



VI CONGRESSO NAZIONALE

Milano – Atahotel Executive 14-16 marzo 2012

Minicorso dal titolo

**LA MALATTIA DELL'AORTA:  
ASPETTI PARTICOLARI**

Il follow-up dei pazienti  
operati per aneurisma  
cronico dell'aorta

**Claudio Grossi**

Dipartimento Cardiovascolare  
Osp. Santa Croce e Carle - Cuneo



**2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM  
Guidelines for the Diagnosis and Management of Patients  
With Thoracic Aortic Disease: Executive Summary**

JACC Vol. 55, No. 14, 2010  
April 6, 2010:1509-44

Recommendation for Employment and Lifestyle in Patients With  
Thoracic Aortic Disease

CLASS IIa

1. For patients with a current thoracic aortic aneurysm or dissection, or previously repaired aortic dissection, **employment and lifestyle restrictions are reasonable, including the avoidance of strenuous lifting, pushing or straining that would require a Valsalva maneuver.** (C)

## Recommendation for Employment and Lifestyle in Patients With Thoracic Aortic Disease

- ***With isometric exercise***, there is a significant increase in mean arterial pressure.
- ***When the Valsalva maneuver is used for the lifting of heavy weights***, there is a superimposed increase in intrathoracic pressure, followed by a dramatic increase in systemic arterial pressure, with systolic pressures reaching 300 mm Hg or more.
- ***Working with patients on an individualized basis to streamline these goals based on insufficient data can be challenging.***

## Recommendation for Employment and Lifestyle in Patients With Thoracic Aortic Disease

- ***There are no outcomes data, and scant data of any variety for that matter, to indicate how much exercise is safe or beneficial for patients with thoracic aortic disease.***
- *Aerobic exercise, is associated with only a modest increase in mean arterial pressure. Consequently, most experts believe that aerobic exercise, particularly when heart rate and blood pressure are well controlled with medications, is beneficial overall.*
- ***Consider performing a symptom limited stress test to ensure that the patient does not have a hypertensive response to exercise.***

# Prosthetic Replacement of the Ascending Aorta Increases Wall Tension in the Residual Aorta

Michael Scharfschwerdt, Hans-H. Sievers, MD, Johanna Greggersen, Thorsten Hanke, MD, and Martin Misfeld, MD, PhD

Department of Cardiac Surgery, University Clinic of Schleswig-Holstein, Lübeck, Germany

(Ann Thorac Surg 2007;83:954–7)

- **Replacement of the ascending aorta with noncompliant prosthetic material significantly increases wall tension and rate of pressure rise in the residual aorta.**
- This may have clinical impact with respect to a sudden and **sustained rise of mechanical load, especially at the vulnerable proximal descending aorta.**

