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Case Report

Bladder paraganglioma: Case report and review of the literature ☆

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ABSTRACT

Pheochromocytoma is a tumor that originates from the chromaffin cells of the adrenal medulla and is responsible for the production of catecholamines. However, when it occurs outside the adrenal glands, it is called a paraganglioma and accounts for 10%-15% of cases. In this report, we present the case of a 27-year-old male patient with a history of hypertension, who presented hematuria and dizziness on urination with a diagnosis of bladder paraganglioma. Contrast-enhanced computed tomography revealed the presence of a bladder tumor. Bladder paraganglioma is a rare condition, and understanding possible imaging findings is crucial to raising suspicion of this diagnosis and expanding our knowledge of this rare disease.

Background

Pheochromocytoma is a tumor that arises from the chromaffin cells of the adrenal medulla and produces catecholamines. Paragangliomas, which are extra-adrenal tumors, account for 10%-15% of cases [1]. Among these, bladder paragangliomas are uncommon, representing approximately 6%-10% of all cases. They do not show a gender predilection, and their clinical manifestations are diverse, ranging from hypertension, headaches, and palpitations to hematuria. Therefore, it is essential to accurately determine their location to establish appropriate management and care, base a multidisciplinary approach between radiologists, urologists, endocrinologists, and nuclear medicine physicians [2]. In this case, we present a patient who experienced hematuria and vertigo during urination. Further investigations, including urine metanephrine testing, were conducted, and a contrast-enhanced computed tomography (CT) revealed a lobulated bladder mass with a necrotic center.

☆ Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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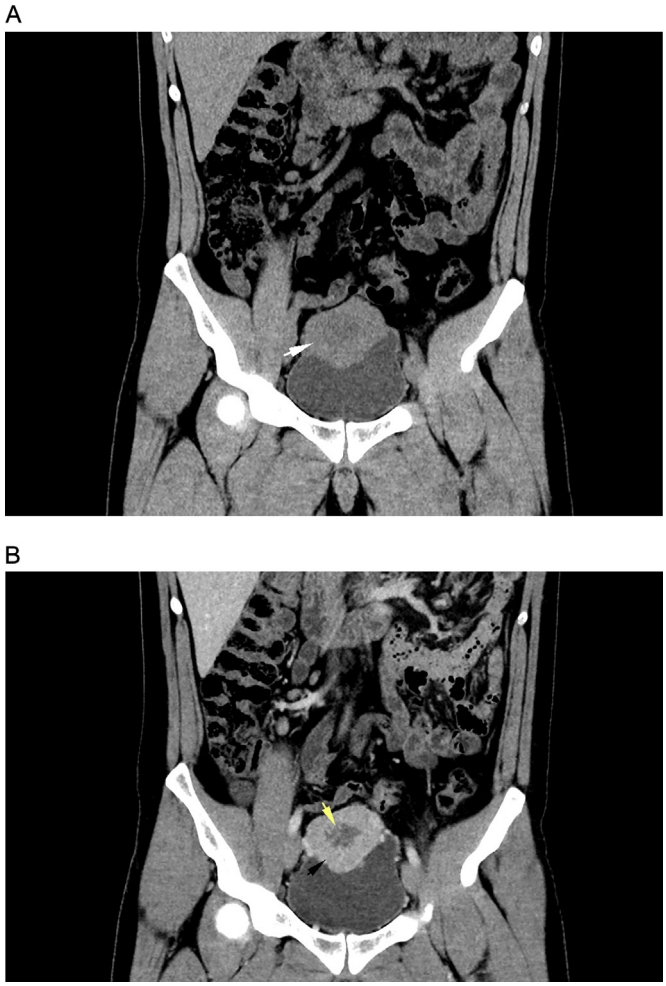

Fig. 1. – (A) Computed tomography (CT). Coronal section in a soft tissue window showing a mass with soft tissue density (white arrow) dependent on the wall of the bladder dome, endophytic growth, and lobulated contours. (B) Contrast-enhanced computed tomography (CT). Coronal section in a soft tissue window showing avid enhancement of the mass (black arrow) and a necrotic center (yellow arrow).

Case description

A 27-year-old male patient with a history of hypertension under pharmacological treatment presented at a high-complexity hospital with complaints of gross hematuria and a sensation of dizziness during urination that had been occurring for the past month. Upon initial review of systems, the patient denied experiencing any additional symptoms, constitutional symptoms, or weight loss. The initial physical examination revealed normal vital signs, cardiopulmonary findings, and abdominal parameters, with no tenderness or palpable masses. The neurological examination was normal.

Extension paraclinical tests showed elevated levels of urinary metanephrines. Abdominal CT with contrast revealed a lobulated bladder mass located on the upper wall, with endoluminal extension, avid enhancement with contrast medium, and a necrotic center (Fig. 1). Additionally, the mass exhibited peripheral calcification (Fig. 2) and dilation of vascular structures of the bladder wall and surrounding the tumor (Fig. 3) which measured an average size of 64 × 71 × 56 mm. Besides, an enlarged obturator right node was observed (Fig. 4). No lesions were found on the chest CT.

