



St. Paul Hospital Millennium Medical College
Graduate Study Program

Relation of cystoscopy findings and pathologic characteristics of
bladder Tumors

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Addis Ababa, Ethiopia

August, 2024 G.C



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**Relation of cystoscopy findings and pathologic characteristics of
bladder Tumors at St. Paul hospital Millennium Medical college,
from 2020 to 2024, cross sectional study**

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**A Research Proposal submitted to the Department of Pathology; Presented in Partial
fulfillment of the Requirements for the Postgraduate Diploma in Anatomic Pathology; St.
Paul Hospital Millennium Medical College**

Addis Ababa, Ethiopia

August, 2024 G.C

Academic Research Proposal

Submission

Name of investigator	Dr. Bethel Teferi
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Abstract

Introduction: Urinary bladder lesions, non-neoplastic and neoplastic, are collectively responsible for significant morbidity and mortality throughout the world. Cystoscopy is the primary diagnostic tool for patients who are suspected of having bladder tumors and an accurate diagnosis of urinary bladder lesions requires simultaneous data from urology, radiology and surgical pathology labs. Currently, there is a gap in understanding how specific cystoscopy features relate with histopathological findings.

Objective: To determine the association between cystoscopy findings and pathologic characteristic of bladder lesions, at St. Paul Hospital Millennium Medical College from August 2020 - August 2024 G.C.

Methods: Cross sectional study was conducted and all cystoscopy biopsy samples from August 2020 to August 2024 G.C was included. Data was collected from the anatomic pathology record file and cystoscopy reports by using structured, self-prepared check list. Data was entered and analysed using SPSS version 27.

Minimum sample size was calculated to be 384. All samples fulfilling the eligibility criteria was included. Descriptive analysis was used for sociodemographic data, cystoscopic findings and histologic spectrum; association direction and magnitude of association was calculated using logistic regression analysis version 27.

Result – In this study Invasive high grade urothelial carcinoma (IHGUC) was the commonest diagnosis made on biopsy accounting for 37% of bladder tumors. 77% of cases where invasive tumors and 58.5% were low grade tumors.

A significant association was found between cystoscopic findings, such as solid configuration, right wall, posterior wall, and anterior wall location, and tumor invasion into the lamina propria. Additionally, solid configuration, left lateral wall location, and

the largest lesion size were significantly associated with muscle invasion. Furthermore, solid and papillary configurations, right wall location, and lesion size showed a significant relationship with tumor grade.

Conclusion - This study showed IHGUC to be the commonest diagnosis in cystoscopic biopsies of bladder tumors followed by ILGUC, among the noninvasive tumors NIPCLG was the commonest.

Furthermore, this study highlighted a statistically significant relationship between cystoscopic findings and histopathologic characteristics, revealing a strong association between the lesion's configuration, location, and size with both the tumor's invasiveness and its grade.

Key words – Cystoscopy, biopsy, bladder tumor, association

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III. Acronyms and abbreviations

BC – Bladder cancer

CER – Central Ethiopia Region

IHGUC – Invasive high grade urothelial carcinoma

ILGUC - Invasive low grade urothelial carcinoma

LUTS – Lower uterine tract symptoms

MiBc – Muscle invasive bladder carcinoma

NIPUCLG – Noninvasive papillary urothelial carcinoma, low grade

NIPUCHG -- Noninvasive papillary urothelial carcinoma, high grade

PUCHG – papillary urothelial carcinoma, high grade

PUNLMP – Papillary urothelial neoplasm of low malignant potential

SCC – Squamous cell carcinoma

SNNPR – Southern nations nationalities peoples of Ethioia

SWEPR – South western Ethiopia peoples region

SPHMMC – St. Paul Hospital Millennium Medical collage

UCC – Urothelial cell carcinoma

UTI – Urinary tract infection

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1. Introduction

1.1 Background

Urinary bladder lesions, non-neoplastic and neoplastic, are collectively responsible for significant morbidity and mortality throughout the world.(1)

Bladder cancer is one of the top ten most common type of cancer globally, accounting for approximately 3.0% of all new cancer diagnoses and 2.1% of all cancer-related deaths annually. Currently, the greatest impact of bladder cancer is observed in the most developed communities worldwide. However, as global demographics change with aging populations, especially in Africa, and as exposure to different risk factors evolves globally, this distribution is expected to shift in the coming decades.(2)

An accurate diagnosis of urinary bladder lesions requires simultaneous data from urology, radiology and surgical pathology labs. Cystoscopy is the primary diagnostic tool for patients who are suspected of having bladder tumors, which allows a direct visualization of the bladder mucosa and biopsies of the suspected lesions.(3)

Cystourethroscopy is a common procedure performed by urologic surgeons, offering a direct view of the urethra, urethral sphincter, prostate, bladder, and ureteral openings. The procedure can be done with either flexible or rigid cystoscopes, and a variety of instruments can be used depending on the specific requirements of the case. (4).

Indications include: Hematuria, gross or microscopic, Surveillance/evaluation of malignancy (bladder, urethra, upper tract UCC, abnormal cytology), Lower urinary tract symptoms (LUTS), the irritative voiding symptoms, obstructive voiding symptoms, urinary incontinence, chronic pelvic pain syndrome, recurrent UTIs,

Trauma, abnormal imaging of bladder, concern for fistula, removal of foreign body.
(4)

1.2 Statement of the problem

Bladder cancer is a prevalent and potentially life-threatening condition, and its early detection and accurate diagnosis are crucial for effective management and treatment. Cystoscopy is a key diagnostic tool for visualizing bladder lesions, yet the relationship between the cystoscopic features observed during the procedure and the underlying pathological characteristics of these lesions remains underexplored.

