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Pathology

SPECTRUM OF HISTOPATHOLOGICAL STUDY IN URINARY BLADDER BIOPSIES – A PROSPECTIVE STUDY

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ABSTRACT **Background:** The urinary bladder is commonly affected by both non-neoplastic and neoplastic lesions, with bladder tumors ranking as the 10th most common malignancy worldwide. Hematuria and increased urinary frequency are frequent presenting symptoms. **Aim:** To study the frequency and histopathological spectrum of bladder lesions. **Materials And Methods:** A prospective study was conducted from November 2022 to October 2023 at KLE's Dr. Prabhakar Kore Hospital, Belagavi. A total of 45 bladder biopsies (22 TURBT and 23 cystoscopic) were analyzed. **Results: Out o**f the 45 cases, 15 (33.3%) were non-neoplastic and 30 (66.7%) were neoplastic. Most patients were males (71.1%) aged 30–70 years. Chronic cystitis was the most common non-neoplastic lesion. Invasive papillary urothelial carcinoma was the most frequent tumor (40%). High-grade variants were more common (53.3%), with 75% showing muscle invasion. **Conclusion:** Neoplastic lesions, especially high-grade invasive papillary urothelial carcinomas, are the most frequent. Grading, staging, and muscle invasion are crucial prognostic indicators.

KEYWORDS : Urinary bladder, Histopathology, Urothelial carcinoma, Cystitis

INTRODUCTION

Urinary bladder lesions including both non-neoplastic and neoplastic types, are common in the general population and can often lead to significant morbidity[1-2]. Hematuria is the most frequent clinical manifestation of bladder lesions and can occur in both benign and malignant conditions. Cystitis represents a frequent non-neoplastic lesion of the bladder, while urothelial carcinoma is the most prevalent malignant tumor. The occurrence of bladder tumors is notably higher in males compared to females and is more commonly observed in urban populations than in rural ones[3-4]. Urinary bladder cancer is a complex and varied illness, characterized by a wide range of histological patterns and the potential for aggressive, life-threatening progression[5]. Cystoscopy serves as the primary diagnostic method, playing a key role in identifying bladder tumors and obtaining biopsies from suspicious lesions[6-7]. Urinary bladder cancer ranks as the ninth most commonly occurring cancer[6,8]. Despite advancements in non-invasive imaging and ongoing research into potential biomarkers or surrogate endpoints for bladder tumors, physical examination, cystoscopic assessment, and histopathological evaluation of biopsy specimens remain the cornerstone of current bladder cancer diagnosis and management[9].

This study aims to provide an in-depth analysis of the histopathological patterns observed in urinary bladder biopsies, encompassing both benign and malignant lesions. Understanding the spectrum of these lesions aids in better clinical management and prognosis of patients.

MATERIALS & METHODS:

This present study was a prospective observational study conducted in the Histopathology Laboratory of KLE's Dr. Prabhakar Kore Hospital & Medical Research Centre, KAHER, Belagavi, Karnataka, over a period of one year from November 2022 to October 2023. A total of 45 urinary bladder biopsy specimens were included, consisting 22 Transurethral Resection of Bladder Tumor (TURBT) and 23 cystoscopic bladder biopsies specimens. All cystoscopic and TURBT bladder biopsy specimens received during the study period were included, while inadequate or inconclusive samples were excluded. The specimens were fixed in 10% neutral buffered formalin, routinely processed, and stained with hematoxylin and eosin. Each case underwent thorough microscopic examination and was categorized into neoplastic or non-neoplastic lesions. Neoplastic lesions were further graded using the WHO/ISUP classification for urothelial tumors. Special attention was given to identifying the presence or absence of muscle invasion in tumor specimens, which plays a vital role in staging and prognostication. Data were compiled and analyzed systematically.

RESULTS:

A total of 45 cases were included in the study which consisted of 22 TURBT and 23 cystoscopic bladder biopsies. Non-neoplastic lesions predominated in the age group of 60–69years(26.7%) and neoplastic lesions were most frequent in the age group of 70–79years (33.3%), while (Table 1). In the present study, neoplastic lesions were more common in males (78.1%) while non-neoplastic lesions were predominantly seen in females (61.5%), indicating a sex-wise variation in bladder lesion distribution(Table 2).

