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Original Research Article

Paris system of reporting urine cytology: An important screening tool for urothelial neoplasms

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ABSTRACT

Background: Urine cytology is an important screening tool for detection of high grade urothelial carcinoma and follow-up of patients with treated disease. Ease of procurement, cost-effectiveness, and lower turnaround time are the major advantages of the system. We aim to determine the frequency of high grade and low grade urothelial carcinoma in urine cytology specimens and to evaluate the accuracy of Paris system.

Materials and Methods: A retrospective study was conducted in the Department of Pathology (Cytology), GMCH from August 2020 to July 2022 where a total of 200 cases were included. Data along with the preserved slides of urine cytology of these cases were collected from the archives and examined for the presence of urothelial carcinoma. The results were calculated in Microsoft word and excel, and p value was calculated by using the Chi- square ($\chi 2$) test of significance, P values less than 0.05 was considered statistically significant.

Results: In our study, a total of 200 cases were analysed, 169 were males and 31 were females, the male to female ratio being 5.5: 1. The most commonly affected age group was 61-70 years, the mean age being 62 years. Of the 200 urine samples examined, 12.5% cases had High Grade Urothelial Carcinoma (HGUC), 13.5% cases had atypical urothelial cells, 9% cases were suspicious for HGUC and 2% cases had Low Grade Urothelial Neoplasm.

Conclusion: The Paris System is a highly sensitive and rapid tool for reporting urine cytology specimens and is particularly useful in diagnosing High Grade Urothelial Carcinoma thereby helping in early management of the patients with neoplastic lesions of the urinary bladder.

1. Introduction

Paris System of reporting urine cytology is a standardized, evidence-based reporting system that uses specific cytomorphologic criteria to categorise the lesions into 7 categories. Conventional urine cytology has low sensitivity and subjective diagnostic criteria making it inadequate for diagnosing majority of lesions.[1–4] Hence, to overcome its pitfalls, at the 2013 International Congress of Cytology, The Paris System (TPS) working group proposed a system to categorise specimens into one of the seven categories: 1). Non diagnostic; 2). Negative for high grade urothelial carcinoma; 3). Atypical urothelial cells; 4) Suspicious for high grade urothelial carcinoma; 5). Low grade urothelial neoplasm (LGUN) and 6). High grade urothelial carcinoma (HGUC); 7). Others (including non-malignant entities) and it was published in 2015.[5]

Bladder cancer (BC) is the 10th most common form of cancer in the world, with an estimated 573,000 new cases in 2020.[6] Urine cytology is an essential diagnostic tool used in the screening and surveillance of urothelial carcinoma. It is an easy to perform, non-invasive procedure.[7]

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The sensitivity of urine cytology is high for detecting high-grade urothelial carcinomas (HGUCs) but relatively low for low-grade lesions. Since HGUC cells are shed in the urine, a positive urine cytology diagnosis is still a clinically meaningful result, even in the lesions not detected cystoscopically and in the absence of tissue confirmation. However, such patients are usually investigated further and closely monitored because most of them eventually develop HGUC.[8,9]

Most of the newly diagnosed urothelial carcinomas, i.e around 75% are non muscle invasive.[10] On the basis of progression and recurrence, these cases are treated with transurethral resection and intravesical therapy.[11] However, 50% of these cases recur. Hence follow up of these patients using cystoscopy and urine cytology is necessary for atleast 5 years from initial treatment.[12]

Approximately 79% of patients with high grade transitional cell neoplasms can be detected using urinary cytology. Conversely, a negative result excludes cancer in more than 90% of cases.[7]

2. Materials and Methods

A retrospective study was conducted in the Department of Pathology (Cytology), GMCH from August 2020 to July 2022. A total of 200 cases were included in the study. The demographic profile of the cases along with the presenting complaints were collected from the archives. The preserved slides of these 200 cases were collected and examined for the presence of urothelial carcinoma.

2.1. Inclusion criteria

1. All the cases that came to the Department of Pathology (cytology), with clinical history of bladder tumours during that period.
2. Patients of all age groups and both sexes were included.

2.2. Exclusion criteria

1. Samples inadequate for diagnosis were excluded

3. Results

It was found in our study that 12.5% cases were positive for HGUC, 13.5% cases had Atypical urothelial cells, 9% cases were suspicious for HGUC and 2% cases had LGUN as shown in Table 1.

In our study, we found that most of the cases (84.5%) with urinary symptoms were males and only 15.5% cases were females with a male to female ratio being 5.5 :1 as shown in Table 2.

It was found in our study that most patients (44%) presented with increased frequency and dribbling of urine, 11.5% cases presented with pedal edema, 13.5% presented with burning micturition, 18% presented with pain abdomen and 13% presented with hematuria as shown in Table 3.

It was found in our study that the highest number of cases were found in the age group of 61-70 years. Also, the highest number of cases of HGUC, LGUN and SHGUC were found in the age group of 61-70 years followed by the age group of 71-80 years. P value= <0.0001, statistically significant as shown in Table 4 and Figure 1.

4. Discussion

The Paris System (TPS) is an international system to standardize the reporting of urinary cytology and it focuses on the diagnosis of HGUC.

It was found in our study that only 12.5% cases were positive for HGUC, 13.5% cases had atypical urothelial cells, 9% cases were suspicious for HGUC and 2% cases had LGUN. The results are concordant with a study by Zare et al[13] who found 11% cases of AUC, 5% cases of SHGUC, 1% cases of LGUN and 13.9% cases of HGUC. However, results of our study are discordant with Rai et al[1] who had a higher SHGUC cases (17.8%) and Sengupta et al[14] who had lower rates of AUC (3.5% cases) and HGUC (4% cases). Another study by Dhakhwa R et al[15] had lower rates of AUC (5.76%) as compared to our study. This discordancy might be due to geographical variation and smaller sample size in our study.

