External Wrapping of the Ascending Aorta as an Adjunct to Endografting

Ralf R. Kolvenbach
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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1Division of Cardiothoracic Surgery, St. Paul’s Hospital, University of British Columbia, Vancouver, Canada; 2Brighton and Sussex Medical School, Brighton, East Sussex, United Kingdom
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
Anson Cheung¹, Kevin M. Lichtenstein²
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True Ascending Aneurysm
Optimal Length of the graft
Thrombus
Pseudo Aneurysm
Pseudo Aneurysm after CABG
Type A Dissection: retrograde or Clamp related after CABG

Combination: Bare Metal + Medtronic Graft
Type A Dissection. Emergency Treatment - Bridging Procedure
Results

- Aneurysms: 9
- Pau: 3
- Dissection: 5
- Thrombus: 3

- Patients: 30
- Mortality: 2
- Stroke: 1
- MI: 1
- Type I Leak: 2
- Techn. Success: 28/30

- Mortality + MAE: 12.1%
- TAVI: 26.0%
True Aneurysms
The role of wrapping procedures

Creation of a distal landing Zone
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 epicardial wrapping is safe and durable

Pikkar Pazzaglia, Mazen Machaalani, Anthony Stewart, Lysleech-Chyckowski, Zoran Katic, Alberto Verheij, Tho Duc Le, Gregory A. Sperof, Frank J. Verha and Marie Lachter

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Abstract

OBJECTIVE: Isolated ascending aortic aneurysms (AAAs) are mainly treated by open graft repair, wrapping, endovascular, or combined approach. Our objective was to evaluate the feasibility, safety, and outcomes of off-pump epicardial wrapping for treating isolated AAAs in patients without symptoms and with a small or moderate asymptomatic ascending aortic aneurysm. METHODS: From November 2015 to July 2017, we treated 12 patients (mean age: 69.2 years, range: 59.6-77.7 years) with isolated AAAs (mean size: 5.2 cm, range: 3.8-7.0 cm) using off-pump epicardial wrapping. The mean aortic diameter at the site of the aneurysm was 5.2 cm (range: 4.6-6.5 cm). RESULTS: The overall procedure duration was 70.5 minutes (range: 36.3-97.8 minutes), the mean aortic cross-clamp time was 9.7 minutes (range: 4.1-15.2 minutes), and the mean warm ischemic time was 3.6 minutes (range: 0.9-7.0 minutes). The mean follow-up was 18.1 months (range: 9.0-30.8 months). CONCLUSION: Off-pump epicardial wrapping is a safe minimally invasive technique for treating isolated asymptomatic ascending aortic aneurysms, with excellent early outcomes and minimal procedure-related complications.
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

Feng Gao et al. 2017
Biomechanical analysis of wrapping of the moderately dilated ascending aorta

Tomasz Piontek, Bartosz Rybak, Andrzej Domanski, Przemyslaw Siedzicki, and Wojciech Kostyczak

Abstract

Background: External wrapping is a surgical method performed to prevent the dilation of the aorta and to decrease the risk of 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 elements method was carried out on three models: a normal aorta, a moderately dilated aorta, and an external wrapping. The models were subjected to a pulsatile flow (2000 mL) and a totally aortic annulus motion of 11 mm.

Results: The finite elements analysis showed that the stress exerted on the outer surface of the ascending aorta in the wrapping model (2000-20 MPa) was similar to that observed in the normal aorta (200-21 MPa) and was lower than in the model of a moderately dilated aorta (365-57 MPa). The stress on the inner surface of the ascending aorta ranged from 32 MPa to 44 MPa in the normal aorta, from 38.5 to 53 MPa in the model of the normal aorta, from 50.5 to 5.3 MPa in the model of the moderately dilated aorta, and from 45.0 to 54 MPa in the wrapping model.

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

Keywords: Aneurysm, Aorta, Wrapping
Stress Reduction

Dacron Sleeve
# True Aneurysms

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<td>Patients</td>
<td>18</td>
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<td>Follow up</td>
<td>21 months</td>
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Conclusion : Endo Bentall ?