Currently, there is a gap in understanding how specific cystoscopy features—such as lesion size, shape, color, and the presence of certain patterns—associate with histopathological findings, including tumor grade, stage, and invasiveness. This lack of correlation knowledge can impact the accuracy of diagnosis, risk stratification, and treatment planning.

1.3 Justification of the study

Conducting this study will allow for a precise association between specific cystoscopic features and their pathological characteristics, improving diagnostic accuracy and enabling the identification of high-risk lesions for timely treatment.

It can also offer evidence to either support or question current clinical practices for interpreting cystoscopy, potentially leading to the creation of standardized protocols for correlating cystoscopy findings with pathology.

2. Literature review

Currently there has been an increasing risk of bladder lesions worldwide, both neoplastic and nonneoplastic. Bladder tumors have different subtypes and behavioral patterns. This challenges both urologists and uropathologists for diagnosis and treatment.(3, 5).

According to study done in Nepal total of 56 cystoscopic biopsies were evaluated among them 80.36% were male and 19.64% were females. Peak age group was 70-79 years. 83.92% were neoplastic, 14.28% nonneoplastic and 1.78% had normal histology. Among the nonneoplastic lesions chronic cystitis were common and among the neoplastic lesions papillary urothelial carcinoma accounted for 95.74%.(5)

Another study done in India on 53 cystoscopic biopsies, 3 of them were non diagnostic among the rest 50 cases which were studied, 33 patients (66%) were males and 17 (34%) were females; nonneoplastic and neoplastic lesions accounted for 50% each. Out of the 25 non-neoplastic lesions, 21 cases (84%) were classified as inflammatory lesions, 2 cases (8%) were categorized as tumor-like lesions, and 2 cases (8%) were identified as epithelial abnormalities. Among the 21 inflammatory lesions, 15 cases (71.4%) were chronic non-specific cystitis (polypoid type), 3 cases (14.3%) were tubercular cystitis, and 1 case each (4.8%) was eosinophilic cystitis, hemorrhagic cystitis, and follicular cystitis. Amongst the 25 neoplastic lesions, 24 cases (96%) were urothelial neoplasms; 20 males and 4 females; and 1 (04%) was squamous cell carcinoma. Of the 24 cases of urothelial neoplasms, 3 cases (12.5%) were invasive urothelial neoplasms and 21 cases (87.5%) were noninvasive urothelial neoplasms. Amongst the 3 cases of invasive urothelial carcinomas, 2 were of the

typical invasive urothelial carcinomas and 1 case was of an infiltrating urothelial carcinoma with a squamous differentiation.

In another study done in India, out of 21 cases of noninvasive urothelial carcinomas, low grade noninvasive papillary urothelial carcinoma (PUCLG) constituted 15 cases (71.42%), high grade papillary urothelial carcinoma (PUCHG) constituted 05 cases (23.80%) and papillary urothelial neoplasm with a low malignant potential (PUNLMP) constituted 01 case (4.76%).

Lateral wall was the most common area of the bladder (64%) which was affected and the least common sites which were affected were dome (4%) and ureteric orifice (4%). The neoplastic cases cystoscopically, 21 cases showed a papillary exophytic growth and 3 cases showed solid lesions. All the 3 cases which showed solid lesions were found to be invasive neoplasms microscopically.(3)

A prospective study conducted at the Department of Urology at Zealand University Hospital showed sensitivity of cystoscopy to be 81%, specificity 73%.(6)

Non-muscle-invasive bladder cancer usually presents as one or more papillary growths. During a cystoscopy, these appear as frond-like tumors with numerous small, blood-rich projections that are prone to bleeding(7). In a study which included 165 patients with bladder cancer Logistic regression analysis revealed that the size, stalk and configuration of the cancer were independent and significant factors that predict muscle invasion of bladder cancer(8).

A Research undertaken in China involving 275 patients who underwent preoperative cystoscopy revealed several significant findings. Univariate analysis showed that factors associated with bladder cancer (BC) included a primary diagnosis of bladder tumor, gross hematuria, tumor location near the right ureteral orifice, in the left lateral wall, or in the bladder neck, as well as a clear tumor boundary, cauliflower-like lesions, and various vessel patterns under narrow band imaging: rich vessels in the lesion area, thick branching vessels, dotted vessels, circumferential vessels, and rich vessels in the basal area. Factors associated with benign bladder lesions included a postoperative diagnosis, wide-base tumors, patchy lesions, flat bulges, mossy lesions,

fine branching vessels, reticulated vessels, disorganized vessels, and fine branching vessels under NBI. Multivariate logistic regression analysis identified gross hematuria, cauliflower-like lesions, dotted vessels, and circumferential vessels in the lesion area under NBI as independent risk factors for BC(9).

Another study found that univariate analysis identified several factors correlated with postoperative high-grade bladder cancer (BC), including age, tumor diameter, number of tumors, tumor location, pedicled status, and morphology. Multivariate analysis further indicated that high-grade BC was significantly associated with a larger tumor diameter, multiple tumor sites, non-pedicled tumors, seaweed-like morphology, mucous morphology, and biopsy-confirmed high-grade tumors(10).

