

Objectives

- ▼ Explain the new technology of endovascular stent grafting and debranching for thoracic and abdominal aortic aneurysm.
- ▼ Outline nursing plan of care for endovascular stent graft patients.
- ▼ Explore assessment cues and complications associated with endovascular stent grafts.

Aortic Aneurysms How Big is the Problem?

- ▼ 1 - 5 % of general population affected
 - Incidence is increasing
- ▼ AAA: 100,000 – 250,000 new cases each year in the U.S.
- ▼ TAA: approximately 15, 000 new cases each year
- ▼ 43,000 – 47,000 deaths per year (CDC)
 - Twice as many deaths from thoracic aortic dissection and rupture than abdominal

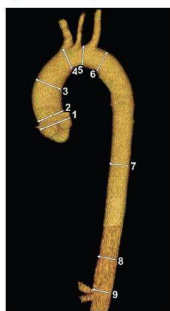
Aortic Aneurysms How Big is the Problem?

- ▼ 10th – 18th leading cause of death in the USA
- ▼ 2/3 of patients who suffer a ruptured aneurysm will die before even reaching the hospital.
- ▼ 90% mortality with ruptured AAA

Source: Society of Thoracic Surgeons

Normal Size of Aorta

Figure 1. Normal Anatomy of the Thoracoabdominal Aorta.



Size in CM	
Root	3.5–3.91
Ascending	2.86
Mid Descending	2.39–2.64
Diaphragmatic	2.43–2.69

Source: J Vasc Surg 1991;13:452-8 and 2010 Guidelines TAD.

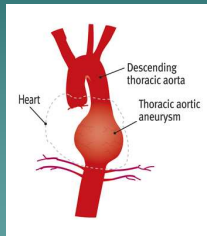
Aortic Aneurysm (AA)



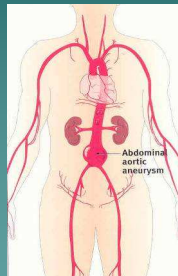
- ▼ Abnormal dilation of the aortic wall that alters the vessel shape and blood flow
 - 50% increase in the diameter of a vessel in comparison of it's expected normal
- ▼ With gradual enlargement, the aorta becomes increasingly weakened, leading to possible dissection and rupture.

Aortic Aneurysm (AA)

Thoracic TAA



Abdominal AAA



Risk Factors

- ▼ Hypertension
- ▼ Increasing Age
- ▼ Smoking
- ▼ Cocaine or other stimulant use
- ▼ Weight lifting or other valsalva maneuver
- ▼ Trauma
- ▼ Deceleration or torsional injury
- ▼ Family history
- ▼ Marfan's syndrome
- ▼ Loeys-Dietz Syndrome
- ▼ Turner Syndrome
- ▼ Pheochromocytoma
- ▼ Coarctation of the aorta
- ▼ Bicuspid valve

Smoking



- ▼ Current smokers are seven times more likely to develop AAA than non-smokers.
- ▼ Former smokers are three times more likely.
- ▼ Strongest modifiable risk factor for development of aneurysm.

Risk

- ▼ Aortic aneurysm disease is rare under the age of 50.
- ▼ Mean age of patient undergoing repair is 70.

Precipitating Events of onset of acute aortic dissection

- ▼ Extreme exertion
 - Weight lifters (Yale)
 - Extreme elevation in BP
- ▼ Episode of severe emotional upset

Screening

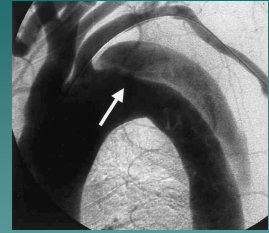
- ▼ Aortic imaging recommended for 1st degree relatives of patient with TAA and/or dissection to identify asymptomatic disease (Class 1B)
- ▼ 20% of AAA patients have a relative with the condition.

Aortic Aneurysm Rupture

- ▼ A tear in the vessel wall near or at the location of the ballooning of the weakened area of the aorta allowing blood to hemorrhage into the chest or peritoneal cavity
- ▼ Rupture carries a 90% mortality

Dissection

- ▼ Tear in the intimal layer of the aortic wall
- ▼ Blood passes into the aortic media through the tear separating the intima from the surround media and/or adventitia, creating a false channel within the aortic wall



Dissection

- ▼ Acute Dissection
 - Diagnosed within 14 days of the onset of symptoms
 - The risk of death is greatest during this acute period
- ▼ Chronic Dissection
 - Diagnosis after two weeks of the onset of symptoms

A Silent Disease

- ▼ 40% of individuals are asymptomatic at the time of diagnosis
 - Often discovered on a routine CXR or abdominal sonogram
- ▼ Only 5% of patients are symptomatic before an acute aortic event.
 - The other 95%, the first symptom is often death

AA Dissection Symptoms “The Great Imitator”

- ▼ S/S depend where the dissection occurs and what area is not getting oxygen
- ▼ Confused with:
 - Kidney stones
 - Gallstones
 - Paralysis -- think neuro diagnosis
 - Myocardial infarction

AA Symptoms

- ▼ Abrupt onset of excruciating pain in chest, back, or abdomen
 - Ascending Dissection
 - ◆ Retrosternal pain that is not exertional in nature
 - Descending Dissection
 - ◆ Interscapular chest pain
 - ◆ Severe flank pain
 - ◆ Epigastric pain
- ▼ Ripping, tearing, stabbing and or sharp quality of pain

