External Wrapping of the Ascending Aorta as an Adjunct to Endografting

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Conflict of Interest: None
Contraindications

Aortic Valve incompetence
Coronary artery disease requiring CABG
Congestive Heart failure NYHA III - IV

Indications:

True Aneurysms
Extension of Landing Zone
Hybrid Procedure
Transvalvular Manipulation is essential

Illustrated techniques for transapical aortic valve implantation
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Ascending Aortic Pseudo Aneurysms

- Previous Ascending repair = ideal case

Tubular landing zone
Technical Issues: Graft Kinking

Consider Transapical Approach

Illustrated techniques for transapical aortic valve implantation
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Optimal Length of the graft
Thrombus
Pseudo Aneurysm
Pseudo Aneurysm after CABG
True Aneurysms
The role of wrapping procedures

Creation of a proximal landing Zone
Options

• Banding of the Aneurysm

• Creation of a proximal landing zone only
Options

- Banding of the Aneurysm
- Creation of a proximal landing zone only
5.7 - 4.2 cm
Wrapping Ascending Aneurysms (4.5 cm – 5.5 cm)
Beware of the PA
Mini Sternotomy
Treatment of isolated ascending aortic aneurysm by off-pump epiaortic wrapping is safe and durable

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From the Cardiovascular Surgery, University Hospital Saarland, Homburg, Germany.

Introduction

OBJECTIVES: Isolated ascending aortic aneurysm (IAA) is usually treated by open and repair requiring sternotomy, cardiopulmonary bypass (CPB) and cardioplegia. This approach causes significant morbidity in older patients or those presenting with comorbidities. We report an original series of patients presenting with IAA and treated with epiaortic wrapping using aortic endoprosthesis. This new aortic repair technique allows reducing the aortic diameter to a predefined value and is performed without CPB.

METHODS: Data from patients presenting with an IAA and treated with the wrapping technique (WT) by polytetrafluoroethylene (PTFE) endoprosthesis between November 2006 and July 2013 were collected. The end points that were analyzed included minimal aortic transverse diameter, postoperative mortality and morbidity, survival, freedom from reinterventions and aortic valve dysfunction during follow-up. The minimal aortic transverse transverse diameter was analyzed based on contrast-enhanced computed tomography (CTA) or magnetic resonance (MR) performed preoperatively and during the follow-up.

RESULTS: The off-pump WT was used in 25 cases with a postoperative mortality. The median radiological follow-up was 22.47 months (range 1-160 months). Overall, the WT achieved a 50% diameter reduction. The mean postoperative and preoperative ascending aortic transverse diameter was 5.1 cm (standard deviation [SD] 0.7) and 2.5 cm (SD 0.4), respectively (p < 0.001). In addition, CTA or MRI follow-up showed similar diameters at the level of the native and the end prosthesis aorta. Mortality occurred during the follow-up (1.5 years) in one patient caused by intestinal perforation of the aortic root and ascending aorta.

CONCLUSIONS: This series shows that the WT with a polytetrafluoroethylene mesh allows safe off-pump treatment of patients with IAA. Clinical and angiographic results are promising. This technique should be an attractive alternative, especially for patients unfit for aortic surgery with CPB and cardioplegia.

Key points: Off-pump • Ascending aorta • Onlay repair • Mesh (polytetrafluoroethylene) • Wrapping grafting • Aortic valve dysfunction.
Diameter reduction by external wrapping

\[ \pi \times \text{diameter (35mm)} = \text{circumference} = 11\text{cm} \]
Downsizing Ascending Aorta

- Ascending Wrapping
- Supraaortic Debranching
- Aortic Arch Stent
Arch Aneurysm - Extension of Landing Zone

- Diameter Reduction Ascending aorta: 5.2 cm → 3.5 cm
- Sandwich Grafts + Chimneys
Ascending Aneurysm - Wrapping

• Wrapping as an adjunct to debranching

• Ascending Bypass – Reinforcement
Ascending Banding Sandwich Graft Periscope Technique
Biomechanics

Biomechanical analysis of wrapping of the moderately dilated ascending aorta

Tomasz Piontek*, Bartosz Rybiński*, Andrzej Dzienis*, Piotr Czyżewski* and Wojciech Kusiak*

Abstract

Background: External wrapping is a surgical method performed to prevent the dilation of the aorta and to decrease the risk of its dissection and rupture. However, it is also believed to cause degeneration of the aortic wall.

A biomechanical analysis was thus performed to assess the stress of the aortic wall subjected to external wrapping.

Methods: A stress analysis using the finite element method was carried out on three models: a non-dilated aorta, a moderately dilated aorta, and a wrapped aorta. The models were subjected to a pulsatile flow (0.600 s) and a physiologic aortic annulus motion of 11 mm.

Results: The finite element analysis showed that the stress exerted on the outer surface of the wrapping aorta in the wrapping model (0.200 MPa) was similar to that observed in the normal aorta (0.160 MPa) and was lower than in the model of a moderately dilated aorta (0.300 MPa) and the model of the normal aorta. The stress on the inner surface of the ascending aorta ranged from 0.95 MPa to 0.49 MPa in the model of the normal aorta, 0.53 MPa to 0.31 MPa in the model of the moderately dilated aorta, and 0.53 MPa to 0.31 MPa in the wrapping model.

Conclusions: The results of this study suggest that the aortic wall is subjected to similar stresses following a wrapping procedure to that present in the normal aorta.

Keywords: Aneurysm, Aorta, Wrapping
Stress Reduction
Ascending aortic aneurysm
71 years old
COPD
Diabetes
Maximum Diameter - Proximal Landing Zone
Banding - Before and After
TAG  Chimney Innominate Artery
Proximal Landing Zone
Max. Diameter
Chimney Graft Innominate Artery
## True Aneurysms

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<td>Patients</td>
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<td>Follow up</td>
<td>21 months</td>
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<td>Wrapping + Stent Graft</td>
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<td>Mortality</td>
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Conclusion: Endo Bentall?
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