In Ethiopia study conducted at Black Lion Hospital on recurrent bladder tumors, which involved 170 patients, found that a majority of the recurrent tumors—55 (76.4%)—were large, and 62 (86.1%) were multiple at their initial presentation(11).

Study carried out in St. Paul Millennium medical collage on 82 cases found out that there 19% of bladder lesions to be nonneoplastic and 81% neoplastic. There was an agreement between cystoscopy evaluation and histopathology with sensitivity and specificity of 50% and 100% respectively for benign lesions and 80% sensitivity and 81% specificity for malignant lesions. (12)

3. Objective

3.1 General objective

To determine the relationship between cystoscopy findings and pathologic characteristic of bladder lesions, at St. Paul Hospital Millennium Medical College from August 2020 - August 2024 G.C.

3.2 Specific objective

- ✓ To describe the frequency of bladder lesions and their corresponding pathologic characteristics
- ✓ To assess association of specific cystoscopic findings with histopathological diagnosis determining which cystoscopic features

4. Materials and Methods

4.1 Study Setting:

The study was conducted at St Paul Hospital Millennium Medical College (SPHMMC) located in Addis Ababa, Ethiopia. SPHMMC is a tertiary and teaching hospital established in 2007 after a medical college was opened in a hospital built in 1968.

According to the database of the pathology department, the pathology service at SPHMMC provides more than 7,000 patients biopsy services annually since its establishment as medical specialty in the college in 2014.

4.2 Study Period:

This study was conducted from June 2024 to January 2025.

4.3 Study Design:

The study design of this study is cross sectional study and data was collected retrospectively from all patients who underwent cystoscopic evaluation with subsequent biopsies from August 2020 to August 2024.

4.4 Study Population:

The source population will be all patients who underwent cystoscopic biopsy at SPHMMC. The study population will be patients who had undergone cystoscopic biopsy and whose samples are sent to SPHMMC, Anatomic Pathology department during the data collection period that fulfil the eligibility criteria.

4.5 Sample Size:

The sample size was calculated using single population proportion formula. The value of P was taken as 50 percent since the proportion of patients in the study population fulfilling the eligibility criteria is not known. Desired confidence level of 95% and margin of error of 5% was used. A sample size of 384 patients was obtained.

$$n = \frac{Z_{\alpha/2}^2 p(1-p)}{d^2}$$

Where; $Z_{\alpha/2}$ = critical value of standard normal deviation at 95% confidence interval (1.96).

d= precision (the marginal error) 5%.

P= Proportion of patients in the study population fulfilling the eligibility criteria (taken as 50%).

4.6 Sampling Procedures:

All cases that have fulfilled inclusion criteria were included in this study.

4.6.1 Inclusion criteria

- Patients of all ages, who underwent cystoscopic biopsies within the data collection period where the biopsy samples were sent to Anatomic pathology at SPHMMC during the study period will be included.

4.6.2 Exclusion criteria

- Cases with unavailable or incomplete cystoscopic and pathologic reports.
- Cystoscopic biopsies that were signed out as Suboptimal/ See description.
- Cases with non-tumoral biopsy results.
- Cystoscopic biopsies that were signed out as secondary and non-epithelial bladder tumors
- Cases with inconclusive biopsy results.

4.7 Measurement

Study Variables:

Dependent variable

- ✓ Pathologic characteristics i.e histopathologic diagnosis, tumor grade, Invasion to the lamina propria

Independent variable

- ✓ Cystoscopic features i.e lesion size, configuration, location, number

4.8 Data Collection and Procedures:

Data was collected from anatomic pathology record file, Histopathology request forms and cystoscopy reports using structured, self-prepared check list designed to include the variables.

4.9 Operational Definitions:

- Bladder tumors – Primary epithelial tumors of the bladder
- Cystoscopic Features: Macroscopic appearances observed during cystoscopy, such as size, shape, number of lesion, location and vascular patterns.
- Pathologic characteristic – factors that determine behavior of tumor like pathologic stage and grade.
- Association: The relationship between cystoscopic features and their corresponding histopathologic findings as well as the ability of specific cystoscopic features to precisely predict corresponding histopathologic findings.

4.10 Data Quality Control and Management:

Data was collected by the trained data collectors. The data collectors were trained about the contents and to collect the data in an accurate manner. Immediately after

administration of the checklist, each paper was checked for completeness by the principal investigator. A pre-test was conducted on randomly selected cases with cystoscopic biopsy on 10% of the sample size. Further modifications and clarifications of the checklist was done after the pre-test.

4.11 Data Analysis

After data was collected, data will be coded, entered to statistical package for the social sciences version 27. Descriptive statistical tests were used to describe the findings using gross numbers, percentages and means. The results of the study are expressed in tables, graphs/charts and narratives.

Association analysis: Pearson test was employed to check for intercorrelation between independent variables and Bivariate Regression Analysis was used to analyse the presence of association between independent and dependent variable with P-value <0.05 used as significant and multivariate Regression Analysis the strength and direction of associations between cystoscopic features and histopathologic spectrum. A p-value <0.05 considered as significant.

