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ORIGINAL RESEARCH

A prospective study on comparison of urinary cytology with histopathological examination in urothelial cell carcinoma of bladder

[1]Dr. Anantha Kumar.G, [2]Dr. Mangaiyarkarasi.S, [3]Dr. Sadagopan.M

[1]MCh Post graduate, [2]Associate Professor, [3]Assistant Professor, Department of Urology, Tirunelveli Medical College, India

Corresponding author
Dr. Anantha Kumar.G
MCh Post graduate, Department of Urology, Tirunelveli Medical College, India

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ABSTARCT

Introduction: Urinary cytology has prominent role in the multidisciplinary diagnostic approach to bladder cancer. It is used as a valuable adjunct to cystoscopy and biopsy for diagnosis and follow up of patients with bladder cancer. Urine Cytological examination is a simple, safe, and inexpensive method to detect hidden urothelial tumours. Histopathological analyses will be used to confirm urine cytology. Based on this aim of our study is to Correlate Urine cytology with Histopathology of the Bladder Urothelial Cell Carcinoma therefore to Study the Role of Urinary Cytology in the diagnosis of Bladder Urothelial Cell Carcinoma and to find out the Correlation between the Grading by Urine cytology and Histopathology. **Methodology:** This study was done as a prospective clinical study done on 110 patients admitted in Department of Urology, Tirunelveli medical college in patients presented with hematuria and lower urinary tract symptoms due to bladder Urothelial cell carcinoma detected by ultrasonography or CT. Urine samples are typically taken three hours after the initial morning void. Cystoscopy was performed in all patients using rigid cystoscope and details of growth are noted. Material was obtained from TURBT biopsy, Radical Cystectomy specimen. **Results:** Coming to ultrasound findings single tumor was seen in 36 patients and multiple tumors in 74 patients. Tumor size was less than 2 cm in 14 patients, 2-5 cm in 20 patients and more than 5 cm in 76 patients. Tumor was low grade in 43 patients and high grade in 67 patients. Coming to tumor staging 30 patients had pTis, 10 had PTa, 28 had PT1 stage and rest 42 had PT2 staging. Coming to urine cytology in 52 patients it was positive, 14 patients it was suspicious, 13 patients it was atypical and in rest 31 it was negative. We next compared histological grade with urinary cytology and high grade has significant correlation with the positive urinary cytology. Further, we also correlated tumor staging with the urinary cytology and as staging increases more cases have positive urinary cytology. **Conclusion:** Urine cytology of the voided urine has both diagnostic and prognostic utility; a high-grade positive cytology is likely to identify patients at high risk for invasive and high-grade tumours. In order to diagnose low-grade cancers that voided Urine cytology largely missed; cystoscopy is crucial. Particularly for high-grade tumours, urinary cytology is still a useful technique for the identification and tracking of bladder UCC.

Keywords: Urine cytology, histopathology, Urothelial cell carcinoma.

INTRODUCTION

In men, bladder cancer makes up 7% of all cancers, while in women, it makes up 2%. A key component of the multidisciplinary diagnostic strategy for bladder cancer is urinary cytology. It is a useful supplement to biopsy and cystoscopy in the diagnosis and monitoring of bladder cancer patients.

The gold standard for detecting bladder cancer is still urine cytology. When assessing possible bladder tumour markers against the test, all others are contrasted. It has a low number of false positive instances and outstanding specificity. A non-invasive method of screening for bladder tumours that can be performed in rural parts of the nation is cytological analysis of voided urine. Even the type and grade of cancer can be determined by cytology.[1,2]

For the diagnosis and follow-up of patients with urological malignancies, Papanicolaou and Marshall (1945) suggested cytological analysis of urine sediment. Conventional cytology has a well-established prognostic value when used to monitor individuals with superficial bladder cancer. Cytology can sample the entire bladder mucosa, allowing for the discovery of occult urothelial abnormalities;

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however, cystoscopy and biopsy are best for diagnosing obvious disease. [3,4]

Cytological investigations have historically been used in conjunction with cystoscopy and biopsy to diagnosis new or recurrent bladder tumours, as well as to detect in situ and early invasive bladder cancer in high-risk populations. Following transurethral resection, cytology has also been utilized to detect lingering tumours. [5]

One easy, secure, and affordable way to find concealed urothelial tumours is through urine cytological analysis. Many times, urinary tract tumours are multifocal. Urine cytology tests are indicated for the diagnosis and detection of tumours, carcinoma in situ, inaccessible lesions in the ureter, pelvis, and diverticula, as well as for the screening of high-risk patients (smokers, those exposed to chemicals or metals), and for the monitoring of tumours and treatment.

