

## Review Article

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## Hypovascular Chemodectomy or Metastatic Lymph Node of the Neck

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### ABSTRACT

Carotid glomus is a rare disease found among non-organ neck tumors in 0.5-0.9%, and among neurogenic neck tumors up to 37%. The latent course, symptoms similar to a large number of pathologies, lead to a high percentage of errors up to 25-90% and, as a result, to an untimely diagnosis. Diagnosis of carotid chemodectomy and metastatic node in the area of carotid artery bifurcation is a difficult task, which is based on the conclusion of the clinical picture, ultrasound, tomography and angiography, morphological verification is not carried out due to the high risk of bleeding and damage to cranial nerve branches. A chemodectoma with low vascularization is extremely difficult to diagnose. In this article, we present a similar case.

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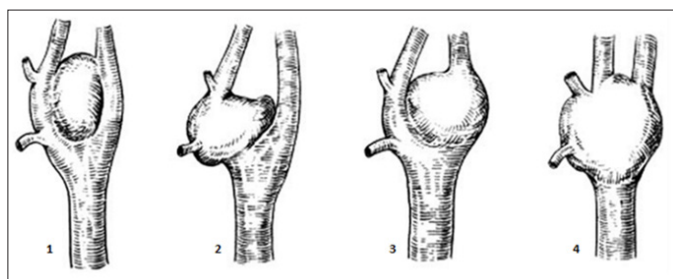
**Keywords:** Paraganglioma, Chemodectoma, Metastatic Lymph Node, Angiography, Ultrasound, Computed Tomography, Diagnosis of Chemodectomy

### Introduction

Neck hemodectoma refers to paragangliomas of the head and neck - it is a neuroendocrine tumor of paraganglionic cells, the migration of which occurs from the neural crest during intrauterine development. Carotid chemodectoma (carotid glomus) is the second largest tumor after the adrenal medulla. Anatomically, it is a reddish-brown oval-shaped structure of about 3-5 mm, surrounded by a fibrous capsule weighing less than 15 mg. In the literature, the location of the carotid chemodectomy is indicated in the adventitia, next to the bifurcation of the carotid artery, but some surgeons describe its location to the periphery in tissues adjacent to the adventitia [1,2]. Glomuses produce biogenic amines, react to changes in the concentration of O<sub>2</sub>, CO<sub>2</sub>, pH of the blood and transmit information about this to the bulbar centers of the brain [3-6]. At low oxygen concentrations, pulses from the paraganglia stimulate the excitation of respiration, an increase in the number of circulating red blood cells, an increase in blood pressure, as well as an increase in the secretion of adrenocorticotrophic hormone, glucocorticoids, adrenaline and insulin [7-10]. Based on the discovery of the chemoreceptor function of non-chromaffin

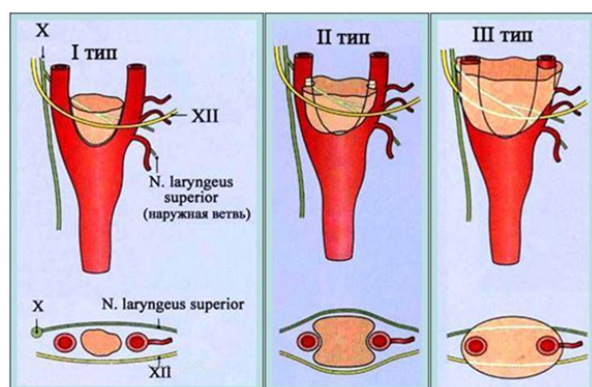
paraganglia, in particular the carotid body, Muligan in 1950 proposed the term chemodectome – hemia - solution, dechtestai – perception. The glomus is characterized by an abundant network of precapillaries and capillaries from the arterial branches of the external, internal or bifurcation of the common carotid artery [11]. The carotid chemodectome is innervated by three sources: ramus sinus carotici nervi glossopharyngei, ramus glomi carotici nervi vagi and rami pharyngei nervi vagi. The pharyngeal nerve (IX) reacts to changes in the partial pressure of carbon dioxide and oxygen, and transmits information to other parts of the central nervous system [12]. Carotid glomus occurs among non-organ neck tumors in 0.5-0.9% of cases [13]. However, among neurogenic neck tumors, they account for 37% [13,14]. The growth of chemodectomy has the following features: significant infiltration of nearby tissues, a tendency to circular growth and fouling of the carotid arteries, a tendency to spread along the vascular bundle to the base of the skull [7-15]. The separation of carotid glomuses occurs depending on various factors, such as the causes of development: sporadic, familial, hyperplastic; histological structure: angiomatous, alveolar, mixed, atypical; from interaction with surrounding tissues: non-invasive, locally invasive, invasive [16-20]. The classification of topographic and anatomical features of tumors and carotid arteries proposed by L.A. Atanasyan in 1967 became the most widespread and consists

in the allocation of 4 variants: 1 - the tumor pushes the external and internal carotid arteries apart (40%); 2 - the tumor in the form of a clutch covers the external carotid artery (15%); 3 - the tumor covers the internal carotid artery (5%); 4 - the tumor covers the bifurcation of the common carotid artery and both its branches (40%). This classification has become widespread in our country.



