CASE REPORT

Journal of Pre-Clinical and Clinical Research
www.jpccr.eu

Are pheochromocytomas easy to find?

Katarzyna Witczak[1,A-B,D], **Kamil Górecki**[1,A-D]✉, **Jakub Gołacki**[2,E-F]

[1] *Students' Scientific Society, Department of Endocrinology, Diabetology and Metabolic Diseases, Medical University, Lublin, Poland*
[2] *Department of Endocrinology, Diabetology and Metabolic Diseases, Medical University, Lublin, Poland*
A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical revision of the article, F – Final approval of the article

Witczak K, Górecki K, Gołacki J. Are pheochromocytomas easy to find? J Pre-Clin Clin Res. doi:10.26444/jpccr/204847

Abstract

Pheochromocytomas are rare catecholamine-producing tumours that arise from the adrenal medulla. They can manifest with paroxysmal hypertension, headache, palpitations, and sweating. Advanced imaging modalities are key for accurate localization. The case is presented of a 66-year-old male admitted in 2018 and diagnosed with a retroperitoneal pheochromocytoma, due to poor physical activity tolerance and resistant hypertension. Abdominal ultrasonography revealed an cystic lesion beneath the right adrenal gland. Hormonal evaluation confirmed elevated plasma methoxy-catecholamines. Due to the unusual location of the tumour, multiple CT scans were required to confirm the diagnosis. The patient underwent pre-operative alpha-blockade therapy to manage catecholamine secretion, followed by successful surgical resection. Retroperitoneal pheochromocytomas are exceptionally rare and diagnostically challenging. Complete imaging and biochemical evaluation are essential for accurate diagnosis.

Key words

pheochromocytoma, paraganglioma, catecholamine-producing, retroperitoneal location.

INTRODUCTION

Pheochromocytomas are rare neuroendocrine tumours that produce catecholamines, originating primarily from chromaffin cells of the adrenal medulla or, less frequently, from extra-adrenal sites such as paraganglia. These tumours may occur sporadically or in association with hereditary syndromes, including Multiple Endocrine Neoplasia type 2 (MEN 2), Neurofibromatosis type 1 (NF1), and von Hippel-Lindau (VHL) syndrome [1, 2]. Although most pheochromocytomas are benign, their catecholamine hypersecretion can lead to severe, potentially life-threatening cardiovascular complications, emphasizing the importance of timely diagnosis and management [1, 2].

The clinical presentation of pheochromocytomas is often variable, with hallmark symptoms including paroxysmal hypertension, severe headaches, palpitations, anxiety, and diaphoresis [1, 2]. These manifestations can be non-specific, necessitating a high degree of clinical suspicion to ensure accurate identification. Biochemical evaluation, particularly the measurement of 3-O- methylated catecholamine metabolites in a 24-hour urine collection, plays a pivotal role in diagnosis [1, 2]. Imaging modalities, such as computed tomography (CT) and magnetic resonance imaging (MRI), are essential for tumour localization, while nuclear medicine techniques provide additional functional information, including gallium-68 (68Ga)-labelled somatostatin analogues (SSAs) and iodine-123 (123I)/iodine-131 (131I)-labelled meta-iodobenzylguanidine (MIBG) scintigraphy, may provide further diagnostic confirmation in complex cases and assist in selecting candidates for peptide receptor radionuclide therapy [3].

✉ Address for correspondence: Kamil Górecki, Students' Scientific Society at the Department of Endocrinology, Diabetology and Metabolic Diseases, Medical University, Jaczewskiego 8, 20-945 Lublin, Poland
E-mail: kamilgorecki12@gmail.com

Received: 03.04.2024; accepted: 09.05.2025; first published: 15.05.2025

This case report highlights an unusual presentation of pheochromocytoma in a retroperitoneal location, and also provides a review of other cases of pheochromocytoma in this atypical location which underscores the importance of integrating clinical, bio-chemical, and radiological findings for accurate diagnosis and effective treatment.

CASE REPORT

A 62-year-old male presented to the clinic with complaints of general deterioration in well-being, reduced physical activity tolerance, and difficult-to-control arterial hypertension. The patient's medical history included coronary artery disease and atrial fibrillation. He was hospitalized for further evaluation and adjustment of treatment.

