

Aortic Guidelines Update

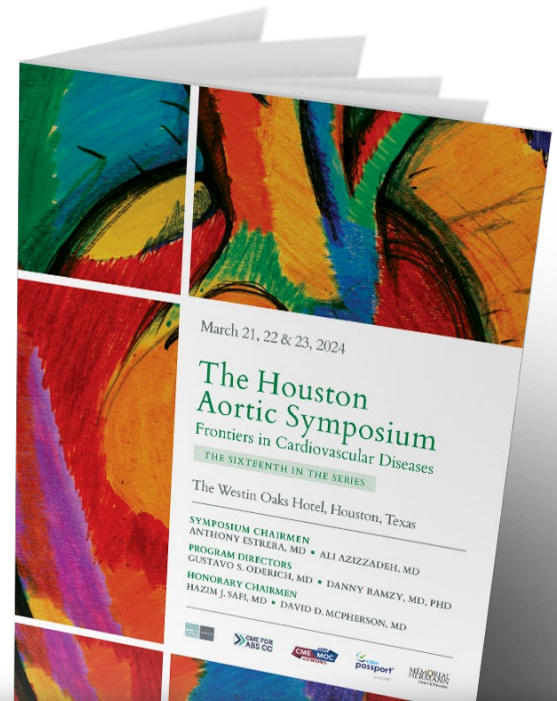
2022 ACC/AHH guidelines for the
Diagnosis and Management of Aortic
disease

Lisa DeGarmo, MSN, APRN, ACNP -BC
Cardiothoracic Nurse Practitioner

Department of Cardiothoracic and Vascular Surgery
McGovern Medical School at UTHealth
Houston, Texas / USA

Department of
**Cardiothoracic &
Vascular Surgery**


UTHealth Houston
McGovern Medical School



6th Annual

Houston Aortic Nursing Symposium

March 20, 2024 • 12:00 - 5:00 PM

2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines

Eric M. Isselbacher, MD, MSc, FACC, Ourania Preventza, MD, MBA, James Hamilton Black III, MD, DFSVS, John G. Augoustides, MD, FAHA, Adam W. Beck, MD, DFSVS, Michael A. Bolen, MD, Alan C. Braverman, MD, FACC, Bruce E. Bray, MD, FACC, Maya M. Brown-Zimmerman, MPH, Edward P. Chen, MD, FAHA, Tyrone J. Collins, MD, MSCAI, FACC, FAHA, FSVM, Abe DeAnda Jr, MD, FAHA, Christina L. Fanola, MD, MSc, Leonard N. Girardi, MD, FAHA, Caitlin W. Hicks, MD, MS, FSVS, Dawn S. Hui, MD, William Schuyler Jones, MD, FACC, Vidyasagar Kalahasti, MD, FACC, Karen M. Kim, MD, MS, Dianna M. Milewicz, MD, PhD, Gustavo S. Oderich, MD, Laura Ogbechie, MSN, Susan B. Promes, MD, MBA, Elsie Gyang Ross, MD, MSc, Marc L. Schermerhorn, MD, DFSVS, Sabrina Singleton Times, DHSc, MPH, Elaine E. Tseng, MD, FAHA, Grace J. Wang, MD, MSCE, and Y. Joseph Woo, MD, FACC, FAHA

TOP 10 TAKE HOME MESSAGES FOR DIAGNOSIS AND MANAGEMENT OF AORTIC DISEASE



1. Multidisciplinary Aortic Team (MAT) Care is considered in determining the appropriate timing of intervention



2. Shared decision making with MAT is highly encouraged for optimal medical, endovascular, and open surgical therapies (especially in considering pregnancy/pregnant)



3. CT, MRI, & echo imaging of patients with aortic disease should follow recommendations for imaging, measurement and reporting of aortic dimensions and frequency of surveillance before and after intervention

TOP 10 TAKE HOME MESSAGES FOR DIAGNOSIS AND MANAGEMENT OF AORTIC DISEASE



4. At centers with MAT and experienced surgeons, threshold for surgical intervention for aortic root and ascending aneurysm has been lowered from 5.5cm to 5 cm. (lower among patients with heritable aortic disease)



5. Smaller/Taller pts surgical thresholds incorporate aortic root or ascending aortic diameter to BSA or height



6. Intervention for Rapid aortic root growth or ascending aortic aneurysm is defined as $\geq 0.5\text{cm}$ in 1 yr or $\geq 0.3\text{cm}$ per yr in 2 consecutive yrs.