Table No.1: Age Wise Distribution Of Cases

Age in Years	Non-Neoplastic lesions		Neoplastic lesions	
	No. of Cases	%	No. of Cases	%
20-29	2	13.3%	1	3.3%
30-39	2	13.3%	2	6.7%
40-49	3	20%	3	10%
50-59	1	6.7%	4	13.3%
60-69	4	26.7%	8	26.7%
70-79	2	13.3%	10	33.3%
80-89	1	6.7%	2	6.7%

Table No.2: Sex wise Distribution of Cases

Sex	Non-Neoplastic lesions		Neoplastic lesions	
	No. Of Cases	%	No. of Cases	%
Male	7	21.9%	25	78.1%
Female	8	61.5%	5	38.5%

Table No.3: Distribution Of Non-neoplastic Lesions

Diagnosis	No.of Cases	%
Acute Cystitis	2	13.4%
Acute on Chronic Cystitis	3	20%
Chronic Cystitis	7	46.8%
Intersitial Cystitis	1	6.6%
Granulomatous Cystitis	1	6.6%
Eosinophilic Cystitis	1	6.6%
Total	15	100%

The spectrum of pathologic lesions revealed, chronic cystitis(46.8%) being most among non neoplastic lesions, followed by acute on chronic cystitis (20%) and acute cystitis (13.4%). Interstitial, granulomatous, and eosinophilic cystitis each accounted for 6.6% of cases(Table 3). Out of 30 neoplastic bladder lesions were analyzed. Invasive high grade papillary urothelial carcinoma (HGPUC)(43.4%) was most common , followed by low-grade papillary urothelial carcinoma (LGPUC, 33.4%). Other lesions included non invasive HGPUC(10%), benign polyp, inverted papilloma, poorly differentiated carcinoma, and recurrence—each accounting for 3.3% of cases(Table 4).

Table No.4: Distribution Of Neoplastic Lesions

Diagnosis	No.of Cases	%
Benign Polyp	1	3.3%

Inverted Papilloma	1	3.3%
LGPUC	10	33.4%
HGPUC-Non Invasive	3	10%
HGPUC-Invasive	13	43.4%
Poorly differentiated	1	3.3%
Recurrence	1	3.3%
Total	30	100%

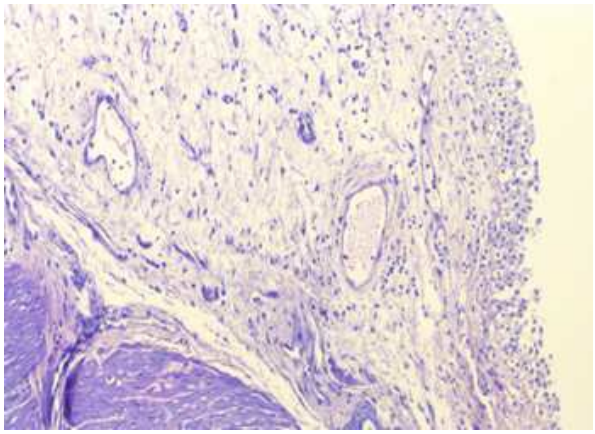

Figure 1: Chronic cystitis: Showing reactive urothelium, lamina propria is edematous with chronic inflammatory infiltrates- (H&E; 10X)

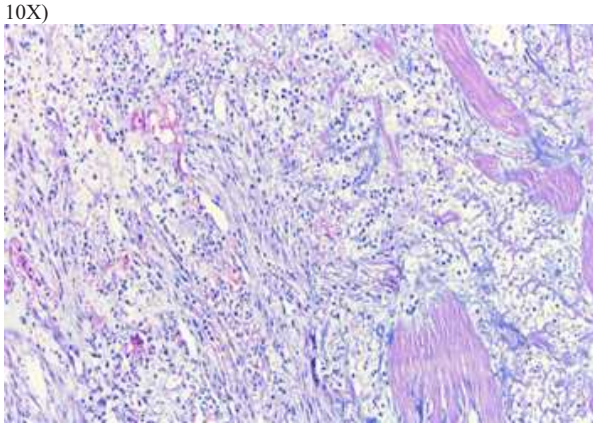

Figure 2: Acute on chronic cystitis: Showing lamina propria is edematous with mixed inflammatory infiltrates mainly of neutrophils, lymphocytes and eosinophils- (H&E; 20X)

