PATHOMORPHOLOGICAL FEATURES OF MYOCARDIAL MICROCIRCULATION IN PERIPARTUM CARDIOMYOPATHY ACCORDING TO PREGNANCY PARITY

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Abstract

Peripartum cardiomyopathy (PPCM) is a serious cardiovascular complication characterized by impaired myocardial contractility and structural remodeling of cardiac tissue. An important role in its development is attributed to disturbances in myocardial microcirculation, endothelial injury, and an imbalance between angiogenic and antiangiogenic factors. Reproductive history, particularly the number of previous deliveries, may influence susceptibility to cardiovascular complications during pregnancy. However, the relationship between pregnancy parity and myocardial microvascular damage in PPCM remains insufficiently investigated.

Objective. To evaluate the available evidence on the pathomorphological characteristics of myocardial microcirculation in peripartum cardiomyopathy and their possible association with pregnancy parity.

Materials and Methods. A descriptive and comparative analysis of five published scientific studies concerning myocardial microvascular remodeling, endothelial injury, angiogenic disturbances, and reproductive risk factors in peripartum cardiomyopathy was performed. Particular attention was given to capillary structure, endothelial integrity, vascular lumen alterations, interstitial fibrosis, and mechanisms of impaired myocardial perfusion. Data related to pregnancy parity were evaluated

separately from findings concerning multiple gestation.

Results and discussion. Morphological studies have demonstrated that disturbances in myocardial microcirculation represent an important component of peripartum cardiomyopathy. Fidziańska et al. identified ultrastructural abnormalities of myocardial capillaries, including endothelial cell remodeling, vascular lumen occlusion, and apoptotic changes. These alterations were accompanied by inflammatory cellular components and secondary interstitial fibrosis.

Experimental investigations have established a relationship between altered angiogenic regulation and myocardial microvascular injury. Patten et al. demonstrated that suppression of cardiac angiogenic mechanisms was associated with reduced myocardial microvascular density and impaired cardiac function. The authors also identified elevated circulating levels of soluble fms-like tyrosine kinase-1 (sFLT1), an antiangiogenic factor, in women with PPCM.

Another important mechanism involves the cleavage of prolactin into a 16-kDa fragment with antiangiogenic and proapoptotic activity. Hilfiker-Kleiner et al. demonstrated experimentally that this prolactin fragment contributes to damage of the myocardial capillary network, providing a possible explanation for microvascular dysfunction during the peripartum period.

The relationship between reproductive history and PPCM is more complex. A systematic review and meta-analysis published in 2025, including 18 studies, identified parity as a significant risk factor for PPCM (OR = 1.79; 95% CI: 1.21–2.67; p = 0.004) [1]. Nevertheless, these epidemiological findings do not establish a direct relationship between the number of previous deliveries and the severity of myocardial capillary injury. The combined evidence suggests that endothelial damage, impaired angiogenesis, and interstitial remodeling are relevant pathological processes in PPCM. However, the available studies do not provide sufficient parity-stratified histological

measurements to determine whether these alterations are more pronounced in primiparous or multiparous women.

Conclusion. Myocardial microcirculatory impairment in peripartum cardiomyopathy is associated with endothelial cell damage, capillary remodeling, vascular lumen abnormalities, and disturbances in angiogenic regulation. Pregnancy parity is associated with PPCM risk, but its independent influence on myocardial microvascular morphology remains uncertain. Further comparative histological and morphometric investigations are necessary to determine whether capillary density, endothelial injury, and perivascular fibrosis vary according to the number of previous deliveries.

References

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