Sarcoma in urine cytology; an extremely rare entity: A report of two cases

ABSTRACT
Primary sarcomas of the urinary bladder or prostate are extremely rare entities. The rarity and lack of awareness makes it difficult for the cytologists to detect the spindle cell lesions in urine for malignant cytology. The literature available for the detection of urinary tract sarcomas is little. Here, we report the urine cytology findings of two interesting cases of urinary bladder and prostatic leiomyosarcoma.

Key words: Bladder; sarcoma; urine

Introduction
Urine cytology is an important diagnostic technique for the detection of urothelial malignancies. The bulk of the malignancies occurring in the urothelial tract is formed by the urothelial carcinoma. Naturally, most of the malignancies detected by the urine cytology are urothelial carcinoma, of which high-grade urothelial carcinomas are confidently picked up; however, the low-grade urothelial neoplasms have a lower sensitivity and specificity of detection by urine cytology. The detection of non-urothelial neoplasms, especially sarcomas in the urine cytology is extremely rare, taking into account the rarity of the lesions as well as the lack of awareness of the cytologists. There are only few case reports available in the medical literature, to the best of our knowledge, describing the urine cytology of a high-grade prostatic leiomyosarcoma[1] and urinary bladder leiomyosarcoma,[2] pediatric rhabdomyosarcoma[3,4] and angiosarcoma.[5] A case report of sarcomatoid carcinoma is also available in the medical literature, which morphologically mimics a sarcoma.[6] Hence, there are only three case reports of the urine cytology of adult genitourinary sarcomas and three other cases of pediatric rhabdomyosarcoma. Here, we report the urine cytology of two cases of sarcoma of the urinary tract, one being a high-grade prostatic leiomyosarcoma and the other being a high-grade primary leiomyosarcoma of the urinary bladder.

Case History

Case 1
A 56-year-old male patient presented with painless hematuria. Digital rectal examination showed moderate prostatomegaly with borderline elevation of serum prostate-specific antigen (PSA) level (9.2 ng/ml). Contrast-enhanced magnetic resonance imaging (CEMRI) showed heterogeneous mass lesion in the prostate and bladder base measuring

Suvradeep Mitra, Gurwinder Kaur, Nandita Kakkar, Priya Singh1, Pranab Dey1
Departments of Histopathology and Cytopathology and Gynecological Pathology, Postgraduate Institute of Medical Education and Research, Chandigarh, India

Address for correspondence: Dr. Pranab Dey, Department of Cytopathology and Gynecological Pathology, Postgraduate Institute of Medical Education and Research, Chandigarh – 160 012, India. E-mail: deypranab@hotmail.com
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The 3-day consecutive urine for malignant cytology showed presence of atypical spindle cells. Histopathology showed a prostatic spindle cell tumor infiltrating the urinary bladder [Figure 1a] arranged in the form of short and long fascicles and solid sheets [Figure 1b], with multiple foci of necrosis interspersed within the tumor cells. Moderate degree of atypia and a brisk mitosis is also noted [Figure 1b]. Immunohistochemistry for cytokeratin, p63, S-100, desmin, and myogenin was negative in the tumor cells with strong positivity for vimentin [Figure 1b, inset] and focal positivity for smooth muscle actin (SMA). A diagnosis of high grade prostatic sarcoma, possibly leiomyosarcoma was rendered.

Urine cytology smears were reviewed in view of the positive histopathology report. The urine cytology smears were highly cellular with discreet population and sheets of spindle cells [Figure 1c]. These spindle cells showed moderate pleomorphism, plump oval-to-spindle shaped nuclei with blunt ends, coarse chromatin, inconspicuous nucleoli and indistinct to moderate amount of cytoplasm [Figure 1d]. The background showed many neutrophils, nuclear debris admixed with benign squamous cells, and few benign urothelial cell clusters. No atypia of the urothelial cell was noted. Immunocytochemistry of pan-cytokeratin performed on the smear was negative ruling out the possibility of an epithelial malignancy.

Case 2

A 60-year-old female patient presented with painless hematuria and passage of blood clots in urine of 4-months duration. Ultrasonography of the urinary bladder showed a heterogeneous growth measuring 3.7 cm × 2.9 cm × 4.5 cm involving the left posterolateral wall. Urine for malignant cytology from 3-day consecutive urine sample smears showed atypical spindle cells. Histopathology revealed a tumor arranged in short and long fascicles with predominantly ulcerated and focally preserved urothelial lining [Figure 2a and b]. These spindle cells showed moderate nuclear atypia, hyperchromatic spindle-shaped nuclei, and moderate amount of cytoplasm. Brisk mitosis and necrosis were observed [Figure 2b]. Immunohistochemistry for pancytokeratin [Figure 2b], p63, S-100, desmin, and myogenin was negative with strong vimentin and focal SMA positivity. A diagnosis of high grade sarcoma of the urinary bladder, possibly leiomyosarcoma was given.

