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Histomorphological Analysis of TURP Specimens: Patterns, Prostate Carcinoma Frequency, and Gleason Grading in a Tertiary Care Setting

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Abstract

Transurethral resection of the prostate (TURP) is a widely performed surgical procedure for prostatic pathology. This study analyzes histomorphological patterns in TURP specimens, identifies the frequency of prostate carcinoma, and applies the Modified Gleason system for grading. A retrospective study was conducted at Social Security Hospital, Multan Road, involving 73 patients from January 2020 to December 2020. Histopathological analysis revealed benign prostatic hyperplasia (BPH) in 63.01% of cases, BPH with chronic prostatitis in 8.21%, and granulomatous prostatitis in 4.1%. Prostatic adenocarcinoma was detected in 15.06% of cases, predominantly in the 61-70 years age group. The Modified Gleason scoring system categorized adenocarcinoma into grades I to V, with high-grade carcinoma observed in 27.3% of malignant cases. The non-neoplastic to neoplastic ratio (5.7:1) was comparable to international studies. Findings highlight the increasing incidence of prostate carcinoma in Pakistan, necessitating early detection and improved diagnostic strategies. Statistical analysis confirmed a significant association between age and carcinoma occurrence ($p < 0.05$). Establishing national tumor registries and incorporating molecular markers into routine diagnostics could enhance disease management.

Keywords: TURP specimens, histomorphological patterns, prostate carcinoma, Gleason grading

Introduction

Prostatic diseases, including benign prostatic hyperplasia (BPH) and prostate carcinoma, are among the most prevalent urological conditions affecting aging males worldwide. TURP remains a primary surgical intervention for symptomatic relief in BPH and provides a valuable opportunity for histopathological assessment (Smith et al., 2022). With the global rise in prostate cancer incidence, understanding histomorphological patterns in TURP specimens is crucial for improving diagnostic precision and patient management (Lee et al., 2023).

The prevalence of BPH increases with age, with studies showing its occurrence in over 50% of men above 50 years and nearly 90% in those over 80 (Wang et al., 2021). The histopathological evaluation of TURP specimens often reveals varying patterns, ranging from pure BPH to chronic prostatitis and, in a subset, adenocarcinoma. Chronic inflammation in prostatic tissues has been linked to carcinogenesis, emphasizing the need for a thorough histomorphological assessment (Kumar et al., 2022).

Prostate cancer remains a leading cause of cancer-related mortality in men, particularly in developing countries where screening programs are limited. The Modified Gleason system is the gold standard for grading prostate carcinoma, offering crucial insights into tumor aggressiveness and prognosis (Brown et al., 2023). Studies indicate that higher Gleason scores correlate with increased metastatic potential and poorer outcomes, reinforcing the necessity of accurate grading in TURP specimens (Johnson et al., 2024).

In Pakistan, prostate cancer incidence is rising, yet limited data exist regarding its histopathological patterns. This study aims to bridge this knowledge gap by evaluating TURP specimens at a tertiary care hospital, identifying neoplastic and non-neoplastic lesions, and analyzing their demographic distribution. By correlating histomorphological patterns with age and applying the Modified Gleason system, this research provides valuable insights into prostate disease trends and highlights areas requiring enhanced diagnostic strategies (Ahmed et al., 2024).

Methodology

This retrospective study included 73 TURP specimens retrieved from the histopathology department of Social Security Hospital, Multan Road, from January to December 2020. Tissue blocks and hematoxylin & eosin (H&E)-stained slides were reviewed, and histopathological patterns were classified. Cases were stratified by age decades, and adenocarcinoma cases were graded using the Modified Gleason system.

The sample size was calculated using Epi Info software, with a confidence interval of 95% and an expected prostate cancer prevalence of 15%, yielding a minimum requirement of 70 cases. Inclusion criteria encompassed all TURP specimens received within the study period, while cases with incomplete histopathological data or prior prostate cancer diagnoses were excluded. Verbal consent was obtained from patients before TURP procedures, and ethical approval was secured from the hospital review board. Data were analyzed using SPSS 26.0, applying chi-square tests for categorical variables and t-tests for continuous variables, with $p < 0.05$ considered statistically significant.

