

peer reviewed **CASE REPORT**

## Vagus nerve schwannoma diagnosed on computed tomography

Chetty S ND Rad (D); B Tech (D) [DUT], Mammography certificate (University of Pretoria), Computed tomography certificate (CPUT)

R.K Khan Hospital, Durban

### Abstract

Schwannomas of the vagus nerve account for three percent of all head and neck tumours and occur equally in men and women. Patients may present with hoarseness of voice and a slow growing mass on the neck, or not have symptoms. This case report describes a vagus nerve schwannoma diagnosed in a patient after undergoing a computed tomography angiography scan of the neck. The clinical history, radiological findings, epidemiology and treatment are discussed.

### Keywords

hoarseness, magnetic resonance imaging

### Case report

A middle aged female presented to a public sector hospital with a palpable mass on the right side of her neck. She complained of a hoarse voice for the past eighteen years and experienced coughing and shortness of breath when hugged around her neck. On clinical examination there was deviation of the trachea. An ultrasound scan was requested to determine whether the mass was vascular, cystic or solid; the findings were a large vascular lesion extending to the sternal area. A computed tomography angiography (CTA) scan of the neck was performed. A carotid CTA protocol was selected. The arterial phase sequence was obtained at 30 seconds, after the administration of 100ml of Ultravist 300mg/ml injected at a rate of 5.0ml per second followed by the administration of 40ml of saline injected at a rate of 5.0ml per second. The external auditory meatus, entire neck and mid chest were included in the scan. Scanning was done in an inferior to superior direction.

The CT scan demonstrated an enlarged spindle shaped mass (14.1cm x 3.6cm x 3.5cm) situated in the right carotid space (Figure 1). The lesion extended from C3 to T4 level. A strong vascular enhancement with the surrounding group of vessels supplying and draining the mass was noted (Figure 2). The right common carotid artery, right thyroid lobe, trachea and larynx were displaced to the left. The right internal jugular vein was displaced to the right. The strap muscles on the right side of the neck were displaced anteriorly (Figure 3). The superior aspect of the mass showed a soft tissue component with a measuring (2.6cm x 1cm); this aspect

had a Hounsfield unit value of 37 with no enhancement. The heterogeneous mass contained an ill-defined tubular hypodensity which extended along the lateral aspect of the mass. There was a focus of calcifications within the mass and was thought to represent an area of necrotic breakdown or haemorrhage (Figure 4). The lesion was suspicious of a malignancy due to the presence of necrotic breakdown, haemorrhage and the presence of calcifications. There was a marked mass effect evident. Histology indicated a benign schwannoma. The patient underwent surgery and was scheduled to visit an ear, nose and throat (ENT) specialist to assess function of her vocal chords and muscles in the region.

### Discussion

A schwannoma is generally a benign, single, slow growing encapsulated nerve sheath tumour that accounts for five percent of all benign soft tissue tumours.<sup>[1, 2]</sup> Malignant schwannomas are rare but there are a few cases described in the literature.<sup>[3]</sup> Schwannomas can also be multiple, round or a dumb bell shaped mass.<sup>[4]</sup> They originate from the schwann cells which border the peripheral, cranial and autonomic nerves.<sup>[5]</sup> These tumours most frequently occur in the head, neck and extremities in contrast to other body regions.<sup>[6]</sup>

The vagus nerve is a mixed nerve with sensory and motor functions.<sup>[3, 7]</sup> It provides part of the sensory and motor innervation of the pharynx and is the motor nerve of the larynx.<sup>[1, 2]</sup> A unilateral lesion of the vagus nerve can cause paralysis of the larynx with paralysis of the vocal cord which causes a nasal voice.<sup>[1, 2]</sup> A lesion on

this nerve can also bring about dysphagia and tachycardia.<sup>[1, 2]</sup> Vagus nerve schwannomas are rare and in the absence of neurofibromatosis type II they make up three percent of all head and neck tumours.<sup>[1, 3]</sup> Cervical vagus nerve schwannomas occur equally in both genders and are mostly diagnosed between the third and fifth decade.<sup>[4, 5]</sup> The patient in this case report was middle-aged. Schwannoma symptoms are associated with the location of the tumour and the involved nerve.<sup>[4]</sup> A schwannoma may not have presenting symptoms or may have minimal symptoms.<sup>[3, 6]</sup> Other symptoms that indicate a vagus nerve schwannoma include compression of the neighbouring structures. These tumours are usually found incidentally on diagnostic imaging.<sup>[7]</sup>

