International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2024: 7.101

Urine Cytology as a Diagnostic Tool for Urothelial Carcinoma: A Case-Based Review

Sujata Kumbhar[1], Neha Ghadge[2], Vaibhav Chavan[3], Anshuli Vispute[4]

[1]Associate Professor, Krishna Institute of Medical Science, KVV, Karad

[2, 3, 4]Junior Resident, Krishna Institute of Medical Science, KVV, Karad
[2]Corresponding Author Email: *nehananaji.369[at]gmail.com*

Abstract: ***Urothelial carcinoma is a common malignancy of the urinary tract, often presenting as hematuria. Urine cytology provides a valuable, non-invasive diagnostic approach especially for detecting high-grade tumors, and can raise suspicion even in low-grade malignancies. This case report describes a 68-year-old female with hematuria, where urine cytology revealed atypical urothelial cells. Imaging studies including CT urogram further supported the diagnosis of a primary urothelial neoplasm. This case highlights the crucial role of cytology in the early detection and evaluation of urothelial carcinoma.***

Keywords: Urine, Cytology, Malignancy

1. Introduction

Urothelial carcinoma, predominantly arising from the bladder and renal pelvis, is a leading cause of morbidity in elderly populations ([1]). Hematuria is a common symptom, often prompting further investigations. Urine cytology serves as an initial diagnostic tool, particularly useful for detecting high-grade urothelial neoplasms. However, even in low-grade malignancies, atypical cellular findings may guide early intervention. Integration with imaging modalities such as ultrasound, CT urogram and histopathology enhances diagnostic accuracy ([2]).

2. Case Report

A 68-year-old female presented with hematuria, dysuria, and burning micturition for 10 days. Urine cytology was performed on a 60 mL sample of pale yellow with reddish tinge and hazy urine. On microscopy smears showed atypical urothelial cells arranged in loosely cohesive sheets and scattered singly. The cells were small to medium-sized, round to oval, high N: C ratio with mildly hyperchromatic nuclei and scanty to moderate eosinophilic cytoplasm. Few binucleated cells were also observed. Background showed few inflammatory cells and many red blood cells. Impression was given as a 'Suspicious for low-grade malignant cells'. (Figure 1, 2, 3). Later, ultrasonography revealed an ill-defined hypoechoic lesion in the right renal pelvis, associated with moderate hydronephrosis. Subsequently, a CT KUB with urography showed a lobulated, heterogeneously enhancing lesion (3.5 × 4.2 × 4.2 cm) in the right renal pelvis, extending to the upper calyces and infundibulum. The lesion caused moderate hydronephrosis and was diagnosed as 'likely primary urothelial malignant neoplasm'. The lesion demonstrated mild enhancement and delayed contrast excretion (Figure 4). From these cytology and radiology reports patient was undergone for total nephrectomy. Histopathological examination confirmed the diagnosis of Urothelial Carcinoma of right renal pelvis.