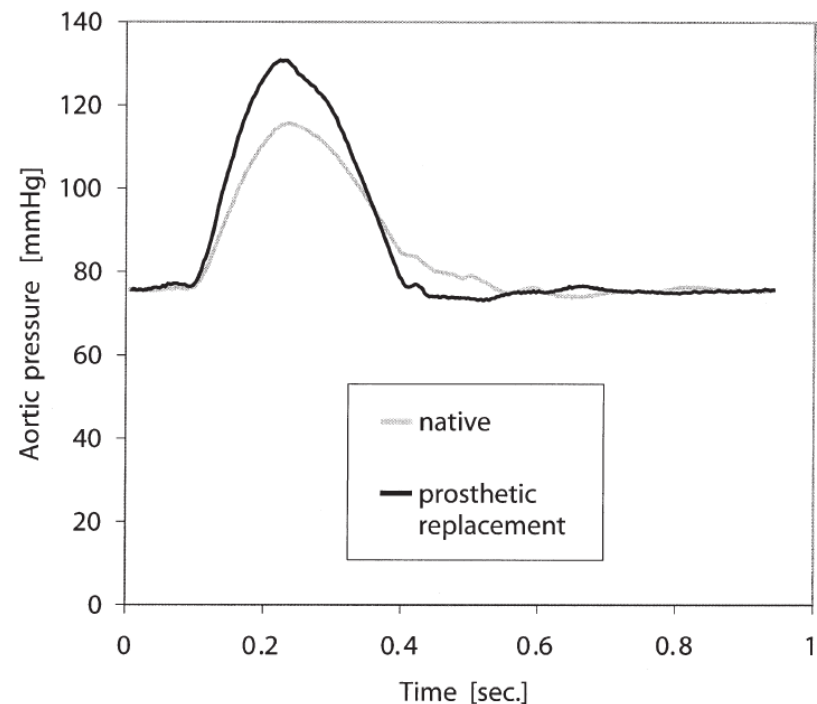


Fig 2. Representative changes in proximal descending aorta pressure waveform after prosthetic replacement (dark line) of the ascending aorta compared with the native condition (gray line). Note the increase in peak pressure and rate of pressure rise at the prosthetic pressure trace.

# Prosthetic Replacement of the Ascending Aorta Increases Wall Tension in the Residual Aorta

Michael Scharfschwerdt, Hans-H. Sievers, MD, Johanna Greggensen, Thorsten Hanke, MD, and Martin Misfeld, MD, PhD

Department of Cardiac Surgery, University Clinic of Schleswig-Holstein, Lübeck, Germany

(Ann Thorac Surg 2007;83:954–7)

- After prosthetic replacement of the ascending aorta **the Windkessel function of this dominant part of the aorta disappears** because of the minimal distensibility of common prosthetic material

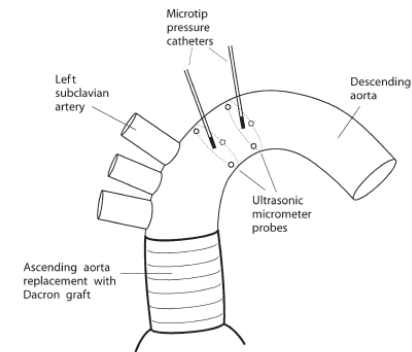


Fig 1. Schematic drawing of the test arrangement illustrates the positioning of the ultrasonic micrometer probes and pressure catheters.

## *Clinical Implications*

- Patients undergoing replacement of the ascending aorta **need regular follow-up**, not only for evaluation of **valve function** in cases of valve-sparing procedures but **also to assess the fate of the remaining aorta.**

# Surveillance

- **All patients who have undergone thoracic aortic surgery must have long-term follow-up.**
- Residual aortic tissue is often not normal and patients are prone to subsequent development of dissections or aneurysms.
- **Pseudoaneurysms are frequently asymptomatic** in the early stages and may initially present as periprosthetic hematomas.
- **Periodic CT or MRI is ideal for assessing progression of disease** in the residual aorta and for discovering the development of complications.
- **Those with Marfan syndrome, familial aneurysms, or dissections, require more vigilant follow-up.**

# 2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM Guidelines for the Diagnosis and Management of Patients With Thoracic Aortic Disease: Executive Summary

JACC Vol. 55, No. 14, 2010  
April 6, 2010:1509-44

**Suggested  
follow-up of  
aortic  
pathologies  
after repair or  
treatment**

Pathology	Interval	Study
Acute dissection	Before discharge, 1 mo, 6 mo, yearly	CT or MR, chest plus abdomen TTE
Chronic dissection	Before discharge, 1 y, 2 to 3 y	CT or MR, chest plus abdomen TTE
Aortic root repair	Before discharge, yearly	TTE
AVR plus ascending	Before discharge, yearly	TTE
Aortic arch	Before discharge, 1 y, 2 to 3 y	CT or MR, chest plus abdomen
Thoracic aortic stent	Before discharge, 1 mo, 2 mo, 6 mo, yearly Or 30 days*	CXR, CT, chest plus abdomen
Acute IMH/PAU	Before discharge, 1 mo, 3 mo, 6 mo, yearly	CT or MR, chest plus abdomen

We prefer CT scan





# 2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM Guidelines for the Diagnosis and Management of Patients With Thoracic Aortic Disease: Executive Summary

JACC Vol. 55, No. 14, 2010  
April 6, 2010:1509–44

Recommendations for Aortic Imaging Techniques to Determine the Presence and Progression of Thoracic Aortic Disease

