URN etd-0407109-183702-80
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Department
Year 2007
Semester 2
Degree Master
Type of Document Master's Thesis
Language English
Title Hemodynamic analysis of Patient-specific Arteriovenous Fistula
Date of Defense 0000-00-00
Page Count 60
Keyword
Arteriovenous Fistula
Oscillatory Shear Index
Wall Shear Stress

Abstract
Arteriovenous fistula (AVF) is the connection of a vein and an artery to allow access to the vascular system for hemodialysis. Failure of access is a main cause of morbidity and hospitalization for end-stage renal disease patients. The most common complications of fistula are stenosis and thrombosis. In this study, the blood flow dynamics in a patient-specific model of end-to-side native AVF was investigated by using Computational Fluid Dynamic. CFD model of the AVF was constructed based on segmented CT images. The physiological flow conditions based on the mean flow of 820 (ml/min) and corresponding pulsating waveform were used for the analysis. In this study blood was considered as incompressible Newtonian fluid and blood vessel wall was considered as rigid wall. Hemodynamic factors such as secondary velocity, wall shear stress (WSS), wall shear stress maximum temporal gradient (WSSTG) and oscillatory shear index (OSI) were investigated by using CFD analysis. It can be seen that high WSS distribution was oscillating at maximum flow rate at the arterial side while low WSS distribution at minimum flow rate at the non-uniform area of the venous side. The areas with high OSI value were observed and the WSSTG values were calculated. CFD analysis provides a detailed description of the hemodynamic parameters which may affect blood vessel disease progression. This analysis allow us to better understand and predict how local hemodynamic conditions could affect the development of vascular lesions such as stenosis and thrombosis
Advisory Committee Nai-Shang Liou - advisor

Files No Any Full Text File.
Date of Submission 2008-07-22