The patient underwent laparoscopic partial cystectomy, as well as robotic-assisted bilateral obturator and hypogastric pelvic lymphadenectomy. During the initial cystoscopy, a large bladder mass located on the dome of the bladder was identified. The mass appeared erythematous and hypervascularized, with a tendency to bleed upon contact, but it did not involve the urinary meatus. The mass was completely resected without complications. Macroscopically, the tumor displayed a shiny nodular surface with a yellowish-brown color. Microscopic examination revealed polygonal cells with eosinophilic and granular cytoplasm, round nuclei with scattered chromatin, few mitotic figures, and areas of hemorrhage. Immunohistochemical analysis demonstrated overexpression of synaptophysin and chromogranin, displaying a membrane and cytoplasmic pattern. CD56 exhibited membrane pattern

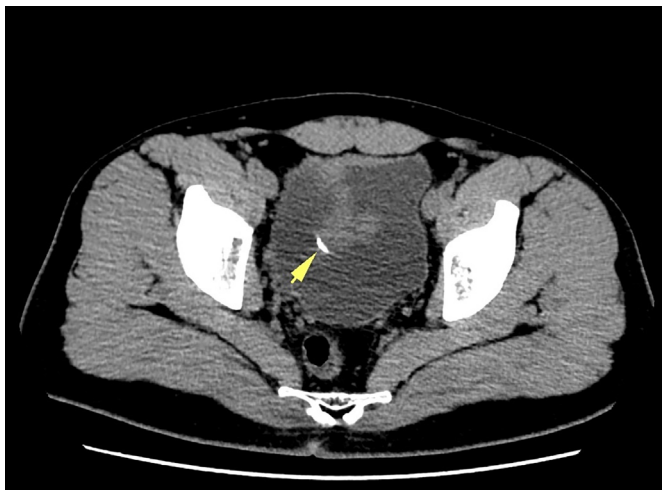

Fig. 2 – Computed tomography (CT). Axial section in soft tissue window showing calcifications in the periphery of the tumor (yellow arrow).

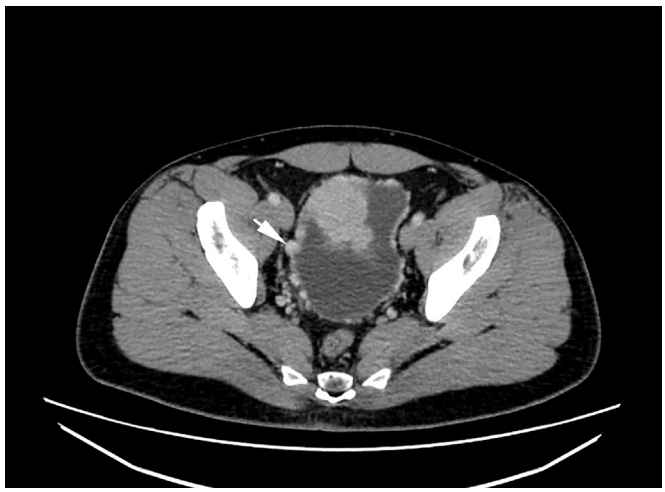

Fig. 3 – Contrast-enhanced computed tomography (CT). Axial section in soft tissue window showing dilation of the vascular structures of the bladder wall and surrounding the tumor (white arrow).

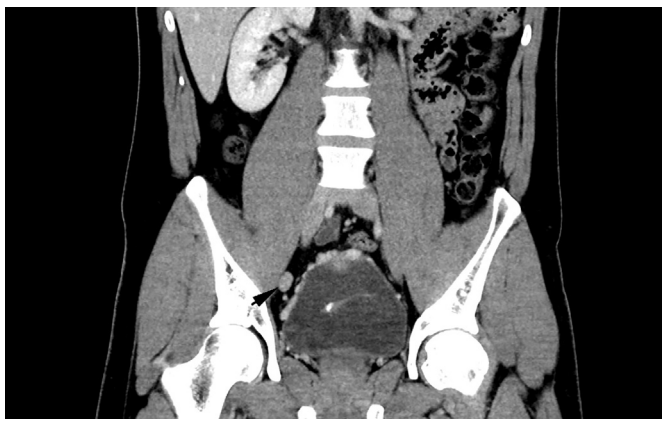

Fig. 4 – Contrast-enhanced computed tomography (CT). Coronal section in soft tissue window showing enlarged right obturator node which measures 10 mm in its short axis (black arrow).

reactivity, and S100 showed reactivity in the sustentacular component. The KI67 cell proliferation index was 1%, with no central or confluent necrosis or atypical mitoses, thus confirming the diagnosis of bladder paraganglioma, with a nested growth pattern, without evidence of extension to adipose tissue or lymphovascular invasion, PASS 2 score.