During a routine abdominal ultrasound, a lesion with both solid and fluid components was identified at the upper pole of the right kidney (Fig. 1 and 2). Subsequent CT imaging revealed a mixed solid-cystic tumour measuring 70 × 66 × 60 mm in the retroperitoneal space, situated just below the right adrenal gland. The tumour caused displacement of the right

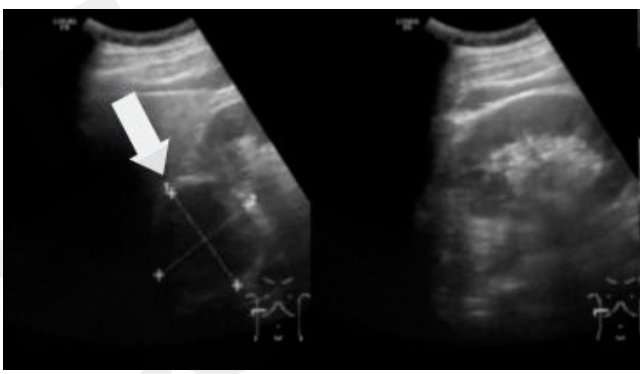

Figure 1. The arrow points to the lesion in the upper area of the right kidney on the abdominal ultrasound

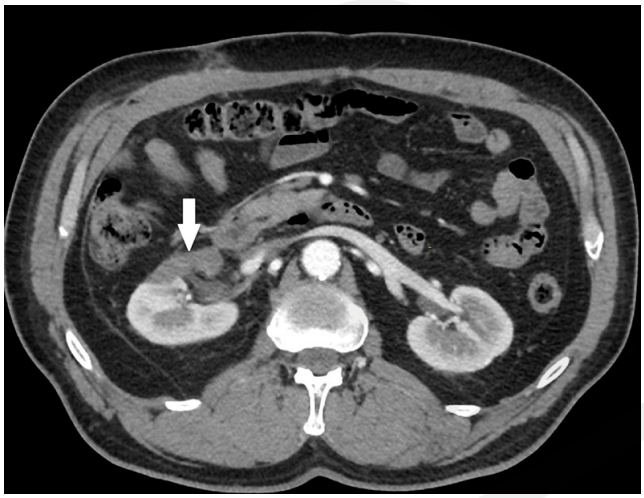

Figure 2. Axial CT scan shows the tumour indicated by the white arrow

adrenal gland and kidney but showed no signs of infiltration, suggesting a primary retroperitoneal origin. Additionally, the tumour exerted significant compression on the inferior vena cava without evidence of venous infiltration or impaired blood flow. No enlarged lymph nodes or bone metastases were observed, indicating that the lesion was likely confined to the retroperitoneal region. Based on the imaging findings, there was suspicion that the tumour originated from chromaffin cells or structures adjacent to the inferior vena cava.

Further diagnostic steps were taken to assess the hormonal activity of the tumour. Laboratory investigations revealed elevated levels of chromogranin A and increased urinary excretion of metanephrine and normetanephrine in a 24-hour collection (Tab. 1). These findings confirmed the functional nature of the tumour.

Table 1. Laboratory results before surgery

Variables	Values	Reference ranges
Chromogranin A [ng/ml]	222.7	< 94
Metanephrine in urine [µg/24h]	7041.1	43–260
Normetanephrine in urine [µg/24h]	2726.7	128–484
3-Methoxytyramine in urine [µg/24h]	189.6	55–247

Given the clinical presentation and biochemical findings, a decision was made to initiate pre-operative alpha-blockade therapy with doxazosin to stabilize the patient and prepare for surgical tumour removal. Two months later, the patient underwent successful surgical resection of the tumour. Histopathological examination confirmed the chromaffin origin of the lesion, consistent with a diagnosis of retroperitoneal pheochromocytoma. The patient recovered without complications and was monitored regularly. A contrast-enhanced CT scan at two months post-resection showed no residual or recurrent lesion. Thereafter, abdominal imaging was repeated at roughly six- to twelve-month intervals for the first two years, and annually thereafter, with all scans remaining unremarkable. Endocrine evaluations—including plasma and/or urine metanephrine assessments—were performed every six to twelve months during the first three years and then once yearly; all biochemical markers stayed within normal limits throughout more than six years of follow-up.

DISCUSSION

Pheochromocytomas most commonly occur in the adrenal glands, with only 15–20% of these tumours originating outside the adrenal glands, where they are referred to as paragangliomas. They are primarily diagnosed in the 4th or 5th decade of life. These tumours can represent a rare cause of secondary hypertension, accounting for only 0.1–0.6% of cases [1]. As for retroperitoneal pheochromocytomas, they are exceedingly rare, with no available statistical data regarding their incidence.

In the presented case, the diagnosis of pheochromocytoma in the patient was incidental, as an ultrasound examination was performed for an unrelated indication. This mode of diagnosis is common – according to available data, 10–49% of cases are discovered incidentally, and 4–8% of all incidentalomas are pheochromocytomas [4]. The symptoms associated with pheochromocytoma in the presented case included resistant hypertension, which might have been masked by co-existing coronary artery disease. It is worth emphasizing that the location of the tumourdoes not directly influence the nature of the symptoms. Instead, the key factor is the amount of catecholamines secreted, which may correlate with the severity and variety of clinical manifestations [5].

