

# Timing of TEVAR for Uncomplicated Acute Type B Dissection:

**Delayed TEVAR is Much Preferable**

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## *Disclosures*

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## ***Treatment of Uncomplicated Type B Dissection***

**TEVR – for uncomplicated cases- should be delayed for 2-3 months after acute event in order to provide effective long term prevention from aortic related death with the lowest risk of peri-operative complications**



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## ADSORB: A Study on the Efficacy of Endovascular Grafting in Uncomplicated Acute Dissection of the Descending Aorta

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### WHAT THIS PAPER ADDS

- This is the first randomised trial on acute dissection. It compares best medical treatment (BMT) with BMT and stent grafting of the primary entry tear in patients having acute uncomplicated type B aortic dissection. Patients are randomised within 14 days of the onset of symptoms.
- The study is a multicentre European trial with a clear definition of uncomplicated dissection with a double lumen in the thoracic aorta. Patients with malperfusion, rupture, penetrating ulcer and intramural haematoma are excluded.
- The study will bring evidence as to whether stent grafting will produce thrombosis and remodelling of the false lumen with a reduction in aneurysm formation and re-intervention.

### ARTICLE INFO

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Outcome

### ABSTRACT

Acute dissection of the descending thoracic aorta carries a 30-day mortality of around 10% with best medical treatment (BMT). In addition, about 25% will develop an aneurysm during the following 4–5 years.

This is the first ever randomised trial on acute dissections comparing BMT with BMT and stent grafting of the proximal tear in patients having an uncomplicated acute dissection of the descending aorta. The commonly used temporal definition of acute dissection being within 14 days of onset of symptoms is applied.

A total of 61 patients will be randomised and followed at regular intervals (1, 3, 6, 12, 18, 24, 30 and 36 months) after acute dissection. Thrombosis of the false lumen, aortic enlargement and rupture are the primary end points.

The study will examine whether aortic remodelling occurs after stent grafting in acute type B dissections, and its effect on aneurysm formation, rupture and re-intervention.

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ADSORB ~~250~~

ADSORB 60

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## *Treatment of Uncomplicated Type B Dissection*

- **Deferred TEVR will result in fewer peri-dissection complications**
- **Deferred TEVR delivers the same protection from late aortic death**

## *Immediate Clinical Sequelae – Deferred TEVR*

- **Progression of disease – uncomplicated - complicated**
- **Procedural complications – aortic fragility**



# Medical Treatment of Uncomplicated Type B

## Update on Outcomes of Acute Type B Aortic Dissection

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**Background.** The optimal treatment of acute type B aortic dissection remains controversial. This study reports early clinical outcomes of medical management for acute type B aortic dissection.

**Methods.** Between January 2001 and April 2006, data on 159 consecutive patients (55 women [35%]) with the confirmed diagnosis of acute type B aortic dissection were prospectively collected and analyzed. Mean age was 62 years (range, 29 to 94). On admission, all patients were initiated on an acute type B aortic dissection protocol with the intent to manage all patients medically. Indications for surgical intervention included rupture, aortic expansion, retrograde dissection, malperfusion (visceral, peripheral), and intractable pain. All patients were followed up after discharge with serial clinical and radiographic examinations.

**Results.** Overall hospital mortality was 8.8% (14/159): 17% (4/23) with procedural intervention, and 7.4% (10/136) when medical management was maintained. Early intervention was required in 23 patients (14.5%), of which 21 (13.2%) were open vascular/aortic procedures, and two (1.3%) were percutaneous aortic interventions. Morbidity

included rupture (5.0%), stroke (5.0%), paraplegia (8.2%), bowel ischemia (5.7%), acute renal failure (20.1%), dialysis requirement (13.8%), and peripheral ischemia (3.8%). Mortality associated with complicated dissection (74/159) was 17%, and mortality associated with uncomplicated dissection (85/159) was 1.2% ( $p < 0.0003$ ). Late vascular related procedures were performed in 11 (7.6%) of 144 cases (9 aortic, 2 peripheral vascular). The only independent risk factors for hospital mortality by multiple logistic regression analysis was rupture ( $p < 0.0009$ ). Independent risk factors for mid-term death were history of chronic obstructive pulmonary disease ( $p < 0.002$ ) and glomerular filtration rate at admission ( $p < 0.0001$ ).

**Conclusions.** Medical management, especially for uncomplicated acute type B aortic dissection, is associated with acceptable outcomes. This study provides current data for initial medical management of acute type B aortic dissection. Alternative strategies for the treatment of acute type B aortic dissection should be compared with these results.

