# When Is The Best Timing For TEVAR In Acute Type B Aortic Dissection

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- Disclosure
- Speaker name:
- Ian Loftus
- I have the following potential conflicts of interest to report:
- Consulting/Speaker Fees/Proctor/Research Grants
  - Endologix
  - Medtronic
  - Abbott
  - Covidien
  - Cook Medical
- Shareholder in a healthcare company: Inotec





# Open and endovascular repair of type B aortic dissection in the Nationwide Inpatient Sample

Teviah Sachs, MD, Frank Pomposelli, MD, Robert Hagberg, MD, Allen Hamdan, MD, Mark Wyers, MD, Kristina Giles, MD, and Marc Schermerhorn, MD, Boston, Mass

Background: The use of stent grafts and mortality of stent graft repair of type B thoracic aortic dissection (TBAD) is not

| Mortality                                 | Open<br>% | TEVAR<br>% | OR (95% CI)                          | P          |
|---|-----------|------------|--------------------------------------|------------|
| All type B dissections<br>Emergent/urgent | 19<br>20  | 10<br>13   | 2.24 (1.36-3.67)<br>1.72 (1.04-2.86) | .01<br>.04 |
| admission<br>Elective admission           | 12        | 5          | 3.21 (0.80-12.96)                    | .09        |

4.3%, P = .02), genitourinary complications (9.0% vs 2.5%, P < .01), hemorrhage (14.0% vs 2.8%, P < .01), and acute renal failure (32.1% vs 17.2%, P < .01) were more frequent in the open repair group. Median length of stay was greater in the open repair group (10.7 vs 8.3 days, P < .01).

Conclusion: For patients with a diagnosis of T<sub>B</sub>AD who undergo repair, the endovascular approach is being used for older patients with greater comorbidities, yet has reduced morbidity and in-hospital mortality. The use of endovascular stent graft repair for type B thoracic aortic dissection merits further longitudinal analysis. (J Vasc Surg 2010; ...)





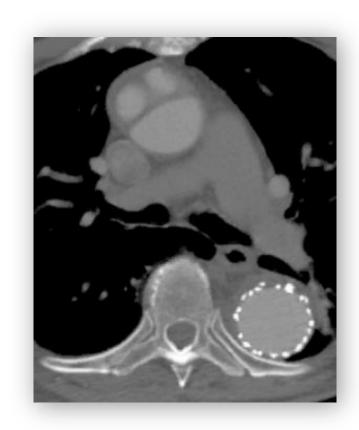






## Retrograde Type A Dissection

- Systematic review of RTAD
  - 38 reports, 9894 patients
- Significantly higher risk in acute dissection
  - AAD 8.4%
  - CAD 3.4%
  - TAA 0.9%
- Mortality ~35%



Canaud et al; Annals Surg 2014





## Issues Relating To Timing Of Intervention

- Delay might allow aorta to stabilise
- Is there a cohort who might benefit from delayed vs emergent TEVAR
- Does early TEVAR pose the same risk, independent on presentation
- Will delayed intervention affect remodelling, and long term outcomes







# The Virtue Registry

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#### The VIRTUE Registry of Type B Thoracic Dissections — Study Design and Early Results

The VIRTUE Registry Investigators\*,a

St George's Vascular Institute, 4th Floor St James Wing, St George's Hospital, London SW17 OQT, UK

Submitted 23 June 2010; accepted 17 August 2010 Available online 16 October 2010

#### **KEYWORDS**

Endovascular; Type B dissection; Mortality; Tumescent anaesthesia; Stroke; Paraplegia

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patients recruited refer to Appendix A.

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Conclusion: The early outcomes for the treatment of Type B aortic dissection are reported in the Virtue Registry. Longer term follow-up is planned to report on clinical and morphological outcomes up to 36 months post-procedure.

