عنوان مقاله:

Computational Investigation of the Effect of Wall Thickness on Rupture Risk in Abdominal Aortic Aneurysms

محل انتشار:

دوماهنامه مکانیک سیالات کاربردی, دوره 14, شماره 2 (سال: 1400)

تعداد صفحات اصل مقاله: 15

نویسندگان:

H. E. Salman - *Biomedical Research Center, Qatar University, Doha, P.O. Box ۲۷۱۳, Qatar*

H. C. Yalcin - *Biomedical Research Center, Qatar University, Doha, P.O. Box ۲۷۱۳, Qatar*

خلاصه مقاله:

Cardiovascular disorders are among the most important causes of sudden death and adult disability worldwide. Abdominal aortic aneurysm (AAA) is a critical clinical condition where the aorta dilates beyond ۵۰% of its normal diameter and leads to a risk of rupture. In this study, we performed fluid-structure interaction (FSI) analysis on an eccentric computational AAA model in order to investigate the effects of wall thickness on AAA wall stresses, which are critically important to estimate the rupture risk. For this purpose, we modeled the problem domain using finite element analysis, and coupled the solutions of fluid and structure domains for improving the accuracy of results. ANSYS commercial finite element analysis software was used for modeling, solving, and post-processing the results. Expanded diameter in AAA sac resulted in altered hemodynamics. Wall shear stresses (WSS) caused by the flow are quite low on the AAA sac, which may deteriorate the endothelial cell regeneration and vascular remodeling in the long term. It is concluded that the most critical region for the rupture risk is the posterior distal end of AAA sac due to being exposed to peak mechanical stresses during the cardiac cycle. Obtained results shed light in understanding the rupture risk assessment of AAA.

کلمات کلیدی:

Abdominal aortic aneurysm, Rupture risk assessment, Finite element analysis, structure interaction, Computational fluid dynamics, Fluid, Wall stress

لینک ثابت مقاله در پایگاه سیویلیکا:

https://civilica.com/doc/1369381