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Case Report

The great mimicker of the bladder: paraganglioma masquerading as urothelial carcinoma

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ABSTRACT

Urinary bladder paraganglioma is an exceptionally rare extra-adrenal neuroendocrine tumor arising from chromaffin cells, accounting for less than 0.05% of all bladder tumors. Due to nonspecific clinical presentation and overlapping radiological features, it is frequently misdiagnosed as urothelial carcinoma. Definitive diagnosis relies on histopathology with immunohistochemistry. A 63-year-old female presented with increased urinary frequency for eight months without hematuria or catecholamine-related symptoms. Imaging revealed a polypoidal lesion in the posterior bladder wall with calcification, suggestive of malignancy. The patient underwent transurethral resection of bladder tumor. Histopathology showed tumor cells arranged in nests with characteristic "salt and pepper" chromatin, raising suspicion of paraganglioma. Immunohistochemistry demonstrated positivity for chromogranin and synaptophysin, with negative epithelial markers and a low Ki-67 index, confirming the diagnosis. The postoperative course was uneventful. Bladder paragangliomas are rare and often indistinguishable from urothelial carcinoma clinically and radiologically. Non-functional tumors further complicate diagnosis. Histopathological overlap necessitates immunohistochemical confirmation. Transurethral resection may be both diagnostic and therapeutic in localized cases. Bladder paraganglioma should be considered in the differential diagnosis of bladder tumors. Early recognition and immunohistochemistry are essential for accurate diagnosis. Complete surgical excision with long-term follow-up is recommended.

Keywords: Urinary bladder, Paraganglioma, Urothelial carcinoma, TURBT, Neuroendocrine tumor, Immunohistochemistry

INTRODUCTION

Paragangliomas are rare neuroendocrine tumors arising from chromaffin cells of the autonomic nervous system, with extra-adrenal locations accounting for approximately 10% of cases.[1] Urinary bladder paraganglioma is an exceptionally uncommon entity, constituting less than 0.05% of all bladder tumors and less than 1% of all paragangliomas.[2]

These tumors may be functional, producing catecholamines and presenting with classical symptoms such as hypertension, palpitations, and micturition syncope, or non-functional, where symptoms are nonspecific and often mimic urothelial carcinoma.[3,4]

The rarity and nonspecific presentation make preoperative diagnosis difficult, and most cases are identified only after histopathological examination.[5]

Histologically, bladder paragangliomas can resemble the nested variant of urothelial carcinoma, creating a diagnostic challenge.[6] Immunohistochemistry is therefore essential, with tumor cells typically expressing neuroendocrine markers such as chromogranin and synaptophysin while lacking epithelial markers.[7]

CASE REPORT

A 63-year-old female presented with increased frequency of micturition for eight months without hematuria, dysuria, obstructive urinary symptoms, or constitutional complaints. There were no features suggestive of catecholamine excess such as episodic hypertension, palpitations, or micturition syncope. Clinical examination was unremarkable except for a reducible umbilical swelling suggestive of an umbilical hernia.

Laboratory investigations revealed anemia (hemoglobin 9.4 g/dL) and mild leukocytosis (total leukocyte count 12,380/mm^3), with normal renal function tests and negative serology for HIV and hepatitis B.

Ultrasonography demonstrated a hypoechoic polypoidal lesion measuring approximately 18×16 mm arising from the posterior bladder wall with a focal calcific component. Non-contrast computed tomography confirmed a well-defined 13×14 mm polypoidal soft tissue lesion with coarse calcification and associated diffuse bladder wall thickening, suggestive of bladder malignancy.

The patient underwent transurethral resection of bladder tumor under spinal anesthesia. Intraoperatively, a solitary polypoidal lesion arising from the posterior bladder wall was completely resected with adequate hemostasis. Notably, there were no intraoperative hypertensive episodes, supporting a non-functional tumor. The postoperative period was uneventful.

Histopathological examination revealed tumor cells arranged in nests and sheets with round to mildly enlarged nuclei, abundant eosinophilic cytoplasm, and characteristic “salt and pepper” chromatin. Prominent vascular channels were present, and focal invasion was noted. These findings raised the differential diagnosis of paraganglioma versus nested variant urothelial carcinoma.

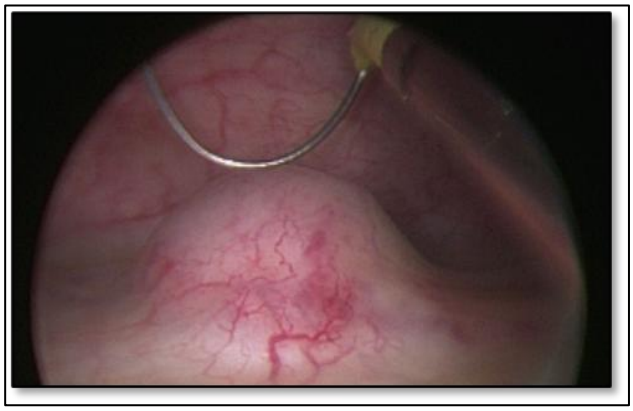

Figure 1: Cystoscopic image showing a smooth, polypoidal lesion arising from the posterior wall of the urinary bladder with prominent surface vascularity, suggestive of a neoplastic growth.