4.12 Ethical Consideration:

Before conducting the research, permission was obtained from SPHMMC research office and research ethics committee. To ensure confidentiality, the name of clients was not recorded on the data collection format. Permission to collect data was obtained from the department of Pathology and department of Urology surgery at SPHMMC.

4.12 Dissemination of Results:

At the end of the research the findings will first be presented at relevant conferences in the field of Pathology and Urology surgery. In addition, the study will be distributed to the health care providers, administrators, policy makers directly affected by the results by publishing the results in a reputable journal.

5.Result

5.1. Sociodemographic data

A total of 451 bladder cystoscopic biopsies were received at SPHMMC Department of Pathology from August 2020 to August 2024, of which 263 cases did not fulfil the eligibility criteria and were excluded from the study. Out of the remaining 188 cases were 45(23.9%) females and 143 (76.1%) were males. The youngest age was 23, oldest was 81 with mean age $\pm$ standard deviation of 58.29 ± 11.751 (*Figure 1*).

Among the 188 case 72(38%) were from Oromia, 49% (26.1%) were from A.A, and 17(17.2%) were from Amhara (*Figure 2*)

Fig.1 – Socio demographic characteristics of patients who underwent cystoscopic biopsies at SPHMMC from August 2020 to August 2024; Age and Sex distribution

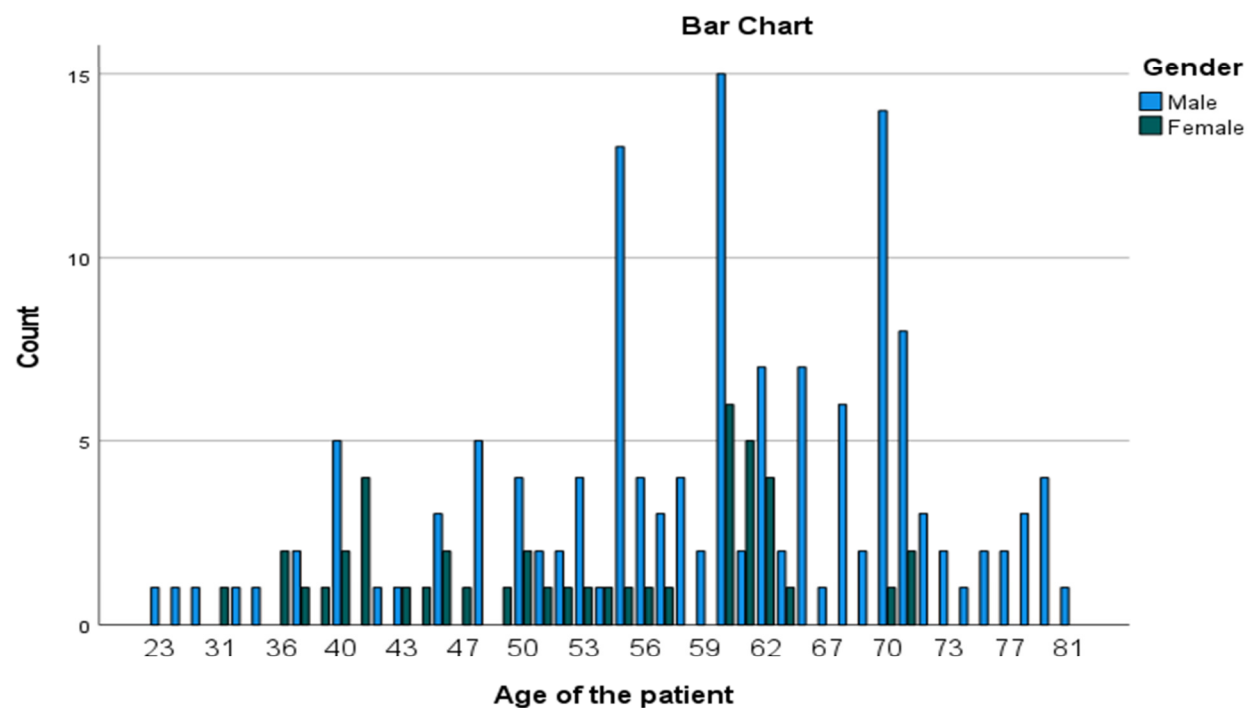


Fig.2 – Socio demographic characteristics of patients who underwent cystoscopic biopsies at SPHMMC from August 2020 to August 2024; Address distribution