High Risk Examination Features

- Pulse deficit
- Systolic BP limb differential >20mm Hg
- Focal neurologic deficit
- Murmur of aortic regurgitation
- Hypotension or shock state

Biomarkers

- D-dimer will elevate in aortic dissection
 - D-dimer is extremely nonspecific as it elevates with any thrombosis
- If D-dimer is not elevated = no aortic dissection

Thoracic Dissection Symptoms

- Severe tearing pain of sudden onset
- Pain has a tendency to migrate from its point of origin to other locations following the path of dissection

2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM Guidelines for the Diagnosis and Management of Patients with Thoracic Aortic Disease

Developed in partnership with the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, American Association for Thoracic Surgery, American College of Radiology, American Stroke Association, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of Thoracic Surgeons, and Society for Vascular Medicine.

Endorsed by the North American Society for Cardiovascular Imaging.



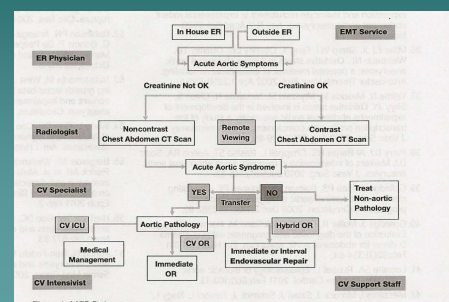
American Heart Association
Learn and Live

You suspect a dissecting/rupturing aneurysm....



Rapid Triage & Treatments

- Aortic Center Aortic Pathway
Methodist Hospital Houston. TX

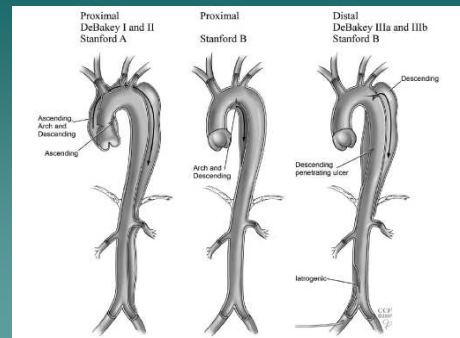


Diagnostics

- ♥ 12 Lead EKG to r/o STEMI
- ♥ Chest x-ray – not very helpful as no abnormalities noted
- ♥ CT scan



Aortic Dissection Classification: DeBakey and Stanford Classifications

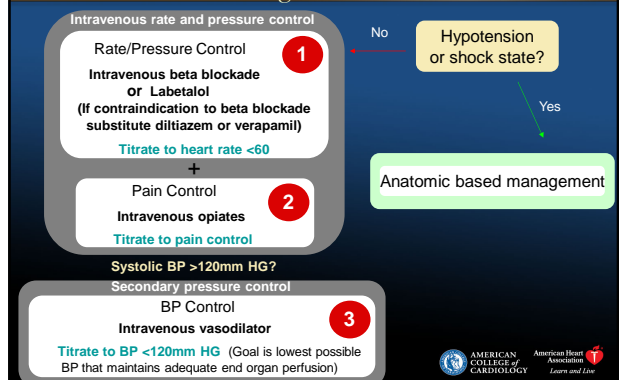


Note: Figure 20 in full-text version of TAD Guidelines. Reprinted with permission from The Cleveland Clinic Foundation.

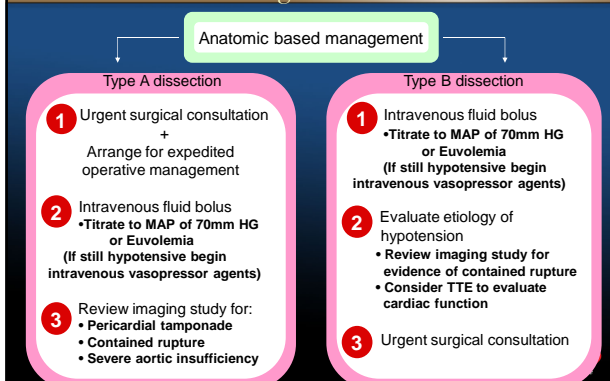
Dissections

- ♥ 62% are Type A
- ♥ Type B are typically older than Type A
- ♥ Type A
 - Immediate operation room intervention
- ♥ Type B
 - Medical management

Acute AoD Management Pathway STEP 2: Initial management of aortic wall stress



Acute AoD Management Pathway STEP 2: Initial management of aortic wall stress



Indications for AA repair

Thoracic

- ♥ Symptomatic
- ♥ Diameter 5.5 - 6 cm
- ♥ Diameter 4.4 - 5 cm associated with genetic disorder (Marfan's syndrome)
- ♥ Symptoms suggesting expansion or compression of surrounding structures

Indications for AA repair

Abdominal

- ▼ Diameter ≥ 5 cm
- ▼ Diameter ≤ 4 cm needs regular follow up
- ▼ Diameter 4 – 5 cm, management is controversial

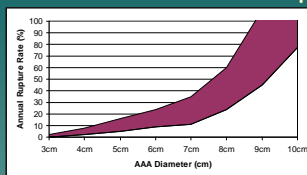
Indications for AA repair

Both: TAA & AAA

- ▼ Rapidly expanding aneurysms
 - growth rate > 0.5 cm/year
- ▼ Symptomatic aneurysm regardless of size

Size --- It really does matter!