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#### Introduction

Each year in Europe an estimated sixteen thousand people are diagnosed with descending thoracic aortic pathology. Endovascular stent grafts promise a minimally invasive approach for the management of thoracic aortic disease and contemporary results suggest that endovascular procedures may be utilised as first line therapy for many thoracic aortic pathologies. The literature for the endovascular treatment of the thoracic aorta is not well formed

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|                   | Acute<br>(n=50) | Sub-Acute (n=24) | Chronic (n=26) |
|-------------------|-----------------|------------------|----------------|
| Mortality 30d (%) | 8               | 0                | 0              |
| Stroke (%)        | 8               | 0                | 0              |
| SCI (%)           | 2               | 0                | 3.8            |





## Early Outcomes For TEVAR in TBAD

- Acute complicated TBAD
  - 102 patients
  - 9 deaths
  - 3 paraplegias, 6 strokes
- Sub-acute complicated TBAD
  - 22 patients
  - No deaths/neurological complications

Steuer et al; Eur J Vasc Endovasc Surg 2013





# **MOTHER Registry**

- >1000 cases
- Prospective data collection
- Adjudicated adverse events
- Sub group analysis
  - Acute TBAD
  - Factors that influence outcomes in short, mid and long term

#### Cardiovascular Surgery

#### Aortic Pathology Determines Midterm Outcome After Endovascular Repair of the Thoracic Aorta Report From the Medtronic Thoracic Endovascular Registry (MOTHER) Database

Benjamin Patterson, BSc, MRCS; Peter Holt, PhD, FRCS; Chrisoph Nienaber, MD; Richard Cambria, MD; Ronald Fairman, MD; Matt Thompson, MD, FRCS

Background—Endovascular repair of the thoracic aorta has become an increasingly utilized therapy. Although the shortterm mortality advantage over open surgery is well documented, late mortality and the impact of presenting pathology on long-term outcomes remain poorly reported.

Methods and Results —A database was built from 5 prospective studies and a single institutional series. Rates of perioperative adverse events were calculated, as were midterm death and reintervention rates. Multivariate analysis was performed with the use of logistic regression modeling. Kaplan-Meier survival curves were drawn for midterm outcomes. The database contained 1010 patients: 670 patients with thoracic aortic aneurysm, 195 with chronic type B aortic dissection, and 114 with acute type B aortic dissection. Lower elective mortality was observed in patients with chronic dissections (3%) compared with patients with aneurysms (5%). Multivariate analysis identified age, mode of admission, American Society of Anesthesiologists grade, and pathology as independent predictors of 30-day death (P<0.05). In the midterm, the all-cause mortality rate was 8, 4.9, and 3.2 deaths per 100 patient-years for thoracic aortic aneurysm, acute type B aortic dissection, and chronic type B aortic dissection, respectively. The rates of aortic-related death were 0.6, 1.2, and 0.4 deaths per 100 patient-years for thoracic aortic aneurysm, acute type B aortic dissection, and chronic type B aortic dissection, respectively Conclusions-This study indicated that the midterm outcomes of endovascular repair of the thoracic aorta are defined by presenting pathology, associated comorbidities, and mode of admission. Nonaortic mortality is high in the midterm for patients with thoracic aortic aneurysm, and managing modifiable risk factors appears vital. Endovascular repair of the thoracic aorta results in excellent midterm protection from aortic-related mortality, regardless of presenting pathology.

Key Words: acute aortic syndrome ■ aneurysm ■ aortic dissection ■ endovascular surgery ■ pathology

The advent of endovascular repair of the thoracic aorta (thoracic endovascular aortic repair [TEVAR]) has altered the management algorithm for pathologies that affect the aortic arch and descending thoracic aorta. In recent years, the number of thoracic endovascular procedures has risen.<sup>1,2</sup> The increased use of TEVAR has been driven by the early mortality advantage reported when endovascular therapy is compared with open surgical treatment of the thoracic norta.<sup>34</sup> TEVAR is now considered the first-line therapy for isolated aneurysms of the descending thoracic aorta and acute complicated type B aortic dissections. 25.8 In the abdominal aorta, the early mortality advantage associated with endovascular repair of abdominal aneurysms was lost as a result of late aortic rupture.9 It has been suggested that long-term durability may be related to individual preoperative aneurysm morphology.10 There is a concern that a

similar "catch-up" phenomenon might affect procedures in the thoracic aorta. At present, midterm to long-term data regarding the fate of patients treated with thoracic endografts are sparse, and it remains difficult to define whether TEVAR offers a durable solution to prevent aortic-related death. The fate of the aorta after endovascular treatment for chronic type B aortic dissection is of particular concern, and some experts suggest that TEVAR is not a viable alternative to open surgical repair in this pathology.11

