

## Peer Reviewed Case Report

### CAROTID BODY TUMOUR: A RARE CASE REPORT

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<https://doi.org/10.54450/saradio.2022.60.2.553>

#### ABSTRACT

A carotid body tumour (CBT) is defined as a paraganglioma that involves the chemoreceptors of the carotid body. Computerised tomography is considered one of the most accurate and sensitive imaging modalities to diagnose a CBT. This case report explores a CBT that was diagnosed in a sixty-one-year-old female patient. The patient's clinical history, radiological findings and management are discussed as well as the epidemiology, aetiology and treatment options.

**Keywords:** computerised tomography, neck, paraganglioma, vascular

#### LAY ABSTRACT

A description of a rare, vascular tumour in the neck is discussed along with its radiographic features.

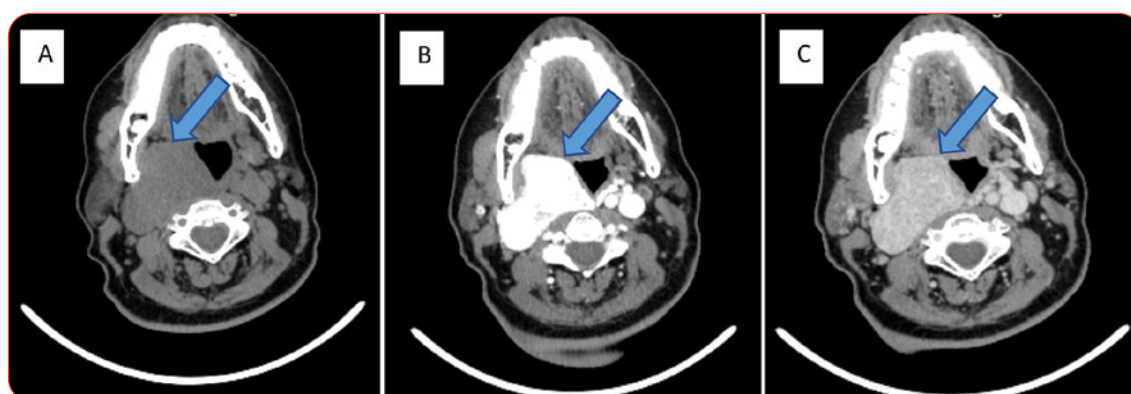
#### CASE REPORT

A sixty-one-year-old female patient presented to the outpatient department at a local tertiary hospital with a right-sided neck mass. She had discovered it seven months ago. Her medical history was that she was hypertensive and suffered from diabetes; both were controlled with medication. No family history of malignancy was recorded. On examination, she experienced severe pain when her neck was palpated. The mass was described as being smooth and firm with no obvious nodules. In addition, the mass was considered pulsatile and not mobile, even when swallowing. She was admitted for further investigation.

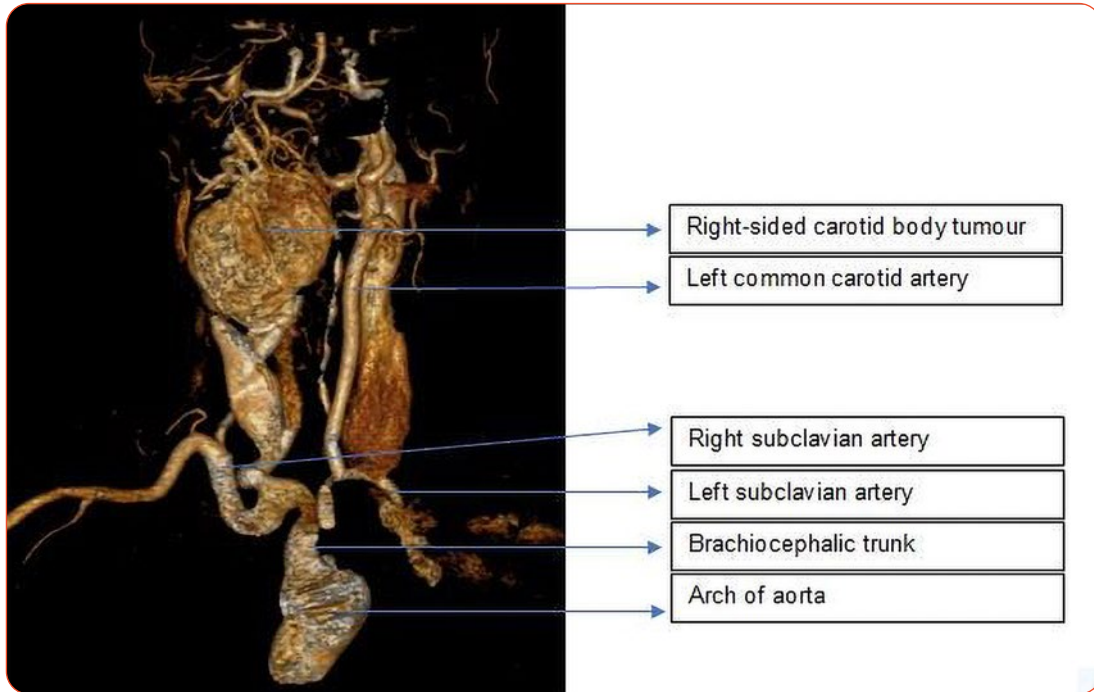
As part of her work up, a fine needle aspiration (FNA) biopsy for cytology was performed to exclude a possibility of malignancy. The results were inconclusive. The FNA was followed by an ultrasound examination of the neck and carotid arteries and included the use of colour doppler. The ultrasound