Annual Incidence of Rupture



- ▼ At 6 cm – aorta becomes a rigid tube
- ▼ It cannot stretch in systole
- ▼ Results in high wall stress
- ▼ 34% risk of rupture
 - TAA at 6 cm
 - AAA at 7 cm

Repair of AA

Traditional:



Open surgical repair

Evolving Trend:



Endoluminal grafting (ELG)

Surgical Repair for AAA

- ▼ > 50 years since first repair
- ▼ Average mortality 4%
- ▼ Significant short & long-term morbidity
- ▼ Causes of aneurysm related death well defined

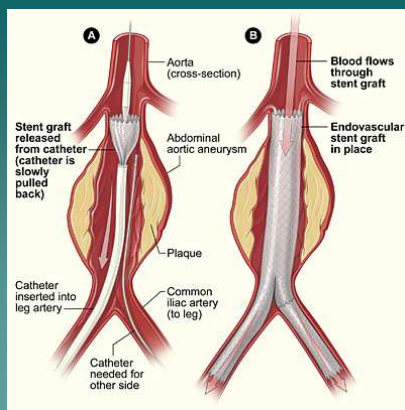
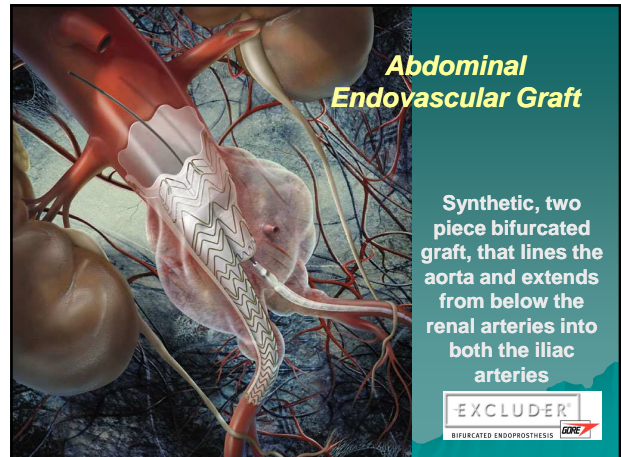
Functional Outcome after Open Repair of Abdominal Aortic Aneurysm

Operative Mortality	4% (154 pts.)
Mean LOS	10.7 days
ICU LOS	4.6 days
Ambulatory Post-op	64% (25 mos.)
Decreased Functionality	33%
Time to Recovery	3.9 mos.
Unrecovered	33%
Again?	18% - No

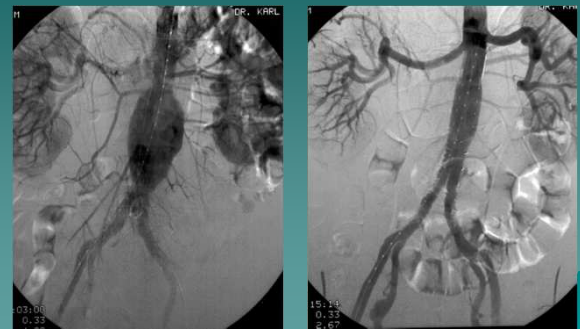
Williamson, et al – Portland, Oregon
J Vasc Surg 2001;33:913-20

Evolving Trend: Endovascular Graft

- ▼ The Endovascular graft is intended to exclude the aneurysm by placing the endovascular graft inside the diseased aorta to make a new path for the blood to flow.
- ▼ FDA approved for both Abdominal and Thoracic Aneurysms



Aneurysm Before & After Endografting



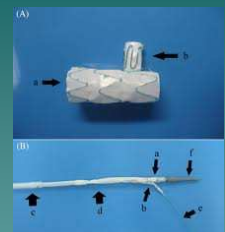
Fenestrated Endografts

- ▼ Holes in the fabric that are positioned adjacent to the aortic branch arteries
- ▼ Deploy smaller covered stents through the branched fenestrations and into the targeted arterial branches



Branched Endografts

- ▼ Pre-attached limbs or cuffs targeted for the aortic branches.
- ▼ Cuffs are deployed in the targeted branch

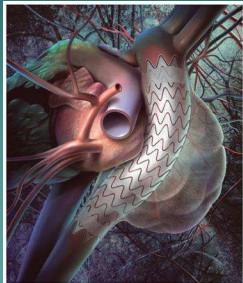


TAG Thoracic Endograft

TEVAR: Thoracic Endovascular Aneurysm Repair

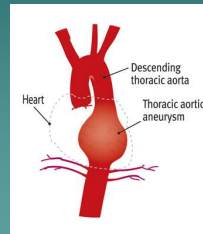
INDICATIONS:

Thoracic Aneurysms
Acute and Chronic Thoracic Dissection



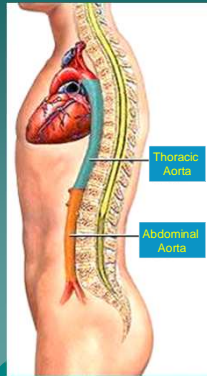
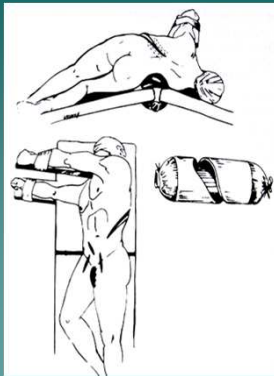
TEVAR