Many patients suffer from hoarseness and have a slow growing lateral neck mass.<sup>[1, 2]</sup> Coughing and exerting pressure on the tumour is another common symptom unique to vagal nerve sheath tumours.<sup>[3, 4]</sup> The patient in this case report experienced coughing when pressure was applied to the mass. Vagus schwannomas displace the internal jugular vein laterally and the carotid artery medially.<sup>[3]</sup> In this case report the internal jugular vein was displaced to the right; the right common carotid artery was displaced to the right.

Investigations to diagnose a vagus nerve schwannoma include ultrasound, CT, magnetic resonance imaging (MRI) and fine needle aspiration.<sup>[5]</sup> CT adequately demonstrates the type of tumour before surgical intervention.<sup>[5]</sup> However, MRI is the key examination to explore the cranial nerves.<sup>[7]</sup> CT scanning remains a highly useful complementary examination to

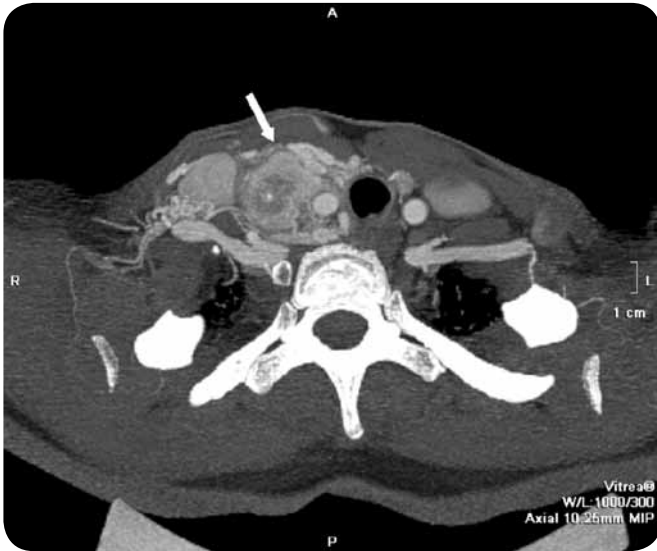


Figure 1: Axial CT view of the neck, showing heterogeneous mass with a focus of calcification situated in the right carotid space (see arrow).



Figure 2: Sagittal CT image of the neck, showing spindle shaped mass with areas of hypo-density and evidence of avid vascular enhancement (see arrow).



Figure 3: Axial CT image of neck, showing the displacement of the right strap muscles anteriorly (see arrow).



Figure 4: Coronal CT image of neck, showing a heterogeneous mass between the right internal jugular vein and right common carotid artery with a focus of calcification (see arrow).

check for bone impairment.<sup>[7]</sup> Schwannomas are mostly hypo to iso-attenuated on CT imaging. Poor to moderate heterogeneous contrast enhancement is due to contrast stasis secondary to obstruction of venous drainage.<sup>[3]</sup> Heterogeneity of schwannomas is best visualised by MRI;<sup>[3]</sup> it is useful to pre-operatively diagnose and evaluate the extent and relationship of the tumour with the jugular vein and the carotid artery.<sup>[4]</sup>

Surgical intervention is done to remove the mass while at the same time preserving the vagus nerve.<sup>[1, 2, 8]</sup> Recurrence of

vagus nerve schwannomas is infrequent: there have been reported cases of recurrence thus follow up is important.<sup>[9]</sup> Patients usually recover well after surgery with minimal vocal paralysis which is corrected by therapy; some may develop dysphagia.<sup>[1]</sup>

### Conclusion

In this case report ultrasound and CT scans adequately led to the diagnosis of a vagal nerve schwannoma. There was no need for an MRI scan even though it is considered the superior modality for diagnosing this tumour.

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