report described a well-defined, hypoechoic mass within the distal, right-sided common carotid artery. On ultrasound, the mass measured 68mm x 67mm x 42mm. Certain areas within the mass appeared to be hyper-vascular. The mass was completely separate from the salivary glands. No lymph adenopathy was noted. The ultrasound report suggested the possibility of a carotid body tumour (CBT) for further radiological correlation. Based on this, a computerised tomography angiogram (CTA) of the extracranial vessels of the neck was requested. Images of the cytology sample and the ultrasound scan are not included in this case report.

A CTA scan of the neck was performed on a Phillips Ingenuity Core 128 slice CT scanner at 2mm intervals. A pre-contrast, arterial and venous phase was performed (Figure 1). A power-injector, at a flowrate of 4,5ml per second, was used for the intravenous administration of 100ml of non-ionic iodinated contrast media (Omnipaque 350mg). Locator



**Figure 1.** Axial CT images demonstrating: the pre-contrast (A), arterial- (B) and venous phase (C) of the CBT.



**Figure 2.** A three-dimensional CT oblique image of the extracranial vessels of the neck, demonstrating the CBT on the right with labelled anatomy.

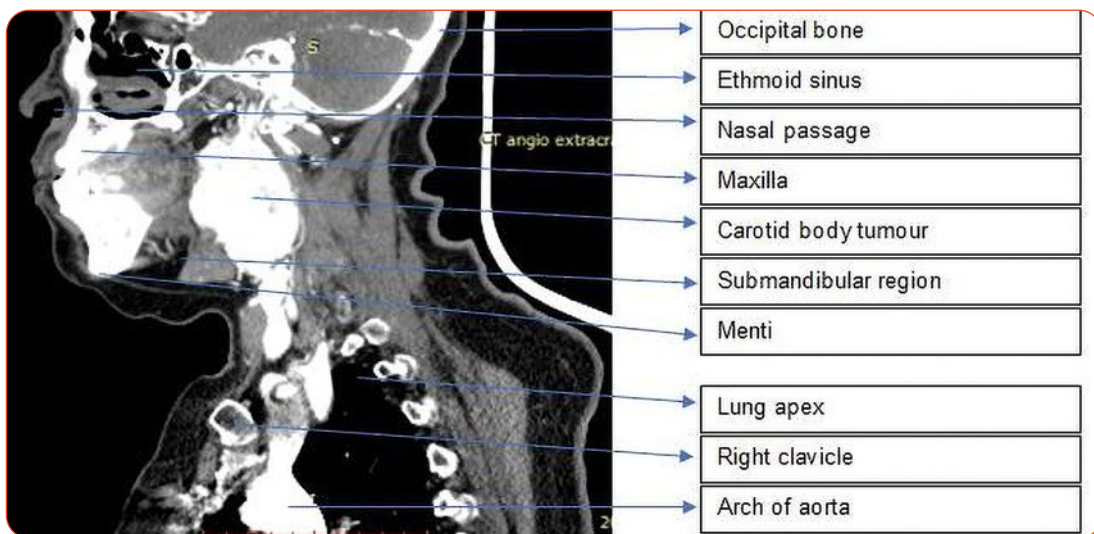
and bolus-tracking software was used to acquire the contrast enhanced scans. The mass on the pre-contrast image equated to 51 HU (Hounsfield Units), 303 HU on the arterial phase and 151 HU on the venous phase. A three-dimensional reconstruction of the extracranial vessels of the neck was also performed (Figure 2). The CTA scan further confirmed a well-defined right-sided neck mass that extends to the submandibular region (Figure 3). The contrast media uptake within the mass was described as homogenous.