Thoracic
TAA



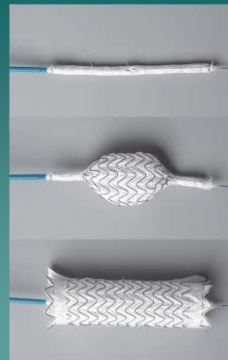
2003
Starting treating TAA
with endografts in
Peoria
2005
FDA approved

Morbidity of Open Repair

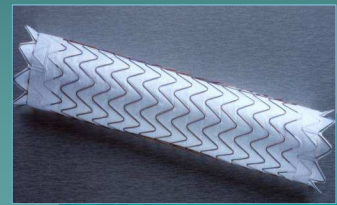


Gore TAG

*Deploys from the middle to the end
This prevents windsock
Windsock can move graft 3 – 5 cm*

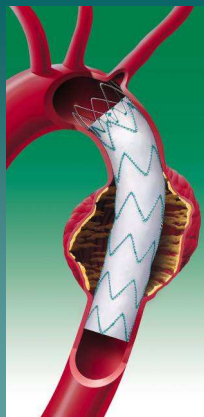


Approved by the FDA on March 23, 2005.



Medtronic Talent Stent Graft

Push pull method to open
Can migrate during cardiac
cycle while deploying.
Use Adenosine to stop heart
while deploying.
Deploys proximal to distal



Zenith[®] TX2[®] TAA ENDOVASCULAR GRAFT

Pro-Form[™]

Transcend: Control
Achieve unrivaled proximal conformity and apposition.



Definition of Hybrid

An offspring resulting from cross-breeding



Hybrid Open/Endovascular Aneurysm Repair

- Hybrid approach: combines standard operative approaches and endografts and/or conduit creation/de-branching
- De-branching: the transposition of the origin of critical branch vessels to facilitate a seal zone

Aortic Debranching Extra-anatomical Bypass



- Aortic Debranching: The transposition of the origin of the critical branch vessels to facilitate a seal zone.
- Aortic Debranching is used to provide blood flow around the arch arteries that become occluded when a TAG is placed in the ascending aorta.

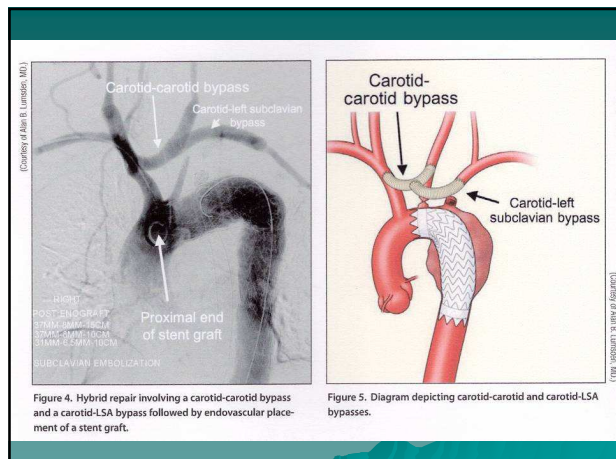
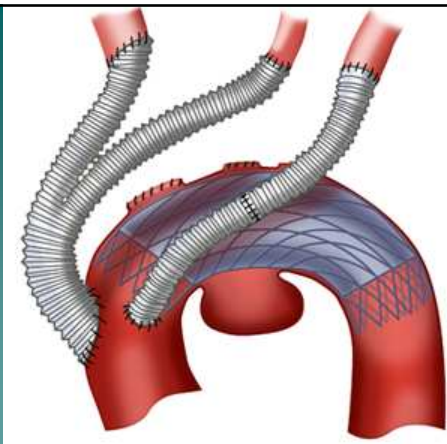


Figure 4. Hybrid repair involving a carotid-carotid bypass and a carotid-LSA bypass followed by endovascular placement of a stent graft.

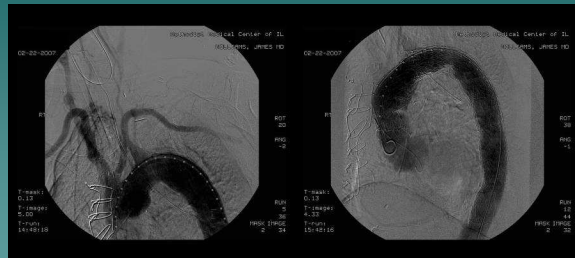
Figure 5. Diagram depicting carotid-carotid and carotid-LSA bypasses.



Photos courtesy of Dr James Bertram Williams

- A board-certified cardiothoracic and vascular surgeon Peoria, IL
- Principal investigator in a number of U.S. clinical device trials for endovascular devices.
- Endovascular Therapies Fellowship Training (ETFT) Program, a six-week visiting fellowship program www.etft.org

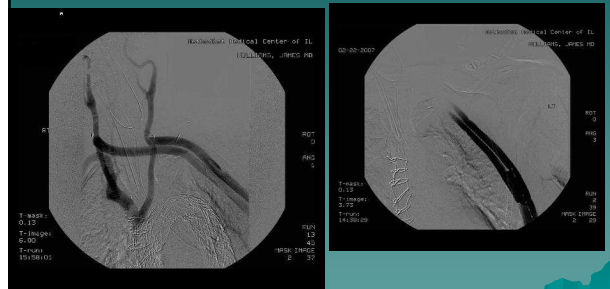
TAG inserted covering the subclavian artery.



