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Transapical Mitral Valved Stent Implantation

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Objectives:

Transcatheter aortic and pulmonary valve replacement is currently being tested in clinical trials. Efforts to create a valved stent to replace the atrioventricular valves have shown minimal success.

Method:

A new valved stent was designed to overcome the difficulties associated with deployment and anchoring of a valved stent in the atrioventricular position. The valved stent is fully retrievable and precise deployment and accurate adjustment of its intra-annular position is achievable to minimize paravalvular leak. The valved stent carrying either a bovine jugular valve or porcine pulmonary valve was deployed without cardiopulmonary bypass in a series of acute experiments in adult pigs. This was performed through a lower mini-sternotomy and a standard transapical approach under transesophageal echocardiographic (TEE) guidance.

Results:

The valved stent was successfully deployed ten times across the mitral valve and animals were monitored for 1 hour. The valved stent function and position was verified at the time of placement and at the end of the observation period by TEE and left ventriculogram. Four out of ten animals exhibited mild mitral regurgitation by TEE and two out of ten by fluoroscopy at the time of stent implantation. All animals remained hemodynamically stable and without TEE or ventriculographic changes at the end of the observation period.

Conclusions:

Successful transapical mitral valve replacement with the new atrioventricular valved stent is feasible and highly reproducible in acute experimental setting. Chronic experiments are currently underway.