

Weerawardana Y.H., Faris A.M.

TOPOGRAPHIC VARIABILITY OF ATHEROSCLEROTIC PLAQUE FEATURES AND ASSOCIATED CLINICAL AND MORPHOLOGICAL MANIFESTATIONS

Tutor: PhD, Associate professor Savosh V.V.

*Department of Pathological Anatomy and Forensic Medicine
Belarusian State Medical University, Minsk*

Relevance. Atherosclerosis is a chronic vascular disease characterized by the formation of atheromas that develop within arterial walls, which impairs blood flow. Topographical variations in atherosclerotic plaque morphology and clinical presentation are complex processes influenced by genetic, environmental, and hemodynamic factors.

Aim: to analyze and compare the pathological anatomy, hemodynamic influences, and clinical manifestations of atherosclerotic plaques in distinct varieties vascular territories, and coronary arteries and to determine how anatomical location influences patient prognosis.

Materials and methods. A study was conducted involving six patients from Sri Lanka. Each patient underwent a thorough evaluation, including medical history, physical exams, and assessment of risk factors such as lipid profile, fasting glucose, HbA1c, high-sensitivity troponin I, and coagulation tests (PT/INR). Imaging studies included duplex ultrasound of peripheral, carotid, and vertebral arteries, echocardiography, ECG (resting and exercise), and coronary angiography. The clinical data was also compared with international data.

Results and their discussion. Cases were stratified into four groups based on plaque location: lower extremity arteries, aortic arch branches, carotid arteries, and coronary arteries with extracardiac vessels. Group I (femoral artery) featured fibrocalcific plaques with thick fibrous caps and paucicellular lipid cores, presenting with intermittent claudication. Limb prognosis is favorable, yet the five-year risk of myocardial infarction or stroke reaches 25%, reflecting systemic disease burden. Group II (subclavian and vertebral arteries) showed calcific intimal plaques at branch ostia, causing subclavian steal syndrome and vertebrobasilar insufficiency. These lesions are often clinically silent, with only 15% progressing to symptoms, though posterior circulation stroke risk persists. Group III (carotid bifurcation) exhibited vulnerable AHA Type VI plaques – large necrotic cores, thin fibrous caps, and surface ulceration with intraplaque hemorrhage – resulting in embolic stroke. Prognosis is guarded, as symptomatic high-grade stenosis confers a 26% two-year stroke risk without surgical revascularization. Group IV (coronary and LIMA arteries) presented with exertional angina and atypical symptoms. Therefore, coronary thin-cap fibroatheromas pose risks of myocardial infarction and sudden death, whereas LIMA stenosis with collateral vasa vasorum proliferation carries a more favorable prognosis. Plaques in the upper aorta and supra-aortic trunks are characterized by high inflammatory infiltrate and necrotic core burden, while peripheral plaques exhibit predominantly fibrocalcific morphology.

Conclusions. Atherosclerosis demonstrates distinct topographical heterogeneity. Plaques in the upper aorta and supra-aortic branches are more vulnerable, with higher embolic risk and neurologic consequences. Peripheral and coronary plaques have different prognostic implications, mainly related to limb loss, myocardial infarction, and systemic mortality. Recognition of these anatomical variations is essential for making diagnostic, therapeutic, and prognostic decisions adapted to the anatomical location.