Urology Case Reports 26 (2019) 100950

Contents lists available at ScienceDirect

Urology Case Reports

journal homepage: www.elsevier.com/locate/eucr

Oncology

A rare case of non-functioning bladder paraganglioma treated with robotic assisted partial cystectomy

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ARTICLE INFO

Keywords:
Bladder
Paraganglioma
Partial cystectomy

ABSTRACT

Primary bladder paraganglioma is rare. A 57-year old man presented with a mass in the inferior wall of the bladder identified on computerized tomography imaging. We investigated the mass with office cystoscopy followed by transurethral resection, which was found to be a nonfunctioning paraganglioma. ^{68}Ga-DOTA-conjugated somatostatin receptor-targeting peptide positron emission tomography revealed no other locations of the disease. The mass was then completely removed through robotic assisted partial cystectomy. Succinate dehydrogenase B immunohistochemistry was normal, arguing against a succinate dehydrogenase-deficient paraganglioma.

Introduction

Paraganglioma, or extra adrenal pheochromocytoma, is a rare neuroendocrine tumor. These tumors can arise in different site in the body; however, they most commonly occur in the retroperitoneum. Rare cases of bladder paraganglioma have been reported, with the classical presentation of having episodic flushing, headache, rising blood pressure, and palpitation during urination due to discharge of catecholamines from these tumors. Paraganglioma of the urinary bladder account for approximately 0.06% of bladder tumors. Owing to their rarity and symptomatic variability, bladder paragangliomas are commonly misdiagnosed leading to a potentially life-threatening cardiovascular event.[1] New modalities of imaging are available to stage this disease.

Case presentation

A 57-year-old male patient presented to our clinic with the finding of a suspicious lesion in the wall of the bladder on computerized tomography imaging, which was performed to investigate unrelated liver problems. Imaging revealed a small, just under 1 cm, hyperdense nodule incidentally noted within the inferior wall of the urinary bladder of uncertain etiology. Given the single-phase exam it was uncertain whether this reflects a hyperdense (i.e. hemorrhagic or proteinaceous) non-enhancing cystic lesion versus a true solid enhancing mural mass (Fig. 1). Urologic consult and magnetic resonance imaging (MRI) of the pelvis with and without intravenous contrast were recommended to better characterize the lesion as either cystic or solid. The patient was then seen in our clinic. He denied any urinary complaints, and an MRI was performed. This MRI revealed an 11 mm × 7 mm focal nodularity along the posterior inferior wall of the urinary bladder. The lesion appeared solid (Fig. 2). Postcontrast imaging was limited by excreted contrast in the bladder and motion artifact.

To better investigate this lesion, we proceeded with direct visualization using flexible cystoscopy in clinic which revealed a pigmented mass with a smooth surface inside the bladder protruding from the wall just above the bladder neck. Suspecting that such a lesion could be either a melanoma or a paraganglioma, we ordered serum catecholamine testing which was with in normal limits. Next, we performed transurethral resection of the mass to determine the pathology. Due to the location of the mass, complete visualization was difficult through the rigid cystoscope and we were unsure of complete removal. Histopathology revealed a nested neoplasm involving the lamina propria that was difficult to distinguish between invasive urothelial carcinoma and PG; however, immunohistochemistry revealed negative staining for cytokeratin AE1/AE3 and p63 with strong staining for chromogranin and GATA3. There was patchy staining of tumor cells and sustentacular cells for S100. Immunohistochemistry for succinate dehydrogenase B (SDHB) was normal (positive), arguing against an SDH-deficient PG. To verify absence of spread of a potentially malignant paraganglioma to other regions of the body we proceeded with staging using ^{68}Ga-DOTA-conjugated somatostatin receptor-targeting

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https://doi.org/10.1016/j.eucr.2019.100950
Received 2 June 2019; Accepted 24 June 2019
Available online 25 June 2019

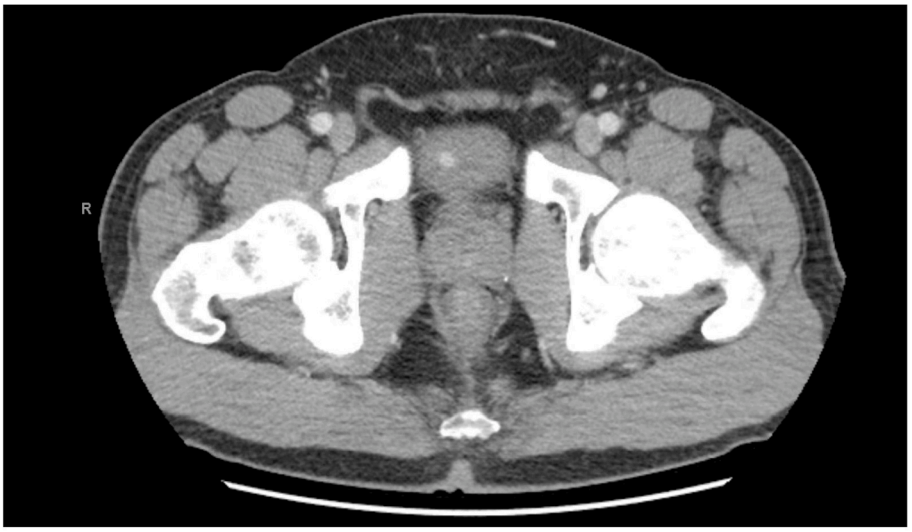

Fig. 1. Computerized tomography imaging of the pelvis showing an enhancing lesion in the wall of the bladder of a patient diagnosed with pheochromocytoma of the urinary bladder.