## CLASS I

1. Measurements of aortic diameter should be taken at reproducible anatomic landmarks, perpendicular to the axis of blood flow, and reported in a clear and consistent format. (C)
2. For measurements taken **by computed tomographic imaging or magnetic resonance imaging, the external diameter should be measured perpendicular to the axis of blood flow**. For aortic root measurements, the widest diameter, typically at the mid-sinus level, should be used. (C)
3. For measurements taken **by echocardiography, the internal diameter should be measured perpendicular to the axis of blood flow**. For aortic root measurements the widest diameter, typically at the mid-sinus level, should be used. (C)

# Impact of Image Analysis Methodology on Diagnostic and Surgical Classification of Patients With Thoracic Aortic Aneurysms

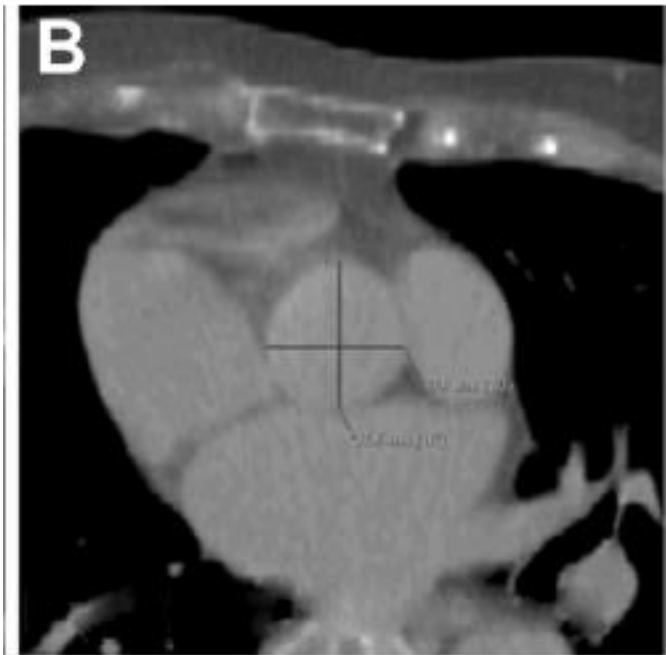
(Ann Thorac Surg 2011;92:904–13)

Dorinna D. Mendoza, MD, Minisha Kochar, MD, Richard B. Devereux, MD,

## ■ About “measuring”..

### Quantification methods.

**B) Axial measurements were made using standard axial planes displayed on the CT workstation; no user adjustments were made.**



**C) DO measurements were made in true short axis orientation; multiplanar reformatting was used to orient the aorta and, next, reformatting a short axis image oriented perpendicular to the (long axis) aortic wall**

## ▪ About “measuring” ..

- *Unlike the precise physical sciences, in clinical aortic size estimation, **one cannot have confidence in a measured change of <3 or 4 mm**, and even this level of precision requires carefully ascertaining that similar levels of the aorta are being measured.*
- *In some cases, **it may be difficult to reconcile discrepant studies** or to achieve an ultimate measurement that encompasses the separate “realities” of **different imaging modalities**.*

**2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM  
Guidelines for the Diagnosis and Management of Patients  
With Thoracic Aortic Disease: Executive Summary**

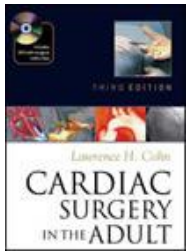
JACC Vol. 55, No. 14, 2010  
April 6, 2010:1509–44

Recommendations for Surveillance of Thoracic Aortic Disease or Previously Repaired Patients

CLASS IIa

1. When following patients with imaging, **utilization of the same modality at the same institution is reasonable, so that similar images of matching anatomic segments can be compared side by side.** (C)
2. If a thoracic aortic aneurysm is only moderate in size and remains relatively stable over time, **magnetic resonance imaging instead of computed tomographic imaging is reasonable** to minimize the patient's radiation exposure. (C)

# Late Mortality



- Reported actuarial survival, like early mortality, is variable and **dependent on the patient cohort.**
- Survival rates are **95% at 1 year,**  
**92% at 5 years,**  
**60 to 73% at 8 to 10 years**  
**48 to 67% at 12 to 14 years.**
- Predictors of late mortality include elevated New York Heart Association class, requirement for arch reconstruction, Marfan syndrome, and extent of distal disease.
- The most common cause of late death is cardiac, but distal aortic disease accounted for 32% of late deaths in one series.