Pre TAG

Post TAG

Aorto bi-carotid bypass:
Y graft to the left & right common carotids
and the infrarenal abdominal aorta



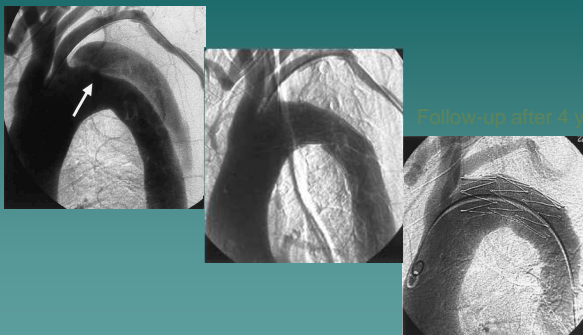
Aortic Banding

A 'hybrid' technique to create seal zones for treatment of aortic aneurysmal disease with endoluminal technology

Type A Dissection

- ▼ Immediate operating room intervention

Acute Type B dissection



Kato N, et al. J Vasc Surg 2003;38:1130-1

Dissection

- ▼ Goal is to have the true lumen reexpand and the false lumen to resolve
- ▼ Need to understand anatomy of the dissection to know what the true lumen vs false lumen is feeding
- ▼ Prefer to wait 8 - 9 days to treat as will have less complications

Complicated Type B Dissection

- ▼ If repair 3- 5 days after dissection→ significant re – dissection
- ▼ If wait longer than 9 days, then the true lumen may not re-expand
- ▼ Best to repair at 8 - 9 days to treat as will have less complications

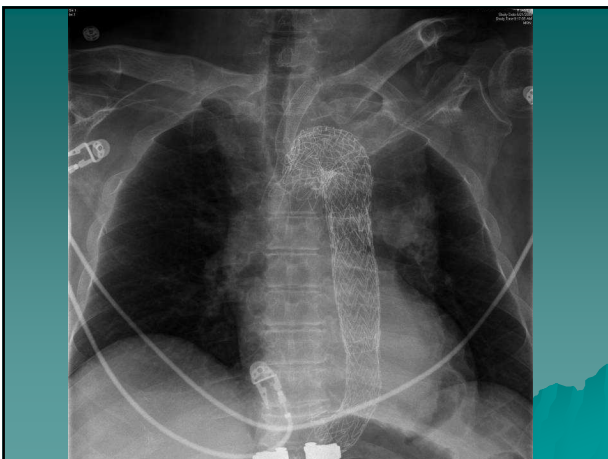
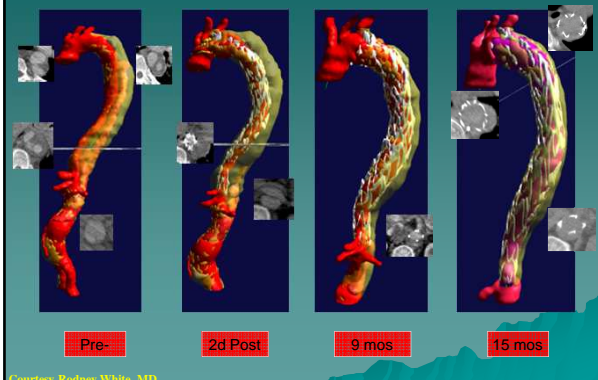
Acute, Uncomplicated Type B Dissections

- ▼ Medical management is currently the most appropriate treatment
- ▼ Acute < 14 days

Chronic Type B Dissections with False-lumen Aneurysm Formation

- ▼ No consensus from TEVAR roundtable (Oct 07) on ideal means of treating.
- ▼ Slight majority favored open vs TEVAR

Acute Type B Dissection



Nursing Care

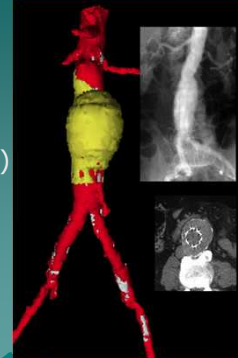
Preoperative Care

- ▼ Usually AM admit
- ▼ Hydrate with NS at 125 -150 ml/hour
- ▼ If Creatinine > 1.6 may give Mucomyst or Bicarbonate infusion (3 amps Bicarb/1000ml D5W at 3 ml/hr x 6 hours --- start 1 hour preop)
- ▼ Permit to include possible resection of aortic aneurysm
- ▼ Teaching

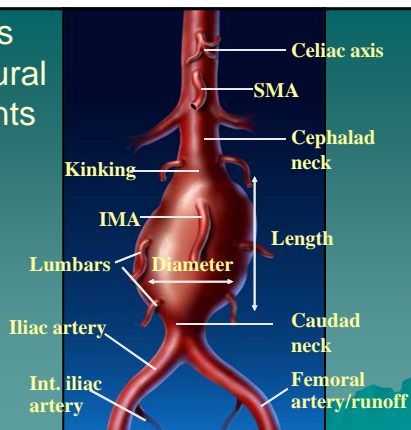
Preop Diagnostics

To measure length & diameter of the arteries

- ▼ Duplex scan
- ▼ CT (without contrast)
- ▼ Aortogram (with calibrated catheter)
- ▼ Spiral CT
- ▼ Intravascular ultrasound
- ▼ 3-D CT Reconstruction

