

ABSTRACT

Ventricular assist devices are blood pumps capable of partially or completely replacing the function of the heart to achieve adequate cardiac output. Long-term fully implantable left-ventricular assist devices became the gold standard in the treatment of terminal stages of heart failure. They improve survival and quality of life of the patients on the waiting list for heart transplantation and those implanted as destination therapy. At the same time, this specific group of patients is at risk of a number of complications specific to this therapeutic modality. Among the most serious belong haemocompatibility related adverse events with a significant impact on morbidity and mortality. One of the aspects influencing the occurrence of these complications may be the non-physiological, non-pulsatile blood flow generated by current generation of devices. Therefore, the aim of this study was to assess the impact of long-term implantable mechanical circulatory support with continuous blood flow on the vasculature and vascular system. The functional and morphological changes in blood vessels as well as changes in biomarkers of vascular injury were analyzed. The results of our study supported the hypothesis that non-pulsatile blood flow affects the vascular system at morphological and functional level, as well as at the level of gene expression. The findings may contribute to the prediction and more timely management of serious complications and could be also essential for the development of the next generations of the devices.