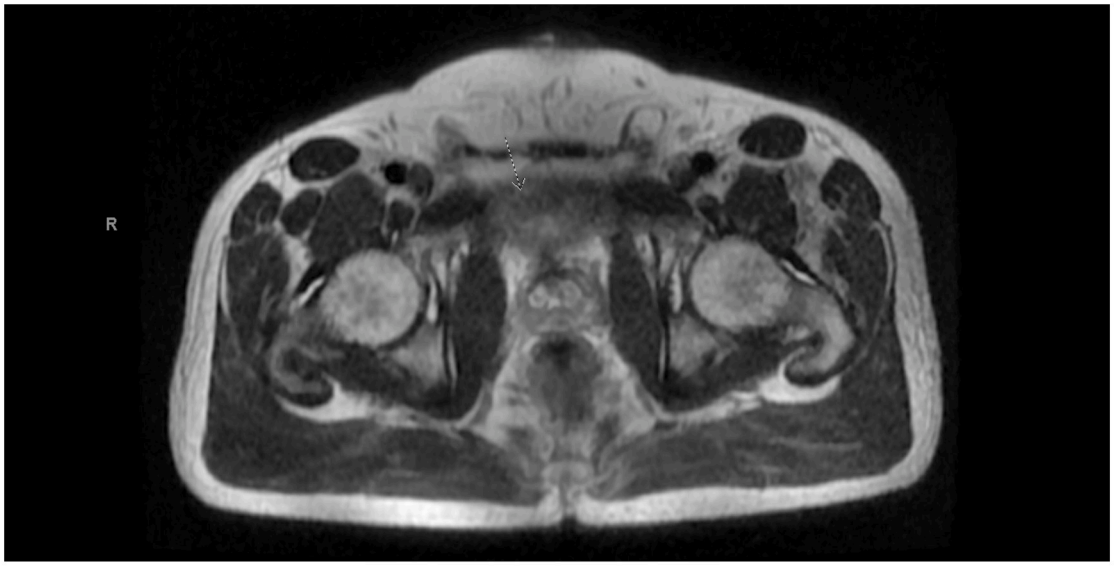

Fig. 2. Magnetic resonance imaging confirming a solid lesion in the wall of the bladder of a patient diagnosed with pheochromocytoma of the urinary bladder.

peptide PET, which showed no other locations of the disease. In view of the diagnosis and the unfavorable location of the tumor on the anterior wall of the bladder, leading to incomplete removal, we performed a robotic assisted partial cystectomy. Intraoperatively we could easily find the location of the previous resection and the final pathology confirmed residual paraganglioma with complete resection of the tumor (Fig. 3).

Discussion

Paragangliomas are extra-adrenal neoplasms derived from neural crest cells. Tumors arising within the adrenal medulla are termed pheochromocytoma, whereas those of other sites are regarded as paraganglioma. Bladder paraganglioma accounts for 0.05% of bladder tumors and occur in young adults (mean age 43 years). They are usually derived from embryonic rests of chromaffin cells in the detrusor sympathetic plexus. It accounts for 10% of extra-adrenal pheochromocytoma. Malignancy has been demonstrated in 10% and characterized by regional lymph node metastases or distant spread. Bladder paraganglioma may be hormonally active and presents with attacks of paroxysmal hypertension, headaches, palpitations, blurred vision, and sweating associated with the act of micturition.[1,2] If a functional paraganglioma is suspected, cystoscopy should be performed under adrenergic blockade in the operating room. The gross appearance is often a solitary, submucosal, or intramural nodule. The definition of the depth of the tumor usually depends on CT scan or MRI. Isotopic scanning using ^{131}Iodine metaiodinebenzylguinidine (MIBG) has previously been the study of choice for localizing small paragangliomas.[3] However, ^{68}Ga-DOTA-conjugated somatostatin receptor-targeting peptide PET has replaced MIBG as a tool to detect pheochromocytoma and paraganglioma at our center. Because paragangliomas express high levels of somatostatin receptor (SSTR), ^{68}Ga-DOTA–conjugated somatostatin receptor–targeting peptides (^{68}Ga-DOTA-SST) PET have shown an excellent lesion-based accuracy in detection of these tumors. In fact, Han et al. performed a systemic review and meta-analysis of the role of this type of imaging in detecting paragangliomas and found that per-lesion detection rates of ^{68}Ga-DOTA-SST PET were consistently higher (ranging from 92% to 100%) than other imaging modalities, including