Histopathologic characteristics

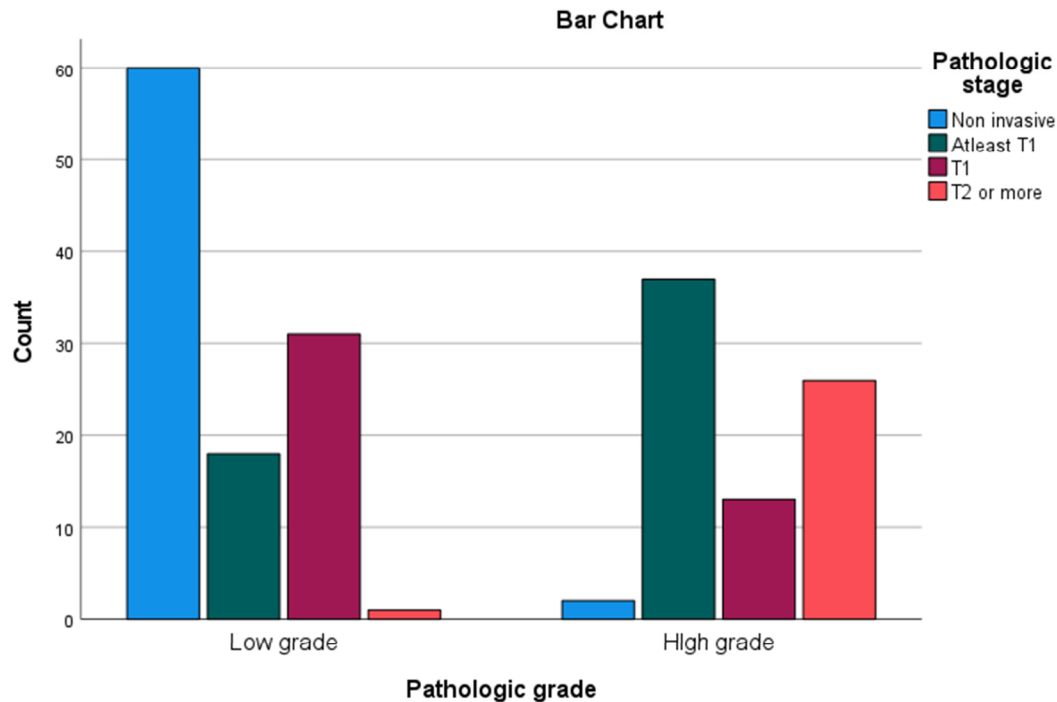
Among the 188 cases Invasive high grade urothelial carcinoma (IHGUC) was the commonest diagnosis made on biopsy accounting for 71 (37%) followed by Invasive low grade urothelial carcinoma (ILGUC) accounting for 50 (26.6%) (*Table 1*).

Table 1 – Histopathologic diagnosis of bladder tumors

Histopathologic diagnosis	n (%)
Invasive high grade urothelial carcinoma	71 (37)
Invasive low grade urothelial carcinoma	50 (26.6)
Noninvasive papillary urothelial carcinoma, low grade	43 (22.6)
Papillary urothelial neoplasm of undetermined significance	16 (8.5)
Noninvasive papillary urothelial carcinoma, high grade	3(1.6)
Adenocarcinoma	3 (1.6)
Papilloma	1 (0.5)
Squamous cell carcinoma	1 (0.5)

Among all cases 110 (58.5%) were low grade tumors while the rest 78(41.5%) were high grade tumors. Of the 188 cases 62(33%) were noninvasive, 126(67%) had invasion at least to the lamina propria. Of the 126 Invasive cases 26(21.4%) had an invasion into the muscle proper. (*Figure 3*)

Fig 3 – Pathologic stage and grade of lesions

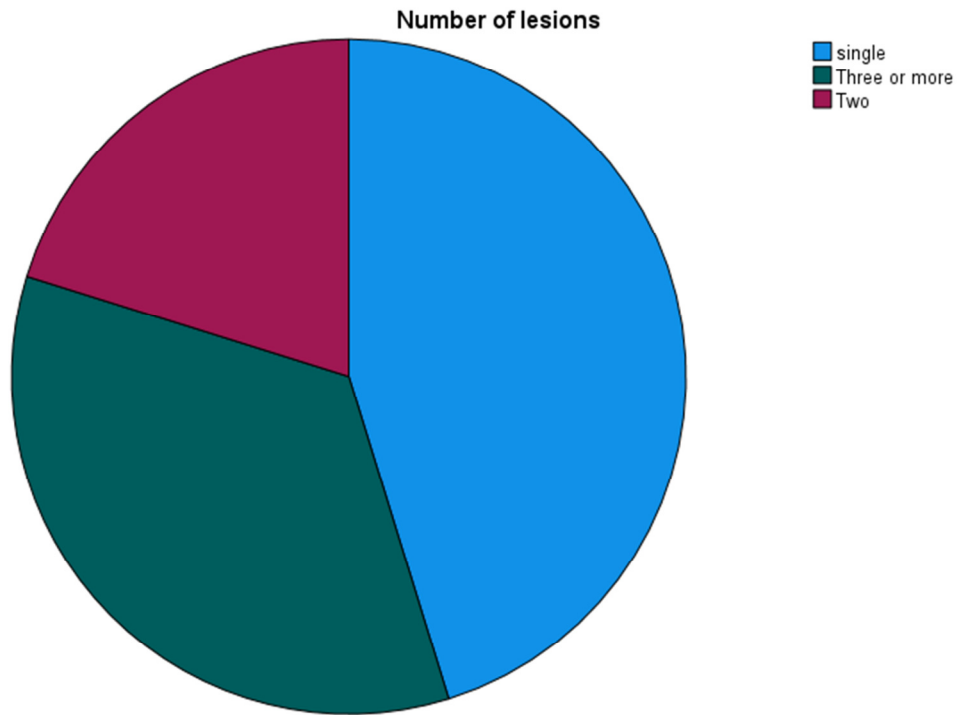


5.3. Cystoscopic Findings

Of the studied 188 cases 148(78) of them had lesion with component of papillary configuration and 55 (29%) had a component of solid configuration on cystoscopic evaluation. 15 caseses had both papillary and solid configuration on the cystoscopy and 3 cases had flat component in addition to the solid and papillary component.