Displacement of the surrounding anatomical structures was evident, inclusive of the aerodigestive tract towards the left. The airway was visible on the scan: it appeared clear

and not obstructed. Tortuosity of the right common carotid artery was noted. No involvement or invading of the surrounding anatomical structures was evident. There were no significantly enlarged cervical lymph nodes and no suspicious lytic or sclerotic osseous lesions. The nasopharynx, thyroid gland and lung apices, also visualised on the scan, appeared normal. The CT report confirmed the radiological features to be in line with that of a CBT.

**DISCUSSION**

A CBT can be defined as a paraganglioma that involves the chemoreceptors of the carotid body.<sup>[1]</sup> According to litera-



**Figure 3.** A sagittal, arterial phase CT image demonstrating the extent of the contrast enhanced CBT with labelled anatomy.

ture, these tumours are extremely rare and have an incidence rating of between 0.06 and 3.33 per 1000 patients.<sup>[2,3]</sup> Apart from a thorough clinical assessment, the gold standard for diagnosing a CBT includes a combination of a colour doppler ultrasound examination and a CTA.<sup>[4]</sup> It is the opinion of the author that this case report will contribute to the body of knowledge in the field due to the low incidence rating of patients diagnosed with a CBT and subsequently, the lack of published works on the subject matter.

The anatomical carotid body was first described in 1743 by Albrecht von Haller as a small cluster of chemoreceptor cells, located in the posteromedial wall of the common carotid artery, near the carotid bifurcation.<sup>[5,6]</sup> A CBT is a rare, slow-growing hyper-vascular tumour that arises from the paraganglionic cells of the carotid body.<sup>[2,6]</sup> The definition of a CBT in 1950 was expanded to it being a benign tumour in most cases. The possibility of malignancy, however, cannot be excluded.<sup>[7]</sup> The incidence rate of it being malignant is between 5% and 7%.<sup>[8]</sup> The results from the FNA biopsy in this case, were inconclusive with regards to malignancy.

The occurrence of a CBT can be: 1) sporadic (occur in people with no family history), 2) hyperplastic (due to an increased number of cell growth) and/or 3) familial (inherited due to familial genetic characteristics).<sup>[9]</sup> By definition and as for the patient presented in this case report, the cause of her CBT may be considered sporadic and hyperplastic, but not familial. It may be seen as a sporadic occurrence as the cause of the CBT is unknown. It could also be seen as being hyperplastic due to an increase of the amount of tissue over the affected area (cell proliferation). The reason for the CBT not being familial in this case report is that the patient did not indicate any predisposed family history of malignancy.

It was found that females are at higher risk for developing a CBT compared to males. The majority (60%) of positive cases presented were on the right side; 17% have been reported to be bilateral.<sup>[9]</sup> The patient presented in this case report is in keeping with the majority of statistics reported in literature as her CBT was diagnosed on her right side and she is also of the female gender.

Symptoms associated with the tumour may include shortness of breath, a visible and palpable neck mass, pain and discomfort, obstructive sleep apnea, fainting, palpitations and flushes.<sup>[2,5,7,10]</sup> The patient, in this case report, presented with a visible palpable neck mass with pain and discomfort. However, it was noted during the literature review that different cases reported different symptoms. It is therefore safe to assume that not all of the symptoms identified previously will be applicable to all of the positively diagnosed patients and that there may be variants.

In addition to ultrasound, CTA is considered to be one of the most frequently used imaging modalities for diagnosing a CBT.<sup>[5]</sup> There is agreement in the literature<sup>[4]</sup> with this statement and in addition indicated that CT can be considered as one of the most accurate and sensitive imaging modalities to diagnose a CBT. CT is able to determine the size and extent of the mass as well as the possibility of any vessel encasement. This is important information and can be used as a guide for planning the patient's treatment.<sup>[7]</sup>

The treatment of choice is a complete surgical resection of the tumour.<sup>[2,7,10]</sup> The patient in this case report has not yet consented to receive treatment. According to a personal communication with one of the healthcare professionals involved, the treatment plan is to surgically resect the CBT. This is in keeping with the treatment recommended in literature.

## CONCLUSION

This case report presented a sixty-one-year-old female patient diagnosed with a rare, right-sided CBT. From the literature reviewed, CTA was considered to be one of the most accurate and sensitive imaging modalities to diagnose a CBT. A CT scan was performed on the patient in this case report. The findings of the CT scan proved extremely valuable as it was able to confirm her diagnosis and shine light on the exact location and size of the tumour. It is hoped that the findings of this case report will contribute to the body of knowledge in the field. In addition, it is also aimed at emphasising the important role of CT in the diagnosis of neck tumours.

## CONFLICT OF INTEREST

None to declare.

## ETHICAL CONSIDERATIONS

Permission for presenting this case report was obtained from hospital management. No identifiable details of the patient, healthcare professionals or institution have been revealed.

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