Surgical stapler for anastomosing aorta and Dacron tube graft

Surgery for aneurysms of the aorta and aortic dissection require resection of the diseased or dissected portion of the aorta with replacement using a Dacron tube graft of matching size. Operating on ascending aorta and the aortic arch requires a bloodless field, achieved by using deep hypothermia and total circulatory arrest. The cooling down of the patient’s body temperature and subsequent rewarming takes an extra two hours or more on cardiopulmonary bypass. Diseased or dissected aortic ends have to be prepared by reinforcing them with Dacron or pericardial strips, adding further to the time it takes to do such operations. Pulling sutures through diseased aorta causes tears and enlarges the needle holes. Coagulopathy is common after long bypass runs and bleeding is a major morbidity. Thus there is need for a device which can perform the aorta to Dacron tube graft anastomosis rapidly and efficiently eliminating the need for prolonged bypass and reducing the risk of bleeding post-operatively.

We have designed a surgical stapler, which addresses these commonly encountered problems by achieving fast and efficient anastomosis of the aorta to Dacron tube graft. The device consists of a central, circular rod, or anvil, on which a matching size Dacron tube graft is sleeved over and secured. This is then inserted into the open end of aorta. Reinforcing Dacron or pericardial strips may also be used externally. The anvil is surrounded by ten stapling limbs, each containing three staples in two rows. A knob at the back of the instrument is used to close the limbs over the overlapping edges of aorta and Dacron tube graft. Further turning the knob will ‘fire’ the staples and they form into their final shape against the anvil, placing two rows of 15 staples each producing an air-tight anastomosis. The staples are made of titanium and therefore biocompatible. The device produces airtight seals between the graft and aorta, and is therefore expected to improve outcomes. Currently there are no stapling devices for aorta to Dacron tube graft anastomosis. This device will fulfill a needed improvement to aortic surgery. The device function was validated in bench experiments (see link to related publication below).
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Applications:
• Aorta to Dacron tube graft anastomosis.

Advantages:
• Creates airtight seals, reducing risk of anastomosis failure.
• Decreases length of surgery during anastomosis procedures, including bypass procedures.

Patent information:
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Licensing Status:
Available for licensing and sponsored research support
Tech Ventures Reference: IR CU13017

Related Publications:
Raza ST. A Circular Surgical Stapler Designed to Anastomose Aorta and Dacron Tube Graft. Aorta, June 2013, Volume 1, Issue 1, 71-77

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