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## **Paragangliomas in the area of carotid bifurcation – case reports**

**Abstract:** Tumor glomus caroticum in the area of carotid bifurcation represents a very rare disease. The aim of this work is to describe this rare disease and experience with surgical treatment at our workplace. Tumour extirpation was successful at all the patients, without necessity to perform resection of the carotid arteries.

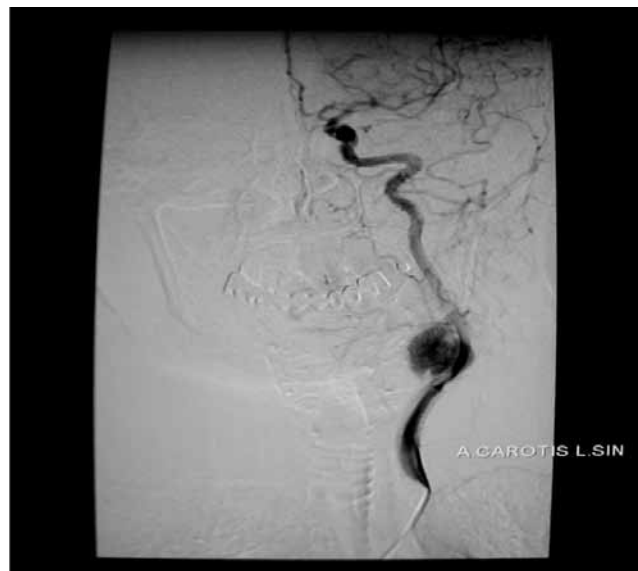
**Keywords:** carotid surgery, Tumor glomus caroticum, paraganglioma.

Tumour of the carotid bifurcation is a rare disease. It is a rare neuroendocrinologic tumour which grows from the paraganglionic tissue, which is located along the spine. Approximately 5 % of the paraganglioma are hormonally active. Most frequently they occur around 50<sup>th</sup> year of age and women suffer 4 times more of it than men. In 2–4 % of the cases the paraganglioma occurs in the neck area and the most frequent is the tumour in the area of carotid bifurcation. In most cases it comes as painless resistance on the side of the neck. Disability of cranial nerves and headache might be very rare symptoms.

**Materials and methods.** In the course of 2005–2014 we operated 3 patients with the Paraganglioma in the area of carotid bifurcation at the Clinic of vascular surgery of Medical faculty of University of Pavol Jozef Šafarik and VÚSCH a. s. in Košice.

In the first case it was a 57-year old female patient who was sent to our clinic to have a surgical therapy performed as she had had tumour glomus caroticum diagnosed by the ultrasound. Before the operation we conducted an additional DSA (digital subtract angiography) of carotid arteries in relation to serious stenosis described by USG (ultrasound examination). At DSA the stenosis was evaluated as hemodynamically irrelevant and the patient was recommended for operation of glomus caroticum tumour. Carotid arteries were prepared and secured under standard conditions using the classical approach, cut in front of m. sternocleidomastoideus. Consequently the subadventitial removal of tumour from ACI (internal carotid artery), ACE (external carotid artery) and from the area of carotic bifurcation was gradually conducted. In the post-operative period the patient was without any complications and was allowed to leave hospital on 5<sup>th</sup> day after the operation (Pic. 1).

In the second case it was a 52 year-old man sent to our clinic with CT (computer tomography) angio diagnosed tumour in the area of carotid bifurcation. After the preparation the patient was operated in the above described way. Like in the first case in regard to the largeness of the tumour the subadventitial excision of tumour was conducted without necessity to carry out resection of the carotid arteries. In the post-operative period the patient was without any complications and was allowed to leave hospital and continue in home care on 4<sup>th</sup> day after the operation (Pic. 2).



Pic. 1. DSA of left carotid artery with tumour (patient No. 1)



Pic. 2. Pre-operative finding (patient No. 2)

The last patient from the group was a 45-year old woman. She came to surgical therapy after recommendation made by a neurologist who had diagnosed glomus caroticum tumour. In this last case there was the biggest tumour sized 5 x 4 x 3.5 cm. Closely connected with the tumour was an increased LU, which was removed un block together with the tumour. Subadventitial excision of tumour was sufficient also in case of this last patient. After the operation the patient was without any complications and was allowed to leave hospital on 4<sup>th</sup> day. There was a neurologic examination conducted at every patient after the operation in order to prove there was no harm done to the nervous structure (Pic. 3).