TOP 10 TAKE HOME MESSAGES FOR DIAGNOSIS AND MANAGEMENT OF AORTIC DISEASE

7. In patients undergoing aortic root replacement surgery, valve-sparing aortic root replacement is reasonable

8. Patients with acute type A aortic dissection, if clinically stable, should be considered for transfer to a high-volume aortic center to improve survival.

9. Increasing role for TEVAR in the management of uncomplicated type B aortic dissection. Clinical trials of repair of TAA with endografts are reporting results that suggest endovascular repair is an option for patients with suitable anatomy.

10. In patients with aneurysms of the aortic root or ascending aorta, or those with aortic dissection, screening of first-degree relatives with aortic imaging is recommended.

Overview

- | | |
|---|---|
| <ul style="list-style-type: none">• Imaging and Measurements• Multidisciplinary Aortic Teams• Shared Decision Making• Aneurysm<ul style="list-style-type: none">• TAA/HTAD/Surgical recommendations• BAV• AAA• Medications recommendations• DTAA | <ul style="list-style-type: none">• Acute Aortic Syndromes<ul style="list-style-type: none">• Presentations• Surgical vs Endovascular Medical Management• Acute Type A dissections• Acute Type B dissections• Aortic Intramural Hematoma (IMH)• Penetrating Aortic Ulcer (PAU)• Traumatic Aortic Injury (TAI)• Pregnancy in Patients with Aortopathy• Other Aortic Conditions• Physical Activity and Quality of Life |
|---|---|

Applying American College of Cardiology/American Heart Association Class of Recommendation and Level of Evidence to Clinical Strategies, Interventions, Treatments, or Diagnostic Testing in Patient Care* (Updated May 2019)

Table 2. Applying American College of Cardiology/American Heart Association Class of Recommendation and Level of Evidence to Clinical Strategies, Interventions, Treatments, or Diagnostic Testing in Patient Care* (Updated May 2019) (Table view)

CLASS (STRENGTH) OF RECOMMENDATION	LEVEL (QUALITY) OF EVIDENCE†
CLASS 1 (STRONG) Benefit >>> Risk Suggested phrases for writing recommendations: <ul style="list-style-type: none"> Is recommended Is indicated/useful/effective/beneficial Should be performed/administered/other Comparative-Effectiveness Phrases‡: <ul style="list-style-type: none"> Treatment/strategy A is recommended/indicated in preference to treatment B Treatment A should be chosen over treatment B 	LEVEL A <ul style="list-style-type: none"> High-quality evidence‡ from more than 1 RCT Meta-analyses of high-quality RCTs One or more RCTs corroborated by high-quality registry studies
CLASS 2a (MODERATE) Benefit >> Risk Suggested phrases for writing recommendations: <ul style="list-style-type: none"> Is reasonable Can be useful/effective/beneficial Comparative-Effectiveness Phrases‡: <ul style="list-style-type: none"> Treatment/strategy A is probably recommended/indicated in preference to treatment B It is reasonable to choose treatment A over treatment B 	LEVEL B-R (Randomized) <ul style="list-style-type: none"> Moderate-quality evidence‡ from 1 or more RCTs Meta-analyses of moderate-quality RCTs
CLASS 2b (WEAK) Benefit ≥ Risk Suggested phrases for writing recommendations: <ul style="list-style-type: none"> May/might be reasonable May/might be considered Usefulness/effectiveness is unknown/unclear/uncertain or not well-established 	LEVEL B-NR (Nonrandomized) <ul style="list-style-type: none"> Moderate-quality evidence‡ from 1 or more well-designed, well-executed nonrandomized studies, observational studies, or registry studies Meta-analyses of such studies
CLASS 3: No Benefit (MODERATE) Benefit = Risk (Generally, LOE A or B use only) Suggested phrases for writing recommendations: <ul style="list-style-type: none"> Is not recommended Is not indicated/useful/effective/beneficial Should not be performed/administered/other 	LEVEL C-LD (Limited Data) <ul style="list-style-type: none"> Randomized or nonrandomized observational or registry studies with limitations of design or execution Meta-analyses of such studies Physiological or mechanistic studies in human subjects
Class 3: Harm (STRONG) Risk > Benefit Suggested phrases for writing recommendations: <ul style="list-style-type: none"> Potentially harmful 	LEVEL C-EO (Expert Opinion) <ul style="list-style-type: none"> Consensus of expert opinion based on clinical experience

