

Is urine cytology still a valuable test in detecting bladder cancer: A Retrospective Study

S Pedamallu, K Alexandrou

Citation

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Abstract

Objectives: Urinary cytology has been considered the gold standard in bladder cancer screening ¹. Recent advances in diagnostic methods are challenging its usefulness. This study compared urinary cytology with pathologic findings of proven bladder cancer patients to determine the value of voiding urinary cytology. **Methods:** Retrospective analysis of voiding urinary cytology results and histopathology reports was carried out in 169 proven bladder cancer patients. Urine specimens were centrifuged and stained with Papanicolaou stain. **Results:** Overall, Urine cytology results were positive for cancer cells in 87(51%), suspicious in 17(10%), atypical in 8(4.7%) and negative in 57(34%) patients. High grade tumours (G3: 82.5%) were more likely to have positive malignant cytology than lower grade tumours (G1:13%). Higher staging (pT2:72%) was positively associated with malignant cytology than lower staging (pTa: 19%). **Conclusions:** Exfoliate Cytology is still a valuable test in detecting bladder cancer. Patients with positive urine cytology are more likely to have higher stage and grade disease. Hence, investigations in these patients need to be more exhaustive. Despite new diagnostic methods, urine cytology still has a role to play in the detection of more advanced and higher grade urothelial cancers, early detection of which is likely to affect long-term prognosis.

INTRODUCTION

Bladder cancer is the second most frequent malignant tumour of the urinary tract. Exfoliate urine cytology is an accepted diagnostic tool in screening and postoperative follow-up of patients with transitional cell carcinoma ⁴. Since the first detailed description of cytological findings of urine in patients with urothelial neoplasms, there have been various studies to assess the accuracy but with variable results. Currently, conventional cytological analysis is complemented with ancillary diagnostic methods like imaging, immunohistochemistry and molecular biology techniques ^{2,5}.

In the present study we conducted a retrospective review of the diagnostic performance of voiding urinary cytology comparing with histo-pathological proven cases of bladder cancer.

PATIENTS AND METHODS

Retrospective review of 169 consecutive patients who had histo-pathologically proven diagnosis of transitional cell carcinoma between Jan 2001 and Dec 2008 was conducted to correlate urinary cytology and histopathology findings.

Urine samples were centrifuged the same day and stained with Papanicolaou stain. Histological grade and pathological stage of the tumours were compared with the urine cytology findings.

RESULTS

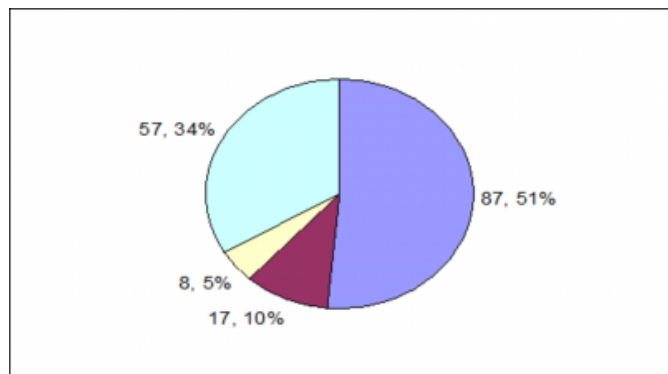
Urine cytology results were positive for cancer cells in 87(51%), suspicious in 17(10%), atypical in 8(4.7%) and negative in 57(34%) patients.

Figure 1

Urine Cytology Results	No of Cases
Positive	87
Suspicious	17
Atypical	8
Negative	57
total	169

Figure 2

Figure 1



There were 54 Grade1, 52 Grade2 and 63 Grade3 tumours in the study group.

Among G1 tumours, positive cytology was established in 7 out of 54 cases (13%) and negative in 41 out of 54 cases (76%). Whereas in G2 tumours, 28 out of 52 cases (53.8%) were positive and 10 out of 52 (19%) were negative. In G3 tumours, 52 out of 63 cases were positive (82.5%) and 6 out of 63 were negative (10%).

