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Empowering Ideas

New Device for Aortic Repair and Replacement

Inventor
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STAGE OF DEVELOPMENT
- Design
- Need to build and test a prototype

INTELLECTUAL PROPERTY
US Utility Patent filed 1/15/15

REFERENCE MEDIA

Schöllhorn et al. Annals of Thoracic Surg, 2014, 97(6) – 2211.
Rylski et al. J Card Surg, 2014, 29(3) – 371.

DESIRED PARTNERSHIPS
License
Co-development

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Problem
Professors from Penn Cardiothoracic surgery have designed a single device that is able to replace the aortic valve and repair the ascending aorta in one procedure. Patients with only aortic valve disease often undergo a minimally-invasive surgery called transcatheter aortic valve Implantation/replacement (TAVI). But for patients who also have concomitant ascending aortic aneurysm (AAA), high-risk open heart surgery is the only option because minimally-invasive transcatheter based endovascular repair (TEVAR) for AAA is not ideal due to the short landing zone for stent deployment on the ascending aorta. No device was currently available to allow one minimally invasive procedure for patients with both of the above problems prior to this invention.

Solution
The device comprises a tubular graft for the thoracic aorta coupled with one of the commercially available self-expandable TAVI prosthetic valves. The graft in the proximal portion is uncovered to facilitate coronary artery perfusion, while the rest is covered; in addition, an external silicone seal ring adheres to the sinotubular junction in order to maximally prevent endoleaks. The prosthetic valve is coupled to the stent graft in the operating room after selecting the appropriate size of aortic valve prosthesis and stent graft based on each individual's unique cardiovascular anatomy.

Advantages
- One stage endovascular Wheat procedure with proximal fixation at the level of the aortic valve annulus (instead of the sinotubular junction) with external silicone or pericardial seal ring for hemostatic sealing at the sinotubular junction
- Frame-to-frame connection where the prosthetic valve is connected to the tubular graft with suture, clips, or other methods (in contrast to two separate and incompatible devices)
- Modular design of the stent graft offers flexible size selection, allowing for individualized site combination based on patient's CT scans
- Free diastolic blood flow to the coronary arteries through the proximal portion of the tubular stent graft