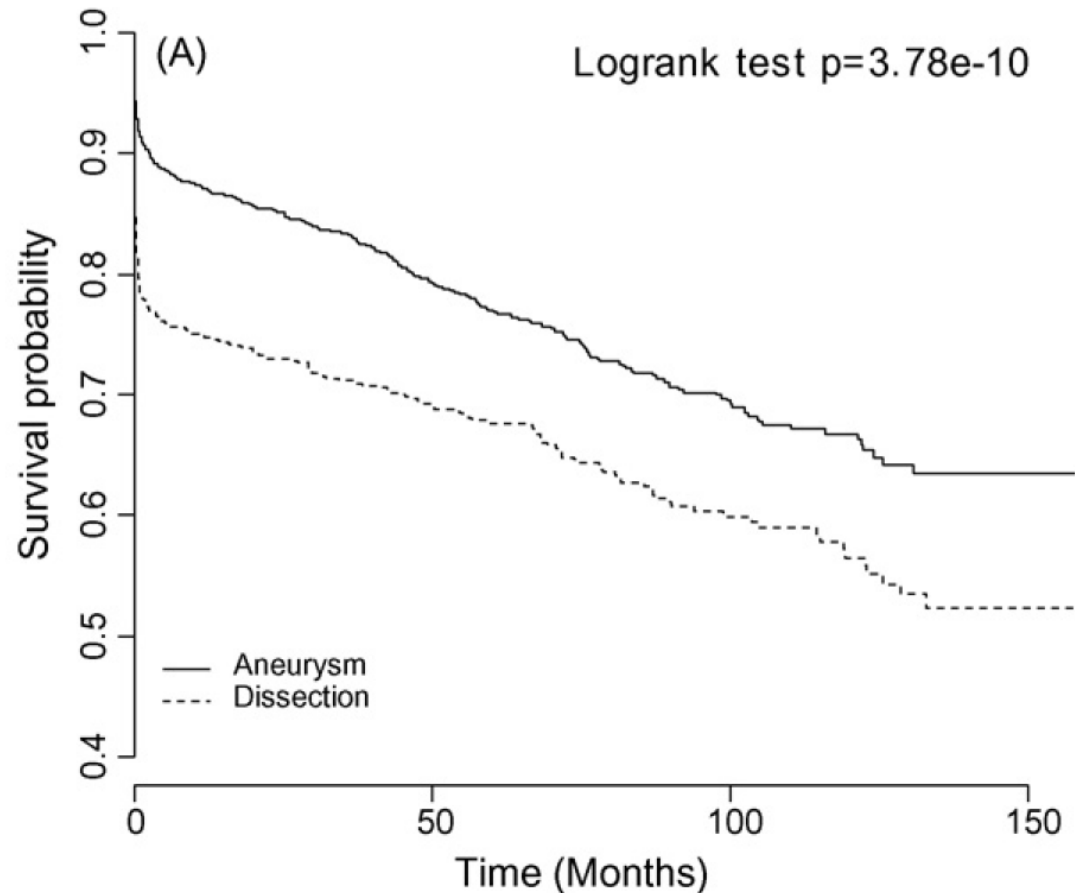
# Surgical and long-term mortality in 2634 consecutive patients operated on the proximal thoracic aorta<sup>☆</sup>

Christian Olsson<sup>a,\*</sup>, Niclas Eriksson<sup>b</sup>, Elisabeth Ståhle<sup>a</sup>, Stefan Thelin<sup>a</sup>

<sup>a</sup>Department of Cardiothoracic Surgery, Uppsala University Hospital, Sweden  
<sup>b</sup>Uppsala Clinical Research Center, Uppsala University, Sweden

