# CAROTID BODY TUMORS

*Carotid body tumor, which is a paraganglioma though bening in general, shows malign characterstics rarely, and takes its origin from the chemoreceptor tissue. In a nine year period seven cases diagnosed as carotid body tumor were operated. Three of the cases were male and others were female. Mean age of the patients was 37. Subadventitial surgical excision was the procedure in operations.*

*Key words: Carotid body tumor, subadventitial excision*

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The carotid body tumor, which is a paraganglioma though benign in general, shows malign characteristics rarely. It takes its origin from the chemoreceptor tissue[1]. The tumor, located at the bifurcation, in the adventitia, is ellipsoid in shape, and has a maximum diameter of 0.5 cm. It plays a role in the regulation of blood pressure, heart rate and depth of respiration according to changes in pH, $pCO_2$, $pO_2$ and body temperature[2-5]. Paragangliomas originated from the internal jugular vein, the aortic arch, the vagal ganglia, the middle ear, the pulmonary artery bifurcation, the pleura, the retroperitoneal and the mesenteric tissues were also reported [1,4].

Carotid body tumors was first described by Von Haller and the total excision was carried out first by Scudder in 1903 [2]. Carotid body tumors are mostly benign, asymptomatic, slowly growing tumors which show familial tendency, and 10 % show local lymph node invasion and distant metastasis [4,6]. Symptoms related to compression or invasion of the hypoglossal, glossopharyngeal, vagus nerves, and the symphathetic chain may be seen. It is encountered on each side of the neck at equal frequency. No sex difference is seen.

## MATERIALS and METHODS

In a period of nine years, at the Cerrahpaşa Medical Faculty, Thoracic and Cardiovascular Surgery Department, seven patients were treated. The cases were analyzed retrospectively in respect to their age, sex, etiologic factors, complaints, diagnostic procedures applied, operations done, mortality and morbidity rates.

Three of the patients were male and 4 were female. The average age was 37 (range, 21 to 54) years. Average duration of symptoms before the diagnosis was 18 months. All of the patients had a mobile, fairly hard mass at the neck region. In two patients, a murmur on the pulsatile mobile mass was detected with auscultation. One patient had

a complaint of difficulty in swallowing. Three patients were asymptomatic. In four patients, pain with local compression and tenderness on the mass were present. In two patients, ultrasonographic examination revealed a mass showing low echogenicity. Angiographic studies were applied to all patients. In six cases, the murmur was unilateral and in one, it was bilateral. In six cases the tumor was resected from the carotid artery with subadventitial excision. In one case where the tumor was infiltrated to the arterial wall, a 6 mm PTFE conduit was interposed between the internal carotid and the common carotid artery. Attention was paid not to leave any residual tumor. Hypoglossal nerve and vagus nerve were especially protected during the procedure. During the postoperative period, hoarsness was seen in three patients. In one patient transient facial paralysis and in another patient transient hemiplegia developed. During the average three years of follow up period, no recurrences and subjective complaints were seen.


**Figure 1.** Digital substractional angiography of the carotid system in a carotid body tumor.

## DISCUSSION

In the differential diagnosis of carotid body tumors; bronchial cysts, salivary gland tumors, carotid artery aneursyms, lateral aberrant thyroid gland, malignant lymphoma, neurofibroma, tuberculosis lymphadenitis and metastatic carcinomas should be considered[1,2,7]. It is difficult to diagnose carotid body tumors preoperatively with incisional or aspiration biopsy in the absence of carotid angiography. In three cases undergone biopsy in other centers for diagnostic purposes, bleeding complications had been developed. Selective carotid angiography is the most useful diagnostic procedure[3,8] (Fig.1). Since the tumor is seen bilaterally in 5-10 % of cases, angiography should be done bilaterally [1]. In our cases, all angiographies were done bilaterally and in one case with bilateral tumor was detected. It was suggested that the people living in high altitudes or exposed to hypoxia carry a higher risk of tumor development [2,8]. Experimentally, in rabbits exposed to hypoxia, tumor growth was shown to be increased [8]. Familial tendency or history of living at high levels were not present in our cases. Generally, the tumor manifests itself as a slowly growing, asymptomatic, palpable mass on the neck region. Since the tumor doesn't cause complaints, the patients apply to the doctor late in the course of the disease. In our cases the period between the occurrence of the symptoms and application to a clinic was 6 months in average. It is quite difficult to differentiate whether carotid body tumors are benign or malignant histologically. Local lymph node invasion and distant metastasis are regarded as the criteria for malignancy [2,7-9]. Pharyngeal compresion, murmur on the neck with auscultation, decrease in size with compresion, being able to move horizontally, not vertically are important clinical findings, but not diagnostic [1,3,8]. Rarely syncope can be seen [7]. In a study, local invasion and metastasis to the organs, which are regarded as malignancy criteria, were seen in 5-10 % of cases [2]. In an other study, changes in shape and diameter of the cells, presence of mitosis, capsule and invasion to the neighboring structures were detected as malignancy criteria, but no distant metastasis was detected [7]. It is suggested that the carotid body tumor

can accompany to larynx, breast, cervix carcinomas and colon adenocarcinomas [2]. Incidence of malignancy is higher in young patients [9]. Since the carotid body tumor occurs in an anatomically critic region, there are some suggestions that should be regarded as malignant [8]. In our study, local lymph node invasion was seen in only one case. No distant metastasis was detected. Benign carotid body tumor contains pleomorphic cells that contain mitotic figures very few in number, and no capsule invasion is seen [2,3]. The treatment methods of carotid body tumors contain surgical excision, radiotherapy, embolization and observation [8]. Spontaneous regression of the tumor is not possible [3,8]. Since the growth rate of the tumor can not be estimated and it has a property of continuous growing, even in the old patients, observation is not a good method. Radiotherapy is not effective in treatment [1,7,8]. Surgery is the mainstay of the treatment of carotid body tumors. Technical improvements in vascular surgery provided the surgeons effective treatment of the carotid body tumors. In the past, carotid artery ligation and excision had a mortality rate reaching 50%, and approximately 30% of the patients surviving suffered from hemiplegia postoperatively [9]. As the tumor grows, difficulty of the operation, and postoperative complication rates are increased. Mostly damaged nerve in the operations is hypoglossal nerve [8]. When the cranial nerves are damaged, hoarsness, dysphagia, facial paralysis and hemiplegia can be seen postoperatively. As a coclusion, we believe that whenever the diagnosis of the carotid body tumor is made, surgical excision without damaging the vascular and neural structures, is the most effective and correct way of treatment.

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