The original urine cytology smears were reassessed. The urine cytology showed smears of moderatecellularity, with discreet population of spindle cells [Figure 2c]. These cells had ellipsoid nuclei with blunt ends, coarse chromatin, few conspicuous nucleoli, and indistinct cytoplasm [Figure 2d]. Pleomorphism is mild-to-moderate at few foci, and the background showed sheets of neutrophils along with reactive urothelial cell clusters and scattered squamous cells. Immunocytochemistry of Pan-cytokeratin performed on the smear was negative ruling out the possibility of an epithelial malignancy.

Discussion

Primary sarcomas of the urinary tract are extremely rare except for embryonal rhabdomyosarcoma in the pediatric

Figure 1: Case 1 (a) Intact urothelial lining epithelium with a spindle cell tumor (H and E stain x40). (b) Cells are oval-to-spindle shaped with blunt ended nuclei, coarse chromatin (H and E stain x400); inset shows strong diffuse cytoplasmic positivity for vimentin (IHC : Vimentin x400). (c) Urine cytology shows discreet population of spindle cells in a highly cellular smear (Pap stain x100). (d) The tumor cells show moderate pleomorphism and oval-to-spindle shaped cells (Pap stain x400)

Figure 2: Case 2 (a) Intact urothelial lining epithelium with a spindle cell tumor stretching the overlying epithelium (H and E stain x40). (b) The tumor cells are oval-to-spindle shaped with blunt ended nuclei (H and E stain x400); inset shows negativity for Pancytokeratin, whereas the urothelial lining is positive (IHC : AE1/AE3 x40). (c) Urine cytology shows discreet population of spindle cells (Pap stain x100). (d) Individual tumor cells show moderate pleomorphism and blunt nuclear ends (Pap stain x400)
age group. Leiomyosarcoma is the most common of all urothelial sarcomas followed by malignant peripheral nerve sheath tumor, angiosarcoma, primitive neuroectodermal tumor, undifferentiated sarcoma, and alveolar soft part sarcoma other than pediatric rhabdomyosarcoma.\(^7,8\) Prostatic leiomyosarcoma constitutes only 0.1% of all the prostatic tumors,\(^9,10\) whereas leiomyosarcoma of the urinary bladder contributes to less than 1% of all the bladder malignancies.\(^8\) These tumors present with hematuria, dysuria, or obstructive symptoms along with pain and metastatic disease. Most of the sarcomas at these sites are aggressive neoplasm with high morbidity and mortality necessitating an early detection.\(^9\)

The differential diagnosis of atypical spindle cells in the urine cytology includes sarcomatoid changes occurring in urothelial carcinoma\(^6\) or renal cell carcinoma.\(^11\) Metastatic or infiltrative spindle cell tumors should also be considered as differential. Rarely, macrophages from a benign histiocytic lesion can adopt spindle cell morphology and should be considered as a differential. Because these tumors are high-grade neoplasms, the background often shows nuclear debris and necrotic material, prompting the cytologist to ignore the spindle cells as degenerated cells with atypia. In such cases, a background history and radiological data often help the cytologist to narrow down the differential. For example, presence of a renal mass can easily be detected by ultrasonogram, thereby ruling out the possibility of sarcomatoid change in a renal cell carcinoma. Similarly, knowledge of a sarcoma of any adjacent site definitely helps the cytologist to be confident about the diagnosis.

Both the cases were initially missed on urine cytology smears due to the rarity of the lesions. However, the cases showed moderate-to-highly cellular smears with discreet population of spindle cells and oval-to-spindle shaped nuclei with blunt-to-rounded ends, coarse chromatin, and predominantly indistinct cytoplasm. Similar cytomorphology of prostatic and urinary bladder leiomyosarcoma had already been depicted in previous case reports.\(^1,2\) An adequate awareness of the cytologists is required for these rare entities due to their highly aggressive nature. In suspected cases, examination of a repeat urine sample with application of ancillary techniques such as immunocytochemistry can be performed on the cell block material.

In brief, sarcoma of the urinary bladder and prostate are rare neoplasms. Given the rarity and difficulty in diagnosis, the available literature for the diagnosis of the sarcomas in the urine cytology is scant. We hereby report the urine cytology of two cases, one each of prostatic and urinary bladder leiomyosarcoma. In view of their aggressive behavior, a necessary awareness is required to diagnose these cases in urine cytology for timely intervention and proper management.

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**Conflicts of interest**
There are no conflicts of interest.

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