European Journal of Cardio-thoracic Surgery 31 (2007) 963–969

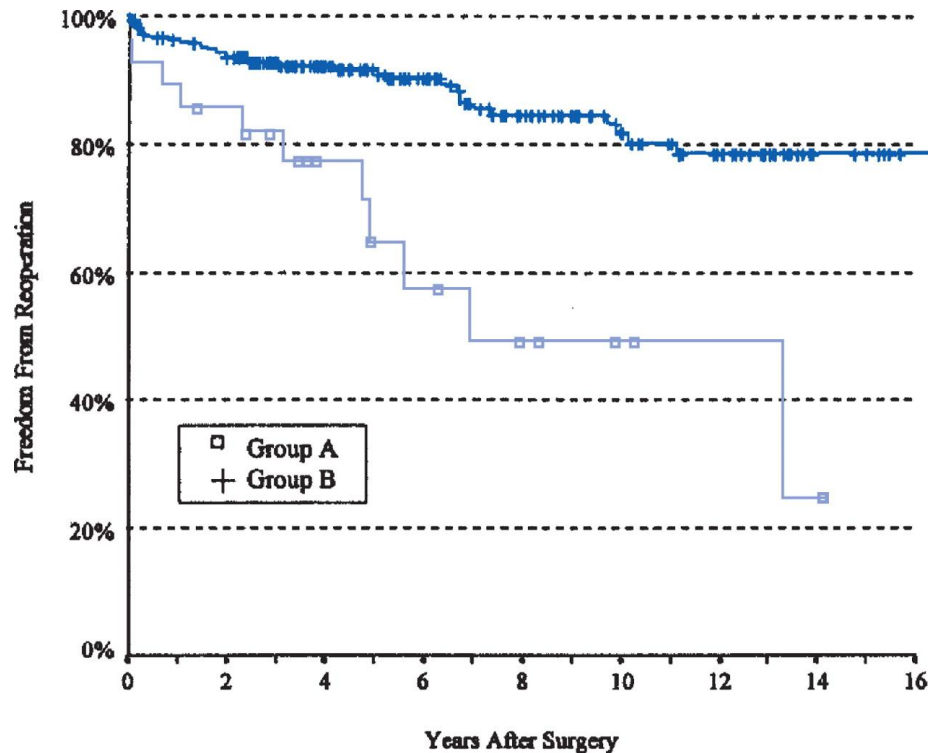
- Results:  
2634 patients  
(mean age 60 years)
- aortic aneurysm  
(1821, 69%)
- aortic dissection  
(813, 31%)



## ■ Thromboembolism

- Major thromboembolic events following replacement of the aortic root with a composite graft **are currently uncommon.**
- Unlike simple aortic valve replacement, suture material and pledgets are excluded from the bloodstream.
- Gott and associates reported an incidence of only  
0.42 thromboembolic events per 100 patient/years

## ■ Freedom for Reoperation : worst for Marfan



Freedom from reoperation (Kaplan-Meier) of patients with Marfan syndrome (group A) versus those without fibrillinopathic etiologies (group B). (Reproduced with permission from Detter et al.44)



## ■ Reoperation On The Ascending Aorta And Aortic Root

- Reoperative surgery on the ascending aorta and aortic root **can be particularly challenging, but is becoming more frequent.**

### Indications for reoperation include

- aortic insufficiency,
- development of aneurysms or dissections in remaining segments of the thoracic aorta,
- false aneurysms,
- prosthetic malfunction or infection, or degeneration of biologic prostheses.

## **Reoperation:**            *risk factors*

- **Appropriate resection of all diseased aortic tissue at the time of original operation will improve outcomes.**
  - ✓ **In one series it was estimated that nearly 60% of redo aortic cases were required because of inadequate repair during previous operations**
  - ✓ Some surgeons have advocated the routine use of hypothermic circulatory arrest (HCA) with the removal of the aortic cross-clamp to ensure complete resection of all diseased aorta.
  - ✓ Other groups have stressed the increased incidence of transient neurologic complications with the routine use of HCA and limit HCA to only those patients with aneurysms of the arch.

## ■ Reoperation On The Ascending Aorta And Aortic Root

### ➤ *Surgical Technique*

- In the case of large pseudoaneurysms or grafts tethered to the posterior sternal wall, it is necessary to go on "**pump-sucker bypass**" until structures are dissected out and bleeding is controlled.
- Fifty percent of patients undergoing reoperation have **significant aortic insufficiency, making myocardial preservation more challenging** (risk of VF)
- Reimplantation of coronary buttons in the case of root replacement is often not possible without use of a modified Cabrol technique or an interposition graft.

