly packed glands (Grade 1) to poorly formed, solid nests (Grade 5). The Gleason score, determined by adding the primary and secondary grades together, fully evaluates the tumor's aggressiveness. Scores that are less than or equal to six indicate low-grade cancer, scores that are between seven and eight indicate intermediate-grade cancer and scores that are greater than or equal to eight indicate high-grade malignancy.

With the help of this scoring system, patients can be categorized according to the severity of their tumors, which helps guide treatment decisions and prognosis evaluations.

Inclusion criteria

- ✓ Trans urethral resection of prostrate (TURP) specimens.

Exclusion criteria

- ✓ Prostatectomy specimens
- ✓ Needle core biopsies

Statistical Analysis- "The study used SPSS 27 for effective analysis. The study used ANOVA to find the significance between PSA levels. MS Excel was used for creating graphs and other calculations. The continuous data were expressed as Mean±Standard deviation while the discrete data were expressed as frequency and its respective percentage."

Ethical Consideration- The Ethical Committee of Karpagam Faculty of Medical Sciences and Research, Coimbatore approved the study method.

RESULTS

Multiple specimens with homogeneous gray-white to tan coloring and a velvety texture are seen in the image. According to this macroscopic examination, the resected prostate tissues acquired after TURP treatments appear homogenous. Several specimens of tissue with comparable features show that the prostatic tissue that was surgically removed looked consistent. To help with the diagnostic evaluation and histological study of prostate lesions, this information gives pathologists and physicians an early idea of the macroscopic characteristics of TURP specimens (Fig. 1).

Fig. 1: Gross appearance of TURP tissues -Multiple gray white to tan soft tissue

Fig. 2 shows glandular epithelial cell proliferation and stromal hyperplasia, which enlarges the prostate gland at 40x magnification with H&E staining. The glands have a bloated appearance and an uneven form; the stroma around them is thickened. Prolonged, non-specific prostatitis is also present, with stromal inflammatory cell infiltrates as a hallmark. Both ASAP and prostate abscess are shown, with their unique histological characteristics that help in diagnosis and treatment. Twenty times magnification of prostate acinar adenocarcinoma shows cancer cells penetrating neighbouring tissues and stromal desmoplastic response. These histological pictures' cellular structures and staining features help identify benign disorders like BPH and inflammatory processes from malignant lesions like adenocarcinoma and precancerous stages like ASAP and PIN. To make informed clinical decisions about surveillance, biopsy, and treatment plans for patients with prostate-related illnesses, it is crucial to understand these histological findings.

Fig. 3 shows the distribution of prostatic lesions by age, with benign and malignant diseases identified across several age groups. There are a certain number of cases shown for benign and malignant lesions for each age range (40–49 years, 90–99 years, etc.) represented by a bar. In twenty cases involving individuals aged forty-nine and up, seventeen were deemed benign and three malignant. Similar numbers of benign and malignant cases are given for 50-59 and 60-69 years, followed by the trend for successive age groups.

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There may be age-related patterns in the occurrence of benign and malignant prostate lesions, as shown graphically in the figure, which differs between age groups. Understanding the epidemiology of prostatic illnesses and developing clinical decision-making and disease management methods suited to distinct age demographics can be facilitated by gaining insights into age-specific distributions.

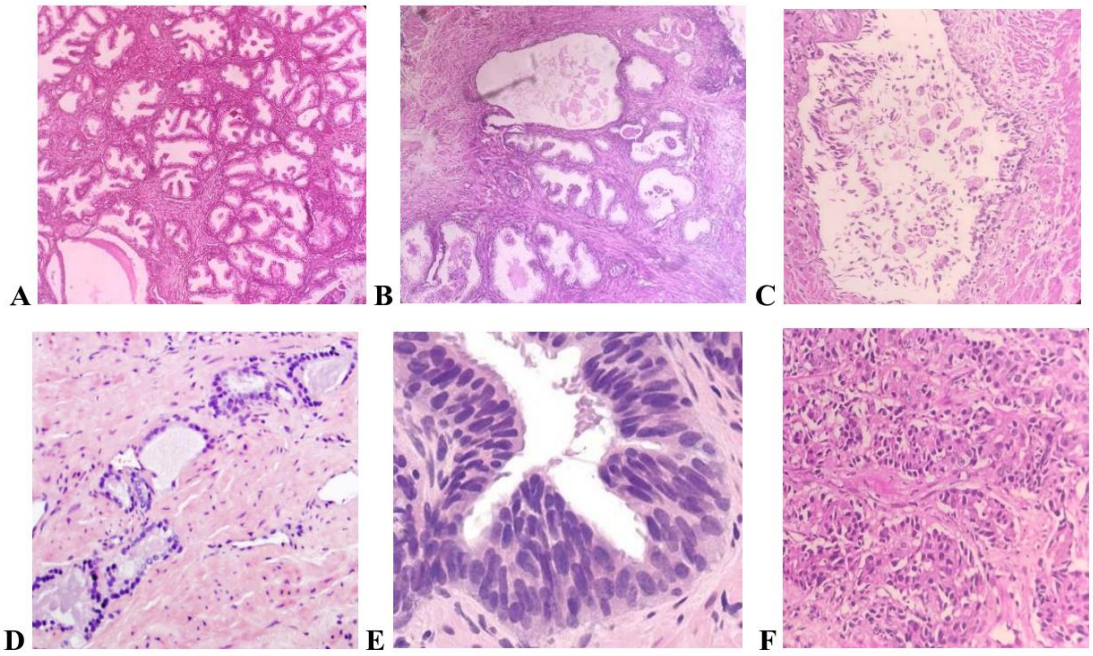

Fig. 2: Benign prostatic hyperplasia, 40x, H&E

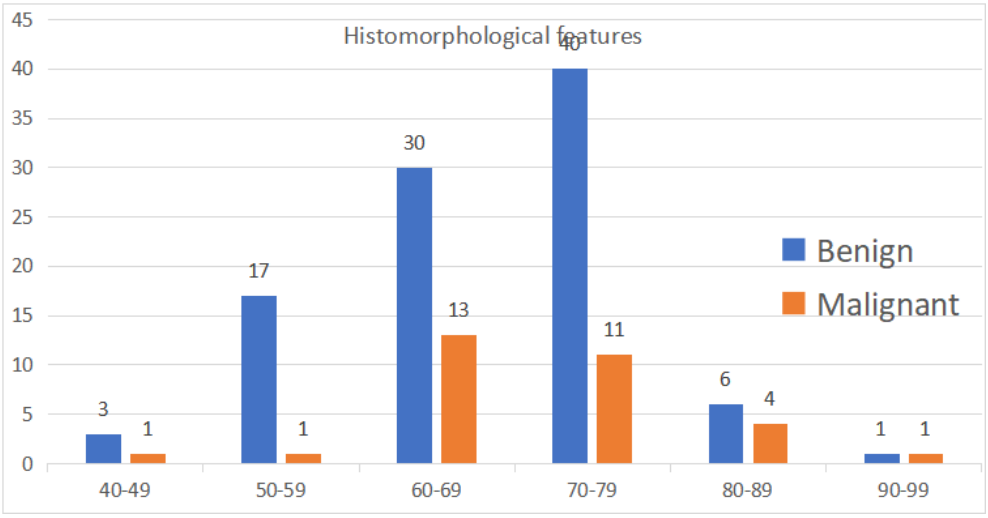

Fig. 3: Age-wise distribution of prostatic lesions

Table 1 shows the distribution of prostatic lesions in TURP specimens. The table lists the cases and percentages for each prostatic ailment type. Here are the diagnoses: 1. at 37.5%, the highest percentage is caused by BPH. 2. Prostatitis that does not have a clear cause makes up 16.4% of cases. 3. 5.4% of cases were found to have a prostate abscess. 8. 4. Stroma and glands that are not cancerous, making for 9.3% of cases. Atypical tiny acinar proliferation accounts for 7.03% of all instances described. HGPIN, or high-grade prostatic intraepithelial lesion, was found in 3.9% of cases. 7. Benign prostatic adenocarcinoma, the second most common diagnosis, accounting for 20.3% of cases. This table presents a complete review of the spectrum of prostatic lesions discovered in TURP specimens. It highlights both benign and malignant disorders that can be found in the prostate. It is essential for clinical care and prognosis evaluation of patients following TURP procedures to understand the spread of these lesions.

Table 1: Distribution of Prostatic lesions diagnosed in TURP

Diagnosis	Number	Percentage (%)
Benign prostatic hyperplasia	48	37.5
Chronic non-specific prostatitis	21	16.4
Prostatic Abscess	7	5.4
Non neoplastic glans and stroma	12	9.3
Atypical small acinar proliferation	9	7.03
High grade prostatic intraepithelial lesion (HGPIN)	5	3.9
Acinar Adenocarcinoma of prostrate	26	20.3

Table 2 shows the relationship between PSA levels and the diagnosis of prostatic lesions found in TURP specimens, which is a procedure that involves removing the prostate through the urinary tract. The table is divided by PSA range (<4, 4-10, 11-20, and >21 ng/mL) and the number of benign or malignant cases at each range. PSA levels below 4 ng/mL tend to be benign (93.8%), but those between 11-20 and over 21 ng/mL are more likely to be malignant (94.7% and 53.8%, respectively). It appears that there is a considerable association between higher PSA levels and the probability of TURP-identifying prostate cancer. All cases in the PSA range of 4-10 ng/mL were benign, suggesting a threshold below which cancer is less likely. According to the findings, clinical management decisions can be informed by PSA levels, which are useful for diagnosing and risk-stratifying prostatic lesions. Furthermore, a strong statistical correlation between PSA levels and prostatic pathology is identified by TURP, as supported by the substantial p-value.

Table 2: Correlation of PSA levels with Prostatic lesions diagnosed in TURP

PSA (n= 76)	Benign (%)	Malignant (%)	p-value
<4	15 (93.8)	1(6.3)	<0.001
≥4-10	15(100)	0 (0)	
11-20	1(5.3)	18(94.7)	
>21	12(46.2)	14(53.8)	
Total	43(56.5)	33 (37.7)	

DISCUSSION

Prostate-specific antigen is commonly utilized for screening various prostate conditions, including carcinoma of the prostate. Prostate cancer's aggressiveness is associated with the size of the tumor upon diagnosis. Research has shown a strong connection between blood PSA levels and Gleason's grading, which is a very reliable predictor of prostate cancer. An investigation was carried out to examine the connection between PSA levels in the blood & Gleason's score/Group grade in different neoplastic prostatic samples and to analyze their histological results at a specialized medical facility. PSA is a sensitive and dependable screening method for detecting both cancerous and non-cancerous prostate abnormalities at an early stage. PSA readings showed a substantial correlation with the Gleason score/grade groups of prostate cancer [12].

The primary method for identifying Prostate cancer is diagnosed by digital rectal examination and serum-PSA, or PSA, testing. However, PSA testing with high sensitivity but limited specificity is a challenge in clinical settings. An investigation was carried out to evaluate the relationship and precision of PSA readings with cancer

diagnosis, aggressiveness (Gleason score>7), as well as bone metastases. The data indicated a significant association between PSA level, tumor aggressiveness, bone metastasis, and tumor diagnosis. There was prostate cancer in 35.39% of individuals in this group. Prostate cancer was more likely to be diagnosed when the PSA level exceeded 20 ng/mL compared to benign hyperplasia of the prostate [13].

A study was carried out to assess the range of the non-neoplastic and neoplastic lesions that affect the prostate's histomorphology and to ascertain the relationship between histomorphological findings and blood levels of PSA. PSA serves as a sensitive and warning sign for prostate cancer diagnosis, according to statistical studies. Using a threshold of 4ng/ml, the sensitivity was 93.5% and the specificity was 46.2% [14].

The term "prostate" originates from the Greek word "prohistani," which translates to "to stand in front of." It is a frequently impacted organ in older individuals, necessitating prompt discovery and treatment. An analysis revealed that among 215 cases of TURP, the most prevalent prostatic lesions were benign, with the majority being BPH at a rate of 83.4%, predominantly observed in individuals aged 61-70 years. Malignant lesions were prevalent in individuals over 65 years old. TURP aids in the timely identification of premalignant and incidental prostate cancer tumors [15].

An adult guy with prostatic hyperplasia needs a comprehensive evaluation due to the second most prevalent cancer among men to be diagnosed is prostate cancer. Although the clinical characteristics of several prostatic lesions are similar, precise identification is essential due to significant differences in treatment and prognosis. Malignant growths are not as prevalent as benign ones. Within histopathological patterns, BPH was the most common kind of prostate lesion. To identify proliferative activity, premalignant lesions, and level of inflammation, analysis of each prostate biopsy (TURP & needle core) is required [16].

Prostate cancer data found incidentally indicate the significant prevalence of prostate cancer worldwide. The study conducted a 10-year retrospective study to determine how often prostate cancer was found unintentionally in patients having TURP for BPH. The study aimed to assess the importance of reviewing all TURP specimens pathologically. A study found that 11% of the participants experienced incidental cancer of the prostate, and in contrast to other Asian nations, Pakistan's prevalence of the disease has been growing recently. The rising incidence of exceptionally high Gleason scores need prompt and careful intervention. Patients' varying socioeconomic and ethnic origins add to their propensity to discontinue treatment at Pakistan's already scarce tertiary healthcare facilities. This pathological analysis of TURP cells is pertinent to those who are Asian and those who are not [17].

CONCLUSIONS

This study concluded that the comprehensive TURP examinations help diagnose and characterise prostate abnormalities. Macroscopic examination of TURP tissues shows constant gray-white to tan coloring, assisting in the first assessment. BPH, chronic nonspecific prostatitis, prostatic abscess, ASAP, PIN, and acinar adenocarcinoma are demonstrated by microscopic analysis. The distribution of prostatic lesions varies with age, aiding tailored treatments. PSA levels aid in identification and risk assessment. Understanding macroscopic, microscopic, and demographic data enhances clinical decisions for TURP patients.

Further research on histopathologic spectrum and molecular pathways is needed. Tracking premalignant lesions could refine risk assessment. Advances in imaging and biomarkers promise improved diagnosis and surveillance of prostate diseases.

CONTRIBUTION OF AUTHORS

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