

TITLE OF THE INVENTION:

AORTA ANASTOMOSIS DEVICE WITH
SHRINKING SLEEVES AND GRAFT

5 TECHNICAL FIELD

This device is designed to connect the proximal and distal ends of the aorta following surgical procedures such as the Frozen Elephant Trunk, Stanford Type A, or Stanford Type B. Instead of suturing the anastomosis, the device utilizes a protrusion design and shrinking sleeves and graft to facilitate the tightening of the connection. In addition, suture loops apply to both ends of the aorta, before & after the protrusions design & creating a secure connection. The shrinking sleeves will pass through the blood vessels and the device, and they will shrink in size after temperature changes.

Aorta is known for its ability to stretch and expand to accommodate changes in blood pressure during the cardiac cycle. Typically, the aorta can expand by approximately 10-20% of its original diameter in response to the pressure changes associated with systole and diastole. Here's a simplified example to illustrate this concept: If the aorta has an original diameter of 3 centimeters (30 millimeters) during diastole, it might expand to around 3.3 – 3.6 centimeters (33 – 36 millimeters) during systole, representing a 10 – 20% increase in diameter.

The graft is used to wrap around the cylindrical tube of the device with suturing loops to ensure that both ends of the aorta are physically secured and tightened. This method offers an alternative to conventional suturing techniques and provides greater ease and accuracy in connecting the two ends of the aorta.

25 BACKGROUND ART

From the inception of cardiovascular surgery, surgeons have relied on hand-held sutures for performing proximal and distal anastomoses, following the principles of suture techniques. However, recent years have seen the development and investigation of various new techniques and methods aimed at establishing sutureless vascular anastomoses, potentially paving the way for widespread adoption of sutureless vascular surgery in the future.

Vascular anastomosis refers to the process of connecting two blood-carrying vessels, with the two main types being end-to-end and end-to-side. Typically, vascular anastomoses are created using conventional suture techniques, which are widely regarded as the "gold standard" in cardiovascular surgery.

Nevertheless, in cases involving diseased arteries or surgeries with limited access or requiring minimal incisions, manual suturing can prove challenging and time-consuming. Such procedures demand a significant level of technical expertise and effort.

To ensure the swift and reliable recovery of patients undergoing high-risk surgery, it is crucial to have accessible, rapid, safe, and dependable sutureless techniques available. Therefore, the development of new sutureless techniques is essential for improving patient outcomes and advancing the field of cardiovascular surgery.

SUMMARY OF THE INVENTION

An innovative device, known as the Aorta Anastomosis Device with Shrinking Sleeves and Graft, has been introduced to facilitate sutureless anastomosis, potentially offering an alternative approach for vascular anastomosis procedures. This device has been developed with several key advantages in mind, including the elimination of sutures, shorter operation times, improved safety, enhanced reliability, increased patency, and greater stability in vascular anastomosis.

To elaborate, the Aorta Anastomosis Device with Shrinking Sleeves and Graft has the potential to revolutionize the field of surgical procedures for vascular anastomosis by eliminating the need for sutures. The use of this device results in shorter surgical procedures, saving time and reducing the associated risks. Additionally, the device is designed to provide a safe and reliable alternative to traditional suture-based techniques.

Another significant advantage of the Aorta Anastomosis Device with Shrinking Sleeves and Graft is its ability to ensure improved patency of the anastomosis. This means that blood flow through the anastomosis is less likely to be restricted, leading to improved healing and recovery for patients. Furthermore, the device provides greater stability to the anastomosis, reducing the risk of leaks or other complications that may occur with suture-based techniques.

In summary, the Aorta Anastomosis Device with Shrinking Sleeves and Graft represents a significant advancement in the field of surgical procedures for vascular anastomosis. Its unique design and features offer numerous benefits over traditional suture-based techniques, making it a valuable tool for surgeons and an effective treatment option for patients.

5 The Aorta Anastomosis Device with Shrinking Sleeves and Graft consists of one cylindrical tube, 40mm in length, with protrusions on both ends of the device. One piece of shrinking sleeve passes through the device on both ends, and a graft is wrapped around both ends of the device with suture loops. The device is made of polymer.

10 BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention are described in more detail with reference to the drawing.

Figure 5:

15 A longitudinal section view shows a tube (1,2) designed to connect the Aorta Proximal & Distal (3,4) using protrusions located at each end of the tube (1,2).