# Determinants of Early and Late Outcome for Reoperations of the Proximal Aorta

Anthony L. Estrera, MD, Charles C. Miller III, PhD, Eyal Porat, MD, Shafi Mohamed, MD, Robert Kincade, MD, Tam T. Huynh, MD, and Hazim J. Safi, MD

Department of Cardiothoracic and Vascular Surgery, The University of Texas at Houston Medical School, Memorial Hermann Hospital, Houston, Texas

- Chronic dissection was the most common indicator for reoperation in our population, followed by progression of aneurysm and infection.
- **Thirty-day and in-hospital mortality was 13.5% (14/104) and 15.4% (16/104), respectively.**
- Chronic obstructive pulmonary disease renal dysfunction, and increased pump time were risk factors for mortality.

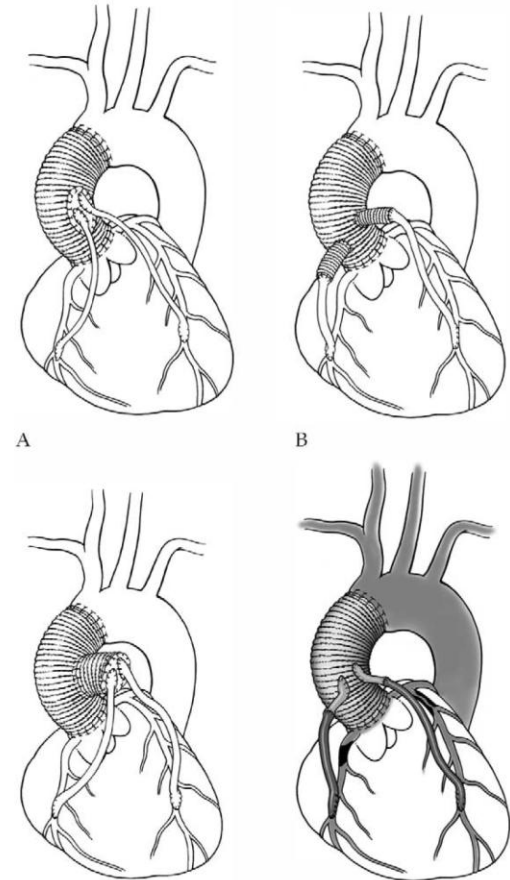


Fig 5. (A) Single button reattachment of saphenous vein bypass grafts. (B) Individual Cabrol interposition grafts. (C) Saphenous vein grafts reattached to a single interposition graft. (D) Interposition saphenous vein grafts.

# Results of Reoperation on the Aortic Root and the Ascending Aorta

(Ann Thorac Surg 2011;92:898–903)

Nicola Luciani, MD, Raphael De Geest, MD, Amedeo Anselmi, MD, Franco Glieca, MD, Stefano De Paulis, MD, and Gianfederico Possati, MD

Divisions of Cardiac Surgery, and Cardiac Anesthesia, Catholic University, Rome, Italy; and Division of Cardiovascular and Thoracic Surgery, OLV Clinic, Aalst, Belgium

- Mean logistic European system for cardiac operative risk evaluation was 29.8%.
- **Operative mortality was 12%** and rate of major operative morbidity was 17%.
- Our findings encourage complete resection of borderline dilated ascending aortic-root tissue at primary and redo operation



# Sostituzione aorta ascendente: Reinterventi

---

*Cuneo: maggio '00 – febbraio '12*

37 PAZIENTI:

euroscore 10,2 / 27,8

5 ex – 13,5%

- 26 Interventi elettivi su aorta ascendente**
- 5 Interventi urgenti**
- 6 Interventi emergenti**

# Ascending Aorta and Aortic Root Reoperations: Are Outcomes Worse Than First Time Surgery?

Jacobo Silva, MD, Luis C. Maroto, MD, Manuel Carnero, MD, Isidre Vilacosta, MD, Javier Cobiella, MD, Enrique Villagrán, MD, and José E. Rodríguez, MD

