

TAA: Natural History & Scope of the Problem

Thoracic Aortic Aneurysm

Incidence/Prevalence

- Incidence of TAA – 10.4 / 100,000 person years
- Incidence rates increase dramatically with age
 - Women are significantly older at their initial diagnosis than men
- Incidence of TAA has increased more than 3-fold in the past 40 years

TAA Anatomy and Pathophysiology

- A permanent localized dilatation with a diameter at least 50% greater than normal
- Etiology of degenerative aneurysms
 - Medial degeneration
 - Collagen and elastin deficiencies
 - Atherosclerosis

What causes TAA?

- Genetics
 - Marfan's disease
 - Non-Marfan's also show familial clusters
- Atherosclerosis of the aorta

Symptoms of TAA

- Most patients are asymptomatic
- Symptoms
 - Hoarseness resulting from stretching of the left recurrent laryngeal nerve
 - Pain in shoulders and back

Risk Factors for Rupture

- Dissection
- Size of aneurysm
- Growth rate
- Smoking/COPD
- Age
- Pain
- Hypertension
- Renal failure

When is Surgery Indicated?

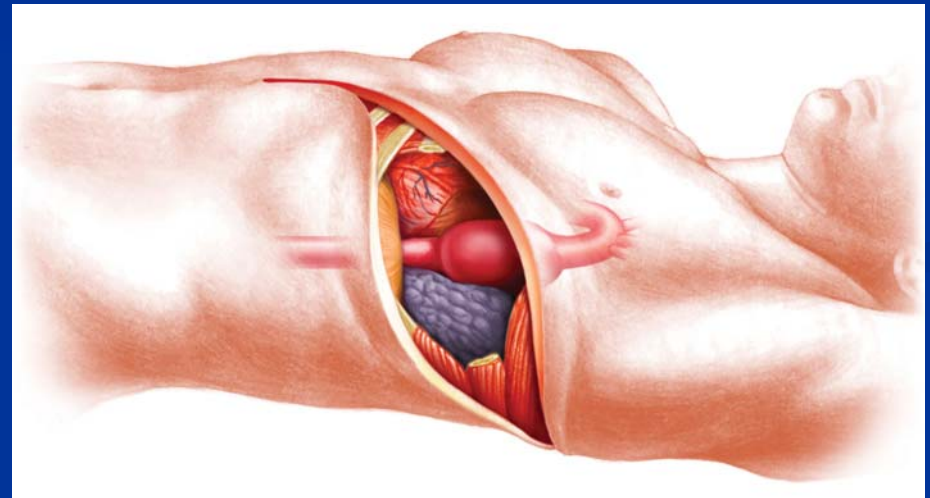
- By the time the descending aorta reaches 7.0cm, 43% of patients will have suffered rupture or dissection
- Symptomatic aneurysms should be resected regardless of size

When is Surgery Indicated?

	Non-Marfan's	Marfan's (or familial)
Ascending	5.5cm	5.0cm
Descending	6.5cm	6.0cm

Open Surgical Technique

- Graft replacement by direct surgical treatment
- Requires broad continuous exposure of left posterolateral aorta
- “Clamp and sew”
 - Regional hypothermia for spinal cord and visceral protection



Aortic Ulcer and Intramural Hematoma

- Distinguished from dissection by lack of flap traversing the aortic lumen
- Rate of rupture on initial presentation is high (45%)
- Rate of progression is high (>50%)
- Late rupture does occur frequently and is lethal
- Routine surgical correction recommended for appropriate surgical candidates

Thoracic Aortic Dissection

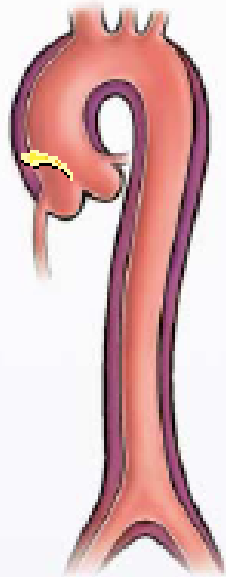
Incidence/Prevalence

- Incidence of acute aortic dissection – 5-30 / 1,000,000 person years
 - 37% Type B
- The most common acute aortic condition requiring urgent surgical therapy