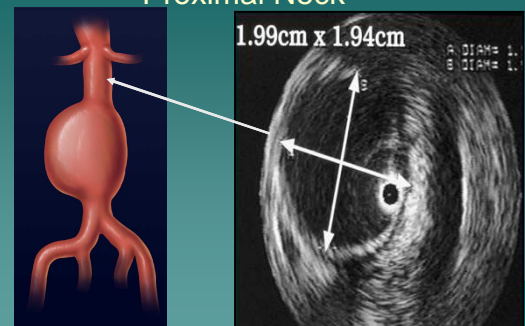


Numerous Pre-procedural Assessments



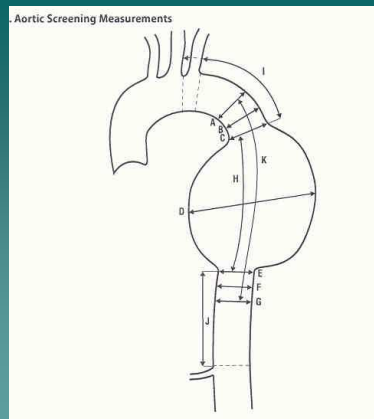
Intravascular Ultrasound

Proximal Neck



TAA

Pre-procedural Assessments



Postop Nursing Care

Management TAG/ELG vs Debranching

TAG & ELG

- Hourly neurovascular checks to extremities
- Immediate notification if decreased movement or sensation in legs-- may need to insert cerebral spinal catheter
- Lactate levels
- Pulmonary Toilet

TAG with debranching

- Volume resuscitate. Keep CVP high
- If hypotensive & hypovolemic, grafts can clot off
- Treat like a trauma or open abdominal surgery --- treat with hypotension with fluids not inotropes until tanked up.
- If Carotid arteries bypassed, hourly neuro checks

Postoperative Assessment, Complications & Care

- Endoleaks
- Extremity Ischemia
- Urinary Retention
- Renal Failure
- Bowel Ischemia
- Abdominal Compartment Syndroms
- Spinal Ischemia (TAA)
- Stroke
- Metabolic Acidosis
- Respiratory Complications

Endoleak

Aneurysm sac remains pressurized

Endoleak Significance

Endoleak = Endopressure \neq Protection

Endoleaks

Aneurysm sac remains pressurized

- Type I:
 - Attachment site of graft either proximally or distally does not seal in vessel due to undersizing or poor apposition to vessel wall-- Treat right away!
- Type II:
 - Native ilio lumbar vessels coming off the aneurysm sac remain patent. Non-emergent -- can be watched. Usually thrombosis after heparin is reversed or within a few months

Endoleaks

Aneurysm sac remains pressurized

- Type III:
 - Leaks between components of graft (rare)
- Type IV:
 - Hole in the fabric of the graft
- Type V:
 - Increase in endotension

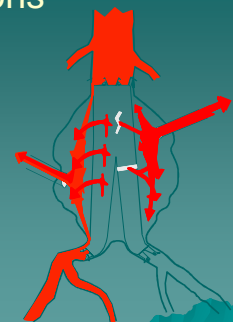
Perigraft Flow/Endoleak: Definitions*

Type I
Attachment leak

Type II
Branch flow

Type III
Defect in graft or modular disconnection

Type IV
Fabric porosity



* White et al., Endoleak Classification, Journal of Endovascular Surgery, 1998;5:305-309

Intraoperative Detection of Endoleak

- ▼ Current standard: Angiography
- ▼ Emerging technology:
 - Color flow IVUS
 - Intra-sac pressures

Post-operative Detection of Endoleak

- Assessment of aneurysm diameter & volume
- ▼ Abdominal four view xrays POD #1
 - ▼ CT with 3-D reconstruction
 - ▼ Duplex Scan
 - ▼ For severe endoleak = hemodynamic instability

Extremity Ischemia

- ▼ Due to thrombosis of graft or groin hematoma at insertion site
- ▼ Assess pedal pulses, *sensation*, color, and temperature of extremities every 15 minutes x 4 and then hourly.
- ▼ Assess for pain in the hip(s) or leg(s) during walking
- ▼ Ankle brachial indexes bilaterally POD #1

Urinary Retention

- ▼ Due to enlarged prostate
- ▼ Discontinue foley in OR or immediately upon admission to unit to prevent urinary retention

Renal Failure

- ▼ Due to occlusion of renal arteries by graft
- ▼ Due to atheroembolism
- ▼ Due to contrast induced nephropathy
 - 200 – 250 mg of contrast used per procedure case
 - HYDRATE preoperative

Pre existing Chronic Renal Failure & TEVAR

- ▼ Significant impact on:
 - Early and late death
 - Stroke
 - Paraplegia

Bowel Ischemia

- ▼ Mesenteric Artery ischemia
 - **Due to occlusion or hypoperfusion of mesenteric artery ischemia**
 - **Due to atheroembolism**
 - **Will do bypass if think graft may cover mesenteric artery**
- ▼ Paralytic ileus
 - **Gastric distention**
 - **Retroperitoneal bleeding**
 - **Mesenteric ischemia**
 - **Drugs (narcotics)**

