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Generating a Pulsatile Pulmonary Flow after Fontan Operation by Means of Computational Fluid Dynamics (CFD) MOSTAFA GHOREYSHI, Sharif University of Technology — This study considers blood flow in total cavopulmonary connection (TCPC) morphology, which is created in Fontan surgical procedure in patients with single ventricle heart disease. Ordinary process of TCPC operation reduces pulmonary blood flow pulsatility; because of right ventricle being bypassed. This phenomenon causes a lot of side effects for patients. A cardiac surgeon has suggested that keeping main pulmonary artery (MPA) partially open, would increase pulmonary flow pulsations. MPA gets closed in ordinary TCPC operation. The purpose of current study is to verify the effects of keeping MPA partially open on pulmonary flow pulsations, by means of computational fluid dynamics (CFD). 3D geometry is reconstructed from CT Angiography (CTA) scan of a patient who has undergone an ordinary TCPC procedure. The stenosed MPA or pulmonary stenosis (PS) is virtually added to the original geometry. Flow field is studied in six different models in which average antegrade flow (AF) -coming through PS- increases gradually. Results show that adding AF increases flow pulsations in both pulmonary arteries. Moreover, power loss increases with respect to average AF. We conclude that adding AF is an impressive way to increase pulsations of pulmonary flow, but energy losses should be considered too.

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