COR and LOE are determined independently (any COR may be paired with any LOE).
 A recommendation with LOE C does not imply that the recommendation is weak. Many important clinical questions addressed in guidelines do not lend themselves to clinical trials. Although RCTs are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.
 * The outcome or result of the intervention should be specified (an improved clinical outcome or increased diagnostic accuracy or incremental prognostic information).
 † For comparative-effectiveness recommendations (COR 1 and 2a; LOE A and B only), studies that support the use of comparator verbs should involve direct comparisons of the treatments or strategies being evaluated.
 ‡ The method of assessing quality is evolving, including the application of standardized, widely-used, and preferably validated evidence grading tools; and for

Imaging and Measurements

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

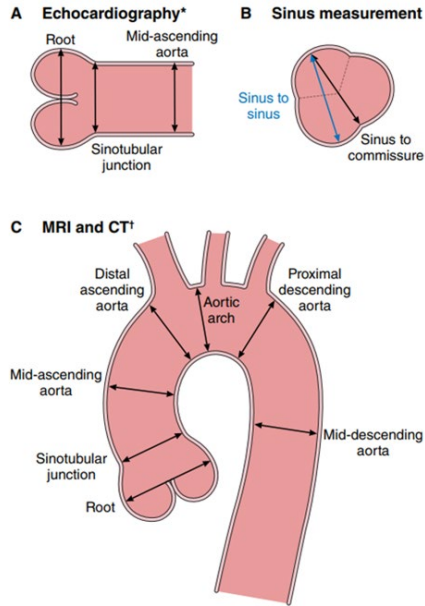
COR	Recommendation
1 B-NR	1. Aortic diameters should be measured at reproducible landmarks perpendicular to the axis of blood flow. Reported in clear and consistent manner
1 C-LD	2. In patients with known/suspected aortic, episodic and cumulative radiation be kept low as feasible to maintain diagnostic quality.
1 C-EO	3. CT/MRI imaging, recommended that the root and ascending aortic diameter be measured inner-edge to inner-edge . If aortic wall abnormalities (atherosclerosis, wall thickening) report outer-edge to outer edge.
1 C-EO	4. The aortic root diameter should be recorded as maximum sinus to sinus measurement

Imaging and Measurements

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

COR	Recommendation
2A C-LD	5. In patients with known or suspected aortic disease , it is reasonable that a dilated root or ascending aorta be indexed to patient height or BSA in the report , to aid in clinical risk assessment
2A C-EO	6. In patients with known or suspected aortic disease, when performing echocardiography, it is reasonable to measure the aorta from leading-edge to leading-edge, perpendicular to the axis of blood flow . Using inner-edge to inner-edge measurements may also be considered, particularly on short-axis imaging.

Imaging and Measurements



Essential Elements of CT/MRI Imaging Reports

1. Maximum aortic diameter at each level of dilation, perpendicular to the axis of blood flow.
2. Wall changes suggestive of atherosclerosis, diffuse thickening (eg, aortitis), or mural thrombus.
3. Evidence of luminal stenosis/occlusion, including location, severity, and length.
4. Findings suggestive of acute aortic syndrome (dissection, IMH, PAU, focal intimal tear, suspected entry tear site) and complications (active contrast extravasation, rupture, contained rupture, rupture including periaortic hemorrhage, pericardial and pleural fluid, mediastinal stranding).

Essential Elements of CT/MRI Imaging Reports

5. Extension of aortic disease process (acute or chronic) into branch vessels, findings suggestive of end-organ injury, and suspected malperfusion.

6. Direct comparison with previous examinations should be detailed

7. Presence and extent of repair (eg, interposition graft, endovascular stent graft), as well as any evidence of complication.