Bowel Ischemia

- ▼ Assess for
 - Loose stool or diarrhea
 - Bright red blood per rectum, blood streak stool
 - Abdominal pain out of proportion to physical findings
- ▼ Decompress bowel with nasogastric tube and keep NPO

Mesenteric ischemia

- ▼ Early diagnosis and treatment are essential to lower mortality
- ▼ Mortality generally exceeds 50%
- ▼ When ischemia is prolonged, irreversible intestinal necrosis may occur within hours
- ▼ Emergency abdominal exploration is indicated if bowel necrosis is suspected

Intra-abdominal hypertension (IAH) and Abdominal Compartment Syndrome (ACS)

Signs of Intra-abdominal hypertension (IAH) and Abdominal Compartment Syndrome

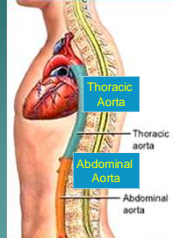
- | | |
|-----------------------------|------------------------|
| ▼ Cardiac | ▼ GI |
| • Low CO with ↑ CVP/PAD | • Nausea/vomiting |
| ▼ Renal | • Abdominal pain |
| • Low urine output | • Abdominal distension |
| ▼ Pulmonary | ▼ Neuro |
| • Dyspnea | • ↑ICP |
| • ↓ tidal volumes | • Anxiety |
| • ↑ intrathoracic pressures | • Confusion |
| | • Lethargy |

IAH and ACS

- ▼ In high risk patients, measure intra-abdominal pressure (IAP) via bladder pressure measurements
 - Get baseline
 - Measure every 2 – 6 hours
- ▼ IAH = IAP \geq 12 mmHg
- ▼ ACS = IAP > 20 mmHg and associated organ failure/dysfunction

Spinal Cord Ischemia (SCI)

- ▼ The spinal cord like the brain
 - No room for anything but the cord and CSF
 - And it is unyielding to increased spinal pressures
- ▼ Paralysis
 - Occurs in about 3 - 6% of all repairs of the descending thoracic aneurysm
 - Due to interference in the blood supply to the spinal cord
- ▼ May occur immediately postop or from 1 - 21 days



Spinal Cord Ischemia

- ▼ Ischemia to the cord
 - Leads to cord edema
 - Can cause the lumbar ICP to rise & impede normal flow of CSF within the spinal cana
- ▼ Thoracic or lumbar spinal cord damage causes paraplegia
- ▼ Similar to muscular 'compartment syndrome'

Spinal Cord Ischemia (SCI)

- ▼ The mechanisms leading to SCI:
 - The interruption of multiple branch vessels that provide spinal cord perfusion.
- ▼ Hypotension - MAP < 70 - 90
 - Periop &/or postop
 - Can be a precipitating factor causing SCI

At risk for permanent and transient paraplegia

- ▼ Complicated Type B dissection
- ▼ Hybrid aortic procedures
- ▼ Aortic transection
- ▼ Chronic renal failure
- ▼ Smoking

Prevention of Spinal Cord Ischemia

- ▼ Prevent Hypotension MAP < 70 - 90
 - Treat with fluids to keep CVP > 6

Treatment Spinal Cord Ischemia

- ▼ Drainage of the lumbar CSF can reduce the risk of cord damage when reducing pressure to < 7 - 10 mmHg
- ▼ Keep MAP > 90 - 99 mmHg

Lumbar Cerebral Spinal Fluid Drain

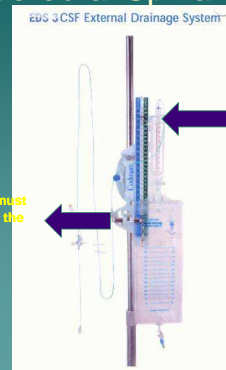
- Also called:
 - Lumbar drain, Lumbar subarchonoid catheter, intrathecal catheter, CSF drain**
- Placed in the Lumbar Subarachnoid space
- Use for those at high risk for paraplegia
 - Previous infrarenal repair**
 - Long segments of spinal cord**
 - Spinal pressure > 10 cm H₂O**



Lumbar Cerebral Spinal Fluid Drain

Purpose
Prevent
paraplegia

The "Zero" reference point must be positioned at the level of the catheter insertion site



Adjust drip chamber height until black level is at the proper drainage resistance. Frequently 10 cmH₂O

Lumbar CSF Drain Safety

- Place CSF transducer on opposite side of bed as hemodynamic pressure monitoring
- Must be a nonflush pressure system
- Turn drainage system off when getting patient up to chair
- Level after repositioning patient
- Remember to unclamp
- Aseptic technique is a must!

Spinal Ischemia Assessment

- Record CSF output hourly
- Notify MD if CSF drainage is > 20 – 30 ml/hr
- Note color of CSF
- Hourly spinal cord assessment for changes in sensation and/or movement

CSF Drainage

- Maintain CSF pressure 10 – 15 mmHg for the first 24 hours
- Then let rise to 15 mmHG
- If CSF pressure goes up above normal, blood flow to the spinal cord goes down, resulting in cord ischemia

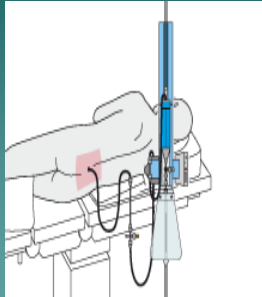
Complications of CSF Drain

- Infection
- Overdrainage
 - Subdural hematoma**
 - Herniation**
- Spinal cord hematoma
- Headache
- Pneumocranium (from air entering system)

