Improved Transcatheter Aortic Valve for Valve-in-Valve Implantation

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Technology description

Background

Minimally invasive transcatheter aortic valve implantation (TAVI) has been expected to replace open heart surgical valve replacement with a less painful, less invasive, and less traumatic procedure. In the elderly population especially, TAVI offers hope for patients too frail for open heart procedures. However, the performance and longevity of transcatheter valves has been questioned. A study by Zegdi et al. (2010) demonstrated that the native calcified and stenotic aortic valves cause distortions in leaflet geometry and non-circular deployment of transcatheter stents. Distortions in aortic valves result in leaks, suboptimal hemodynamics (which can result in symptoms such as fainting, weakness, chest pain and chronic heart failure), and early valve failure. A new transcatheter valve design that could overcome the geometrical challenges of inserting a transcatheter valve inside a calcified and stenosed valve would facilitate broad adoption of TAVI for both replacement of diseased valves and replacement of deteriorated earlier valve prostheses without open heart surgery. Description UCSF investigators have developed a new design for a percutaneous valve that can be used for valve-in-valve replacement of either native or prosthetic aortic valves. The design allows for the valve to sit above the native valve position so that the size and shape of the new valve are not constrained by the size or calcification of the valve to be replaced. The new valve design has significant hemodynamic advantages over that of the first generation percutaneous valves. Efficacy of this design was tested in an in vitro pulse duplicator system and transvalvular gradients obtained with the new valve-in-valve design were comparable with standard surgical valve replacement of equivalent size.

UCSF investigators have developed a new percutaneous prosthetic aortic valve that can be used for valve-in-valve replacement of either native or prosthetic aortic valves. The design allows for supravalvular placement of the prosthetic valve.

Publications

Azadani et al. Valve-in-valve implantation using a novel supravalvular transcatheter aortic valve: proof of concept. Ann Thorac Surg 2009. 88:1864-1869.

Azadani et al. Transcatheter aortic valves inadequately relieve stenosis in small degenerated bioprostheses. Interact Cardiovasc Thorac Surg 2010. 11:70-77.

Application area

Treatment of native aortic stenosis by replacement valve
Replacement of degenerated bioprosthetic aortic valve

Advantages

Improved hemodynamics over other transcatheter valves
Less invasive than surgical valve replacement
Advantages include reduced paravalvular leak, reduced energy loss and improved hemodynamics regardless of the calcification level of the diseased valve.

Institution

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