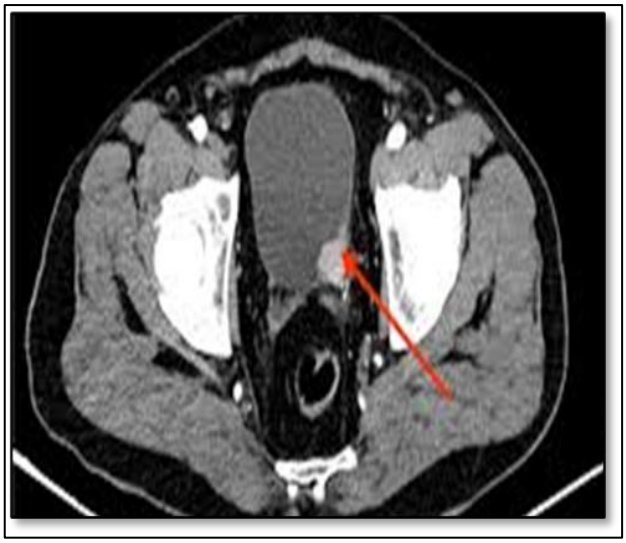

Figure 2: Non-contrast axial CT image of the pelvis demonstrating a well-defined polypoidal soft tissue lesion arising from the posterior wall of the urinary bladder (arrow), associated with focal calcification.

Immunohistochemistry showed diffuse positivity for chromogranin and synaptophysin, confirming neuroendocrine differentiation, while cytokeratin, p63, uroplakin, and NKX3.1 were negative. The Ki-67 proliferation index was low (1-2%). These findings established the diagnosis of urinary bladder paraganglioma.

Following complete resection, the patient was planned for regular cystoscopic surveillance and follow-up imaging.

DISCUSSION

Urinary bladder paraganglioma represents a rare but clinically significant diagnostic entity due to its ability to mimic urothelial carcinoma both clinically and radiologically. In recent literature, Aryal et al emphasized that these tumors are frequently misdiagnosed preoperatively due to nonspecific imaging findings.[2] Similarly, a 2025 case reported by Sun et al described a bladder paraganglioma initially mistaken for hypertensive disorders in pregnancy, highlighting the diagnostic complexity of functional variants.

Our case is particularly notable for its non-functional presentation, which aligns with observations from recent reports that a significant proportion of bladder paragangliomas lack catecholamine-related symptoms.[3,8] A 2025 case by Duran et al described an asymptomatic elderly patient with an incidental bladder mass diagnosed postoperatively, closely mirroring our presentation.

Radiologically, bladder paragangliomas typically present as enhancing, hypervascular masses but cannot be reliably distinguished from urothelial carcinoma.[9] This limitation was evident in our case, where imaging

strongly suggested malignancy. Similar findings have been consistently reported across multiple case series and reviews.[4,10]

Histopathology remains the cornerstone of diagnosis, with the characteristic "zellballen" architecture. However, overlap with nested variant urothelial carcinoma necessitates immunohistochemical confirmation.[6,11] The immunoprofile observed in our case-positivity for chromogranin and synaptophysin with negativity for epithelial markers-is well documented in the literature.[7,12]

Management strategies vary depending on tumor characteristics. While partial cystectomy has traditionally been advocated, recent reports suggest that transurethral resection may be sufficient for small, localized lesions.[13] A recent 2025 report demonstrated successful en bloc resection without recurrence, supporting a conservative surgical approach in selected cases.

Importantly, functional tumors may precipitate intraoperative hypertensive crises if not diagnosed preoperatively, necessitating biochemical screening and alpha-blockade.[14] However, such complications were absent in our case, consistent with a non-functional tumor.

Long-term follow-up is essential, as recurrence and malignant transformation, although rare, have been reported.[15,16] Recent literature continues to emphasize the absence of standardized surveillance protocols due to the rarity of this tumor.

CONCLUSION

Urinary bladder paraganglioma is a rare tumor that can closely mimic urothelial carcinoma, leading to potential misdiagnosis and inappropriate management. This case highlights the importance of considering paraganglioma in the differential diagnosis of bladder masses, especially when histological features are atypical.

A practical clinical approach should include maintaining a high index of suspicion, especially in cases with unusual clinical presentation or inconclusive histopathology. Preoperative evaluation for catecholamine excess should be considered when paraganglioma is suspected to prevent perioperative complications.

Complete surgical excision remains the cornerstone of treatment, with transurethral resection being adequate for small, localized, non-functional tumors. Given the lack of standardized guidelines, we recommend structured long-term follow-up with periodic cystoscopic surveillance and imaging to detect recurrence early.

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