

Relief of Left Pulmonary Artery stenosis with stent implantation in children with Single Ventricle Malformation prior to Fontan

Ballesteros F., Zunzunegui J.L., Vazquez M.C. , Alvarez T., Granja da Silva S., Centeno M, Maroto E. Gregorio Marañón Hospital. Madrid. Spain

Introduction

Patients with single –ventricle Fontan physiology need an energy-efficient circulatory system to minimize the work load on the single ventricle. Pulmonary artery stenosis is a common lesion that limits the efficacy of the Fontan operation.

The Norwood Procedure (NP) as others surgeries with aortic reconstruction resulting in a large aorta, limits left pulmonary artery size based on their anatomic proximity.

Our objectives are to evaluate the safety and efficacy of stent angioplasty of stenotic left pulmonary artery (LPA) in these patients, and to determine the mid-term outcome following these procedures.

Methods

Retrospective review of medical records; study period from January 2006 to December 2010. Inclusion of all pediatric patients with single ventricle malformation and bidirectional Glenn stage in which LPA stenosis was treated with stents. Initial, follow-up catheterization and surgical data were reviewed.

Results

During the study period 38 stents were implanted in the LPA in 37 patients. Mean (SD) age was 3.9 years (1.8). Mean (SD) weight was 15.2 Kg (1.3). 31 patients (83%) underwent NP as stage I palliation. The mean \pm SD size of the pulmonary artery stenosis was 3.9 ± 1.33 mm before and 8.3 ± 1.6 mm ($p<0.001$) after stent implantation. Redilatable (not premounted) stents were used in all but 3 patients. There were two procedure related complications: 1 stent migration and 1 left main bronchus compression in a 5 kg patient resolved by intrabronchial covered stent implantation. 24 of 37 patients had follow-up catheterizations after a mean time interval of 14 (0.2-48) months. Mean \pm SD pulmonary artery pressure decreased from $11.9\pm 3,1$ mmHg to 11.1 ± 2.7 mmHg ($p=0,16$). In 4 patients (20%) in stent stenosis by significant neointimal proliferation was diagnosed, requiring balloon redilation. Fontan procedure was performed in 14 patients (37%) during the follow-up period with no technical inconveniences.

Conclusions

Stent implantation to treat left pulmonary artery stenosis in single ventricle patients is effective and can be performed safely. The frequent compressive etiology of stenosis after NP makes this technique especially valuable. The use of redilatable stents permits long term treatment to optimize pulmonary hemodynamics. During total cavopulmonary connection previously implanted stents do not interfere with the surgery technique.