- The tube (1,2) is 40mm long and has a thickness ranging from 0.5mm to 1mm.
- The protrusions are placed about 8mm away from each end of the tube and have a height of 1mm to 2mm.

20 The outer diameter of the tube (1,2) with the protrusions is slightly larger than the Aorta Proximal & Distal (3,4), while the tube's outer diameter without protrusions is slightly smaller. This size difference makes it easier for the Aorta to fit onto the tube's outer diameter.

Shrinking sleeves (9,10) are applied to the tube (1,2) both before and after the protrusions. These sleeves will shrink and securely attach to the tube (1,2) when heated or when they come into contact with blood.

30 Additionally, a graft (11,12) is applied around the tube (1,2) to protect the shrinking sleeves (9,10) in case suture loops are tightened around the tube before and after the protrusions.

35 Figure 6:

To ensure a secure connection between the Aorta and Cylindrical tube(1,2), 2 to 3 suture loops(5,6,7,8) are applied to the protrusions, before and after; at both ends of the tube(1,2).

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To further enhance the prevention of dislodgement of blood vessels with the cylindrical tube(1,2), both ends of the blood vessels(3,4) should be sutured together.

DESCRIPTION

Introducing an innovative medical implant for Aorta Proximal and Distal Anastomosis. This advanced device makes it easy to fit the Aorta onto it because both ends of the device are smaller than the Aorta.

The device features unique protrusions, located about 8mm from both ends. These protrusions stop blood from flowing between the device and the Aorta, ensuring safe and efficient blood flow through the Aorta.

Shrinking sleeves tightly secure the blood vessels and the device, both before and after the protrusions, once heated or in contact with blood. Suture loops are applied for a secure connection before and after the protrusions, and a graft protects the shrinking sleeves after the suture loops are applied.

This device is a game-changer in the world of medical implants, set to revolutionize Anastomosis procedures. Its design ensures efficiency, effectiveness, and patient safety.

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CLAIMS:

Claim 1: Aneurysm Anastomosis Device with Shrinking Sleeves And Graft

- 5 Cylindrical tube for aneurysm anastomosis, comprising:
- 1.1 A cylindrical tube having a length of 40mm.
 - 1.2 The protrusions are positioned at a distance of 8mm from both ends of the cylindrical tube.
 - 1.3 The protrusions serve as markings or indicators for proper alignment during the anastomosis procedure.
 - 1.4 Both ends of the cylindrical tube are designed to be smaller than the aorta for easy lodging of the aorta onto the device.
 - 1.5 The protrusions are designed to be larger than the aorta, effectively blocking the blood flow between the device and the aorta.
 - 1.6 A suture loop is applied before and after the protrusions, each with a height of 1mm.
 - 1.7 The device is made of Titanium.
 - 1.8 The device is made of Nitinol.
 - 1.9 The device is made of Polymer.

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Claim 2: Enhanced Stability

- The protrusions of the cylindrical tube according to Claim 1 provide increased stability and effectively prevent dislodgement during normal blood flow.

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Claim 3: Suture Loop Integration

- The integration of suture loops before and after the protrusions of the device in Claim 1 enables secure attachment of blood vessels.

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Claim 4: Prevention of Dislodgement

- The combination of the cylindrical tube design, protrusions, shrinking sleeves, graft and suture loops as described in Claim 1 ensures the prevention of dislodgement of the cylindrical tube and blood vessels.

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Claim 5: Secure Fixation

5 The suturing of both ends of the blood vessels to the cylindrical tube using the sutures described in Claim 1 creates a secure and reliable connection.

Claim 6: Minimized Risk

10 The device's design and suturing technique outlined in Claim 1 reduce the risk of complications associated with aneurysm anastomosis procedures, including but not limited to leakage or displacement.

Claim 7: Simplified Surgical Procedure

15 The novel device described in Claim 1 simplifies the surgical procedure for aneurysm anastomosis by providing an effective method of securing blood vessels without compromising stability.

Claim 8: Improved Patient Outcomes

20 The utilization of the device specified in Claim 1 may result in improved patient outcomes by reducing the risk of complications and promoting successful aneurysm repair.

25 Claim 9: Compatibility

The device of Claim 1 is designed with a cylindrical body that is compatible with minimally invasive surgical techniques.

30 Claim 10: Biocompatibility

35 The Aneurysm Anastomosis Device according to Claim 1 is equipped with a coating or surface treatment on the cylindrical tube to enhance biocompatibility and reduce the risk of thrombosis.