**Scheme 2:** Scheme of Growth Variants of Carotid Paragangliomas According to I. a. Atanasyan.

Shamblin W.R. and co-authors in 1971 proposed to distinguish 3 types of tumors (Scheme 2): “small” tumor or Type I - the tumor is in close contact with the walls of both carotid arteries, the size of the tumor (in diameter) is up to 2.5 cm; “large” tumor which includes type II and III - the tumor is in dense solidity with the advent of the carotid arteries (removal is considered difficult), size > 2.5 cm, but < 5 cm is type II, the tumor completely envelops the carotid arteries, size > 5 cm is type III.



**Scheme 2:** Scheme of Anatomical Classification of Chemodectomas by W.R. Shamblin et al. (1971).

The symptoms of this tumor may be different. In most cases, this is the presence of a tumor and its increase in size. Local symptoms include dysphagia, hoarseness of voice, stridor, dizziness, cranial nerve paralysis, bradycardia, pressure “jumps”. When palpating a tumor, attention is drawn to the fact that it shifts horizontally, but not vertically, and there is also a pulsation transmitted from the carotid artery. Given the latent course of the disease, the symptoms are similar to a large number of pathologies, the diagnosis of paragangliomas of the neck, even at present, has a high percentage of errors up to 25-90%. The rarity of this disease, and as a result, the low awareness of doctors, also leads to an untimely diagnosis. At the first stage, it is difficult to distinguish between a chemodectoma and a lymph node during a physical examination. Ultrasound examination of the carotid arteries makes it possible to identify the localization of the tumor, the structure, the degree of vascularization and suspect this pathology, therefore, most often the first link in the diagnosis is the doctors of ultrasound methods. Magnetic resonance imaging is the standard for the diagnosis of chemodectoma. The characteristic features of the carotid glomus are localization and granularity (like

“salt and pepper”) on T1-weighted images. The gold standard is angiography, which demonstrates the volume, location and vascularization of the tumor. Given the high risk of bleeding and/or damage to cranial nerve branches, puncture biopsy is not recommended [21]. Diagnosis is based on the conclusion of the clinical picture, ultrasound, tomography and angiography [22-25]. The main method of treatment of carotid chemodectoma is surgical treatment, which is contraindicated in cases of extensive tumor dissemination and the presence of distant metastases. Chemodectoma has a low sensitivity to radiation therapy and as an independent method has shown low effectiveness, at the same time, radiation therapy with a total focal dose of 40-50 Gy is advisable in the postoperative period [26-28].

Taking into account all of the above, differential diagnosis of carotid chemodectoma and metastatic node in the area of carotid artery bifurcation can be a difficult task.

### Clinical Case

Patient T., born in 1954, 64 years old. Height 172 cm, body weight 64 kg, BMI 21.6 kg/sq.m, Body surface area 1.75 sq. m, T – 36.6 C.