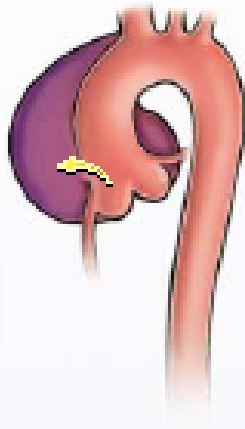
Classification of Aortic Dissection

DeBakey Classification

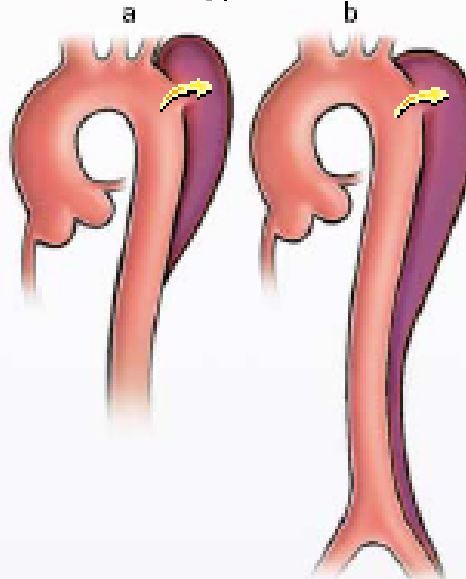
Type I



Type II

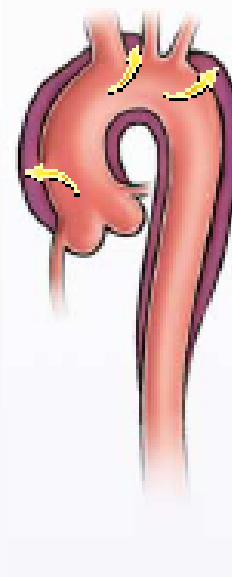


Type III



Stanford Classification

Type A



Type B



Thoracic Dissection

Pathophysiology

- Blood separates the layers of the aortic media, usually through a tear in the intima
- Typically, 1 or more tears in the intimal layer allow communication between the 2 lumens

What causes aortic dissection?

- Hypertension
- Cystic medial degeneration
- Marfan's syndrome
- Bicuspid aortic valve
- Aortic coarctation
- Blunt trauma
- Pregnancy
- Connective tissue disorders

Symptoms of Type B Dissection

- Severe pain in back or abdomen
- Pain typically described as “sharp”
 - May feel like “ripping” or “tearing”

Treatment Strategy for Acute Type Dissections

- Uncomplicated → Medical Management
 - Anti-hypertensives
 - Beta-blockers
- Complicated → Surgical Management
 - Symptomatic
 - Impending rupture
 - End-organ ischemia

Treatment Strategy for Chronic Type Dissections

- Aneurysm formation
 - Diameter $>5 - 6\text{cm}$
 - Recurrent acute dissection

Clinical Results with the Talent Thoracic Stent Graft

Results from Literature

Results of Open Thoracic Aortic Surgery

	In-hospital / 30 day mortality	Paraplegia/Paraparesis
Svensson LG, Crawford ES, et al. 1993	Type I: 7%	Type I: 15%
Elefteriades JA. 2002	Descending and thoracoabdominal: 8%	Descending operations: 8%
Coselli JS. 2002	Type I: 5.5%	Type I: 3.7%
Cambria RP et al. 2002	Type I: 14.3%	Type 1: paraplegia 5.5%, paraparesis 8.8%
Coselli JS. 1996	5.1%	1.3%
Galloway. 1996	10.3% (6.4% elective, 25% emergent)	0% elective, 18.3% emergent

