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**CAROTID ARTERY OCCLUSIONS: CLINICAL AND
ULTRASONOGRAPHICAL CHARACTERISTICS**

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The **general part** of the thesis presents a review of the literature regarding the epidemiology of carotid atherosclerosis, the ultrasonographical characteristics of the unstable carotid plaque, clinical, diagnostical and therapeutical aspects of the carotid occlusions and dissections.

The experimental part is structured in five distinct parts.

The objective of the study was to analyse the epidemiological, clinical, diagnostical (especially the ultrasonographical diagnosis) and therapeutical aspects of the carotid artery occlusions.

Patients and methods

We analysed 5000 duplex cerebro-vascular ultrasound records performed during a 6-year period from 2007-2012 from patients who were examined in the Ultrasound Laboratory of Neurology Clinic I at Mureș County Clinical Emergency Hospital. The examinations were performed using a Siemens Acuson Antares ultrasound system (VFX13-5 MHz linear transducer, PX4-1 MHz transcranial transducer, CW5 Doppler pencil transducer). In questionable cases, the ultrasound findings were confirmed by angiography or CT angiography.

A total of 171 out of 5000 (3.42%) patients with cerebro-vascular disease who were referred for carotid sonography had a carotid artery occlusion. The medical history, risk factors and clinical characteristics of these cases were obtained from the archived medical records.

Results

From the 5000 patients examined ultrasonographically 3000 were hospitalized for acute ischaemic stroke. The prevalence of the carotid artery occlusion in the patient group with acute stroke was 5.1%. The carotid artery occlusion was symptomatic (occurrence of at least one transient ischaemic attack or stroke attributable to carotid circulation on the ipsilateral side) in 76,6 % of the cases and asymptomatic (there were no reports of symptoms or signs attributable to vascular events in the region of the occluded carotid artery) in 23,4%.

The main vascular risk factors for occlusion were: hypertension (81,3%), smoking (38%), dyslipidemia (34,5%). A potential cardioembolic source for occlusion was identified in 14% of the cases. In the majority of the cases the diagnosis of occlusion was based on ultrasound examination, in 28 cases the ultrasound findings were confirmed by DSA, CT-angiography or MRI-angiography. Bilateral carotid occlusion was diagnosed in 12 cases.

The site of the occlusion in the majority of the cases was the internal carotid artery (ICA) proximally (72,67%), the distal ICA occlusions, the common carotid artery occlusions (CCA) and CCA+ICA occlusions were more rare (14,7%, 7,1%, 5,47%, respectively). The etiology of the occlusion was identified 87,1% of the cases, the most important etiological agents were atherosclerosis (77,2%), embolism (5,8%), dissection (1,8%), postirradiation arteriopathy (1,2%) and hypercoagulability (1,2%). According to the OCSF (Oxfordshire Community Stroke Project) classification the most frequent stroke syndromes secondary to carotid occlusion were PACS (partial anterior circulation syndrome-58,8%), TACS (total anterior circulation syndrome 34,6%) and PCS (posterior circulation syndrome-5,3%). According to the Glasgow Outcome Scale the patients with acute stroke secondary to occlusion presented good recovery in 14,4% of the cases, moderate disability in 45,1%, severe disability in 35,3 %, vegetative state and death in 5,2%.

The mean age of the patients with asymptomatic CAO was significantly higher comparing with the symptomatic group ($p=0.02$). The left carotid axis was more frequently affected in case of the symptomatic occlusions. The distal ICA occlusions were more frequently symptomatics, the CCA occlusions asymptomatics. The occlusions secondary to embolism and dissection were more frequent in the symptomatic group. CCA occlusions represented only 12,8% of the carotid occlusions (22/171 cases). Patent distal vessels were found in 50% of the cases, in the majority of the latter cases the ICA was supplied by the external carotid artery, with retrograde blood flow. In a single case both the ECA and ICA had anterograde flow and were supplied by the first branch of the ECA. In case of the CCA occlusions with patent distal vessels the systolic blood pressure values were significantly lower ($p=0.007$), and the majority of these cases were asymptomatic.

The bilateral occlusions were more rare, the bilateral CCA occlusion is extremely rare, the prognosis of these cases is not poorer comparing with the unilateral occlusions. Only 3 patients from the 171 presented ICA occlusion secondary to dissection, in all these cases the ICA was affected distal to the carotid bifurcation.

In the end of the results chapter we presented rare and particular cases of carotid occlusion as aortic arch syndrome, mobile carotid artery thrombus complicated with carotid occlusion after surgical intervention (the youngest case of mobile carotid artery thrombus described in the literature) and pseudoperipheral brachial palsy secondary to carotid occlusion.

The majority of our cases were treated with antiplatelets and statins. Surgical revascularisation was performed for a significant contralateral ICA stenosis in 5 cases, without complications.

Conclusions:

The most important cause of the carotid occlusion is the atherosclerosis. The prevalence of the dissection in our patient group is significantly lower comparing with the literature data. Duplex sonography is a reliable method for diagnosing the carotid occlusion and establishing the patency of the distal vessels in case of CCA occlusion. Patients with symptomatic occlusions are significantly younger and the nonatherosclerotic etiologies (dissection, embolism) are more frequent in this patient group. Distal ICA occlusions are more frequently symptomatic. The patients with CCA occlusion with patent distal vessels

had good prognosis. The treatment methods have not been standardized, surgical revascularization is possible in selected cases, but the indication for surgery is debatable.

Key-words: carotid artery occlusion, stroke, duplex ultrasound, outcome