

Hemodynamics of Total Cavopulmonary Connection: Flow Visualizations and Computational Fluid Dynamic Studies

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Abstract

Flow visualizations and computational fluid dynamics were performed to determine hemodynamics in a total cavopulmonary connection (TCPC) for surgically correcting congenital heart defects. From magnetic resonance (MR) images, a realistic glass model was fabricated to visualize steady flow. Results showed that SVC and IVC flow merged directly to the intra-atrial conduit, creating two large vortices in the conduit. Significant swirl motions in the connection were also observed in the model. Merged or swirling flow might result in energy loss in TCPC models. A large chamber or a sharp bend influences on fluid energy losses in TCPC.

Keyword: *Congenital heart defect, Total cavopulmonary connection(TCPC), Flow visualization, Computational fluid dynamics(CFD), Fluid energy loss*