



ORIGINAL ARTICLE

Hematologic lesions in urine cytology

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KEYWORDS

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Introduction Bladder infiltration by leukemia or lymphoma is rare and can mimic benign processes such as follicular cystitis (FC).

Materials and methods Eight benign and malignant hematologic diseases encountered in urine cytology were retrospectively reviewed for clinical, radiographic, and cytologic findings.

Results There were 2 cases of acute myeloid leukemia, 2 cases of diffuse large B-cell lymphoma, and 4 cases of FC. The most common presenting symptom was hematuria. Imaging findings included echogenic debris within the bladder or an adjacent soft tissue mass in acute myeloid leukemia cases and bladder wall thickening in diffuse large B-cell lymphoma cases. No FC cases had any imaging abnormalities. Cytologic material of the leukemia cases showed numerous myeloid blasts with markedly increased nuclear-to-cytoplasmic ratios, centrally located nuclei, inconspicuous nucleoli, nuclear indentations, and some irregular nuclear membranes. The background showed sparse urothelial cells and histiocytes. Both lymphoma cases showed a discohesive population of atypical large lymphoid cells with irregular nuclear borders and prominent nucleoli. The FC cases had a background lymphoid cell population with a maturation spectrum from small lymphocytes to large lymphoid cells (immunoblasts) and histiocytes including tingible body macrophages. Additionally, there were many mature squamous cells and reactive urothelial cells.

Conclusions Bladder leukemia, lymphoma, and FC are infrequently encountered on urine cytology. FC can be distinguished from a hematologic malignancy by the presence of a lymphocytic maturation spectrum and tingible body macrophages. Radiologic abnormalities are associated with malignant processes; however, discrete bladder masses are usually not identified.

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Introduction

The most common tumor encountered in urinary cytology is urothelial cell carcinoma. However, lymphoma, leukemia, and follicular cystitis (FC) can occasionally occur, posing diagnostic challenges due to mimicry of other more common disorders or the operator's unfamiliarity with these

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Table 1 Patient characteristics.

Case	Age, yrs	Sex	Presentation	Radiologic findings	Cytologic diagnosis	Bladder biopsy	Diagnosis
1	56	M	Testicular masses	None	Malignant cells consistent with large cell lymphoma, degenerative changes and few reactive urothelial cells	DLBCL	DLBCL transformed from follicular lymphoma
2	80	M	Dysuria, groin pain	Diffuse bladder wall thickening and bilateral hydronephrosis	Highly suggestive of malignant lymphoma, large cell type; biopsy advised	DLBCL	Primary bladder DLBCL
3	48	F	Hematuria	Soft tissue mass adjacent to the bladder	Malignant cells consistent with AML and reactive urothelial cells	None	t-AML
4	74	M	Hematuria	Distended bladder with echogenic debris	Abundant blasts consistent with patient's known history of AML	None	AML-MDS
5	45	F	Microscopic hematuria	None	Follicular cystitis	None	Follicular cystitis
6	37	M	Hematuria	Normal	Follicular cystitis	None	Follicular cystitis
7	49	F	Hematuria, proteinuria	Normal	Follicular cystitis	None	Follicular cystitis
8	56	F	Dysuria, flank pain, nephrolithiasis	Normal	Follicular cystitis	None	Follicular cystitis

Abbreviations: AML, acute myeloid leukemia; AML-MDS, acute myeloid leukemia with myelodysplasia-related features; DLBCL, diffuse large B-cell lymphoma; F, female; M, male; t-AML, therapy-related acute myeloid leukemia.

conditions. Though a discohesive cell population is a common clue, artificial cell clustering can lead to a misdiagnosis of small cell or urothelial cell carcinoma.¹ Lymphoma composes only 5% of nonurothelial tumors of the urinary tract.² Bladder infiltration by acute leukemia is so rare that it has only been described previously in case reports.^{1,3-5} FC is characterized by the presence of lymphoid follicles in the bladder mucosa, usually as a result of chronic inflammation. FC cytology has been described in 6 cases,^{6,7} 2 of which were from our institution.⁶

Materials and methods

We performed a retrospective database search for lymphoma, leukemia, and FC in urine cytology at our institution for the past 22 years (1992-2014). We identified 2 cases of acute myeloid leukemia ([AML], 1 treatment-related and 1 with myelodysplastic features), 2 cases of diffuse large B-cell lymphoma ([DLBCL], 1 secondary and 1 primary), and 4 cases of FC, including 2 previously published by our institution. All cases were diagnosed between 2006 and 2014. Urine specimens were received fresh and ThinPrep (Hologic, Inc) smears were prepared and stained with Papanicolaou stain. Cell blocks were made and sections stained with hematoxylin and eosin. Immunohistochemical stains were performed on formalin-fixed, paraffin-embedded cell block sections.

Results

Results are summarized in [Table 1](#). Case 1 had a 7-month history of follicular lymphoma treated with chemotherapy before presenting with bilateral testicular masses. Case 2 had no history of hematologic malignancy but was diagnosed with small cell lung cancer 4 months earlier and treated with chemotherapy and radiation. He developed groin pain and urinary symptoms for 1 month and was found to have bilateral hydronephrosis.

Both patients with leukemic bladder involvement (cases 3 and 4) presented with hematuria. Case 3 developed treatment-related acute promyelocytic leukemia from radiation and chemotherapy treatment for ovarian serous carcinoma with bladder metastasis. She developed hematuria 2 weeks after her leukemia diagnosis. At presentation, her white blood cell count was 16,320 with 37% blasts and her platelet count was 96,000. Case 4 had a 1-year history of chronic myelomonocytic leukemia with decitabine treatment when he developed spontaneous bleeding and was found to have AML with myelodysplasia-related changes. At presentation, he was in tumor lysis syndrome with white blood cell of 204,000 with 44% blasts and platelet count of 45,000.

Three of the 4 FC patients presented with hematuria (cases 5-7) and the other with dysuria (case 8). Three cases had a history of bladder irritation. Cases 6 and 8 had a

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