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### Material and Methods

Data collection and analysis was approved by the Memorial Hermann Hospital and the University of Texas Houston Medical School Committee for the Protection of Human Subjects. Between January 2001 and April 2006, information was prospectively collected and analyzed on 159 consecutive patients with the confirmed diagnosis of acute type B aortic dissection. Mean patient age was 62 years (range, 29 to 94), and 55 (35%) were women.

Aortic dissection was classified as type B according to the Stanford classification if the dissection did not involve the ascending aorta [5]. The dissection was considered acute if the dissection presented within 2 weeks of the initial onset of symptoms (eg, pain). Included were cases of classic dissection; that is, dissecting membrane with some degree of patency of both the true and false lumens, and intramural hematoma (IMH). Classic dissection was noted in 146 (92%) of 159 patients, with isolated IMH in 16 (8%).

On admission, all confirmed patients were treated with an acute aortic dissection protocol. Details have been previously reported [4]. Initial intent was to manage

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- Most series include some complicated patients in medical management group

- 159 patients

- Overall mortality 8.8%

- Intervention 17%, medical 7.3%

- Uncomplicated - medical management 1.2%



# Systematic Review RTAD

## ORIGINAL ARTICLE

### Retrograde Aortic Dissection After Thoracic Endovascular Aortic Repair

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**Objective:** To provide data regarding the etiology and timing of retrograde type A aortic dissection (RTAD) after thoracic endovascular aortic repair (TEVAR).

**Methods:** Details of patients who had RTAD after TEVAR were obtained from the MOTHER Registry supplemented by data from a systematic review of the literature. Univariate analysis and binary logistic regression analysis of patient or technical factors was performed.

**Results:** In MOTHER, RTAD developed in 16 of the 1010 patients (1.6%). Binary logistic regression demonstrated that an indication of TEVAR for aortic dissection (acute  $P = 0.000212$ ; chronic  $P = 0.006$ ) and device oversizing (OR 1.14 per 1% increase in oversizing above 9%,  $P < 0.0001$ ) were significantly more frequent in patients with RTAD. Data from the systematic review was pooled with MOTHER data and demonstrated that RTAD occurred in 1.7% (168/9894). Most of RTAD occurred in the immediate postoperative (58%) period and was associated with a high mortality rate (33.6%). The odds ratio of RTAD for an acute aortic dissection was 10.0 (CI: 4.7–21.9) and 3.4 (CI: 1.3–8.8) for chronic aortic dissection. The incidence of RTAD was not significantly different for endografts with proximal bare stent (2.8%) or nonbare stent (1.9%) ( $P = 0.1298$ ).

**Conclusions:** Although RTAD after TEVAR is an uncommon complication, it has a high mortality rate. RTAD is significantly more frequent in patients treated for acute and chronic type B dissection, and when the endograft is significantly oversized. The proximal endograft configuration was not associated with any difference in the incidence of RTAD.

**Keywords:** complications, retrograde dissection, TEVAR, thoracic aorta  
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Thoracic endovascular aortic repair (TEVAR) is extensively utilized as a treatment modality for pathology affecting the descending thoracic aorta and distal aortic arch. One of the most feared complications of this procedure is retrograde type A aortic dissection (RTAD), which has a low incidence but high mortality.

Several reports have considered the etiological factors contributing to this potentially lethal complication, but data so far have been preliminary and interpretation made difficult by heterogeneity of data quality and reporting parameters. In the European Registry on Endovascular Aortic Repair Complications, Eggebrecht et al<sup>1</sup> reported 63 cases of RTAD among 4750 TEVAR procedures. In this series, it was suggested that the use of proximal bare spring endografts might be an important causative factor for RTAD. However,

the ratio of proximal bare spring to proximal nonbare stent grafts was not reported.<sup>2</sup> There is a general consensus that RTAD may be more common in patients with acute type B aortic dissection, but no definite association has been proven to date. Equally, there have been many mechanisms proposed to cause RTAD (extension of disease, wire trauma, and trauma from differing proximal endograft configurations) but little hard evidence to support evolving clinical practice or graft design.

The aim of this study was to provide insight into the etiological and procedural factors associated with RTAD following TEVAR. Data were obtained from the MOTHER<sup>3</sup> registry and were supplemented by cases from a systematic review of the literature. Data from both sources were aggregated to report the contemporary literature.

