



Case Report

Carotid Paraganglioma: A Case Report

Paragangliome Carotidien : À Propos d'Un Cas

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ABSTRACT

Carotid paragangliomas (CPs) are rare neuroendocrine tumors, accounting for less than 1% of head and neck neoplasms. Arising from the carotid body, these tumors are often benign but may, in some cases, progress to a malignant form. They commonly present as a painless cervical mass. This report describes a case of carotid paraganglioma incidentally discovered during a routine examination, with a focus on its clinical and diagnostic features. A 60-year-old female patient presented for routine medical follow-up. Clinical examination revealed a left carotid bruit, prompting further investigations. Doppler ultrasound, cervical MRI, and PET/CT identified a hypervascularized mass located at the left carotid bifurcation. Complete surgical excision was performed, confirming a non-secreting paraganglioma. Carotid paragangliomas highlight the importance of systematic clinical examination and rigorous diagnostic evaluation. Surgical excision remains the treatment of choice despite technical challenges and the risk of postoperative neurological complications.

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RÉSUMÉ

Les paragangliomes carotidiens (PC) sont des tumeurs neuroendocrines rares, représentant moins de 1 % des tumeurs de la tête et du cou. Issues du glomus carotidien, ces tumeurs sont le plus souvent bénignes mais peuvent, dans certains cas, évoluer vers une forme maligne. Elles se manifestent généralement par une masse cervicale indolore. Ce rapport décrit un cas de paragangliome carotidien découvert fortuitement lors d'un examen de routine, en mettant l'accent sur ses caractéristiques cliniques et diagnostiques. Une patiente âgée de 60 ans s'est présentée pour un suivi médical de routine. L'examen clinique a révélé un souffle carotidien gauche, motivant la réalisation d'explorations complémentaires. L'échographie Doppler, l'IRM cervicale et le PET-scan ont mis en évidence une masse hypervascularisée localisée à la bifurcation carotidienne gauche. Une exérèse chirurgicale complète a été réalisée, confirmant un paragangliome non sécrétant. Les paragangliomes carotidiens soulignent l'importance d'un examen clinique systématique et d'une évaluation diagnostique rigoureuse. L'exérèse chirurgicale demeure le traitement de choix malgré les difficultés techniques et le risque de complications neurologiques postopératoires.

INTRODUCTION

Paragangliomas are neuroendocrine tumors derived from neural crest cells. They develop within the autonomic paraganglionic system, which includes structures scattered throughout the body, such as the carotid body located at the bifurcation of the common carotid arteries [1]. Head and neck paragangliomas account for approximately 0.6% of

cervicofacial tumors and are primarily located at the jugular glomus, vagal glomus, and carotid body [2].

Although benign in most cases, these tumors can become malignant in about 10% of cases, particularly when associated with genetic mutations such as those affecting the SDHB, SDHC, and SDHD genes [3, 4]. Malignant paragangliomas are defined by the presence of distant metastases and are often more aggressive.

The clinical manifestations of carotid paragangliomas include a lateral cervical mass, usually painless and slow-growing. However, some cases remain asymptomatic and are only discovered incidentally during routine clinical examinations or imaging for concomitant conditions [5]. Diagnosis relies on imaging, including Doppler ultrasound, MRI, and PET/CT, which help characterize the mass and assess its extension. The treatment of choice is complete surgical excision, although this procedure can be complicated by cranial nerve involvement due to their proximity to the tumor [6, 7].

Here, we report a case of a carotid paraganglioma incidentally discovered in an asymptomatic diabetic patient, highlighting the diagnostic and therapeutic challenges encountered.

CASE PRESENTATION

A 60-year-old woman, with a history of well-controlled type 2 diabetes (HbA1c within therapeutic targets), presented for a routine medical check-up. Her medical history included a left tonsillectomy performed during childhood and chronic allergic rhinitis managed with intermittent antihistamine therapy.

During the clinical examination, a left carotid bruit was detected on cervical auscultation. This incidental finding prompted further investigations, including a Doppler ultrasound of the supra-aortic trunks. The examination revealed a mass localized at the left carotid bifurcation, suggestive of a carotid paraganglioma (**Figure 1**).

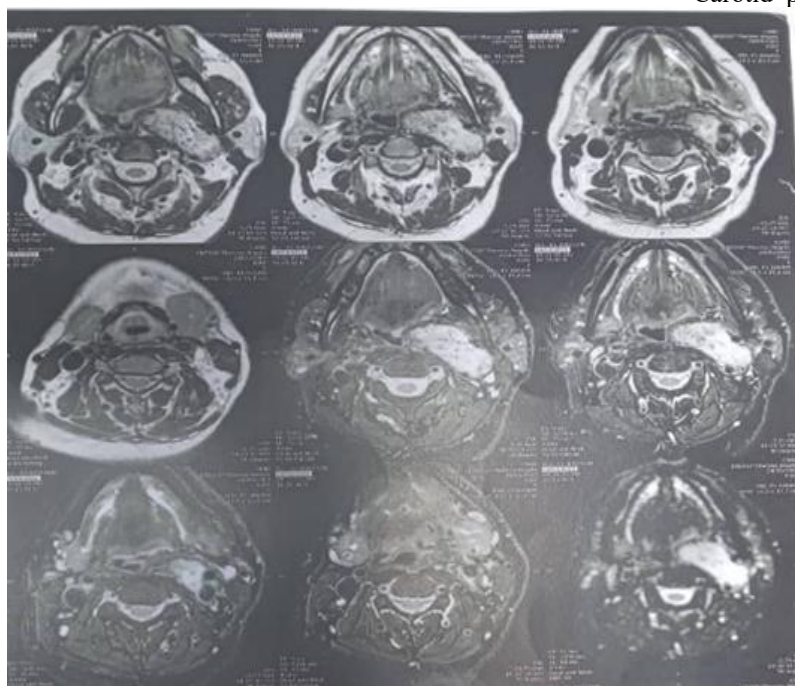


Figure 1: MRI of carotid paraganglioma

To confirm the nature of the lesion and plan appropriate management, additional imaging with contrast-enhanced MR angiography was performed. The imaging revealed a well-vascularized, encapsulated mass consistent with a non-secreting paraganglioma.