Figure 3

Table1: Urine Cytology results in different tumour Grades

Urine Cytology Results	G1 (well differentiated)	G2 (Moderately differentiated)	G3 (Poorly differentiated)
Positive	7(13%)	28(53.8%)	52(82.5%)
Suspicious	3(5.5%)	11(21%)	3(4.7%)
Atypical	3(5.5%)	3(5.7%)	2(3.1%)
Negative	41(75.9%)	10(19%)	6(9.5%)
total	54	52	63

Figure 4

Figure 2

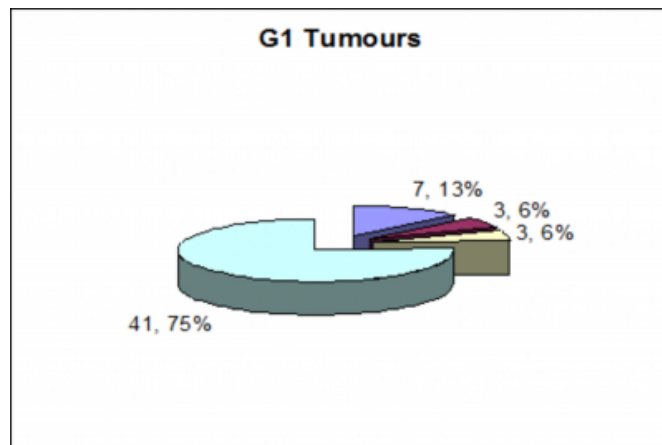


Figure 5

Figure 3

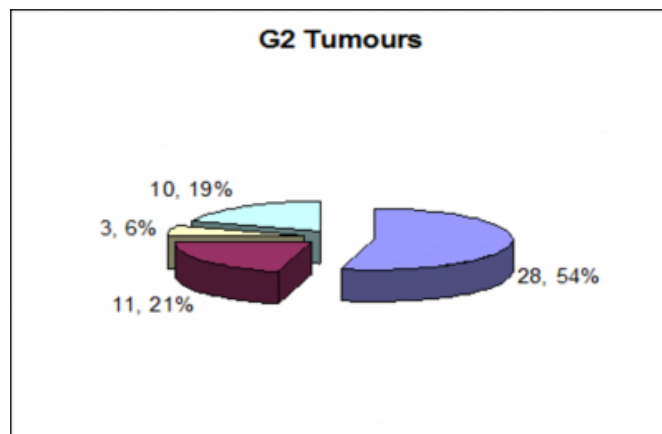
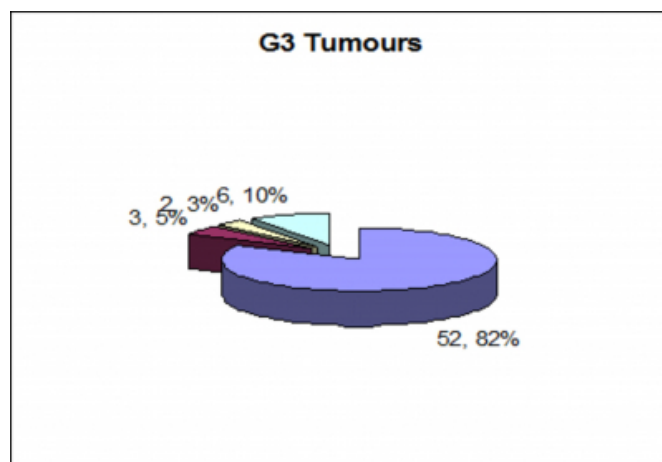


Figure 6

Figure 4



Study group consists of 57 non-invasive tumours (pTa), 34 tumours invaded sub epithelial connective tissue (pT1) and

78 tumours invaded the muscle (pT2).

Positive cytology was found in 11 cases of pTa (19.2%), 19 cases of pT1 (55.8%) and 57 cases(73%) of pT2 & above staging. 38 cases of pTa(67%), 10 cases of pT1(29%) and 9 cases(11%) of pT2 & above staging were found to have negative cytology. 67% of non invasive tumours had negative urine cytology.

Figure 7

Table2: Urine Cytology results in different tumour stages

Urine Cytology Results	PTa	PT1	PT2 & above
Positive	11(19.2%)	19(55.8%)	57(73%)
Suspicious	5(8.7%)	3(8.8%)	9(11.5%)
Atypical	3(5.2%)	2(5.8%)	3(3.8%)
Negative	38(66.7%)	10(29.4%)	9(11.5%)
total	57	34	78