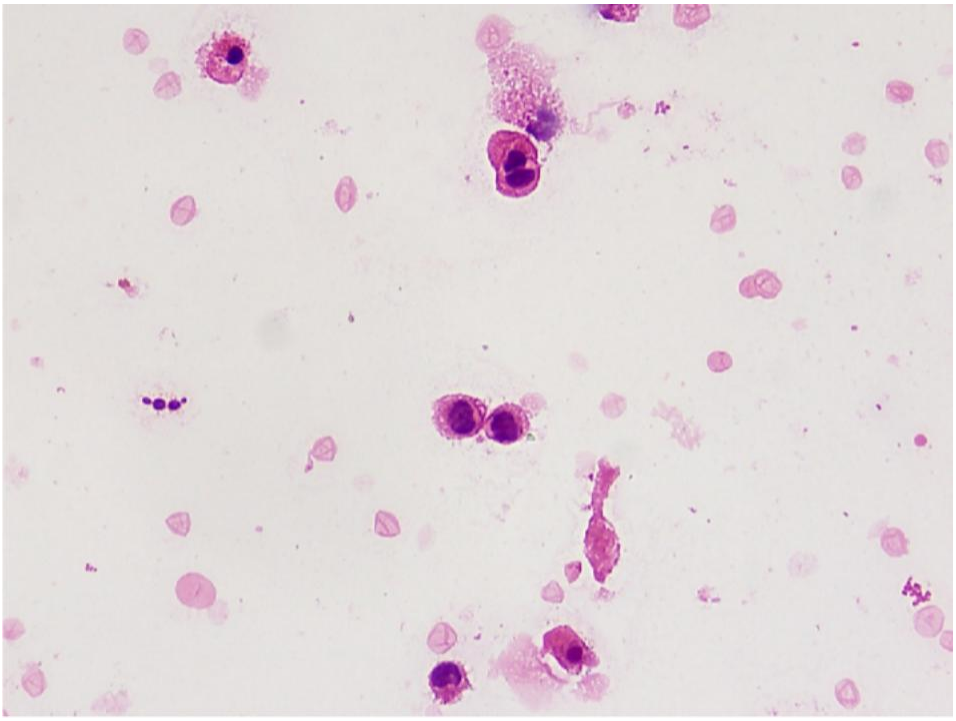

Figure 1

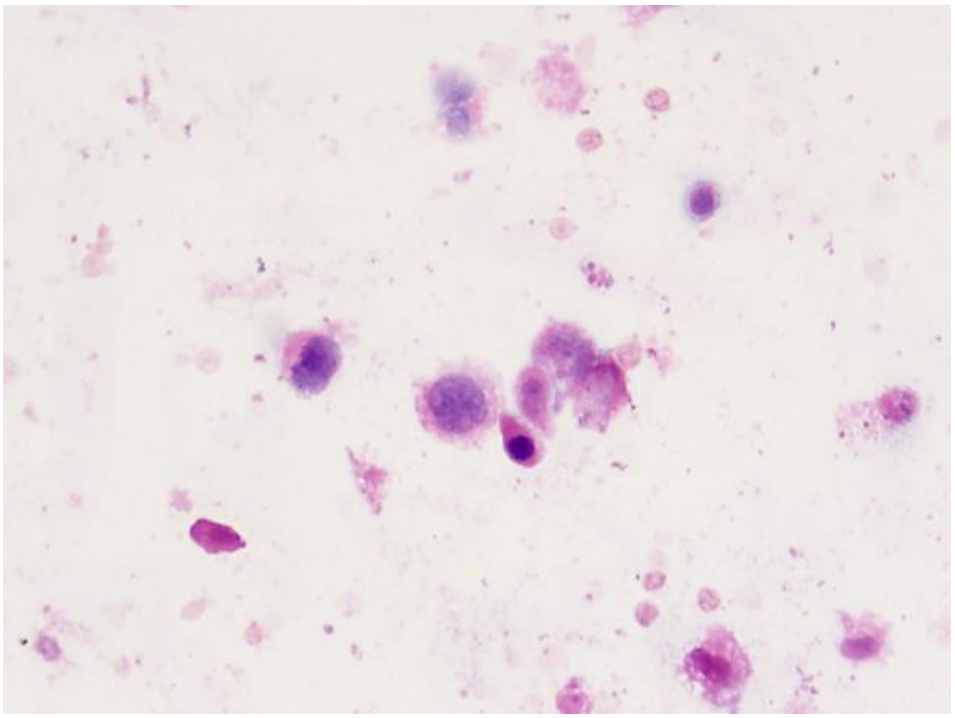

Figure 2

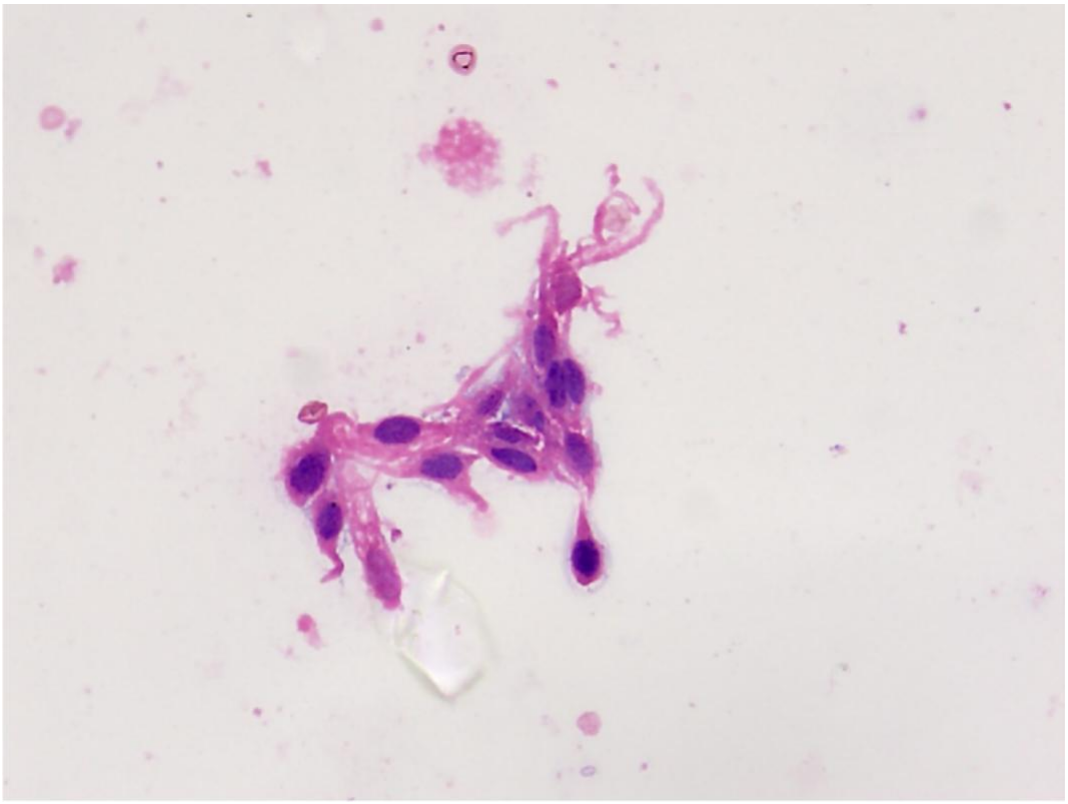

Figure 3

Fig: 1, 2, 3 – Microscopy: Atypical urothelial cells in loosely cohesive sheets and singly scattered. Occasional binucleated cells were noted with numerous RBCs.

Figure 4: On CT KUB – Lobulated, heterogeneously enhancing lesion in the right renal pelvis

3. Discussion

Urothelial carcinomas involving the upper urinary tract are less common than bladder cancers but pose diagnostic challenges due to delayed presentation and anatomical inaccessibility (3). Urine cytology remains a key diagnostic modality due to its non-invasive nature and specificity for high-grade lesions (4). In this case, the subtle cytologic findings of the presence of mildly hyperchromatic, mildly pleomorphic cells and binucleation are seen. According to The Paris System for Reporting Urinary Cytology this case aligns with 'Atypical Urothelial Cells – Suspicious for Low-Grade Urothelial Neoplasm' (5). These cytology findings prompted as further imaging diagnostic modalities. Imaging findings corroborated the suspicion, and CT features were consistent with a urothelial malignancy in the renal pelvis. This case illustrates the synergistic role of cytology and radiology in prompt identification and planning for histological confirmation and therapy.