Anamnesis: in April 2024, during dental treatment (removal of mandibular teeth), in May 2024, I noticed an increase, soreness in the submandibular area on the right (lymph node?). In June 2024. there was an education under the tongue. I went to a doctor at my place of residence, antibacterial therapy was recommended, against which I noted a decrease in the submandibular lymph node on the right. An abscess of the sublingual space on the right? In June 2024, the opening and drainage of an abscess of the oral cavity. Sent to the CAOP. With ultrasound, there are signs of cervical lymphadenopathy on both sides, pathological cervical lymph nodes on the left (level IIA). Under ultrasound control, a TAB of formation in the projection of the carotid artery bifurcation on the left was performed, a cytogram - in the obtained material, single groups of tumor polymorphic cells with degenerative changes, some inclusions: salivary gland cancer? The Milan System for Reporting Salivary Gland Cytopathology – V, suspected malignant tumor (SM). FEGDS in June 2024 – superficial gastritis. FLS in July 2024 – chronic laryngitis. Repeated ultrasound of the lymph nodes of the neck in July 2024. – Ultrasound signs are more typical for secondary lesions (metastases), TAB, cytogram – corresponds to metastatic cancer. PET CT scan (18F-FDG) in August 2024. – single superior jugular lymph node on the left 17x12mm, SUV max 1.95, single submandibular on the left up to 11x8mm, SUV max 1.08. A solid focus in the S9 of the right lung is 9x5 mm, with background metabolism of RFP, subsegmental atelectasis in the S5 of the right lung, single bronchopulmonary lymph nodes on both sides up to 10 mm SUV max 2.84 (reactive), diffuse accumulation of RFP in the walls of the stomach SUV max 4.84 (most likely of inflammatory origin), cyst in the S7 liver up to 6 mm, numerous calcifications of the liver and spleen up to 4 mm, single cysts of the left kidney up to 3 mm. CT scan of the neck in August 2024. – in the carotid space in the bifurcation area of the common carotid artery, an oval-shaped hypervascular formation with clear contours up to 18x14mm, closely adheres to the external carotid artery by more than 180 degrees, to the internal carotid artery by less than 180 degrees, pushes them apart, probably corresponds to a carotid paraganglioma (Fig.2 in). The patient was sent to the department of head and neck tumors of the Oncological Center No. 1, S.S. Yudin State Clinical Hospital for diagnosis and treatment with a diagnosis of C77.0 Metastasis to the lymph nodes of the neck on the left without a primary lesion? Carotid paraganglioma? Concomitant diseases: I11.9 Hypertension II ct, controlled hypertension, GLP 2A, risk 4. I25.1 Atherosclerotic



heart disease. Coronary heart disease: angina pectoris FC 2, CHF 1, FC 2. K29.6 Chronic superficial gastritis, stage of remission.

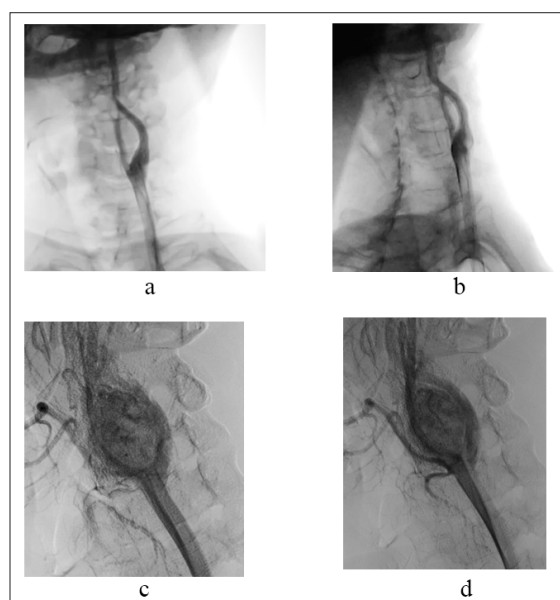
On palpation, the lymph nodes on the neck are not clearly defined, when examining the oral cavity: there is no trism, the mobility of the tongue is preserved, the mucous membrane is pink, smooth, without signs of tumor growth, on the mucous membrane of the bottom of the oral cavity on the right there is a postoperative scar up to 10 mm, without signs of tumor growth.

At the consultation: taking into account the discrepancy between the data of X-ray methods on the one hand and ultrasound signs and cytology on the other, it was decided to perform angiography of the carotid arteries on the left for differential diagnosis and determination of further tactics.