Discussion

Bladder paraganglioma is a rare nonepithelial neuroendocrine neoplasm that arises from autonomic nervous tissue, specifically chromaffin cells [3]. It represents a small percentage (0.05%-0.06%) of all bladder tumors and typically occurs between the ages of 43 and 50, with no gender predominance [2]. Pheochromocytomas in the genitourinary tract most commonly occur in the urinary bladder (79.2%), followed by the urethra (12.7%), pelvis (4.9%), and ureter (3.2%) [4]. Bladder paragangliomas can present with a wide range of symptoms, and up to 83% of cases may exhibit functional symptoms related to catecholamine secretion [1,5]. Typical clinical manifestations include flushing, paroxysmal hypertension, palpitations, tremors, micturition syncope, and hematuria, while other diverse symptoms such as paresthesias and dyspnea have also been reported [4,5].

Due to delayed medical consultation, patients with bladder paragangliomas may experience advanced manifestations resulting from catecholamine secretion, such as syncope, retinopathy, or intracranial hemorrhage [4,6]. This can lead to a delay in diagnosis and treatment.

Bladder paragangliomas can be located within the muscle layer or the bladder itself, with 45% found to be submucosal and 42% intramural. They typically have an average size of 2.5 cm, with larger intramural tumors appearing spherical or lobulated and smaller ones exhibiting a more homogeneous appearance [7].

The diagnostic imaging modalities for bladder paraganglioma include ultrasound, where the tumors appear as hypoechoic lesions (60%) with an obtuse angle in relation to the bladder wall, and increased blood flow on color Doppler [1,5]. CT has a sensitivity of 91% and typically shows an hyperdense, rounded, homogeneous lesion with arterial phase enhancement and prominent peritumoral vessels in larger tumors, calcification is present in 10% of cases and necrosis is rare [2]. These tumors are highly vascularized and may occasionally display calcifications [7]. Magnetic resonance imaging (MRI) is more sensitive than CT and provides excellent soft tissue contrast for localizing the tumor within the bladder layers. Bladder paragangliomas typically appear hyperintense on T1 and T2 weighted images compared to the muscularis propria. Diffusion restriction is often observed, and larger tumors may exhibit a “salt and pepper” appearance [1,2,8].

Another imaging method used is nuclear medicine images with tracer uptake and PET CT. Gallium 68 DOTATATE is a very useful marker to identify metastatic disease with 18 F-FDG and 18 F-DOPA, it has greater sensitivity and specificity for abdominopelvic paragangliomas [2], additionally, an available alternative is 123-iodine-metaiodobenzylguanidine (123 I-MIBG) SPECT/CT should be reserved for patients considered for radioiodine therapy [2].

Around 10%-26% of bladder paragangliomas have a malignant presentation, which is defined by lymph node involvement or distant metastasis [5,9]. Differentiating malignant from benign pheochromocytoma has been a challenge based on histological characteristics, which is why the PASS score (Pheochromocytoma of the Adrenal gland Scaled Score) was developed, and a score >4 is considered potentially malignant tumors [10]. In terms of staging, bladder paragangliomas are classified as T2 when they involve the bladder wall, as T3 indicating extension into the perivesical fat, and as T4 representing invasion of adjacent organs or muscles. N1 refers to the presence of pelvic lymph node involvement, there is no T1 stage for bladder paragangliomas. Metastasis is considered when nonadrenal and nonparasympathetic chain tissues are affected, with common sites being lymph nodes, bone, liver, and lungs [2].

Histologically, these tumors are composed of principal cells arranged in cords or nests, surrounded by sustentacular cells and capillary networks. Immunohistochemical staining for neuroendocrine markers such as synaptophysin and CD56 is usually positive, along with positive staining for chromogranin A. Other diagnoses involving catecholamine-synthesizing-enzymes conditions can be ruled out [2].

Treatment options for paragangliomas include catecholamine blockade, surgery, chemotherapy, and radiation therapy, depending on the stage of the tumor. Surgical management, such as transurethral resection of the prostate (TURP) or partial cystectomy [2,11], is typically chosen for localized or locally advanced tumors. Prior medication administration is necessary to prevent hypertensive crises, arrhythmias, or complications during surgery. Nonsurgical approaches may involve chemotherapy, and follow-up is recommended at 3 months after finishing medical treatment for patients with elevated biochemical markers, nonfunctioning tumors, or those without a hormonal profile prior to surgery. Local recurrence, even after margin resection, occurs in approximately 15% of cases, highlighting the importance of regular imaging follow-up, ideally with MRI, every 1-2 years [2].

In conclusion, although bladder paragangliomas are rare, it is crucial to recognize and suspect this condition. Accurate diagnosis, utilization of characteristic imaging techniques, and appropriate planning of interventions are essential to avoid unnecessary urgent surgeries or misdiagnoses that are not compatible with the nature of the tumor.

Ethical approval

This article was approved by the hospital ethics committee.

Patient consent

Informed consent was obtained from the patient for the publication of data from her clinical history and the necessary images.

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