8. Impression regarding disease classification (eg, acute aortic syndrome, aneurysm/pseudoaneurysm, luminal stenosis, atherosclerotic aortic disease).

9. Relevant details regarding method of image acquisition and measurement should be included.

Multidisciplinary Aortic Team

COR LOE	Recommendations
1 C-EO	For patients with acute aortic disease requiring urgent surgical repair, a multidisciplinary team, should determine the most suitable intervention
2a C-LD	For patients who are asymptomatic with extensive aortic disease, or who may benefit from complex open or endovascular repairs, or with multiple co-morbidities, referral to a high-volume center (performing 30-40 aortic cases yearly) with a Multidisciplinary Aortic Team is reasonable to optimize outcomes

Shared decision Making

COR LOE	Recommendations
1 C-LD	Pt with aortic disease, shared decision making is recommended when determining the appropriate threshold for intervention, surgical repair, surgical approach (open vs endovascular), medical management and surveillance.
1 C-EO	In patients with Aortic disease who are contemplating pregnancy or who are pregnant, shared decision making is recommended when considering the CV risk of pregnancy, the diameter thresholds for prophylactic aortic surgery and the mode of delivery

Aneurysms



TAA Causes



AAA Causes RF and screening



Medical Management of Sporadic and Degenerative AAD



Surgical and endovascular
Management of Aortic Aneurysm

Aneurysms: TAA Causes



Heritable Thoracic Aortic
Disease (HTAD)

Marfan's, Loeys-Dietz, Vascular
Ehlers-Danlos, etc



Congenital Conditions

(Bicuspid AV, Turner syndrome,
Coarctation of the aorta, TOF)



Hypertension



Atherosclerosis



Degenerative



Previous Aortic dissection

Aneurysms: TAA Causes

Inflammatory Aortitis

- (Giant Cell Aortitis, Takayasu Aortitis, Behcets, etc)

Infectious Aortitis

- (Bacterial, fungal, syphilitic)

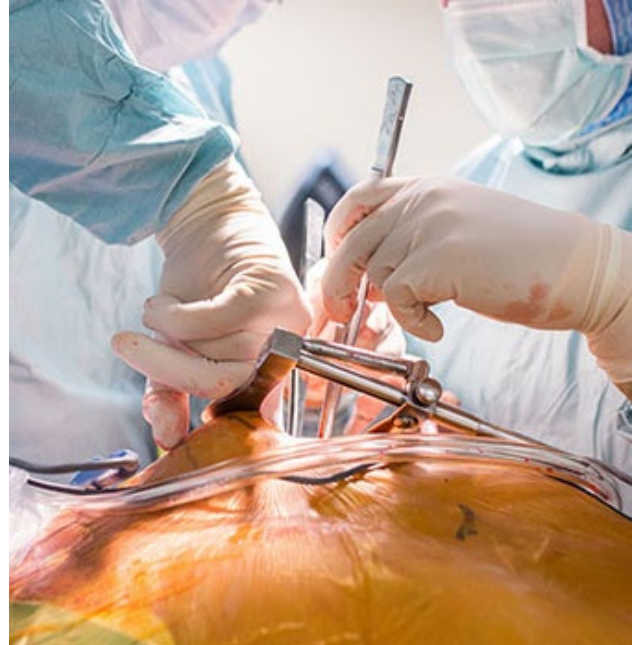
Previous Traumatic Aortic Injury

Aneurysm: Screening and surgical recommendations

Nonsyndromic heritable thoracic aortic disease (nsHTAD)

Pts with nsHTAD and no identifiable genetic cause, repair of aorta is recommended when diameter is >5.0 in absence of high-risk features or >4.5 cm in presence of high-risk factors

