

Ph.D. dissertation
***Morphological and hemorheological examinations
of experimental artificial arterio-venous shunts***
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Summary

The artificial arterio-venous (AV) shunt maturation and functional state are influenced by several factors. For the examination of these factors many experimental model are known on rats, most frequently as femoro-femoral artificial AV shunts. However, significant part of these shunts cause circulatory disturbances, even cardiac failure. Saphenous vessels (saphenous artery, medial saphenous vein) are rarely used for shunt examination. However, because of their easy access they would provide good possibility to study shunt maturation, microcirculation, hemodynamical, morphological examinations and concerning the shunts, the less known hemorheological changes. For studying these questions, we aimed to perform an end-to-side sapheno-saphenous artificial AV shunt model in rats.

During the examination of arterio-venous hemorheological base differences –which supposedly change after performing an AV shunt– we found that rats' red blood cell deformability slightly decreased and erythrocyte aggregation index increased in blood samples obtained from the abdominal aorta, compared to caudal caval vein blood samples.

The performed end-to-side artificial sapheno-saphenous AV shunt caused slightly changes in the microcirculation values of shunt-side thigh and paw skin, and only local differences in the hemodynamical parameters. Erythrocyte elongation index parameters decreased in arterial and venous blood samples taken from the AV shunt, compared to the non-operated side and healthy control values, showing a decreasing arterio-venous difference. Erythrocyte aggregation index values were increased at the shunt side both in saphenous artery and medial saphenous vein.

It was demonstrable with morphological and histological examinations that both legs of the AV anastomosis dilated during shunt maturation that became visible by the 8th postoperative week. Histologically, it was noticed both on the arterial and venous legs of the shunt that the intima and media layer of the vessel wall significantly thickened.

The presented end-to-side artificial sapheno-saphenous AV shunt model can be safely performed using microsurgical techniques. By its anatomical localization it provides easy access and does not influence the systemic circulation markedly. Our experiments may give base for further investigations of clinically important issues, such as influencing factors of the shunt maturation, prevention of complications and shunt failure. More detailed investigation of local and systemic hemorheological changes has importance in studying alterations of endothelial function and microcirculatory parameters.

Keywords: experimental animal models, artificial sapheno-saphenous shunt, vascular wall morphology, hemorheology
(állatkísérletes modellek, művi sapheno-saphenosus shunt, érfal morphologia, haemorheologia)