## METHODS

### MOTHER Database

The MOTHER registry comprises the combined data from 5 prospective trials and institutional data from a single UK center, which has been previously described.<sup>3</sup> Briefly, the registry consists of the endovascular arm of a phase II/III trial (VALOR I<sup>4</sup>), the intervention arm of a randomized controlled trial, INSTAND,<sup>5</sup> and 3 phase IV trials (VALOR II,<sup>6</sup> Captivia, and VIRTUE<sup>7</sup>). The single institute series included all TEVARs performed over a period of 8 years that used the Talent or Valiant stent graft systems. All of the trials had stringent protocols for data collection and validation. The institutional series was prospectively maintained, and follow-up was done by computed tomography. Morphological data available in the Mother registry were as follows: proximal aortic neck diameter, distal neck aortic diameter, aortic diameter at left subclavian artery, aortic diameter at left common carotid artery, and maximum aneurysm diameter. Device oversizing was calculated according to the diameter from the adventitia to adventitia of the proximal landing zone as compared with the diameter of the proximal endograft implanted.

### Systematic Review

#### Search Strategy

The systematic review conformed to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis guidelines. A literature search was undertaken to identify all published English language studies reporting RTAD after TEVAR. The EMBASE, MEDLINE, and COCHRANE databases were searched, for the period of 1993 to January 2013. Key words entered in this search were “TEVAR,” “retrograde dissection,” “thoracic stent-graft,” “endograft,” and “graft” with the Boolean operator OR. The reference lists of the articles obtained were reviewed for pertinent citations. In addition to those identified by the literature search data from the most important trial for the Gore Tag Thoracic Endograft<sup>8</sup> and the Zenith TX2 Endovascular Graft<sup>9</sup> was included in analysis.

#### Study Selection

Studies were eligible for inclusion if they included patients who developed RTAD after TEVAR and reported clinical outcomes.

■ 38 reports: 9594 patients

■ Overall incidence 1.7%

■ Mortality 33.6%

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Ludovic Canaud and Baris A. Ozdemir hold joint first authorship/contributorship on this work.

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## *Pathology and RTAD*

- TAA: 1.1%
- Acute dissection 8.4%; chronic dissection 3%
- OR (relative TAA): 7.8 AAD / 2.7 CAD

## ***Aortic Remodelling after TEVR for Aortic Dissection***

- **Aim of treating uncomplicated Type B – prevent late  
aortic related death**
- **Aortic remodelling – expansion TL, FL thrombosis**
- **Risk of deferring treatment as remodelling better in  
acute phase cf. chronic**



# Virtue Study and Aortic Remodelling

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

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

**Abstract** *Introduction:* Endovascular procedures for repair of Type B aortic dissection have become increasingly common and are often considered to be first line therapy for acute complicated dissections. The long term durability of these repairs is largely undefined.

*Methods:* The Virtue Registry is a prospective, non-randomised, multi-centre European Clinical Registry designed to inform on the clinical and morphological outcomes of 100 patients with Type B aortic dissection treated with the Medtronic Valiant thoracic stent graft. Patients with acute, sub-acute and chronic Type B dissections will be prospectively followed for three years. Clinical outcomes and aortic morphology will be defined.

*Results:* Fifty patients had an acute dissection, 24 a sub-acute dissection and 26 a chronic lesion. The 30-day mortality for the acute, sub-acute and chronic lesions was 8%, 0% and 0%. The in hospital composite outcome (mortality, stroke or paraplegia) for the three groups was 16%, 0% and 3.8% respectively. The effect of left subclavian artery (LSCA) revascularisation was defined with the composite endpoint of patients with a covered, non-revascularised LSCA being 20% as compared to 5.8% in the covered, revascularised group.

*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.<sup>1</sup> The literature for the endovascular treatment of the thoracic aorta is not well formed