Because it enables the mapping and sampling of the lesions, cystoscopy is still the gold standard for the diagnosis and monitoring of bladder tumors. However, a cystoscopy cannot examine the entire bladder urothelium or identify all cases of carcinoma in situ or upper urinary tract tumors. It must therefore be used in conjunction with urine cytology, especially when looking for tumor cells from high-grade lesions, regardless of where they are located in the urinary system. Bladder tumors can be identified by urine cytology before they are discovered via cystoscopy. The treatment of patients with Urothelial cell carcinoma still relies heavily on urine cytology. It is still the gold standard for screening for bladder cancer. Urine cytology samples will be taken at random to check for any bladder neoplasms found by ultrasound. Histopathological analyses will be used to confirm urine cytology. [3,4] Urine cytology will be validated with histopathological examinations.[5] Based on this aim of our study is to Correlate Urine cytology with Histopathology of the Bladder Urothelial Cell Carcinoma therefore to Study the Role of Urinary Cytology in the diagnosis of Bladder Urothelial Cell Carcinoma and to Find out the Correlation between the Grading by Urine cytology and Histopathology.

MATERIALS AND METHODS

This study was done as a prospective clinical study done on 110 patients admitted in Department of Urology, Tirunelveli medical college from January 2023 to December 2024 on patients presented with hematuria and lower urinary tract symptoms (LUTS) due to bladder Urothelial cell carcinoma detected by ultrasonography or CT. Patients with Bladder Neoplasms detected by ultrasound & Symptomatic patients with LUTS and hematuria were included in the study. While patients who already undergone biopsy & Other causes of Hematuria like RCC, Upper tract UCC were excluded.

Urine samples are typically taken three hours after the initial morning void. Immediately after, samples are combined with 95% alcohol and refrigerated until centrifugation. About 100 millilitres of urine are centrifuged for 20 minutes at a Urine of 2500 revolutions per minute. Slides are quickly fixed in 95% alcohol after many smears are made from the sediment. Papanicolaou stain and hematoxylene and eosin stain are used to stain smears. Urinary sediment exfoliative cytology results are categorized as either positive, suspicious, atypical, or negative.

Cystoscopy was performed in all patients using rigid cystoscope and details of growth are noted. Material was obtained from TURBT biopsy, Radical Cystectomy specimen. Biopsies taken are processed routinely and 3-5 u thick sections are cut. H & E Staining was done on tissue section for morphological evaluation & lesions are histologically classified as Low grade, High grade & No malignancy.

RESULTS

This study was done as a prospective clinical study done in 110 patients admitted in Department of Urology, among who presented with hematuria and lower urinary tract symptoms (LUTS) due to bladder Urothelial cell carcinoma detected by ultrasonography or CT.

In this study among 110 patients 88 were male and rest 22 were female.83 were smoker and 26 were non-smoker in our study. Most common symptoms encountered were hematuria followed by dysuria and increased frequency of micturition.

Coming to ultrasound findings, in 25 patients, it was hyperechoic, in 62 it was hypoechoic and in 20 it was isoechoic and in 3 patients it was mixed. Single tumor was seen in 36 patients and multiple tumors in 74 patients. Tumor size was less than 2 cm in 14 patients, 2-5 cm in 20 patients and more than 5 cm in 76 patients. Tumor was low grade in 43 patients and high grade in 67 patients.

Coming to location of lesion it was anterior in 10 patients, posterior in 38 patients, lateral was most common location with 58 patients, in 2 patients' lesion was situated at the dome and rest 2 at base. The lesion was pedunculated in 55 patients and sessile in 55 patients.

Coming to tumor staging 30 patients had pTis, 10 had PTa, 28 had PT1 stage and rest 42 had PT2 staging.

Table 1: Urine Cytology

Urine cytology results	No of cases
Positive	52
Suspicious	14
Atypical	13

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Negative	31

Coming to urine cytology in 52 patients it was positive, 14 patients it was suspicious, 13 patients it was atypical and in rest 31 it was negative.

Table 2: Comparison Of Histology with Urinary Cytology

Urine Cytology	Positive	Suspicious	Atypical	Negative
Low Grade	16	6	10	11
High Grade	36	8	3	20

We next compared histological grade with urinary cytology and high grade has significant correlation with the positive urinary cytology. Further, we also correlated tumor staging with the urinary cytology and as staging increases more cases have positive urinary cytology.

