INFLAMMATORY RESPONSE OF BIODEGRADABLE STENTS IN THE DUCTUS ARTERIOSUS IN A NEONATAL PIGLET MODEL

Poster Contributions
Poster Sessions, Expo North
Sunday, March 10, 2013, 9:45 a.m.-10:30 a.m.

Session Title: Congenital Cardiology Solutions: Percutaneous Therapies
Abstract Category: 13. Congenital Cardiology Solutions: Pediatric
Presentation Number: 1204-130

Authors: Holly C. DeSena, Surendranath Veeram Reddy, Tre' Welch, Jian Wang, James Richardson, Joseph Forbess, Alan Nugent, UT Southwestern, Dallas, TX, USA

Background: The ductus arteriosus (DA) closes at birth from vasoconstriction and neo-intimal formation. Maintaining a patent DA with a stent is a strategy in congenital heart disease. Metal/nitinol stents in human DA have significant restenosis. DA constriction may influence stent integrity. Data on biodegradable (BD) stent inflammatory response and performance in DA is lacking and this is evaluated using a BD poly-L-lactic acid (PLLA) stent in piglet DA.

Methods: A pregnant sow delivered 7 newborn piglets (1.5-2.68 kg) and they underwent catheterization via the right neck at age 4-12 hours. An angiogram in the descending aorta noted ductal patency. Via a venous line a PLLA stent was delivered to the DA. Aspirin was administered, and at 2 weeks repeat angiography and histology were performed.

Results: The procedure was challenging with 1 DA patent. All DA were crossed with a 0.014" wire and pre-dilated with a 3mm balloon. The stent length complicated delivery but in 4/7 successful placement of 2.5-4.0mm diameter; 15-20mm length was achieved. At 2 weeks (4.8-6.93 kg) repeat angiography revealed all DA were occluded. Histology showed mid portion patency with collapse at the aortic and pulmonary ends. There was mild inflammation with marked smooth muscle proliferation.

Conclusions: The unique characteristics of DA have important implications for BD stent design. The inflammatory response is analogous to metal/nitinol. Future studies with increased radial strength at proximal and distal ends are planned.