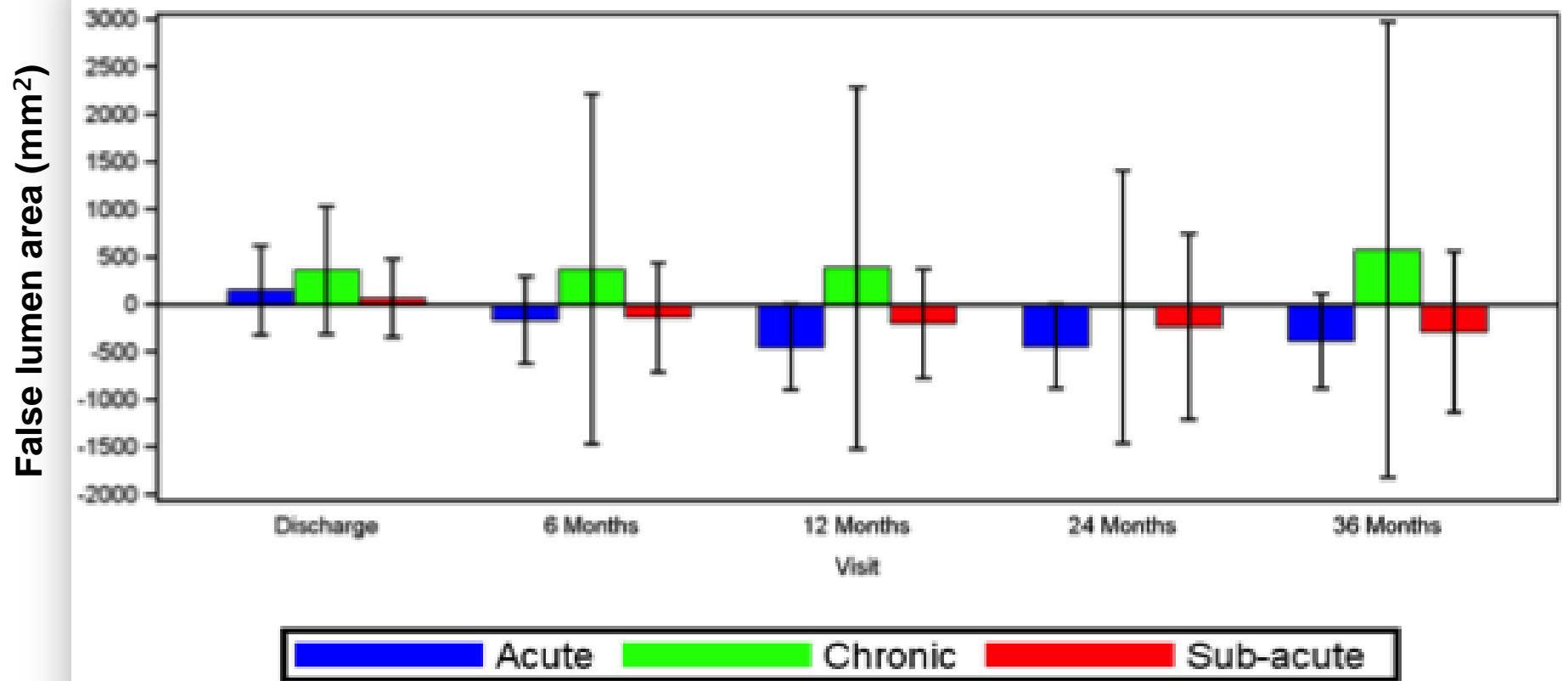
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<sup>a</sup> For Contributing centres with lead investigator and number of patients recruited refer to Appendix A.