Pic. 3. Pre-operative finding (patient No. 3)

**Discussion.** The first reference about the carotid bifurcation tumour comes from Haller in 1762. Glomus caroticum is part of the extra-adrenal neuroendocrine system. Paraganglion cells are in human body along the autonomic nervous system. The most frequent localizations of paragangliomas in the area of head and neck are: jugular bulb, middle ear, area of nervus vagus and carotid glomus. Paraganglia in the area of carotid bulb are chemoreceptors and are responsible for keeping the haemostasis of a human organism. These cells are sensitive to change of partial arterial pressure O<sub>2</sub>, CO<sub>2</sub>, as well as to the change of pH and temperature of arterial blood. Glomus caroticum tumours form approximately 0.6 % of head and neck tumours and totally 0.03 % of all human body tumours.

The most frequent occurrence is between 40<sup>th</sup> and 50<sup>th</sup> year of age. In most cases the tumour appears as a painless, moving mass on the side of the neck, with slow growth progression. In exceptional cases the symptoms caused by compression of carotid sinus, internal carotid artery or surrounding cranial nerves might be present.

General symptoms like sickness, loss of weight or fatigue are typical for malignant tumours and there is a high probability of present metastasis. Malignant tumours glomus caroticum are described only in 2–10 % cases. As the tumor gets bigger, the operation becomes more difficult, and postoperative complications increase. Tachycardia, palpitations, hypertension and tremor use to be present with endocrine-active tumours [1].

Diagnostic uses the following methods of demonstration: USG, DSA carotid, CT angiography and MR angiography (magnetic resonance). In most cases USG examination is sufficient for diagnostic purposes. Invasive display methods are reserved for unclear cases (e.g. carotid artery aneurysm). In terms of histology they comprise 2 cell subtypes and their histological nature is benign. Malignancy of tumor is characterized by invasive growth and presence of metastases — local and distant, not by its histological image. Occurrence of local and distant metastases is in less than 10 % of cases, the most frequently in regional lymph nodes [2]. Classification of carotid paraganglioma comes from Shamblin and is significant at assessment of scope and operability of tumor and prediction of post-operative morbidity [3] (Table 1).

Table 1. – Classification of carotid paraganglioma

I	small tumour, easily detachable from carotid arteries
II	medium-length tumour, intimately adherent to carotid arteries — detachable by subadventitial dissection
III	large tumour (> 5cm.) within filtration of carotid artery (transmural growth) and with the need of partial or complex artery resection with its supplement

In the therapy of carotid glomus tumor, a selection method is surgical removal of the tumor. According to Shamblin, in case of type III tumors excision of carotid artery is necessary, according to the scope and nature of the tumor and its replacement by VSM graft (great saphenous vein) or artificial replacement [4]. With regard to strong vascularity, the pre-operative embolisation is used in the therapy of paraganglioma;

however its significance is questionable. On one hand the successful embolisation decreases blood loss during the operation, but there is a risk of carotid artery thrombosis and risk of embolisation [5]. Glomus caroticum tumor is considered as radioresistant but in exceptional cases (tumor of large size, relapse of tumor, a patient not suitable for surgical therapy) a possible treatment method is also radiotherapy [6]. It is

possible to use the radiotherapy also for patients after non-completed extirpation of a large tumor.

Annual mortality is low — up to 10 % on average also in non-treated cases, thanks to very small growth of tumor and its benign nature.

Modern surgical procedures have reduced occurrence of pre-operative and post-operative CMP (brain stroke) to less than 5 %. However, occurrence of cranial nerve damage is still high — from 20 % up to 40 %. Occurrence of such damage is high mainly at patients with a large tumor (over 4.5 cm). In case of approximately 20 % of patients this neurological deficit is permanent. On the other hand, damage of

the nerves caused by long-term compression of tumor is typically permanent and irreversible [7].

In differential diagnostics the abscess, aneurysm of carotid arteries, lipoma, goitre and lymphoma must be considered.

**Conclusion.** Removal of glomus caroticum tumour is a selective method for patients in overall good condition. Removal should come as soon as possible after it has been diagnosed to prevent complicated resections and reconstructions of carotid arteries at advanced tumours. Subadventitial dissection and removal of tumour is vital to remove the tumour completely without minimum level of morbidity.

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## Peculiarities of dermatoglyphic values among the people of Uzbek population dependently on sex

**Abstract:** This article describes a study conducted to determine the basic dermatoglyphic traits, located in relation to gender in persons of Uzbek population. Provides definitions of the differences in rate of dermatoglyphic depending on nationality.

**Keywords:** dermatoglyphics, national origin, papeleria patterns, fingerprints.