Complication of CSF

Lumbar Drain Overdrainage

- ▼ Low pressure headache
- ▼ Radiculopathy
- ▼ Pneumocephalus
- ▼ **Sagging Brain / intracranial hypotension**
- ▼ Hemorrhage
- ▼ Subdural, intradural Hematoma
- ▼ Cranial nerve palsies
- ▼ Tension Pneumocephalus
- ▼ Brainstem herniation



Post removal of Lumbar drain

- ▼ Cap 24 hours prior to removal
- ▼ Assess for lower extremity weakness or loss of sensation
- ▼ SCI can occur up to 30 days post op.
- ▼ Teach patients to come to ED immediately for aggressive treatment if they notice any change, numbness, or weakness in their legs.

Stroke

- ▼ 4- 7% risk
- ▼ Routine neuro checks

Respiratory Complications

- ▼ Due to general anesthesia and smoking
 - Incentive Spirometry every 1- 2 hours while awake
 - Aggressive Activity
 - ♦ **HOB 30°**
 - ♦ **Chair when stable**
 - ♦ **Ambulate 200' evening of surgery**
 - ♦ **Then Ambulate 4- 6 times per day**
- ▼ Left Pleural Effusion
 - Something may be bleeding

Admission ABGs

What would you do?

	Patient A	Patient B
ph	7.29	7.33
pCO ₂	60	41
pO ₂	132	100
TCO ₂	31	22
O ₂ %	98	98
BE	-1	-6

Type A Lactic Acidosis

Ongoing Metabolic Acidosis means something is not being perfused

- ▼ Serum lactate levels used to assess the acid-base state and adequacy of tissue perfusion
- ▼ By product of anaerobic metabolism if tissue hypoxia exists

The Value of Lactate

Serial lactate levels predictor of perfusion

- Normal <2.5mmol/L
- Mild acidosis 2.5-4.9mmol/L (mortality 25-35%)
- Moderate acidosis 5.0-9.9mmol/L (mortality 60-75%)
- Severe acidosis > 10mmol/L (mortality > 95%)

Shoemaker, WC et al. Textbook of critical care. 1995, WB Saunders

Serum Lactate levels

- ▼ Serum Lactate levels every 4 hours x 24 hours
- ▼ Level will be around 4 – 5mmol/L on admission
- ▼ Lactate levels need to decrease
- ▼ May be the first indication that something is wrong

Discharge

- ▼ Abdominal – POD #1 from CVICU
- ▼ Thoracic -- POD #2 or 3
- ▼ Teaching
- ▼ 10 days post procedure the patient should be back to normal activities
- ▼ MRI conditional up to 3 Tesla

Follow-up

- ▼ CT scan at 1, 2, 6, and 12 months and then annually to assess for aortic growth
- ▼ Teaching
 - Avoidance of exertional activities
 - ♦ Betablockers blunt pressure spikes
 - Avoidance of extreme emotional upsets

Specific Lifestyle Recommendations

- ▼ Avoidance of strenuous lifting, pushing or straining that would cause Valsalva maneuver. Class IIa B
 - When the Valsalva maneuver is used for the lifting of heavy weights, there is a superimposed increase in intrathoracic pressure, followed by an often dramatic increase in systemic arterial pressure, with systolic pressures reaching 300 mmHg or more

Functional Outcome after Open Repair of Abdominal Aortic Aneurysm

Operative Mortality	4% (154 pts.)
Mean LOS	10.7 days
ICU LOS	4.6 days
Ambulatory Post-op	64% (25 mos.)
Decreased Functionality	33%
Time to Recovery	3.9 mos.
Unrecovered	33%
Again?	18% - No

Williamson, et al – Portland, Oregon
J Vasc Surg 2001;33:913-20

EVAR for AAA > 5 cm

- Reduces 30 day aneurysm related mortality
- Lower length of stay
- Surgical benefits from less morbid procedure
- Long term benefits are less clear
 - Continued surveillance
 - Increased re-intervention rates

Source: Methodist DeBakey Cardiovascular Journal, July- Sept 2011;7(3) 11.

TEVAR Reintervention

- 3.6 – 22%
 - From endoleaks
 - Progression of the aortic pathology

CONTROLLED ENDOVASCULAR STENT GRAFT TRIALS

- 2005 TAG Pivotal Trial (N=139)
- 2008 TX2 Pivotal Trial (N=160)
- 2008 Talent Pivotal Trial (N=195)

TRIAL NAME	STARZ-TX2		TAG		VALOR (Talent)	
Arm	Endo	Open	Endo	Open	Endo	Open
Procedure time	114 min	244 min	150 min	N/A	154 min	303.3 min
Blood loss	216 ml	2,538 ml	471 ml	2,402 ml	371 ml	3,055 ml
ICU stay	2.2 days	9.4 days	2.7 days	5.2 days	1.95 days	7.7 days
Hospital discharge	5.0 days	16.1 days	7.4 days	14.4 days	6.4 days	16.7 days
Stroke	2.5%	8.6%	4%	4.3%	3.6%	N/A
Paraplegia	1.3%	5.7%	3%	14%	1%	.5%
One-year mortality	5.8%	11.8%	4.0%	8.0%	3.1%	11.6%

THANK YOU!

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