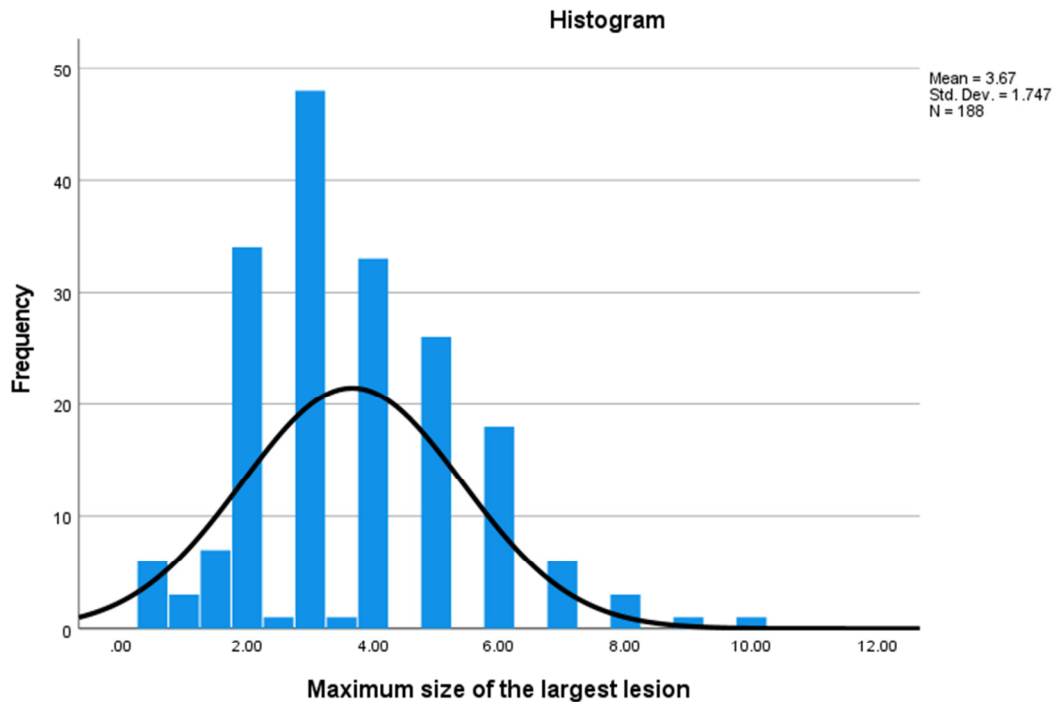
Among all 188 cases 85(45%) were single lesion on cystoscopic evaluation while in 65(34%) of them there were three or more lesions on the cystoscopic evaluation. (*Figure 4*)

Fig. 4 – Number of lesions on cystoscopic evaluation



The mean size $\pm$ SD of largest lesion on cystoscopy finding was 3.67 ± 1.75 cm; were 0.5 cm and 10cm being the minimum and maximum sized respectively. (*Figure 5*)

Fig. 5 – Size of largest lesion on cystoscopic evaluation



Left lateral wall was involved by the lesion in 76(38%) of the cases followed by Right lateral wall being involved by lesion in 73(38.8%) of cases during cystoscopic evaluation. (*Table 2*).

Table 2. – Location of lesion on cystoscopic evaluation

Sites involved by lesion	Number (%)
Left lateral wall	76 (40.4)
Right lateral wall	73 (38.8)
Posterior wall	60 (31.9)
Anterior wall	41 (21.8)
Ttrigone	40 921.3)
Bladder neck	24 (12.8)
Dome of the bladder	17 (9)
Uretral orifice	8 (4.3)

The stalk of the lesions were reported as broad based in 18 (9.6%) of cases and narrow based in 3 (1.6%) cases in the rest of 167 (88.8) cases status of the stalk was not mentioned.

5.4 Association between Cystoscopic Features and Pathologic characteristics of bladder tumors

Invasion at least to the lamina propria

Bi-variant analysis was done between invasion of tumors to the lamina propria and independent variables. Significant association was made between invasion of tumors to the lamina propria and independent variables with p value of < 0.25 . (*Table 3*)

Multivariate analysis was done to determine the magnitude and direction of association between invasion of tumors to the lamina propria and independent variables. (*Table 4*)

Lesions which had solid configuration of lesion on cystoscopy were 17 times more likely to be invasive at least to the lamina propria.

Involvement of the anterior wall by lesion on cystoscopy increased the likelihood of having tumor with invasion at least to the lamina propria by 3.607 times; while involvement of the right lateral wall and posterior wall by lesion on cystoscopy decreased the likelihood of having tumor with invasion at least to the lamina propria by 0.455 and 0.369 times respectively.

