Original Research Article

Evaluation of urine cytology in diagnosis of bladder tumor – An institutional study of 54 cases

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Abstract

Introduction: Bladder cancer is a common neoplasm in middle and old age. Urine cytology is simple quick cost effective method can be used for screening of urothelial neoplasm. It is a non invasive method with fair accuracy in high grade neoplasm. **Aims & Objectives:** The aim of this study was to correlate between urine cytology and histology in diagnosis of bladder tumor. **Materials and methods:** It was a descriptive observational study, conducted in Department of Pathology, Calcutta National Medical College & Hospital from June 2014 to May 2016. We assessed 54 cases of clinically & radiologically suspected cases of bladder tumor. All the clinical, radiological data were documented. Urine samples were processed by standard methods for Leishman & PAP stained smears. Cytological finding were reported four categories and correlated with final histological diagnosis of the bladder tumor. **Results:** Among the 54 total cases of bladder tumor most common were high grade urothelial carcinomas. Overall sensitivity of urine cytology was 42.86%. Sensitivity was found less in papilloma and PUNLMP. Specificity and predictive value of urine cytology were 80% and 95.45% respectively. **Conclusion:** Exfoliative urinary cytology represents an essential tool in diagnosis of bladder tumor with high positive predictive value though its sensitivity is low as compared to histopathology.

Key words: Cytology, urothelial tumor, histology.

Introduction

Bladder cancer is the 9th most common cancer worldwide[1]. More than 380,000 new cases of bladder carcinoma are diagnosed each year globally with more than 150,000 deaths contributed by malignancy. Male: Female ratio in bladder cancer is 3.8:1[1]. In India the incidence of bladder cancer is 3.09/Lac and M: F ratio is 3.17:1[2]. The incidence of bladder cancer is higher in developed countries than developing countries & in urban than the rural dwellers[3]. Whites are more affected than the blacks[4].

Urine cytology is an essential screening modality for the detection of urothelial neoplasm[5]. Urinary cytology is non-invasive method of examination and can easily be repeated. It has long been known that urine cytology is accurate in the diagnosis of high grade urothelial carcinoma with cyto-histological correlation as high as 98%[5]. In contrast, it carries a much lower diagnostic yield for low grade urothelial neoplasm.

Aims and Objectives

Aim of the study was to assess any correlation between urine cytology & histopathological findings in diagnosis of bladder cancer.

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Materials and method

It was a descriptive observational study conducted in the department of Pathology & Urosurgery of Calcutta National Medical College & hospital (C.N.M.C & H) from June, 2014 to May, 2016. Patients of clinically suspected case of bladder tumor as well as USG/CT scan proved cases of bladder SOL, attending in the OPD & also in indoor facility in the department of urosurgery of CNMC&H. The total no of patients were 54. Interpretations of cytological smears were obtained from pap stained centrifuged deposits of urine sample.

Histopathological examination of tissue sample of clinically suspected bladder cancer patient obtained from transurethral resection of bladder tumour (TURBT) and radical cystectomy specimens were done using H&E stained slides following WHO guidelines of reporting urothelial neoplasms.

The complete statistical analysis was done with the help of Statistical Package for Social Scientists (SPSS), Windows Version 20.0.

All the parameters for each group were analyzed for the mean value along with standard error (S.E.). Then they were analyzed separately (i.e. between groups and within group) by Duncan Method (One way ANOVA) and the significance (P value) was recorded at 5% level.

Results

We received 54 bladder biopsy samples of which 25 cases were TURBT specimens and rest 29 were radical cystectomy cases.

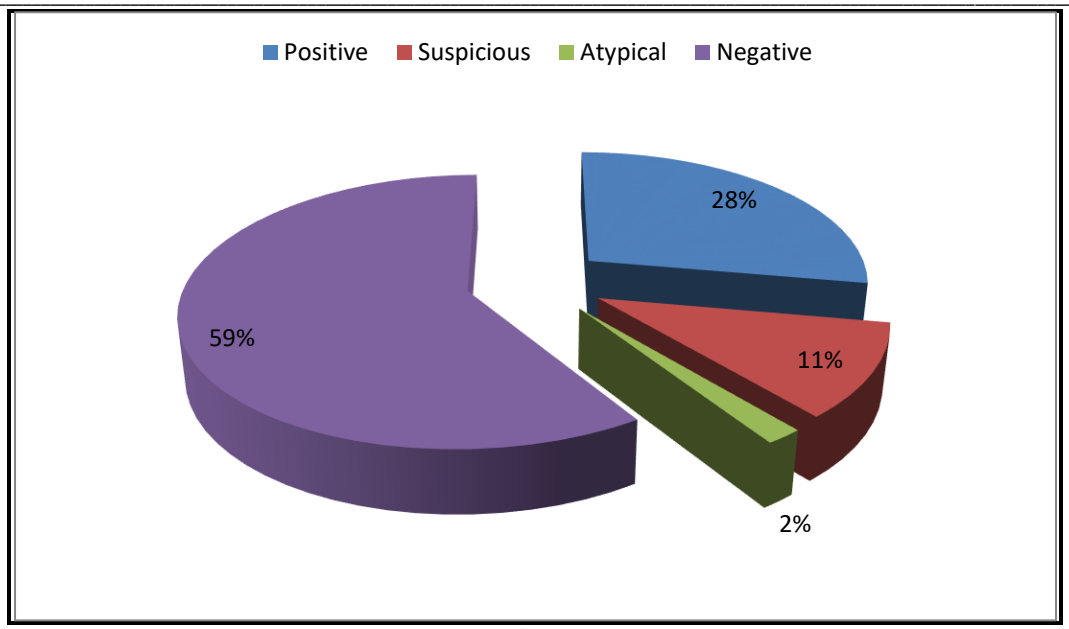

Figure 1: The urine cytology findings is shown in the pie chart

The histopathological findings is shown in the following table (Table 1)