The present study showed that males were most commonly affected with the male: female ratio being 5.5 :1, and this result was concordant with the studies made by Zare et al[13] which had a male: female ratio of 7: 1 and Cowan et al[16] which had a male: female ratio of 6.2 :1.

In our study, the most commonly affected age group was 61-70 years, the mean age being 62 years. However, this result is almost similar with other studies done by Zare et al[13] and Cowan et al[16] where the mean age was 69 years and 72.9 years respectively.

As per the clinical and radiological history obtained from urology department, all the 25 cases of HGUC which were detected on Paris system had a bladder mass, making the accuracy rate of 100%.

However, when clinical history was considered for the AUC, SHGUC and LGUN cases, it was seen that most patients of each group had history of hematuria and urgency only and had no clinically detectable bladder mass. Catergorization of these cases was done according to Paris System. However, radiological examination of these patients revealed the presence of bladder mass in 1 out of 4 LGUN cases, 10 out of 18 SHGUC cases and no mass was found in any of the AUC cases. Hence, it suggests that Paris system of reporting urine cytology can pick up malignant cells even in absence of a prior radiological investigation, making it a useful tool for detecting urothelial neoplasms.

Table 1: Distribution ofcases according to Paris system of reporting urine cytology

Paris Categories	Total number of cases (n=200)	Percentage (%)
1. Negative for malignancy	126	63
2. Atypical urothelial cells	27	13.5
3. Suspicious for HGUC	18	9
4. Low grade urothelial neoplasm (LGUN)	4	2
5. HGUC	25	12.5

Table 2: Sex wise distribution of cases

	Male	Female	Male: Female
1. Negative for malignancy	106	20	
2. Atypia	25	2	
3. Suspicious for HGUC	13	5	5.5 :1
4. Low grade urothelial neoplasm (LGUN)	3	1	
5. HGUC	22	3	
Total (n=200)	169(84.5%)	31(15.5%)	

Table 3: Clinical presentations

S.No.	Complaints	No. of cases (n=200)	Percentage (%)
1	Increased frequency and dribbling of urine	88	44
2	Pedal edema	23	11.5
3	Burning micturition	27	13.5
4	Pain abdomen	36	18
5	Haematuria	26	13

Table 4: Age wise distribution of cases

	31-40y	41-50y	51-60y	61-70y	71-80y	81-90y	Chi -square (χ2)	P value
1. Negative for malignancy	38	42	17	26	3	0		
2. Atypia	2	4	7	6	4	4		
3. Suspicious for HGUC (SHGUC)	0	1	3	6	5	3	82.19	<0.0001
4. Low grade urothelial neoplasm (LGUN)	0	0	1	2	1	0		
5. High grade urothelial carcinoma (HGUC)	0	1	4	8	7	5		
Total no. of cases	40	48	32	48	20	12		

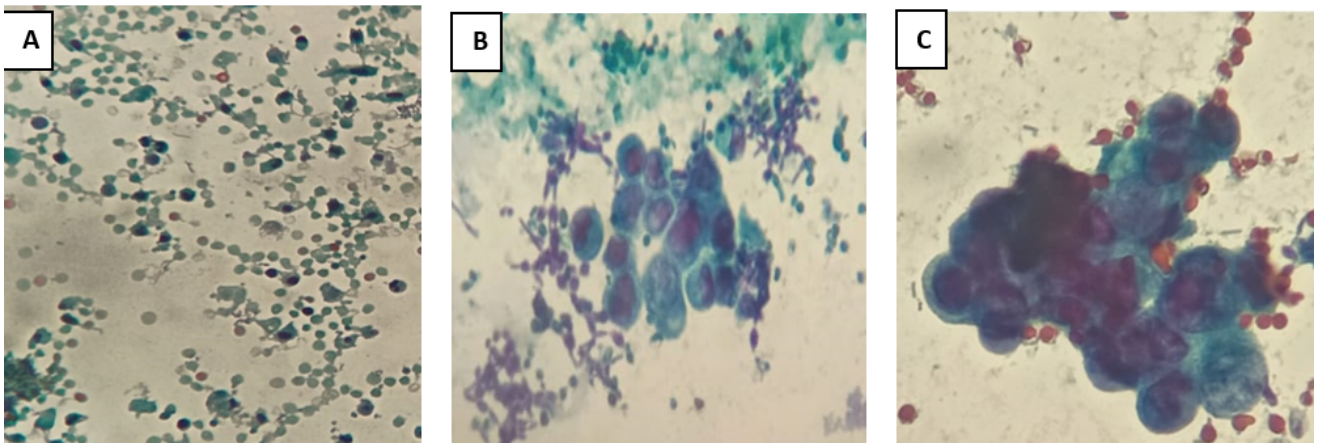

Fig. 1: Pictomicrograph of urine cytology of **A:** Low grade urothelial neoplasm (PAP stain 10x10); **B:** High Grade Urothelial carcinoma with fungal infection (PAP stain, 10x40) and **C:** High grade urothelial carcinoma (PAP stain, 10x40)

5. Conclusion

Paris system of reporting urine cytology is an easy, cost-effective, rapid, non-invasive procedure, which is highly sensitive and accurate method of urine analysis. Pick up rates of Paris System is very high, specifically for high grade urothelial carcinoma. Therefore it helps in the management of patients with various neoplastic lesions of the urinary bladder.

6. Source of Funding

None.

7. Conflicts of interest

There are no conflicts of interest.

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