

**CASE REPORT**

## A case of carotid body tumor

### Karotis cismi tümörü: Olgu sunumu

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A thirty-five-year-old woman had an asymptomatic, slow growing mass that pushed the right tonsilla palatina and was pulsatile in the oropharyngeal region. Magnetic resonance imaging showed a vascular mass at the carotid bifurcation, causing displacement of the external and internal carotid arteries. The diagnosis of a carotid body tumor was confirmed by magnetic resonance angiography. Surgery included a subadventitial dissection at the carotid bifurcation, preserving the hypoglossal and vagal nerves. The patient developed loss of function of the tenth cranial nerve postoperatively. After a year follow-up period there was no change in the function of the tenth cranial nerve.

**Key Words:** Carotid arteries/pathology/radiography; carotid body/pathology; carotid body tumor/diagnosis/pathology/surgery; head and neck neoplasms; paraganglioma/surgery.

Otuz beş yaşında kadın hasta yavaş büyüyen asemptomatik kitle ile başvurdu. Kitle, sağ tonsilla palatinayı itmekte ve orofarenjeal bölgede pulsasyon göstermekteydi. Manyetik rezonans incelemesinde, kitlenin karotis bifurkasyonunda eksternal ve internal karotis arterlerde yer değişikliğine yol açtığı izlendi. Karotis cismi tümörü tanısı manyetik rezonans anjiyografi ile desteklendi. Cerrahi tedavi olarak, karotis bifurkasyonunda hipoglossus ve vagus korunarak subadventisyal diseksiyon yapıldı. Ameliyat sonrası dönemde hastada 10. kranyal sinir felci oluştu. Bir yıllık izlem sonunda hastanın sinir felcinde değişiklik olmadı.

**Anahtar Sözcükler:** Karotis arterleri/patoloji/radyografi; karotis cismi/patoloji; karotis cismi tümörü/tanı/patoloji/cerrahi; baş-boyun neoplazileri; paragangliom/cerrahi.

Paraganglioma is a benign and solitary tumor, arising from paraganglia which are derived from the embryonic neural crest. The carotid body is a discrete paraganglion located in the adventitia of the posteromedial aspect of the carotid bifurcation. A clinical history of a slow growing, diffuse neck mass in the region of the carotid bifurcation is typical for a carotid body tumor. The diagnosis can be confirmed by computed tomography (CT), which typically demonstrates a contrast-enhancing mass wedged between the internal and external carotid arteries. Magnetic resonance

imaging (MRI) and MR angiography provide further information on the origin and vascularization of the tumor and the contribution of several branches of the external carotid arteries. Surgery is the preferred treatment for the carotid body tumors, which requires a significant level of care because of the high risk of neurovascular complications.

### CASE REPORT

A thirty-five-year-old woman was admitted for an asymptomatic, slow growing mass of a three-

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year history in the right side of the neck. On physical examination, an elastic hard, rather fixed tumor, 5-6 cm in diameter was palpable in the right carotid triangle region, extending to the skull base. The mass pushed the right tonsilla palatina and was pulsatile in the oropharyngeal region. The patient did not have a family history of paraganglioma. Laboratory findings were within normal limits. Ultrasonography revealed a hypoechoic mass at the carotid bifurcation. Magnetic resonance imaging showed a characteristic vascular mass (3x4x4 cm) in the right carotid space, exerting compression on the carotid bifurcation and causing displacement of the external and internal carotid arteries (Fig. 1a). It appeared hypointense on T<sub>1</sub>-weighted, and hyperintense on T<sub>2</sub>-weighted images. Multiple vascular structures were observed within the lesion. The parapharyngeal lipomatous (adipose) areas were obliterated and there was mild indentation in the wall of the oropharynx. The nasopharynx, larynx, trachea and airway structures, the left pharyngeal and bilateral parapharyngeal adipose areas appeared normal. Diagnosis of a carotid body tumor was confirmed by MR angiography which demonstrated a hypervascular tumor fed by several branches of the external carotid artery (Fig. 1b).

