

**P158. Percutaneous Pulmonary Valve Replacement: Implantation Of Tissue Engineered Valved Stent**

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**OBJECTIVES:** Transfemoral application of pulmonary heart valves has been recently introduced clinically. An autologous tissue-engineering approach was pursued to overcome the current limitations of degeneration of bovine jugular vein valves.

**METHODS:** Porcine pulmonary heart valves and small intestinal submucosa were obtained from slaughterhouse. After dissection and antimicrobial incubation, valves were trimmed (removal of sinus and most of the muscular ring) to fit into the deployment catheter. To avoid stent strut related tissue damage during folding and deployment of the delicate tissue-engineered valves, small intestinal submucosa covered the inside of the pulmonary valved stents. Valves were decellularized enzymatically. Endothelial cells (EC) and autologous myofibroblasts (MF) were obtained from carotid artery segments of juvenile sheep. Following MF-seeding constructs were placed in a dynamic bioreactor system and cultured for 21 days. After additional EC seeding (7 days) the valved stents were deployed at the pulmonary annular site. Angiography was performed at implantation and explantation (4 weeks). Explanted constructs were analyzed macro- and microscopically and processed for immunohistochemistry.

**RESULTS:** Angiography demonstrated orthotopic position of the stents (n=7) throughout the study. Fluoroscopy and gross morphology demonstrated good opening and closure characteristics. A confluent EC lining of the leaflets (identified by the presence of Factor VIII-related antigen) displayed typical cobblestone morphology. Immunocytochemistry revealed strong expression of  $\alpha$ -smooth muscle actin in neo-interstitial cells.

**CONCLUSIONS:** In the present study we demonstrated for the first time successful merging of two novel technologies for percutaneous treatment of pulmonary valve diseases using viable stented valve constructs.