4. Conclusion

This case exemplifies how urine cytology can play a critical role in raising early suspicion for urothelial carcinoma. Recognition of subtle atypical features in urine smears should prompt thorough radiological evaluation, aiding early diagnosis and intervention, especially in elderly patients presenting with hematuria.

References

[1] Sarver J, Memo M. Upper tract urothelial carcinoma presenting at a bifurcation of a partially duplicated left ureter: A minimally invasive approach. Urol Case Rep.2022; 40: 101879.
[2] Giudici N, Blarer J, Sathianathen N, Burkhard FC, Wuethrich PY, Thalmann GN, et al. Diagnostic value of urine cytology in pharmacologically forced diuresis for upper tract urothelial carcinoma diagnosis and follow-

up. *Cancers (Basel)*.2024 Feb 12; 16 (4): 758
[3] Cassell A 3rd, Manobah B, Willie S. Diagnostic and therapeutic challenges of rare urogenital cancers: urothelial carcinoma of the renal pelvis, ureters and urethra. *World J Oncol*.2021 Feb; 12 (1): 20-27.
[4] Kalogeraki AM, Tamiolakis DI, Mamoulakis CK. Urine cytology and axillary testing for interpretation and follow-up of urinary tumors. *Acta Clin Croat*.2022 Nov; 61 (3): 505-510.
[5] Nikas IP, Seide S, Proctor T, Kleinaki Z, Kleinaki M, Reynolds JP. The Paris System for Reporting Urinary Cytology: a meta-analysis. *J Pers Med*.2022 Jan 27; 12 (2): 170.