Abstract

This doctorial thesis was focused on morphological and functional changes in microvasculature and endomysium in human atrial myocardium with atrial fibrillation. Atrial fibrillation (AF) is one of the most common arrhythmias in the clinical practice and it is associated with an increase in mortality risk that is strongly related with old age. Its pathogenesis is still not sufficiently explored. One of the generally recognized factors contributing to the initiation and maintenance of atrial fibrillation is structural remodeling of the myocardium. Structural remodeling is reflected by changes that affect both atrial cardiomyocytes as well as endomysium.

We analyzed atrial biopsies obtained from patients undergoing bypass or mitral valve surgery. The patients had a regular sinus rhythm or were suffering from AF. Immunohistochemistry was used to visualize collagen I, collagen III, elastin, desmin, smooth muscle actin and VEGF in the atrial samples.To detect capillaries UEA-lectin was used. For detection of different types of immune cells the following markers were detected immunohistochemically: CD45 as a pan-leukocyte marker, CD3 for T-lymphocytes, CD68 for monocyte/macrophages, mast cell tryptase for mast cells and DC-SIGN for immature dendritic cells.

Our results document that in patients undergoing open heart surgery variable level of ECM proteins can be found but the amount of collagen I, colagen III and elastin do not differ when the patient group is divided based on the presence of atrial fibrillation or sinus rhythm. Elastin volume fraction is higher in the right atrium compared to the left possibly reflecting different biomechanics or embryonic origin. VEGF is present in myocardia of patients but its amount is not dependent on the heart rhythm. Most of atrial capillaries are associated with pericytes but similar to microvascular density we did not observe changes during atrial fibrillation or when left and right atrium was compared. CD45+ cells are a heterogeneous cell population in atrial myocardium from patients undergoing open heart surgery and these cells can be detected regardless of the heart rhythm. The finding of higher frequency of CD45+ leukocytes with elongated processes in the AF samples suggests the activation of inflammatory cells in this arrhythmia.

Key words: atrial fibrillation, myocardium, endomysium, collagen, fibrosis