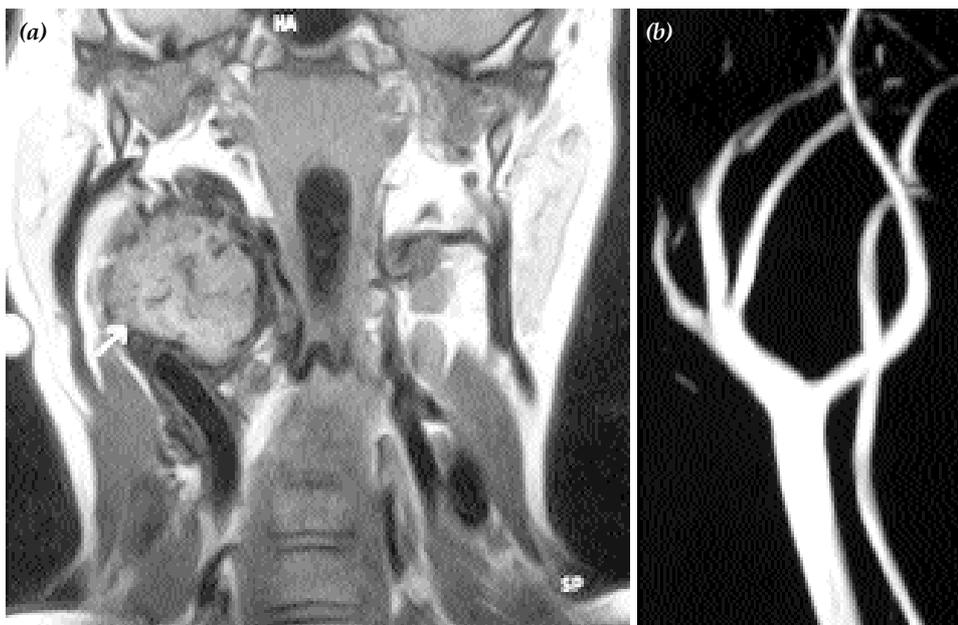
Surgical removal of the mass was performed four weeks after MR angiography. The tumor was located just inside the carotid bifurcation (Fig. 2a). A sub-adventitial dissection was performed at the carotid

bifurcation, preserving the hypoglossal and vagal nerves (Fig. 2b). No complications were encountered during surgery. However, the patient developed loss of function of the tenth cranial nerve in the postoperative first day. At the end of a year follow-up period, there was no change in the function of the vagal nerve. Pathologic diagnosis was reported as a paraganglioma.