#### Editorial see p 5 Clinical Perspective on p 32

Given the spectrum of different pathologies that affect the descending thoracic aorta, it is important to define whether the outcome of TEVAR is pathology specific to refine procedural technique and endograft design. Careful analysis of long-term

Continuing medical education (CME) credit is available for this article. Go to http://cme.ahajournals.org to take the quiz. Processed April 4, 2012, accepted October 26, 2012.

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The online-only Data Supplement is available with this article at http://circ.ahajournals.org/tookup/suppl/doi:10.1161/CIRCULATIONAHA.

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### Clinical Presentation

- 'Soft' versus 'hard' indications for immediate intervention
  - BP / pain / interval expansion
  - Rupture / malperfusion





# Mother: 30 Day Outcomes (n=164)

|               | BP / Pain /<br>Expansion (n=63) | Malperfusion / Rupture (n=101) |
|---------------|---------------------------------|--------------------------------|
| 30-day death  | 6 (9.5)                         | 11 (10.9)                      |
| 30-day stroke | 4 (6.3)                         | 8 (7.9)                        |
| 30-day SCI    | 1 (1.6)                         | 2 (2)                          |





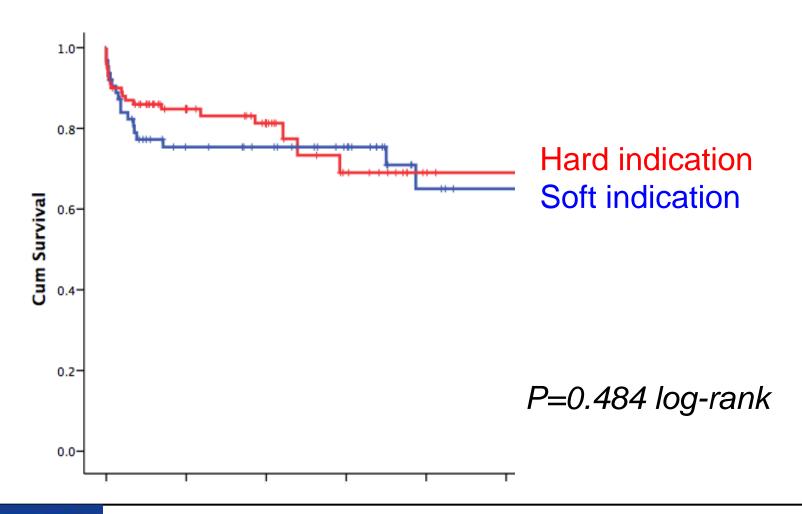
# Mother: Early Cause of Death

|                     |            | Pain / BP /<br>Expansion<br>(n=63) | Rupture / Malperfusion (n=101) |
|---------------------|------------|------------------------------------|--------------------------------|
| 30-day<br>mortality | Aortic     | 4 (6.3)                            | 7 (6.9)                        |
|                     | Non-aortic | 2 (3.2)                            | 4 (3.9)                        |





### Indication and Mid Term Death







### Mother: Mid-Term Cause of Death

|                       |              | Pain / BP /<br>Expansion<br>(n=12/57) | Rupture /<br>Malperfusion<br>(n=12/90) |
|-----------------------|--------------|---------------------------------------|--|
| Mid-term<br>mortality | Aortic       | 5 (8.8%)                              | 1 (1%)                                 |
| (>30 days)            | Respiratory  | 1 (1.7%)                              | 1 (1%)                                 |
|                       | Neurological | 0                                     | 1 (1%)                                 |
|                       | Sepsis       | 0                                     | 1 (1%)                                 |
|                       | Unknown      | 6 (10.5%)                             | 6 (6.7%)                               |