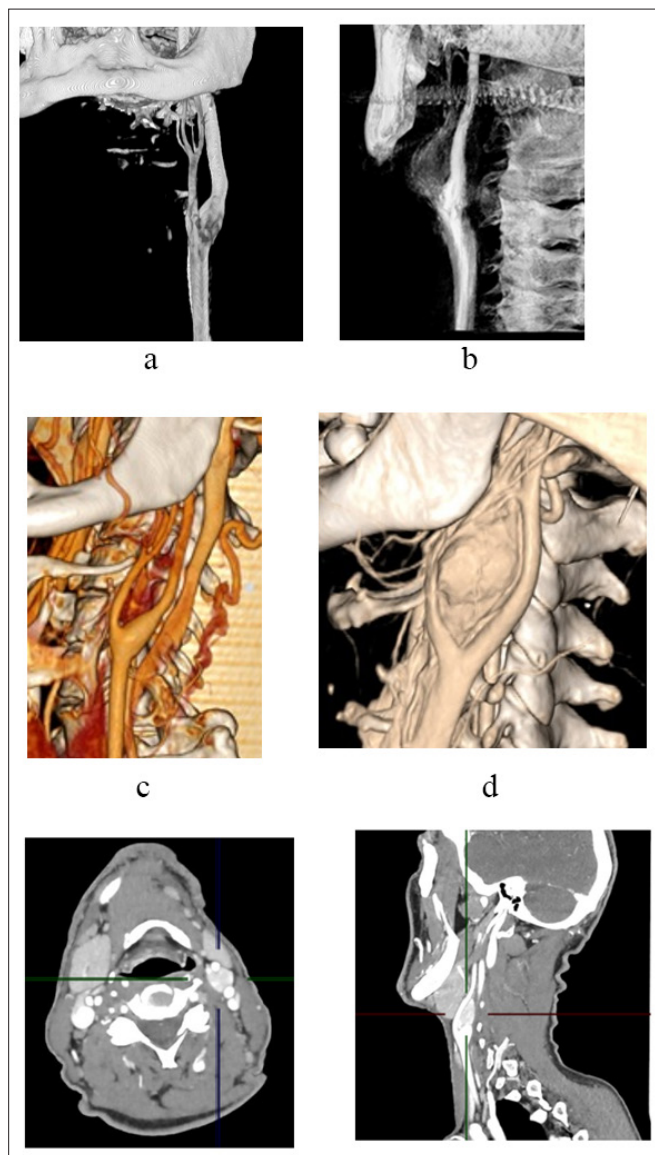
During angiography of the carotid arteries on the left, performed on a Philips Azurion 7 M20 device with Omnipak 350 contrast agent, the common, external and internal carotid arteries were visualized, the formation of bifurcation in the projection was not determined, as well as the vessels feeding this zone were not detected (Fig.1). To exclude errors, angiography was performed in different projections, including with using FD-CT (Fig.2). It was decided that the formation of soft tissues of the neck is not a chemodectome, but a lymph node. Trepan (cor) biopsy was performed in the ultrasound-controlled angiographic with Doppler examination, whitish-colored tissue columns were obtained - 2 columns (Fig.3). After biopsy, no signs of paravasal contrast propagation were revealed during control angiography. The patient was transferred to the ward in a satisfactory condition and discharged on the second day.

Histological conclusion: epithelial cell malignant tumor in the lymph node of the neck, to clarify the histotype, the material is directed to IHC.

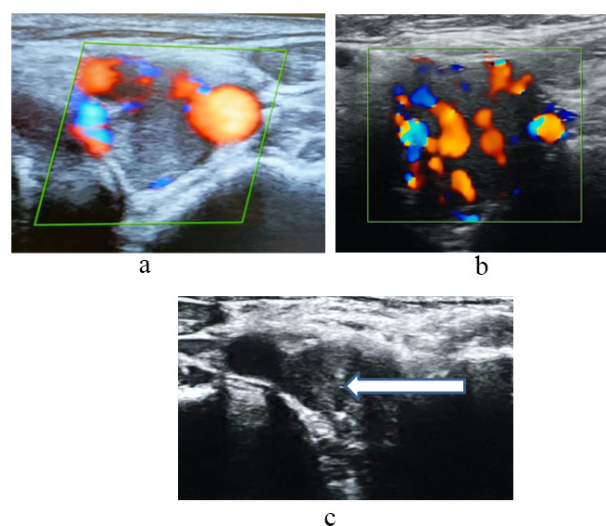
IHC – in tumor cells, a pronounced cytoplasmic granular reaction with a/a to Synaptophysin (clone MRQ40 Cell Marque Corporation USA), Chromogranin-A (clone LK2H10 Ventana), CD56 (clone 123C3 Ventana), S100 (clone 4C4.9 Ventana) – signs of paraganglioma metastasis.



**Figure 1:** A, B - Angiography of the Carotid Arteries of Patient T. In Different Projections; C, D – Angiography of the Chemodectomy.



**Figure 2:** a – FD-CT of Patient T., b – FD-CT of Chemodectomy, c – CT of 3D Patient T., d – CT of 3D Chemodectomy, e – CT of Patient T. Horizontal section, e – CT of Patient T. Sagittal Section.



**Figure 3:** a - ultrasound with a Doppler examination of patient T.; b - ultrasound with a Doppler examination of a patient with a

chemodectomy, c - biopsy (the arrow indicates a biopsy needle).

## Conclusion

This clinical case shows the complexity of differential diagnosis of hemodectoma and metastatic lesions of the lymph nodes of the neck, based on ultrasound, CT, as well as angiography for hypovascular paraganglioma. Histological examination is the most reliable, but also dangerous method, given the risks of bleeding and neurological disorders. Conducting a trepan biopsy under the supervision of an ultrasound and an angiograph reduces these risks and allows you to correctly diagnose.

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