Table 3 – Bivariate analysis of Invasion to the lamina propria and independent variables

Independent variables		P-value
Configuration of the lesion	Papillary	0.997
	Solid	<0.001
Number of lesions	Single	0.441
	Two	0.247
	Three or more	0.016
Site of lesion	Right lateral wall	0.118

	Left lateral wall	0.984
	Anterior wall	0.189
	Posterior wall	0.114
	Trigone	0.759
	Bladder neck	0.614
	Ureteric orifice	0.781
Size of the largest lesion	3.67 ± 1.75 cm	<0.001

Table 4 – Multivariate analysis of Invasion to the lamina propria and independent variables

Independent variables	COR	AOR	CI (95%)
Solid configuration	21.781	17	5.096,93.090
Right wall	1.638	0.455	
Posterior wall	1.587	0.369	0.854,2.951
Anterior wall	0.587	3.607	0.268,1.297

Invasion to the muscle

Bi-variant analysis was done between invasion of tumors to the muscle and independent variables. Significant association was made between invasion of tumors to the muscle and independent variables with p value of < 0.25. (*Table 5*)

Multivariate analysis was done to determine the magnitude and direction of association between invasion of tumors to the muscle and independent variables. (*Table 6*)

Lesions that had solid configuration of lesion on cystoscopy were 83 times more likely to be invasive at least to the muscle.

Involvement of the left lateral wall by lesion on cystoscopy increased the likelihood of having tumor with invasion to the muscle by 7.61 times.

Each additional 1 cm increase in the size of the lesion on cystoscopic evaluation was associated with an increase of 1.868 in the odds of having tumor invasive to the muscle.

Table 5 - Bivariate analysis of Invasion to muscle and independent variables

Independent variables		P-value
Configuration of the lesion	Papillary	0.341
	Solid	<0.001
Number of lesions	Single	0.371
	Two	0.232
	Three or more	0.013
Site of lesion	Right lateral wall	0.341
	Left lateral wall	0.110
	Anterior wall	0.145
	Posterior wall	0.270
	Trigone	0.090
	Bladder neck	0.194

	Ureteric orifice	0.687
Size of the largest lesion	3.67 ± 1.75 cm	<0.001

Table 6 – Bivariate analysis of Invasion to the muscle and independent variables

Variables	AOR	COR	CI (95%)
Solid configuration	83	53.9	16,180
Left lateral wall	7.61	0.498	0.212,1.170
Largest size of the tumor	1.868	1.737	1.320, 2.287

Tumor Grade

Bi-variant analysis was done between tumor grade and independent variables. Significant association was made between invasion of tumors to tumor grade and independent variables with p value of < 0.25. (*Table 7*)

Multivariate analysis was done to determine the magnitude and direction of association between tumor grade and independent variables. (*Table 8*)

Lesions which had solid configuration of lesion on cystoscopy were 7.991 times more likely to be high grade tumors, while lesions with papillary configuration were 0.194 times less likely to have high grade tumor. Lesion that are found on the right wall were also 0.446 times less likely to have high grade tumors. Each additional 1 cm increase in the size of the lesion on cystoscopic evaluation was associated with an increase of 1.283 times in the odds of having high grade tumor.

Table 7 – Bivariate analysis of Tumor grade and independent variables

Independent variables		P-value
Configuration of the lesion	Papillary	<0.001
	Solid	<0.001
Number of lesions	Single	0.373
	Two	0.293
	Three or more	0.215
Site of lesion	Right lateral wall	0.109
	Left lateral wall	0.457
	Anterior wall	0.476
	Posterior wall	0.596
	Trigone	0.884
	Bladder neck	0.195
	Ureteric orifice	0.815
Size of the largest lesion	3.67 ± 1.75 cm	<0.001

Table 8 – Multivariate analysis of Invasion to the Tumor grade and independent variables

Independent variables	AOR	COR	CI (95%)
Solid configuration	7.991	23.543	9.157, 57.396
Papillary configuration	0.194	0.031	0.009,0.106

Right wall	0.446	1.64	0.895,3.011
Size	1.283	1.505	1.320,2.287

6. Discussion

This study presents a detailed analysis of urothelial neoplasms diagnosed through cystoscopy and biopsy, highlighting differences in the presentation of noninvasive and invasive lesions, as well as their histological grade among cystoscopic biopsies received in the department of Pathology at SPHMMC. After exclusion criteria was applied, 188 out of 451 cases were analyzed.

In this study the predominant histopathologic diagnosis among bladder tumors was Invasive high grade urothelial carcinoma accounting for 71 (37%) followed by Invasive low grade urothelial carcinoma 50 (26.6%), Noninvasive papillary urothelial carcinoma, low grade 43 (22.6%), Papillary urothelial neoplasm of undetermined significance 16 (8.5%) Noninvasive papillary urothelial carcinoma, high grade 3 (1.6%) Adenocarcinoma 3 (1.6%), Papilloma 1 (0.5%) and Squamous cell carcinoma 1 (0.5%). In contrast to this a study done in India shows out of 25 neoplastic cases of the bladder 21 cases were noninvasive urothelial carcinomas, low grade noninvasive papillary urothelial carcinoma (PUCLG) constituted 15 cases (71.42%), high grade papillary urothelial carcinoma (PUCHG) constituted 05 cases (23.80%) and papillary urothelial neoplasm with a low malignant potential (PUNLMP) constituted 01 case (4.76%). No case of papilloma was noted. Amongst the rest 3 cases of invasive urothelial carcinomas, 2 were of the typical invasive urothelial carcinomas and 1 case was of an infiltrating urothelial carcinoma with a squamous differentiation (3)

These discrepancies could be explained by the difference in prevalence of bladder tumors across different countries and regions. Also, the number involved participants in the study can be additional factor.