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## Aortic Re-modelling

- Essential for good long term outcomes
- Measures at different aortic levels:
  - True/false lumen index
  - True lumen diameter
  - False lumen diameter
  - False lumen thrombosis



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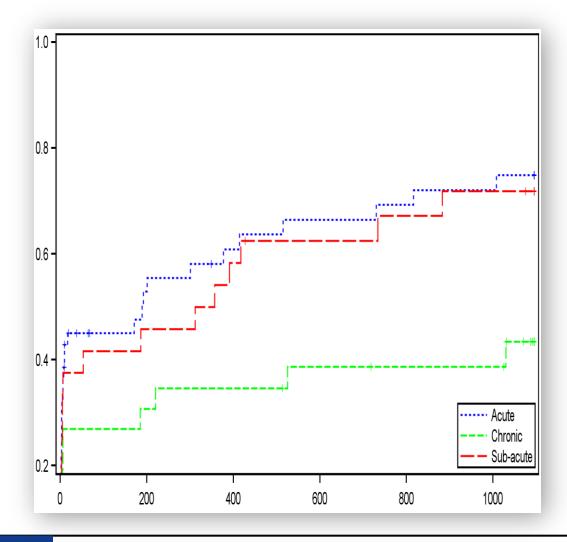
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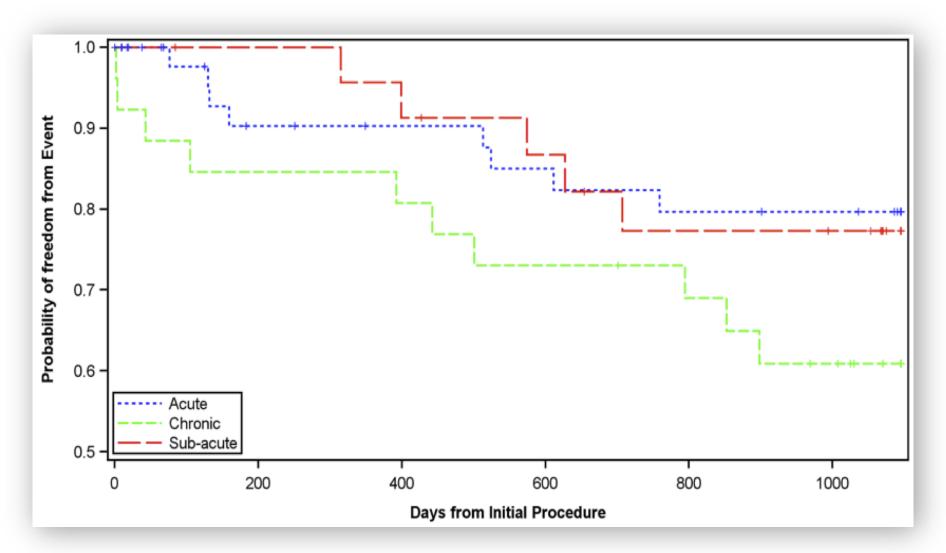
# False Lumen Thrombosis (3 years): Diaphragm







### Virtue: Aortic Related Interventions







# Aortic Related Re-intervention

|                 | Acute  | Sub-Acute | Chronic   |
|-----------------|--------|-----------|-----------|
|                 | (n=50) | (n=24)    | (n=26)    |
| TEVR extension  | 4 (8%) | 4 (16.7%) | 8 (30.8%) |
| Open AAA repair | 2 (4%) | 0         | 0         |
| Remodelling     | 1 (2%) | 0         | 1 (3.8%)  |
| LSA plug        | 1 (2%) | 1 (4.2%)  | 0         |





### Conclusions

- Early outcomes for sub-acute better than acute TBD
- Long term outcomes/re-modelling similar
- Consider delay intervention >2 weeks unless 'hard' indication
- 'Softer' indications are not more benign
- Care that we don't increase non-operative mortality
- Close monitoring until intervention
- Further work required ?clinical trial



