Abstract ID 69

IN-SILICO TOOL FOR VIRTUAL HEMODYNAMICS OF FEMORO-POPLITEAL "BI-PASS" SURGERY

Dalibor D. Nikolic[1]**, Dragan B. Sekulic**[2]**, Danko Z. Milasinovic**[3]**, Dragana S. Paunovic**[2]**,
Igor M. Sekulic**[4]**, Igor B. Saveljic**[1]**, Nenad D. Filipovic**[5]

[1]Institute for Information Technologies, University of Kragujevac, Kragujevac, Serbia
[2]Clinic for Vascular and Endovascular Surgery,Military Medical Academy, Belgrade, Serbia
[3]University of Kragujevac, Faculty of Hotel Management and Tourism in Vrnjacka Banja, Vrnjacka Banja, Serbia
[4]Institute of Radiology Military Medical Academy, Belgrade, Serbia
[5]Faculty of Engineering University of Kragujevac, Kragujevac, Serbia
*markovac85@kg.ac.rs, doktorsekula@gmail.com, dmilashinovic@gmail.com,
paunovic1503@gmail.com, igorsekulic76@gmail.com, isaveljic@kg.ac.rs, fica@kg.ac.rs*

Keywords: Peripheral arterial occlusive disease, Femoro-popliteal by-pass, Finite element analysis, FEA.

Summary: "Bypass" of the femoral-popliteal artery is indicated in the advanced stage of peripheral arterial occlusive disease. Surgical treatment is indicated based on clinical features, "ankle-arm index" and angiographic findings. In the finite element analysis method, a 3D model can be created based on scanning angiography, and various physical quantities can be measured to calculate the value of the "ankle-brachial blood pressure ratio". The aim is to depict arterial hemodynamics using the Finite Element Analysis (FEA) method, based on preoperative and postoperative scan angiography and physical parameters that can be measured in this way. This review presents "bypass" hemodynamics of the femoral-popliteal artery in preoperative and postoperative models. The model obtained from FEA shows pressure, shear stress, velocity, and streamlines. Pressure compared to values measured in the patient, "ankle arm index", preoperative and postoperative FEA results. Postoperatively, higher pressure and "ankle-arm index" values were measured in patients and models. The values shown in the model are significantly correlated with the values measured in the patient. Shear stress and velocity values are significantly reduced in the postoperative model. The streamline shows the predominant tibialis anterior artery. The physical quantity values measured in the patient and the model obtained by the FEM method correlate to a large extent.