

New Device for Aortic Repair and Replacement

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Technology description

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.

Reference Media

Schöllhorn et al. [Annals of Thoracic Surg](#), 2014, 97(6) – 2211.

Rylski et al. [J Card Surg](#), 2014, 29(3) – 371.

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

Institution

[University of Pennsylvania](#)

Inventors

[Karianna Milewski](#)

[Joseph Bavaria](#)

[Bartosz Rylski](#)

联系我们



叶先生

电话 : 021-65679356

手机 : 13414935137

邮箱 : yeyingsheng@zf-ym.com