Clinical Results with the Talent Thoracic Stent Graft

- 47 patients received Talent Thoracic Stent Graft
 - 31 TAA
 - 16 Type B aortic dissections
- Results at 1 Year
 - 97.9% implant success
 - 30 day mortality: 2.1% (1 patient, iliac artery rupture)
 - Late aneurysm-related death – 2.1% (ruptured TAAA with attachment site endoleak, 60 days p/o)
 - Aneurysm-related death: 4.2%
 - Paraplegia / Stroke – 0
 - Surgical Conversion – 0
 - Dissection Results: Thrombosis of false lumen – 71%

Descending Thoracic Aortic Diseases: Stent-graft Repair

- 70 patients (59 chronic, 11 acute) – 67 Talent, 3 Gore Excluder
 - 18 degenerative aneurysms
 - 21 trauma
 - 22 descending thoracic aortic dissection
 - 4 Acute Type B
 - 12 Chronic Type B
 - 6 residual dissection after type A repair
 - 6 penetrating ulcer
 - 3 suture dehiscence and pseudoaneurysm after surgical replacement of DTA
- Successful placement: 97%
- Aneurysm/false lumen exclusion: 66/68 (2 type I leaks)
- 0 hospital deaths
- 0 paraplegia, despite covering the entire DTA in 21 patients
- Total procedure failure (aortic rupture or conversion): 9% (6/68)

Endovascular Treatment of Thoracic Aortic Dissection

	Open Surgery	Talent Thoracic Stent Graft
# of patients	12	12
Mean ICU Stay (hours)	92645	36612
Mean Hospital Stay (days)	40624	763
Paraplegia	17%	0
Neurologic defect	25%	0
30 day mortality	8.3%	0
Late aneurysm-related death	8.3%	0
Morbidity	42%	0
Physical Recovery	58%	100%

Results

- Patients treated = 59/60
 - 1 access failure
- Successful deployment = 58/59 (98.3%)
- Devices
 - Aneurx (n=31)
 - Talent (n=27)
 - Gore (n=1)

Results

	<i>All Patients (n=59)</i>
<u>Local anesthesia/IV sedation</u>	<u>66%</u>
Procedure length (min)	197 (38-530)
EBL (ml)	1066 (100-7500)
ICU LOS (d)	2d (1-33)
Total LOS (d)	7d (1-36)

Results

Indications for repair of TAA *n=35*

TAA (>5cm or rapid expansion) 26

Saccular 3

Acute perforation 2

Post-traumatic pseudoaneurysm 1

Previous open repair

 Peri-operative hemorrhage 1

 Post-operative expansion 1

 Bronchial-Aortic fistula 1

Results

Indications for repair of TD

n=24

Chronic (N=8)

Aneurysm enlargement

6

Failure of medical therapy

2

Acute (N=16)

Perforation

7

Failure of medical therapy

8

Traumatic dissection

1

Results

	<i>Overall</i> (<i>n=59</i>)	<i>TAA</i> (<i>n=35</i>)	<i>Dissection</i> (<i>n=24</i>)
30d mortality	15%	17%	13%
Overall mortality	28%	37%	17%
Conversions	3%	--	8%
Secondary Procedures	24%	20%	29%
Endoleak	19%	20%	17%

Endografting of TAAs

- Open surgical repair of TAAs and dissections is associated with high rates of morbidity and mortality, especially in the acute setting
- Endografting of the thoracic aorta is technically feasible and successful
- Endografting affords significantly lower morbidity and mortality for acute presentations of aneurysms, dissections, and ruptures when compared with traditional open surgery
- Thoracic endografting provides the only alternative for many high-risk patients who are denied conventional surgery because of known morbidity and mortality

Endograft Exclusion of Descending Thoracic Aortic Dissections

- Promising role for endograft treatment of chronic dissections with associated TAA enlargement, and or recurrent dissections
- Impressive early results for exclusion of acute dissections that are failures of medical management, or where organ ischemia prevents further observation
- Regression of both acute and chronic dissections in many patients over time warrents aggressive investigation of this evolving therapy for these otherwise prohibitively high-risk surgical patients