Type of tumor		No. of cases	Percentage
Papilloma		5	9.25%
PUNLMP		4	7.41%
Low grade urothelial carcinoma	Noninvasive	15	27.78%
	Invasive	3	5.56%
High grade urothelial carcinoma	Noninvasive	3	5.56%
	Invasive	21	38.89%
Squamous cell carcinoma		1	1.85%
Metastatic tumour		2	3.70%

Table 2: Showing cyto-histologic correlation of bladder tumour

Urine cytology	Papilloma	PUNLMP	Low grade urothelial carcinoma		High grade urothelial carcinoma		Squamous Cell Carcinoma	Metastatic tumour
			Noninvasive	Invasive	Nonivasive	Invasive		
Positive	0	0	2	1	1	10	1	0
Suspicious	1	0	1	0	0	4	0	0
Atypical	0	1	0	0	0	0	0	0
Negative	4	3	12	2	2	7	0	2

The overall sensitivity of urine cytology was 42.86% when histological finding of papilloma was considered negative for malignancy and histological findings of PUNLMP (Figure 2), PLGNI, PLGI, PHGNI, PHGI were considered malignant. We have also considered suspicious and atypical urinary cytology finding as positive result. The specificity was 80%. The positive predictive value was 95.45%.

The mean value of cytologically positive invasive cases (12±0.41) were significantly ($p < 0.05$) higher than the cytologically positive noninvasive cases (3±0.41). The mean value of cytologically negative invasive cases (11±0.41) were significantly ($p<0.05$) lower than cytologically negative noninvasive cases (21±0.41).The mean value of cytologically positive noninvasive cases (3±0.41) were significantly ($p < 0.05$) lower than cytologically negative noninvasive cases (21±0.41). The mean value of cytologically positive invasive cases (12±0.41) were significantly ($p < 0.05$) higher than cytologically negative invasive cases (11±0.41). The mean value of cytologically suspicious invasive cases (4±0.41) were significantly ($p < 0.05$) higher than cytologically suspicious noninvasive cases (2±0.41).

The sensitivity of low grade urothelial carcinoma was 22.22 % and sensitivity of high grade urothelial carcinoma (Figure 3) was 62.50%.

Discussion

Urinary cytology is a noninvasive method of examination and can easily be repeated. Exfoliate urine cytology is an accepted diagnostic tool in screening and postoperative follow-up of patients with transitional cell carcinoma[6].

Many studies have evaluated the accuracy of urine cytology in the detection of bladder cancer. Overall, the reported sensitivity ranges from 20% to 97.3%; specificity ranges from 74% to 99.5%[5]. In comparison, the overall sensitivity of urine cytology in our study was 42.86% when histological finding of papilloma was considered negative and histological findings of PUNLMP, PLGNI, PLGI, PHGNI, and PHGI were considered positive. We have also considered suspicious and atypical urinary cytology finding as positive result. The specificity was 80%. The positive predictive value was 95.45%. So our study is concordant with the previous authors. Bhuiyan et al found the overall sensitivity of urine cytology 62.0% which was higher than our study[7]. But **Brimo et al** found sensitivity of urine cytology was 29.6 % which was lower than the present study[5]. The sensitivity of low grade urothelial carcinoma was 22.22 % and sensitivity of high grade urothelial carcinoma was 62.50%. In general, most of the workers reported that papilloma and

papillary urothelial neoplasms of low malignant potential cannot be reliably diagnosed regardless of the inclusion of several key cytologic findings. Urine cytology sensitivity increases with the grade of the tumour. The mean value of cytologically positive invasive cases (12±0.41) was significantly ($p<0.05$) higher than cytologically positive noninvasive cases.

In 28 cases false negative result was obtained. On histopathology, 3 cases were diagnosed as papilloma, 12 cases were low grade noninvasive PUCs, 2 were low grade invasive PUCs, 2 were high grade noninvasive PUCs, 7 were high grade invasive PUCs and 2 were adenocarcinoma. The number of cells shed with the urine can vary considerably inter- and intra-individually and also depends on diuresis, therefore, cell concentration techniques are indispensable. The nature of bladder carcinoma provides additional problems. **First,** highly differentiated superficial bladder tumours (papillomas according to the WHO classification) which are classified as such by their histologic features, have a cytologically benign appearance. Well differentiated urothelial carcinomas consist of cells with different grades of anaplasia so that the cytologic picture can vary. **Secondly,** the degree of exfoliation of malignant cells by any urothelial malignancy may also vary, and the cytologic appearance of cells found in one urine sample will not always be representative of the underlying tumour[8].

One case was diagnosed as suspicious in cytology which on histopathology was diagnosed as papilloma. The reasons for false positivity include catheterization, inflammation, viral infection (polyomavirus), and chemotherapy[9]. However, a positive cytology in the presence of a negative biopsy is not always indicative of a false positive diagnosis since urine cytology allows sampling of the entire urinary tract; positive urine cytology may point towards malignancy in the upper urinary tract rather than in the urinary bladder per se. This highlights the importance of providing a detailed history to the reporting cytologist or histopathologist.

Conclusion

The effective treatment for urothelial carcinoma can only be achieved by early tumor detection in the setting of the primary diagnostic workup and follow-up. Exfoliative urinary cytology represents an essential tool in establishing diagnosis with high positive predictive value though its sensitivity is low as compared to histopathology. However, it has significantly higher sensitivity in high grade and invasive urothelial neoplasm than noninvasive and low grade urothelial carcinoma. In order to make it more efficient, we need to study its limitations carefully and define diagnostic criteria.

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