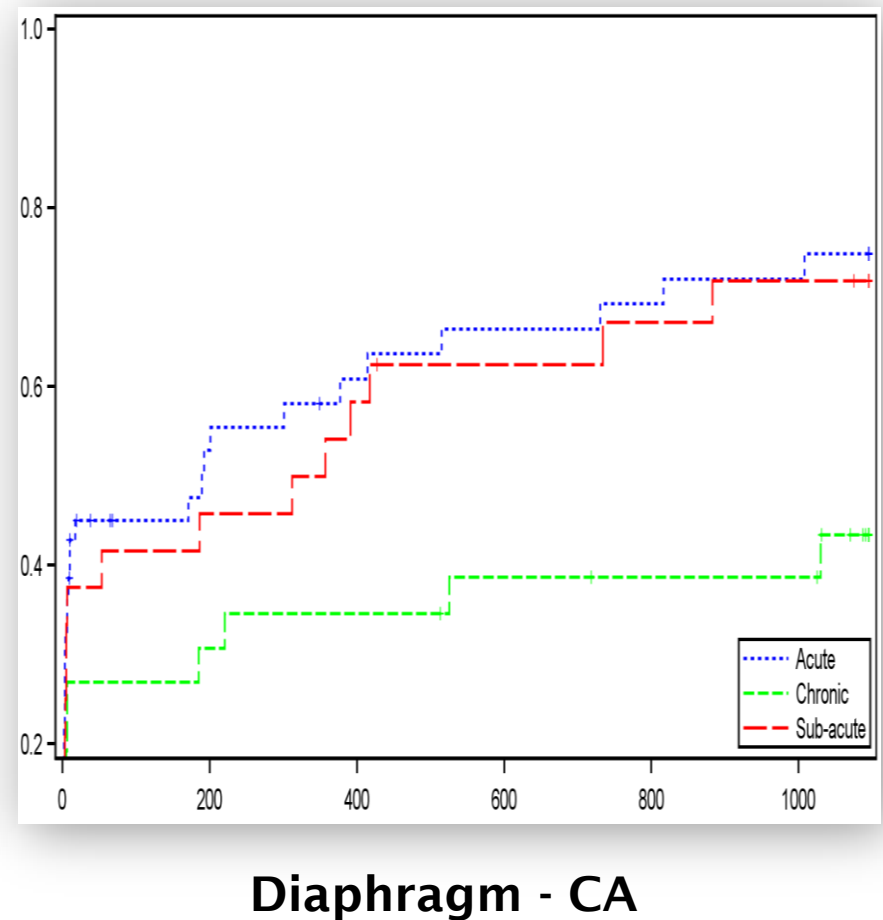
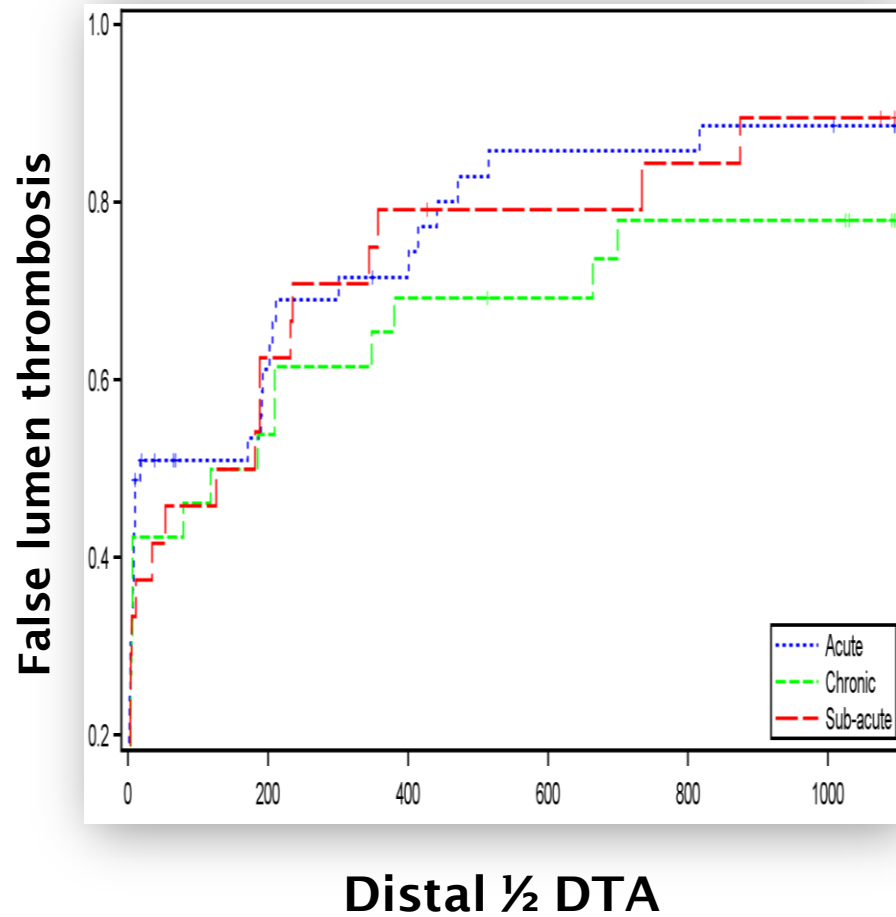
- 100 patients with aortic dissection
- 3 year follow-up
- Acute, sub-acute (14-92 days), chronic
- Clinical outcomes
- Aortic morphology

## *False Lumen Area - Change from Baseline - Max*





## False Lumen Thrombosis





- ...your aortic dissection is uncomplicated and there is a 99% chance that you will be OK



- ...your aortic dissection is uncomplicated and there is a 99% chance that you will be OK
- ...so I need you to stay in hospital without any time to recover from this event



- ...your aortic dissection is uncomplicated and there is a 99% chance that you will be OK
- ...so I need you to stay in hospital without any time to recover from this event
  - ...so I can do an urgent operation on you



- ...your aortic dissection is uncomplicated and there is a 99% chance that you will be OK
- ...so I need you to stay in hospital without any time to recover from this event
  - ...so I can do an urgent operation on you
- ...the operation is much more dangerous than it would be in a few months time



- ...your aortic dissection is uncomplicated and there is a 99% chance that you will be OK
- ...so I need you to stay in hospital without any time to recover from this event
  - ...so I can do an urgent operation on you
- ...the operation is much more dangerous than it would be in a few months time
- ...the long term results are the same now as they would be in a few months time

**Would you have your uncomplicated Type  
dissection treated acutely???**

**Please vote for deferred intervention**