Units of Cardiac Surgery and Cardiology, Hospital Clínico San Carlos, Madrid, Spain

(Ann Thorac Surg 2010;90:555–60)

- **group I : 58 patients had had prior ascending aorta and (or) aortic valve surgery**
- **group II: 307 patients were assigned to an initial surgery group**
- Hospital mortality was **7 of 58 (12.1%) in group I**  
**21 of 207 (6.8%) in group II**
- **After adjusting for the different variables, reoperation could not be identified as an independent predictor of postoperative morbidity.**

# Surgical treatment of pseudoaneurysm of the thoracic aorta

Fernando A. Atik, MD,<sup>a</sup> Jose L. Navia, MD,<sup>a</sup> Lars G. Svensson, MD, PhD,<sup>a</sup> Pablo Ruda Vega, MD,<sup>a</sup> Jingyuan Feng, MS,<sup>b</sup> Mariano E. Brizzio, MD,<sup>a</sup> A. Marc Gillinov, MD,<sup>a</sup> B. Gosta Pettersson, MD, PhD,<sup>a</sup> Eugene H. Blackstone, MD,<sup>a,b</sup> and Bruce W. Lytle, MD<sup>a</sup>

The Cleveland Clinic

J Thorac Cardiovasc Surg 2006;132:379-85

- **Aortic pseudoaneurysm is an uncommon pathologic condition.**
- **One third have endocarditis**
- **Hospital mortality was 6.7%**
- Postoperative pseudoaneurysms, located in the ascending aorta or aortic arch, and whether infected or not, **occurred within 2 years of the initial operation in more than half of the patients**
- **Almost 80% of patients had the operation performed within 2 weeks** of diagnosis of aortic pseudoaneurysm
- Operation was performed on an **emergency basis in 8 patients (13%)** because of signs of cardiovascular collapse or systemic hypoperfusion



## ■ Reoperation On The Ascending Aorta And Aortic Root

### ➤ *The Infected Aortic Graft*

- Graft infections are **reported in 0.9 to 1.9%** of patients following surgery of the thoracic aorta and are associated with a **mortality rate ranging from 25 to 75%**.
- **Most graft infections become evident in the first month** after operation but may occur years after graft insertion. .
- Mortality rates remain substantial despite aggressive measures.

# Options for managing infected ascending aortic grafts

Scott A. LeMaire, MD,<sup>a</sup> and Joseph S. Coselli, MD<sup>b</sup>

J Thorac Cardiovasc Surg 2007;134:839-43

- **The cornerstone surgical strategy for treating patients with infected peripheral vascular grafts is graft removal and extra-anatomic bypass.**
- **The surgical options involve either salvaging the existing graft or replacing it in situ.** In either case the need to leave prosthetic material in an infected surgical field makes it difficult to eradicate the infection

- ✓ **Graft Removal and Replacement With a Synthetic Graft**
- ✓ **Graft Removal and Replacement With a Tissue Graft**
- ✓ **Salvaging the Original Graft**

# Options for managing infected ascending aortic grafts

Scott A. LeMaire, MD,<sup>a</sup> and Joseph S. Coselli, MD<sup>b</sup>

J Thorac Cardiovasc Surg 2007;134:839-43

## Conclusions

- It is notable how **little evidence is available to guide surgeons** in treating patients with ascending aortic graft infection.
- **In situ replacement can be effective but is often associated with substantial morbidity and mortality, especially in patients with infected Composite Vascular Grafts.**
- **In many cases, existing grafts can be salvaged** through a regimen of aggressive debridement, irrigation, and coverage with healthy tissue.
- **Ultimately, the treatment strategy should be selected on the basis of relevant clinical factors and tailored specifically to the individual patient.**

A white, rectangular sticky note is pinned to a white background with a single red pushpin at the top center. The note has slightly irregular, torn edges. The text "Follow Up!" is written in a black, casual, handwritten font, slanted upwards from left to right. The pushpin is a standard red office pushpin with a translucent red cap and a gold-colored metal base. The note casts a soft, grey shadow on the surface below it.

Follow Up!