Figure 8

Figure 5

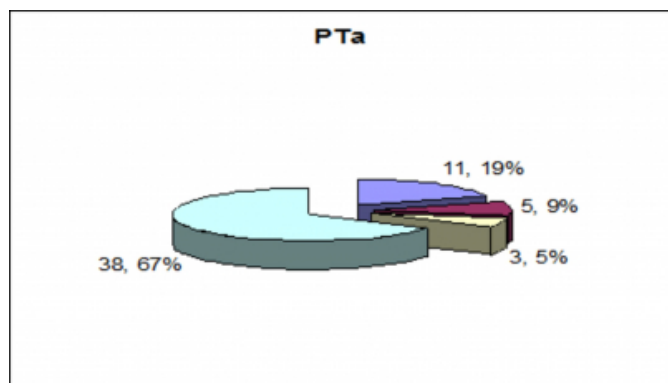


Figure 9

Figure 6

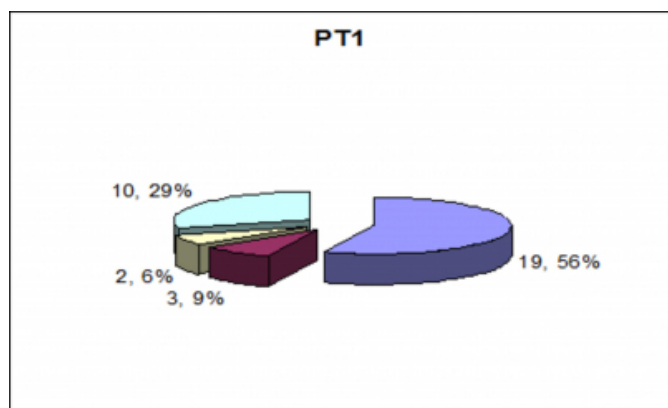
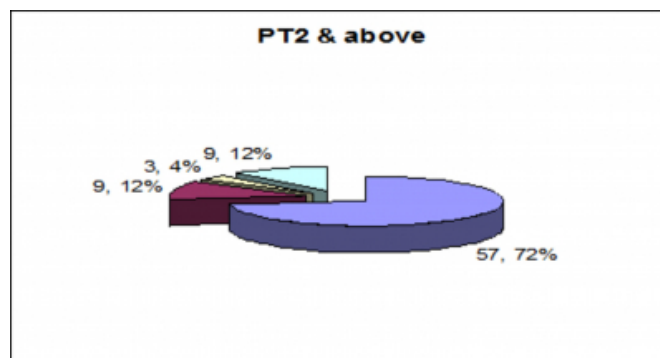


Figure 10

Figure 7



DISCUSSION

Exfoliate urine cytology is undoubtedly a useful investigation in the management of urothelial carcinoma. However, a negative test does not rule out malignancy. This test lacks sensitivity for low grade superficial tumours³. This group of tumours constitute the majority of transitional cell carcinomas. Most reported sensitivities for low-grade tumours are in the region of 30–60%^{15,9-12}. Despite high specificity, it is not possible to localise cancer based on urine cytology alone. Therefore, a positive test result always needs further investigations. A normal looking bladder on cystoscopy and negative bladder biopsy however, doesn't exclude possibility of urothelial cancer. In positive urine cytology cases with normal bladder biopsy, imaging and cystoscopy should be repeated since a bladder or upper urinary tract cancer may be subsequently detected^{1,7,8}. There are several other factors such as reactive changes secondary to infection, stone, previous instrumentation and intravesical therapy which are responsible for majority of false diagnosis³.

It is important to provide relevant clinical information (including instrumentation, previous treatment and the method of urine collection) in order to enable the cytopathologist to report with greater accuracy³.

Instrumentation artefacts are known to cause considerable difficulty in interpretation of urine specimens¹³. A review of 17 published series showed that, at worst, the false-negative rates after instrumentation were more than 50% for primary bladder cancer and averaged nearly 75% for superficial low grade disease¹⁴.

In this study, all specimens were collected prior to instrumentation. Positive cytology was found in 87 out of 169 cases (51%), suspicious cytology in 17 cases (10%), atypical in 2 cases (1.1%) and negative cytology in 57 out of

169 patients (34%). High grade tumours (G3) were more likely to be positive for malignant cells (82%) compared to lower grade tumours (13%). Invasive tumours had more positive cytology yield compared to non invasive tumours cases. Despite relatively small numbers, this study confirmed that diagnostic yield of urine cytology is best in poor prognosis tumours. Exfoliate urine cytology is negative for malignant cells in only 11% of muscle invasive tumours with a corresponding figure of near 66% in non-invasive tumours. This study showed that 55% patients with tumour invaded sub-epithelial connective tissue (pT1) and 73% muscle invasive tumours (pT2 & above) had positive cytology.

General rule is that diagnosis is more accurate with higher grade tumours. Despite all these limitations, urine cytology remains very useful in the monitoring of patients with high-grade, superficial urothelial carcinoma where sensitivity and specificity are in the region of 90%¹⁵.

CONCLUSION

Exfoliate urine cytology is still a useful test in detecting bladder cancers, despite its limitations. It is still useful in hospitals where new more expensive tests are currently unavailable. The value of this test is highest in the diagnosis of high grade and stage with worst prognosis.

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Author Information

Srinivas B. Pedamallu, MRCS(Edin)

Department of Urology Ysbyty Gwynedd Hospital Bangor United Kingdom

K. Alexandrou, FRCS(Urol)

Department of Urology Ysbyty Gwynedd Hospital Bangor United Kingdom