Clinical and biological evaluations showed no signs of metabolic dysfunction related to hypercatecholaminemia. A multidisciplinary discussion led to a decision for surgical

management, with optimal preoperative medical preparation.

Initial Investigations:

Doppler ultrasound of the supra-aortic trunks: A well-defined, hypoechoic, hypervascularized mass was identified at the left carotid bifurcation, measuring $46 \times 43 \times 31$ mm.

Biological assays: Plasma and urinary metanephrine and normetanephrine levels were normal, ruling out secretory activity.

Advanced Imaging:

Cervical MRI: A well-defined mass measuring 51×21 mm was observed, displacing the left lateral pharyngeal wall medially.

FDG PET/CT: Intense hypermetabolic activity of the lesion was identified, with no other pathological foci detected.

Surgical Management:

A complete tumor excision was performed. The procedure was complicated by left recurrent nerve injury, resulting in postoperative dysphonia.

Histopathological Analysis:

Histopathological and immunohistochemical examinations confirmed the diagnosis of a non-secreting paraganglioma, with no signs of malignancy.

DISCUSSION

Carotid paraganglioma is a rare neuroendocrine tumor, accounting for approximately 0.6% of head and neck tumors [1]. Although often benign, it may occasionally present in a malignant form, necessitating rigorous diagnostic evaluation and multidisciplinary management. The anatomical location of this tumor at the carotid bifurcation makes its diagnosis and treatment particularly challenging, especially due to the proximity to critical vascular and neural structures [2, 6].

Diagnosis

In this case, the carotid bruit detected during clinical examination guided further imaging investigations. Doppler ultrasound suggested a hypervascularized mass, a characteristic finding of paragangliomas [7]. Cervical MRI was crucial for visualizing the tumor's relationship with adjacent structures. Additionally, FDG PET/CT confirmed hypermetabolism, a common feature in both functional and non-functional paragangliomas [8].

A particular feature of paragangliomas is their potential secretory activity. However, in this case, the absence of abnormal plasma and urinary metanephrine and normetanephrine levels ruled out functional activity [3]. This finding aligns with studies showing that carotid paragangliomas are generally non-secreting, unlike other locations such as adrenal paragangliomas (pheochromocytomas) [9].

Modern imaging, particularly FDG PET/CT, is invaluable for detecting metastases or recurrences and assessing disease extent [10]. The use of specific tracers like DOTA-TATE in nuclear medicine can better differentiate benign from malignant lesions and evaluate therapeutic options such as targeted radiotherapy in cases of malignancy [11].

Management

The treatment of choice for carotid paragangliomas remains complete surgical excision. However, surgery can be complicated by injury to adjacent cranial nerves, such as the recurrent laryngeal, hypoglossal, or glossopharyngeal nerves, due to their anatomical proximity to the tumor [2]. In this case, the patient experienced postoperative dysphonia due to left recurrent nerve injury, a well-documented complication in the literature [12]. Some studies suggest that non-surgical approaches, such as radiotherapy, could be considered in specific cases, particularly for patients with surgical contraindications or inoperable tumors [13]. However, for young or healthy patients, surgical excision remains preferred to minimize the risk of recurrence or malignant transformation [14].

Prognosis and follow-up

Carotid paragangliomas are generally associated with a good prognosis when diagnosed early and managed appropriately [15]. Nevertheless, regular follow-up is essential to detect recurrence or new lesions, particularly in cases where predisposing genetic mutations, such as those involving SDHx (succinate dehydrogenase) genes, are identified [16]. SDHB mutations, in particular, are associated with a higher risk of malignancy and metastases [17].

In this case, the absence of histopathological malignancy and signs of metastatic dissemination is reassuring. However, long-term surveillance, including regular clinical evaluations and follow-up imaging, is necessary to detect any recurrence.

Clinical insights and lessons learned

This case highlights several key points:

- The importance of a thorough clinical examination, which led to the incidental detection of a carotid bruit.
- The critical role of imaging techniques in diagnosing and characterizing paragangliomas.
- The surgical challenges posed by the tumor's proximity to critical structures.
- The need for long-term follow-up, even after complete excision, to minimize the risk of recurrence or malignant progression.
- Additionally, this observation underscores the importance of multidisciplinary management involving surgeons, radiologists, endocrinologists, and oncologists to ensure optimal care for these patients [18].

CONCLUSION

Carotid paragangliomas, although rare, emphasize the importance of thorough clinical evaluations and the utility of advanced imaging techniques in their detection and characterization. This case highlights the role of incidental findings, such as a carotid bruit, in prompting timely diagnosis and management. While surgical excision

remains the cornerstone of treatment, it requires careful planning to mitigate the risks associated with the tumor's proximity to critical neurovascular structures. Postoperative complications, such as cranial nerve injury, underscore the need for experienced surgical teams and multidisciplinary collaboration. Long-term follow-up is essential to monitor for recurrence or potential malignant transformation, ensuring optimal patient outcomes.

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