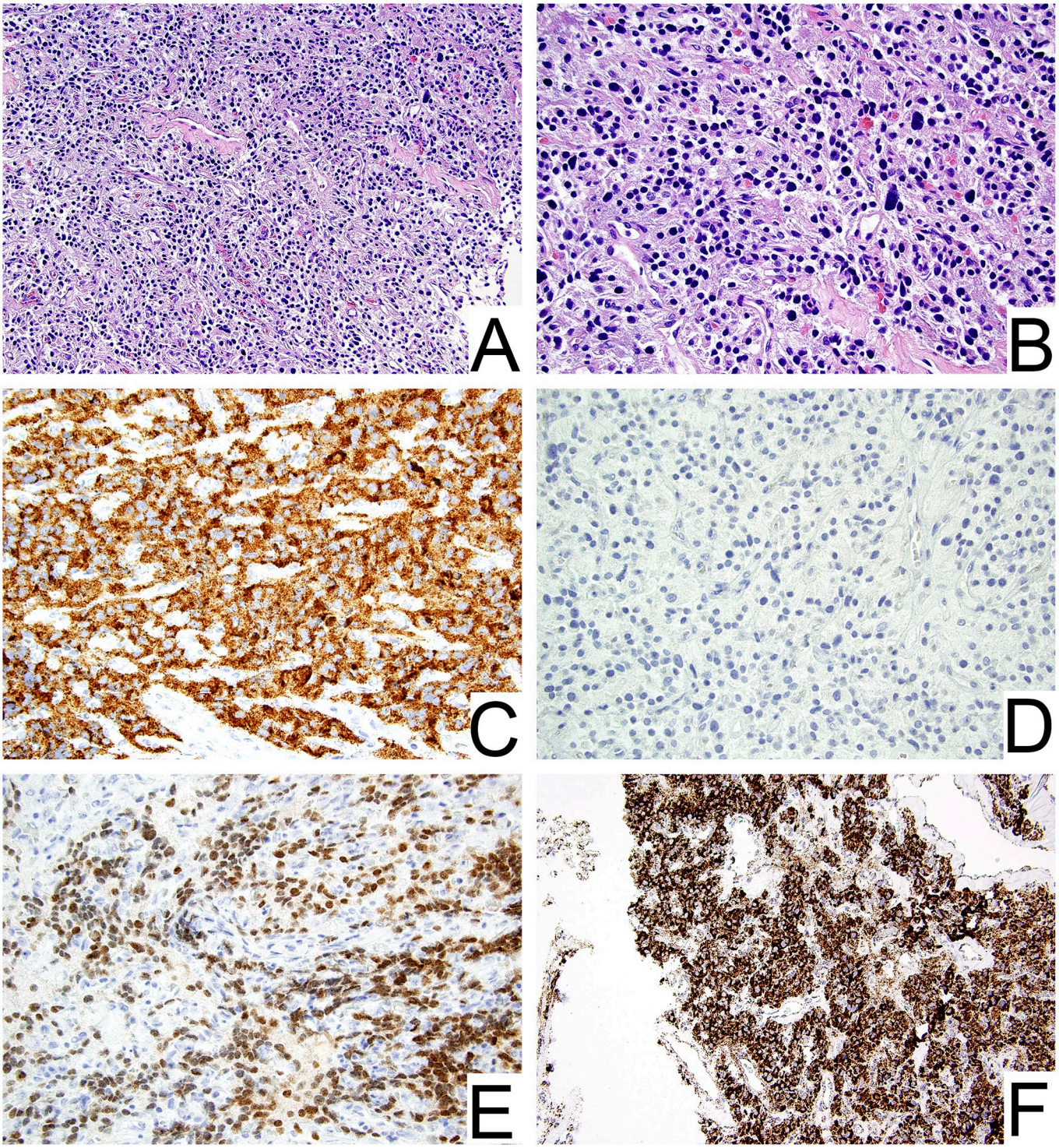

Fig. 3. A) Histopathology of the tumor shows a neoplasm with nested architecture, nuclear size variation, and pseudoinfiltrative pattern, making discrimination from urothelial carcinoma difficult. B) Higher magnification shows a suggestion of amphophilic cytoplasm and variation in nuclear size. C) There is strong staining for chromogranin and D) negative staining for cytokeratin AE1/AE3. E) GATA3 is positive, which is common in paraganglioma but could lead to confusion with urothelial carcinoma. F) Succinate dehydrogenase B staining shows a normal (positive) pattern, arguing against association with SDH germline mutations.

^{18}F-fluorohydroxyphenylalanine (^{18}F-FDOPA) PET, ^{18}F-FDG PET, and $^{123/131}$I-metaiodobenzylguanidine ($^{123/131}$I-MIBG) scintigraphy. The authors concluded that ^{68}Ga-DOTA-SST PET can be used as a first-line imaging modality for the primary staging of paraganglioma.[4] Surgical treatment with partial or radical cystectomy is the recommended treatment and should be employed under the same precautions as in adrenal pheochromocytoma with controlled adrenergic blockade in patients with functional paraganglioma.

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