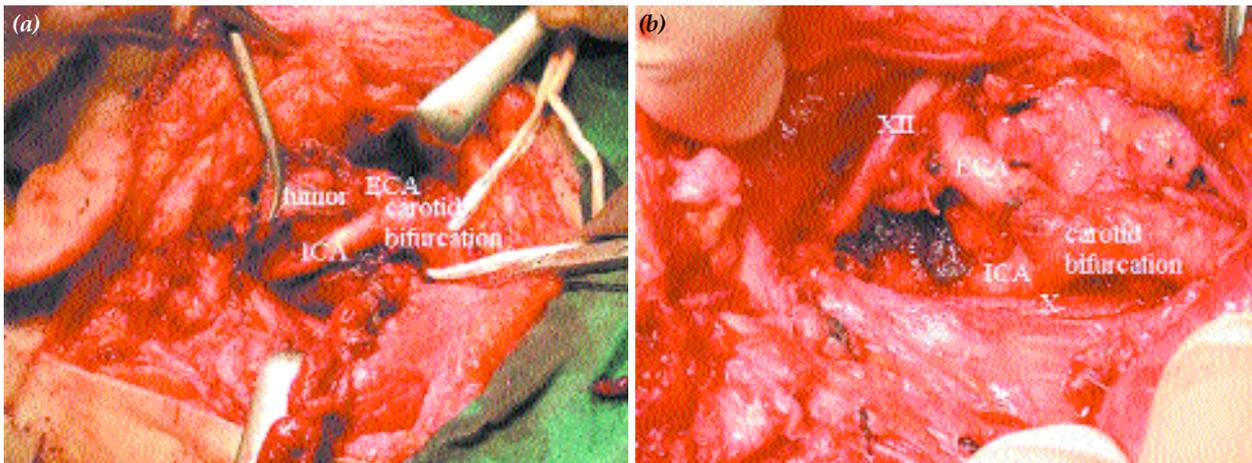
## DISCUSSION

Paragangliomas originate in the head and neck region with greater frequency than all other body sites. The carotid body is a discrete paraganglion located in the adventitia of the posteromedial aspect of the carotid bifurcation.<sup>[1]</sup> Carotid body tumors occur at an average age of 45 years, with a slight predilection for women.<sup>[2]</sup> They present as slow growing, non-tender, pulsative masses of the lateral aspect of the neck. On palpation, these tumors may be displaced in the lateral plane, but can not be mobilized in the vertical axis.<sup>[3]</sup> They are also firm but compressible, and may have an audible bruit. About 10% of the cases present with a cranial nerve palsy, most frequently involving the vagal nerve.<sup>[2]</sup>

A history of uncontrolled or recently diagnosed hypertension, tachycardia, facial flushing, or excessive sweating may signal the possibility of a catecholamine secreting tumor. Serum and urine catecholamine levels and breakdown products must be examined.<sup>[4]</sup> In our case, the patient had no hyper-



*Fig. 1 - (a) T<sub>1</sub>-weighted magnetic resonance view showing the tumor (arrow) at the right carotid bifurcation. (b) Magnetic resonance angiography of the carotid body tumor with typical bowing of vessels at the carotid bifurcation.*



**Fig. 2 - (a)** Intraoperative appearance of the carotid body tumor. **(b)** The operation field after removal of the tumor showing the preserved cranial nerves X and XII, and the carotid artery system.

tension, facial flushing, or tachycardia, and serum and urine catecholamine levels were normal. A family history of carotid body tumors is elicited in about 10% of patients; of these, bilateral tumors are detected in 30%.<sup>[5]</sup>

The differential diagnosis of a carotid body tumor should include lymphadenopathies, branchial cleft cysts, salivary gland tumors, aneurysms of the carotid artery, and metastatic carcinomas or neurogenic tumors.<sup>[2]</sup>

When a carotid body tumor is suspected with history and physical examination findings, biopsy should not be performed. Computed tomography may enable the diagnosis with typical demonstration of a contrast-enhancing mass wedged between the internal and external carotid arteries.<sup>[6]</sup> Moreover, MRI and MR angiography are helpful in showing the origin and vascularization of the tumor and the contribution of several branches of the external carotid arteries.<sup>[7]</sup> Carotid angiography is important for preoperative evaluation and embolization. Angiography usually confirms the diagnosis and provides information about the vascular supply of a paraganglioma.<sup>[2]</sup> If the diagnosis remains unclear after all the radiologic investigations, ultrasound-guided fine-needle aspiration biopsy may be helpful.<sup>[2]</sup>

Although employed by some authors, preoperative embolization is not a routine procedure for carotid body tumors.<sup>[2]</sup> In our case, we did not use preoperative embolization.

Surgical removal is the preferred treatment for carotid body tumors.<sup>[8]</sup> Complication rates show a

high correlation with the size and anatomic localization of the tumor.<sup>[2]</sup>

The hypoglossal nerve and the vagus are the most frequently injured cranial nerves, resulting in cranial nerve palsies in 25% of cases. Injury to the carotid artery is found in 20% of cases.<sup>[9]</sup> In our case, considerable care was given not to injure the carotid artery and the cranial nerves. In our case, development of right vocal cord fixation in the postoperative period was attributed to stretching or thermal damage by coagulation to the surrounding tissues during dissection at the skull base. Since carotid body tumors are hypervascularized, the operation field is covered by bleeding during dissection, preventing good visualization and predisposing to nerve injuries due to stretching or coagulation. Thus, the preservation of the cranial nerves during surgery may not ensure the functionality of these nerves.

In conclusion, the diagnostic and therapeutic planning of a carotid body tumor must be carefully made. It requires a significant level of expertise and experience because of high risk of neurovascular deficits. The preservation of the lower cranial nerves and the carotid artery is the major issue during intraoperative management.

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