In this study Left lateral wall was the commonly involved site by lesion in cystoscopic evaluation being involved in 76 (40.4%) of the cases followed by Right lateral wall 73 (38.8%), Posterior wall 60 (31.9%), Anterior wall 41 (21.8%), Trigone 40 (21.3%), Bladder neck 24 (12.8%), Dome of the bladder 17 (9%) and Urethral orifice 8 (4.3%) which is similar with study which was done in India which also states Lateral wall was the most common area of the bladder (64%) which was affected and the least common sites which were affected were dome (4%) and ureteric orifice (4%). (3)

In this study it was noted that Lesions with a solid appearance on cystoscopy were 7.991 times more likely to be high-grade tumors, while those with a papillary appearance were 0.194 times less likely to be high-grade. Lesions found on the right wall were 0.446 times less likely to be high-grade. Furthermore, each 1 cm increase in lesion size on cystoscopy

was associated with a 1.283 times higher likelihood of the tumor being high-grade. But there was no significant association with tumor grade and number of lesions, or tumor size; unlike the findings of the similar study done on 266 cases which suggests that Number of lesions and tumor size more than 3cm had significant association with tumor grade; in addition to those variables, they have also suggested that tumor pedicle and tumor site had also significant association with tumor grade. (10)

This study demonstrates that lesions with a solid configuration on cystoscopy were 17 times more likely to show invasion at least to the lamina propria and 83 times more likely to invade the muscle. Additionally, for each 1 cm increase in lesion size on cystoscopy, the odds of muscle invasion increased by a factor of 1.868. These findings align with a study conducted in Japan, which identified factors such as lesion size greater than 1 cm, a stalk, and a non-papillary configuration as independent and significant predictors of muscle invasion in bladder cancer. (8)

This study indicates that lesions involving the anterior wall on cystoscopy were 3.607 times more likely to exhibit tumor invasion at least to the lamina propria. In contrast, lesions affecting the right lateral wall and posterior wall decreased the likelihood of invasion to the lamina propria, with odds ratios of 0.455 and 0.369, respectively. Additionally, involvement of the left lateral wall increased the likelihood of muscle invasion by 7.61 times. However, these findings show some discrepancy with another study, which suggests that tumors located beside the left ureteral orifice are an independent risk factor for muscle-invasive bladder cancer (MiBc). (9)

7. Strengths and limitations of the study

7.1 Strengths

- Given that there has been a lack of adequate studies on this topic, this study provides valuable new insights into how cystoscopic features associate with pathological characteristics such as tumor invasiveness and grade.

- The study used both descriptive analysis and association analysis
- This study can serve as a tool for improving the quality of healthcare and an important starting point for further research on cystoscopic biopsies.

7.2 Limitations

- Due to missing and incomplete cystoscopic and pathologic reports it was not possible to conduct analysis on all bladder cystoscopic biopsies received at the department of Pathology during the study period.
- Certain cystoscopic features, such as stalk of the lesion and vascular pattern were not analysed because they were not mentioned in majority of the reports.
- This is a single center study and did not include cases from other health care centers.

8. Conclusion and recommendations

8.1 Conclusion

This study showed IHGUC was the commonest diagnosis in cystoscopic biopsies of bladder tumors followed by ILGUC, among the noninvasive tumors NIPCLG was the commonest.

Furthermore, this study highlighted a statistically significant relationship between cystoscopic findings and histopathologic characteristics, revealing a strong association between the lesion's configuration, location, and size with both the tumor's invasiveness and its grade.

8.2 Recommendations

For Pathologists:

- To practice the habit of reviewing cystoscopic reports and correlate with histopathologic findings to reach the accurate diagnosis
- To make sure completeness of pathologic reports of cystoscopic biopsies

For Urosurgeons:

- To ensure completeness of cystoscopic reports by commenting on all relevant features

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For researchers:

- To conduct more extensive, possibly prospective studies and develop predictive models that integrate cystoscopic and pathological data to forecast tumor behavior.

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9. Annex

9.1 Check list for Relation of cystoscopic findings and pathologic characteristics of bladder tumors

Date -----/-----/-----

MRN-----

Biopsy code number-----

Name of data collector-----sign-----

Part I: Demographic data

Gender –

- A. Male
- B. Female

Age of the patient in years -----

Address -----

Part II: Cyatoscopic finding

1. Configuration of the lesion*
 - A. papillary
 - B. solid
 - C. flat
 - D. Other:
2. Number of lesions*
 - A. single
 - B. two
 - C. three or more
 - D. Other:
2. Location of the lesion*
 - A. Anterior wall
 - B. Posterior wall
 - C. Right lateral wall
 - D. Left lateral wall
 - E. Trigone
 - F. Bladder neck
 - G. Dome
 - H. Urethral orifice
3. Maximum size of tumor in cm* -----
4. Stalk
 - A. pedunculated
 - B. sessile
 - C. Not mentioned

5. vascular pattern -----

Part I: Histopathologic characteristics

1. Histopathologic diagnosis*
 - A. Papilloma
 - B. PLUMP
 - C. NILGPN
 - D. NIHGPN
 - E. Invasive low grade urothelial carcinoma
 - F. Invasive high grade urothelial carcinoma
 - G. Other:

2. Pathologic stage*
 - A. Non invasive
 - B. T1
 - C. Atleast T1, Muscle status unknown
 - D. T2 or more
 - E. Other:

3. Pathologic grade*
 - A. High grade
 - B. Low grade
 - C. Other: