

Three-Dimensional Rotational Angiography Guided Stenting to Optimize Pulmonary Blood Flow in Children with Single Ventricle Physiology

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Introduction – Stenosis of the Fontan circulation, in particular the pulmonary arteries (PA), is common in children with single ventricle physiology. Stent placement is the most used interventional strategy to optimize PA flow and Fontan hemodynamics.

Methods – A retrospective study was performed to investigate the prevalence, causes and outcome of Fontan circulation stenosis in children with single ventricle physiology treated with three dimensional rotational angiography (3DRA) guided stenting in our center.

Results – From September 2011 to October 2018 39 patients received 60 stents during 55 3DRA stent procedures. Median age and weight were 3.9 years (0.0-17.2) and 16.1 kilograms (4.1-70.0), respectively. Left pulmonary artery (LPA) stenosis accounted for 75% of the stenosis. In 22 cases the LPA stenosis was caused by external compression of the close interaction between ascending neo-aorta, descending aorta, pulmonary artery and airway. EV3 Mega/Max LD (N=33) and Cook Formula stents (N=21) were mostly used. Adverse events occurred in 5 catheterizations (10.6%). Fifteen patients (36.8%) underwent 19 reinterventions including planned serial redilation (N=12), extra stent placement (N=4) and surgery (N=1), and unplanned balloon dilation (N=1) and stent placement (N=1) for restenosis by intima proliferation.

Conclusion – Fontan stenosis, especially LPA stenosis, is common in children with single ventricle physiology and external compression is one of the main causes. 3DRA guided stenting is effective in both short and long term and can safely be performed in small children. Restenosis by intima proliferation is rare and may be the result of the stent types used. Repeated redilations are obviously necessary to match stent diameter with patient growth.