Transcatheter interventions for tricuspid regurgitation - heterotopic technology: TricValve

Hans R. Figulla*, MD; Katharina Kiss, MD; Alexander Lauten, MD

1. Kerckhoff Heart Center, Bad Nauheim, Germany; 2. Intern Kardiologische Angiologische Gruppenpraxis, Vienna, Austria; 3. Department of Cardiology, Charité-Universitätsmedizin Berlin, Campus Benjamin Franklin, Berlin, Germany

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Introduction
Considering the incidence of tricuspid regurgitation (TR) and its implications on functional status and long-term survival, TR is currently undertreated. With the increasing adoption of catheter-based treatments of other types of structural heart disease there is a growing interest and need for effective interventional treatment also for tricuspid regurgitation. Therefore, multiple treatment approaches are under investigation; however, in this chapter we focus exclusively upon tricuspid replacement.

Transcatheter replacement of the tricuspid valve
Due to the high operative mortality of isolated tricuspid surgery, it is probably correct to predict that the percutaneous approach will be the treatment of choice in patients requiring tricuspid surgery. Considering the large unmet need for an interventional option for inoperable patients with tricuspid regurgitation, percutaneous valve implantation could be a feasible alternative, besides interventional valve repair. From the interventional perspective, there are two basic approaches, depending on the anatomic site of prosthetic valve implantation – an orthotopic versus a heterotopic valve replacement.

In orthotopic valve replacement, the prosthetic valve is deployed at the level of the TV annulus between the right ventricle (RV) and right atrium (RA). This approach was investigated by Boudjemline et al by means of implanting a double-disc nitinol stent with a semilunar valve into the tricuspid annulus. Due to the anatomic structure and the flexibility of the surrounding myocardium, this site of implantation offers little resistance for orthotopic long-term fixation of stent-based valves. In functional TR, annulus diameter may reach >50 mm associated with a loss of anatomic landmarks between the RV and RA. A device intended for orthotopic TV replacement would therefore require unique solutions for stent-valve fixation as well as tissue valve engineering (e.g., a 50 mm tissue valve would require a profile height of >30 mm). To our knowledge only one company is presently working on such a demanding system for orthotopic valve replacement (TRicares GmbH, Aschheim, Germany).

*Corresponding author: In den Bornwiesen 4, D-07749 Jena, Germany. E-mail: figulla@figulla.org