Table 3: comparison of urinary cytology with tumor staging

	Positive	Suspicious	Atypical	Negative
PTA	1	1	1	7
PTIS	18	5	3	4
PT1	8	5	4	11
PT2 AND ABOVE	25	3	5	9

DISCUSSION

In this study among 110 patients 88 were male and rest 22 were female. Our findings are concordant with Mikou et al, Siddappa et al, Freedman et al. [6-8] 83 were smoker and 26 were non-smoker in our study. Most common symptoms encountered were hematuria followed by dysuria and increased frequency of micturition. In the early stages, there may be no signs and symptoms of Urothelial cell cancer of the renal pelvis and ureter. Symptoms may appear as the tumor grows and may include: blood in the urine, a pain in the back that doesn't go away, extreme tiredness, weight loss with no known reason, painful or frequent urination.

Coming to ultrasound findings, in 25 patients, it was hyperechoic, in 62 it was hypoechoic and in 20 it was isoechoic and in 3 patients it was mixed. On an ultrasound, Urothelial cell carcinoma (UCC) of the urinary tract can appear as a mass or thickening in the bladder wall, or a mass in the renal sinus. The appearance of UCC on an ultrasound depends on the location of the tumor. Single tumor was seen in 36 patients and multiple tumors in 74 patients. Tumor size was less than 2 cm in 14 patients, 2-5 cm in 20 patients and more than 5 cm in 76 patients. Tumor was low grade in 43 patients and high grade in 67 patients.

Coming to location of lesion it was anterior in 10 patients, posterior in 38 patients, lateral was most common location with 58 patients, in 2 patients' lesion was situated at the dome and rest 2 at base. The lesion was pedunculated in 55 patients and sessile in 55 patients.

Coming to tumor staging 30 patients had pTis, 10 had PTa, 28 had PT1 stage and rest 42 had PT2 staging. Coming to urine cytology in 52 patients it was positive, 14 patients it was suspicious, 13 patients it was atypical and in rest 31 it was negative.

We next compared histological grade with urinary cytology and high grade has significant correlation with the positive urinary cytology. Further, we also correlated tumor staging with the urinary cytology and as staging increases more cases have positive urinary cytology.

A non-invasive technique for identifying, diagnosing, and monitoring bladder Urothelial cell carcinomas is urine cytology. Exfoliated cells from the urinary tract lining are used in urine cytology. The basis of urine cytology is the excretion of cancerous cells in urine. It is more common for high-grade tumours, such as CIS, to release aberrant cells into the urine. High-grade cancers have higher sensitivity rates. Low-grade tumours are less sensitive and have a lower propensity to release cells into the urine. False positives brought on by instruments, chemotherapy, radiation, and stone infections.

Urine cytology is used to diagnose individuals with clinical symptoms and to find tumours in high-risk patients who have smoked or been exposed to industrial toxins. Cytology is a supplement to cystoscopy and biopsy, not a substitute. Cytology is helpful in identifying minor or obscure lesions such as the urethra, renal pelvis, ureters, and diverticulum. Urine cytology is in greater demand as the incidence of urothelial cancer rises. In order to reduce false positives, clinical history is crucial. The sensitivity of urine cytology rises with tumour grade. The quality of the material, the quantity of exfoliated cells, and the pathologist's experience all have an impact on the sensitivity of urine cytology. Additionally, patients with inflammatory bladder problems were not allowed to participate in the trial since they could skew the results.

Numerous studies have examined the diagnostic accuracy of urine cytology in identifying bladder Urothelial cell carcinoma (UCC) in comparison to histological evaluation. The advantages and disadvantages of urine cytology in clinical practice

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have been repeatedly emphasized by these investigations. 52 of the 68 histologically confirmed UCC patients in a prospective investigation were properly diagnosed by urine cytology, with a sensitivity of almost 76%. This emphasizes how useful cytology is for identifying bladder UCC, especially when it comes to high-grade tumours. Urinary cytology's importance in the initial diagnosis and ongoing surveillance of UCC is further supported by a different study that found a 76.4% concordance rate between cytological grading and standard histological results.

CONCLUSION

Urine specimens can be usefully examined cytologically to help diagnose bladder cancers. More than 60% of the time, void urine cytology matches the histology findings. With high-grade cancers, the accuracy is higher. Most of the time, urine cytology and histopathological grade are correlated. Urine cytology of the voided urine has both diagnostic and prognostic utility; a high-grade positive cytology is likely to identify patients at high risk for invasive and high-grade tumours. In order to diagnose low-grade cancers that voided Urine cytology largely missed; cystoscopy is crucial. Particularly for high-grade tumours, urinary cytology is still a useful technique for the identification and tracking of bladder UCC.

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