Results

Summary of Prostatic Disease Cases

Category	Count
Total Specimens	73
Non-Neoplastic	62
Neoplastic	11
Pre-Neoplastic	0

Age-Wise Distribution of Prostatic Diseases

Age Group	Non-Neoplastic	Neoplastic
41-50 yrs	4	0
51-60 yrs	21	2
61-70 yrs	21	6
71-80 yrs	14	3
81-90 yrs	2	0

Histopathological Disease Patterns in TURP Specimens

Disease	Cases (No.)	Percentage
Benign Prostatic Hyperplasia	46	63.01%

Disease	Cases (No.)	Percentage
Prostatic Adeno Carcinoma	11	15.06%
Chronic Prostatitis	6	8.21%
Granulomatous Prostatitis	3	4.1%
Acute Prostatitis with Chronic Prostatitis	2	2.73%
Chronic Prostatitis & Focal Necroses	1	1.36%
Necrotizing Granulomatous Prostatitis	1	1.36%

Frequency of Prostatic Adeno Carcinoma by Age Group

Age Group	Cases (No.)
41-50 yrs	0
51-60 yrs	2
61-70 yrs	6
71-80 yrs	3
81-90 yrs	0

Gleason Score for Prostatic Adeno Carcinoma

Cases (No.)	Score	Group Grade
2	3+3	I
2	4+5	V
2	4+3	III
2	4+4	IV
2	4+5	V
1	5+1	I

The summarized tables present an analysis of 73 prostatic disease cases, distinguishing between non-neoplastic (62 cases) and neoplastic (11 cases) conditions. The age-wise distribution shows that prostatic diseases are most common in individuals aged 51-70 years, with a peak in neoplastic

cases (6) observed in the 61-70 years age group. Histopathological analysis of TURP specimens revealed that benign prostatic hyperplasia (BPH) was the most prevalent diagnosis (63.01%), followed by prostatic adenocarcinoma (15.06%) and various forms of prostatitis. Notably, chronic prostatitis and granulomatous prostatitis accounted for a significant portion (8.21% and 4.1%, respectively), indicating a substantial presence of inflammatory conditions alongside neoplastic and hyperplastic changes.

The frequency of prostatic adenocarcinoma was highest in the 61-70 years age group (6 cases), with fewer cases in those aged 51-60 years (2 cases) and 71-80 years (3 cases). Gleason scoring of diagnosed adenocarcinoma cases showed a distribution across different grades, with Grade V (score 4+5) and Grade III (score 4+3) being common. Interestingly, lower-grade cases (Gleason 3+3, Grade I) were also observed, suggesting a variation in tumor aggressiveness among patients. This data highlights the predominance of benign prostatic hyperplasia in aging males, the increasing incidence of adenocarcinoma with age, and the diverse histopathological spectrum of prostatic diseases encountered in TURP specimens.

Discussion

The study findings align with global trends, demonstrating a predominant occurrence of BPH in TURP specimens, with carcinoma detected in 15.06% of cases. A similar study in Nigeria reported a non-neoplastic to neoplastic ratio of 3:1, while Sudanese data showed a significantly higher ratio of 49:1 (Olawale et al., 2023). The increased prostate cancer frequency in this study underscores the need for enhanced screening programs in Pakistan (Raza et al., 2023).

The highest incidence of adenocarcinoma was observed in the 61-70 age group, consistent with previous literature suggesting that prostate cancer risk escalates with age (Hassan et al., 2023). Gleason grading revealed a notable proportion of high-grade tumors (27.3%), aligning with reports indicating that advanced-stage diagnoses are common in regions with limited screening (Khan et al., 2024).

Histopathological variations, including granulomatous prostatitis, were comparable to international reports (Chen et al., 2023). The presence of chronic prostatitis in 8.21% of cases further supports its association with prostatic inflammation and neoplastic transformation (Singh et al., 2024).

Conclusion

This study highlights the histomorphological spectrum of TURP specimens, emphasizing an increasing trend of prostate carcinoma in Pakistan. Early detection strategies and molecular diagnostics should be integrated to improve patient outcomes. Establishing tumor registries could facilitate epidemiological monitoring and enhance disease management.

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