In the presented case, the diagnostic process for pheochromocytoma began with abdominal ultrasonography; however, the most crucial examination is CT. CT has a sensitivity ranging from 88% – 100%. Nevertheless, according to the guidelines of the European Society of Endocrinology, imaging studies for pheochromocytoma should only be performed after prior biochemical confirmation of the diagnosis [2]. The typical radiological features of pheochromocytoma include a well-circumscribed, round or oval mass, which may appear homogeneous or heterogeneous, usually exceeding 4 cm in size, with increased attenuation on non-contrast imaging and significant vascularization [6]. Pheochromocytomas can also present as cystic lesions or exhibit necrotic areas with some calcifications. Nearly 100% of pheochromocytomas demonstrate a mean attenuation of more than 10 Hounsfield units (HU) on unenhanced CT. Additionally, these tumours can exhibit more than 60% contrast washout on delayed scanning performed at 15 minutes. Conversely, an adrenal mass with homogeneous attenuation of <10 HU essentially excludes pheochromocytoma. Contrast-enhanced CT using non-ionic media can be safely performed in patients without prior adrenergic receptor blockade. Modern CT scans can detect tumours as small as 5 mm. However, the sensitivity of CT for detecting recurrent, residual, or metastatic lesions is significantly lower compared to MRI. In such cases, functional imaging is often more reliable [2].

In the presented patient, scintigraphy with MIBG was not performed as it was not deemed essential for diagnosis. MIBG is primarily used in cases where CT and MRI are inconclusive or when there is suspicion of metastatic or extra-adrenal pheochromocytoma. While MIBG scintigraphy has high specificity, its sensitivity can vary, particularly for small lesions or those with low uptake. In this case, the diagnosis was sufficiently confirmed through biochemical tests and imaging studies [7]. Additionally, diagnostic vigilance should be heightened in patients diagnosed with syndromes such as MEN 2, VHL, NF1 or Hereditary Paraganglioma Syndromes (PGL Syndromes) Types 1–5 (associated with SDH complex mutations), as the incidence of pheochromocytoma is

significantly higher in these conditions, compared to the general population.

The strongest correlation between pheochromocytoma and hereditary syndromes is observed in MEN2, where in the MEN2A subtype, this tumour occurs in approximately half of the patients. Therefore, expanded diagnostic evaluation should be considered in individuals with this syndrome [4].

CONCLUSIONS

Retroperitoneal pheochromocytomas represent a rare and diagnostically-challenging subset of catecholamine-producing tumours. Their atypical location often results in delayed detection, as symptoms may be non-specific and imaging findings unconventional. The presented case emphasizes the importance of combining detailed biochemical evaluation with advanced imaging techniques, such as CT or MRI, to confirm the diagnosis.

Moreover, the unique presentation in this case reinforces the need for clinicians to remain vigilant for extra-adrenal pheochromocytomas, particularly when initial imaging or clinical findings deviate from the typical adrenal presentation. Multi-disciplinary collaboration, involving endocrinologists, radiologists, and surgeons, is paramount for achieving accurate diagnosis, effective preoperative preparation, and successful tumour resection.

This case not only highlights the diagnostic complexity of retroperitoneal pheochromocytomas but also serves as a reminder of the critical role of detailed evaluation in detecting and managing rare tumour presentations, ultimately contributing to better patient outcomes.

Funding
None declared.

Conflict of interests
None declared.

REFERENCES

1. Tsirlin A, Oo Y, Sharma R, Kansara A, Gliwa A, Banerji MA. Pheochromocytoma: a review. Maturitas. 2014;77(3):229–238. doi:10.1016/j.maturitas.2013.12.009
2. Sbardella E, Grossman AB. Pheochromocytoma: An approach to diagnosis. Best Pract Res Clin Endocrinol Metab. 2020;34(2):101346. doi:10.1016/j.beem.2019.101346
3. Taïeb D, Hicks RJ, Hindié E, et al. European Association of Nuclear Medicine Practice Guideline/Society of Nuclear Medicine and Molecular Imaging Procedure Standard 2019 for radionuclide imaging of phaeochromocytoma and paraganglioma. Eur J Nucl Med Mol Imaging. 2019;46(10):2112–2137. doi:10.1007/s00259-019-04398-1
4. Aygun N, Uludag M. Pheochromocytoma and paraganglioma: from epidemiology to clinical findings. Sisli Etfal Hastan Tip Bul. 2020;54(2):159–168. doi:10.14744/SEMB.2020.18794
5. Falhammar H, Kjellman M, Calissendorff J. Initial clinical presentation and spectrum of pheochromocytoma: a study of 94 cases from a single center. Endocr Connect. 2018;7(1):186–192. doi:10.1530/EC-17-0321
6. Moez R, Ouanes Y, Sahnoun W, et al. Retroperitoneal cystic mass: a rare form of adrenal pheochromocytoma. J Surg Case Rep. 2021;2021(5):rjab169. doi:10.1093/jscr/rjab169
7. Wiseman GA, Pacak K, O'Dorisio MS, et al. Usefulness of 123I-MIBG scintigraphy in the evaluation of patients with known or suspected primary or metastatic pheochromocytoma or paraganglioma: results from a prospective multicenter trial. J Nucl Med. 2009;50(9):1448–1454. doi:10.2967/jnumed.108.058701