

Abstract

Ventricular assist devices are an important therapeutic modality in advanced surgical therapy of end-stage heart failure. Devices mainly used until recently generate primarily non-pulsatile blood flow. Despite indisputable clinical success of this therapy, we encounter complications specific to the devices with continuous flow. Complications are mostly attributed to increased shear stress and changes in blood vessels, blood elements and endothelium. The aim of this study was to determine the effect of continuous blood flow on the vasculature and blood elements by longitudinal monitoring of selected biomarkers of vascular health. During the study we monitored circulating microparticles, endothelial progenitor cells and stem cells and examined degradation dynamics of von Willebrand factor and its function.

Results obtained in our study confirm the hypothesis of changes in the dynamics of studied markers dependent on the change of characteristics of blood flow. The possible negative effect of continuous flow on monitored parameters was observed in tracked period. In degradation of the high molecular weight von Willebrand factor multimers the probable positive effect of artificial pulsatility was observed. Further research can provide important data for the development of specific characteristics of new generations of mechanical circulatory support, especially in defining pulse amplitude rate and its synchronisation with native heart rhythm.