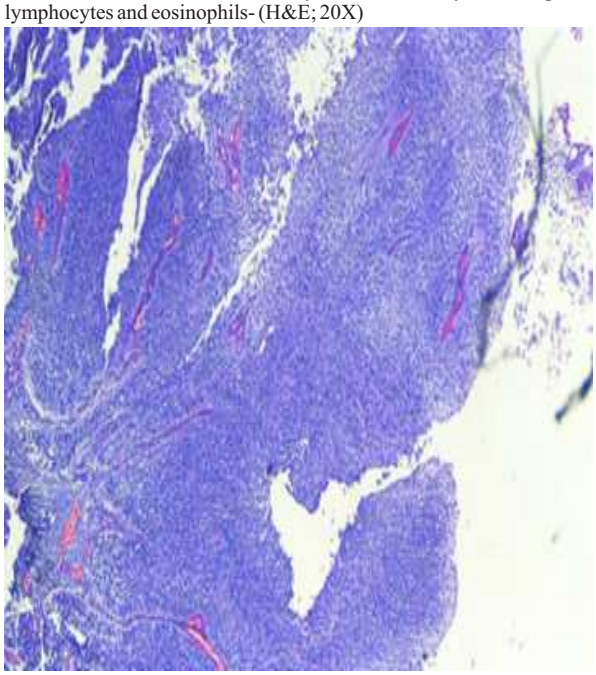

Figure 3: LGPUC: Showing slender papillary fronds with frequent branching and minimal fusion (H&E; 4X)

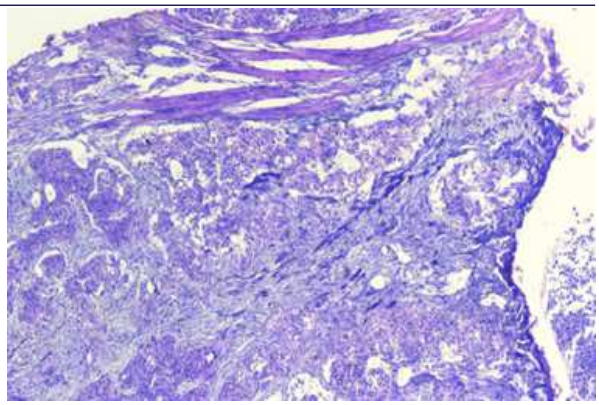

Figure 4: Invasive HGPUC: Showing muscularis propria invasion of tumor cells (H&E; 4X)

DISCUSSION

In the present study, 45 urinary bladder biopsies were examined with a mean patient age of 50 years and a male predominance. Non-neoplastic lesions accounted for 33.4% and neoplastic lesions for 66.6% of cases. Chronic cystitis was the most common non-neoplastic lesion, whereas high-grade papillary urothelial carcinoma (HGPUC-invasive) was the most frequent neoplastic lesion. Compared to other studies, this study had the youngest mean age among patients.

Anita Shah et al. studied 36 cases with a mean age of 52.7 years and a male predominance. Their findings revealed 30.5% non-neoplastic and 69.5% neoplastic lesions, closely aligning with the present study. The slight variation in percentages may be due to the smaller sample size, but overall trends are similar.

Shruthi H P et al. analyzed 76 cases with a higher mean age of 61 years and also a male predominance. Their study reported 31.5% non-neoplastic and 61.5% neoplastic lesions, again comparable to the present findings. The higher mean age suggests a possible shift in lesion prevalence with advancing age.

Priyamvadha Singhal et al. conducted a much larger study with 252 cases and a mean age of 60 years. They reported a higher incidence of neoplastic lesions (79%) and a lower proportion of non-neoplastic lesions (21%), differing from the present study. The large sample size and institutional referral patterns may have contributed to this variation.

Shrestha et al. studied 145 cases, with a mean age of 62 years and male predominance. They found 32% non-neoplastic and 68% neoplastic lesions, findings that closely match those of the present study. Their data further supports the observed trend of neoplastic lesions being more common in urinary bladder biopsies.

CONCLUSION

This study demonstrates that neoplastic lesions are more common than non-neoplastic ones in urinary bladder biopsies, with invasive high-grade papillary urothelial carcinoma being the most prevalent malignancy. A significant number of high-grade tumors showed muscle invasion, underlining their aggressive nature and the need for timely diagnosis. Histopathology remains the gold standard for definitive diagnosis, grading, and staging of bladder lesions. The presence or absence of muscle invasion serves as a key prognostic factor and guides treatment planning. Early detection through cystoscopy and biopsy, followed by prompt histopathological evaluation, can significantly improve patient outcomes. This study reinforces the importance of thorough pathological assessment in all suspected bladder lesions for better prognosis and survival rates.

LIMITATIONS

This study had several limitations. The sample size was relatively small, with only 45 cases, which may not fully represent the broader population. Being a single-center study, the findings may not be generalizable to other regions. Additionally, the lack of clinical follow-up data limited the ability to correlate histopathological findings with patient outcomes. Ancillary diagnostic techniques such as immunohistochemistry and molecular studies were not utilized, which could have provided further diagnostic and prognostic information.

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