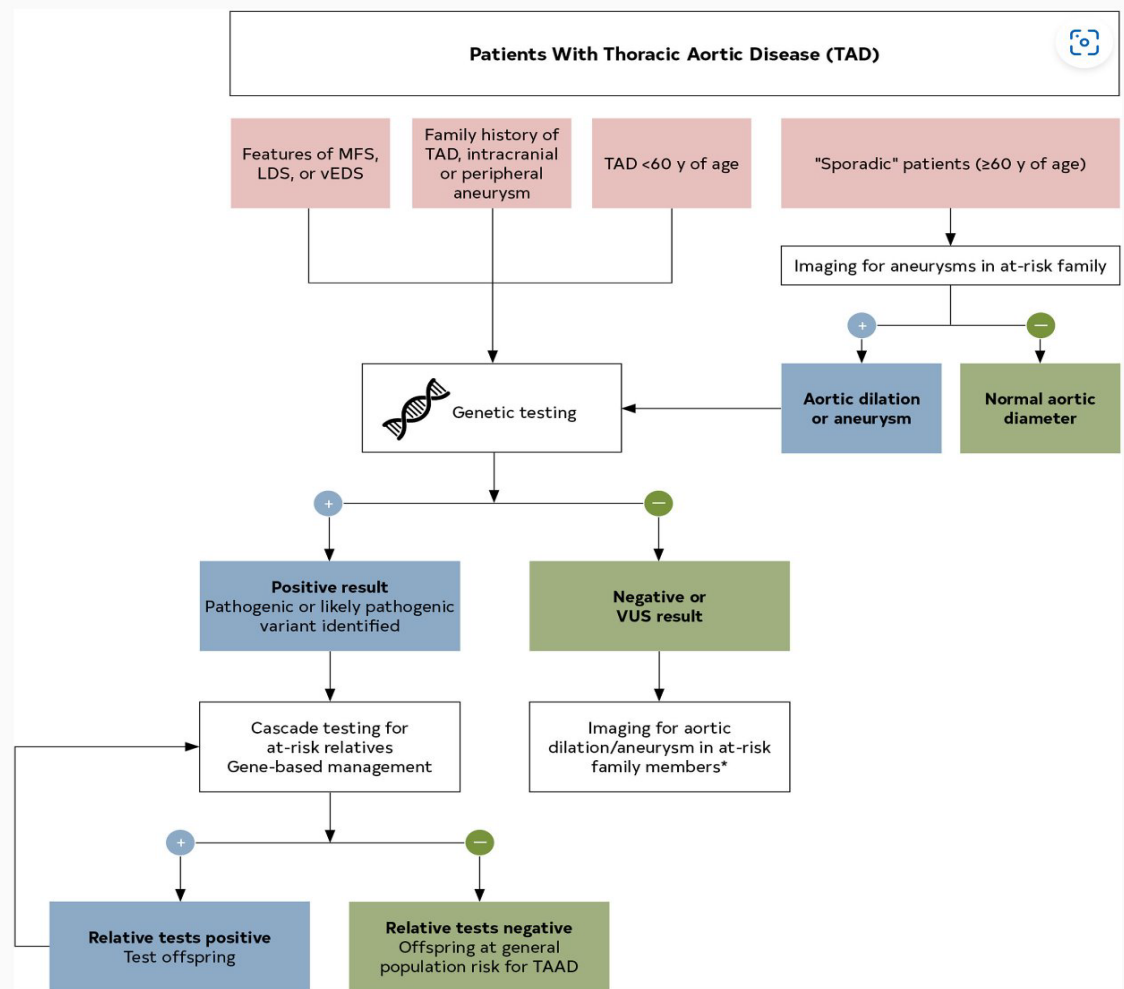
(family history of dissection at aortic diameter < 5.0 cm or unexplained death < 50 y/o)



Aneurysms: Risk Factors and Screening

- Class I recommendations for screening in HTAD
 - Genetic Testing and Screening Family members for Thoracic Aortic Disease (TAD)
- Risk Factors for Familial TAD
 - TAD and syndromic features of MS, LDS, EDS
 - TAD presenting at <60 yrs of age
 - History of TAD or peripheral/intercranial aneurysms in 1st/2nd degree relative
 - History of unexplained death at a young age in 1st/2nd degree relative

Aneurysms: Risk Factors and Screening



Aneurysm: Marfan's Syndrome



TTE is recommended at the time of initial diagnosis, to determine the diameters of the aortic root and ascending aorta, and **6 months thereafter**, to determine the rate of aortic growth; if the aortic diameters are stable, an annual surveillance TTE is recommended. (I, C-EO)



In patients with Marfan syndrome, treatment with either a **beta blocker** or an **ARB**, in maximally tolerated doses (unless contraindicated), is recommended to reduce the rate of aortic dilation. (I A)

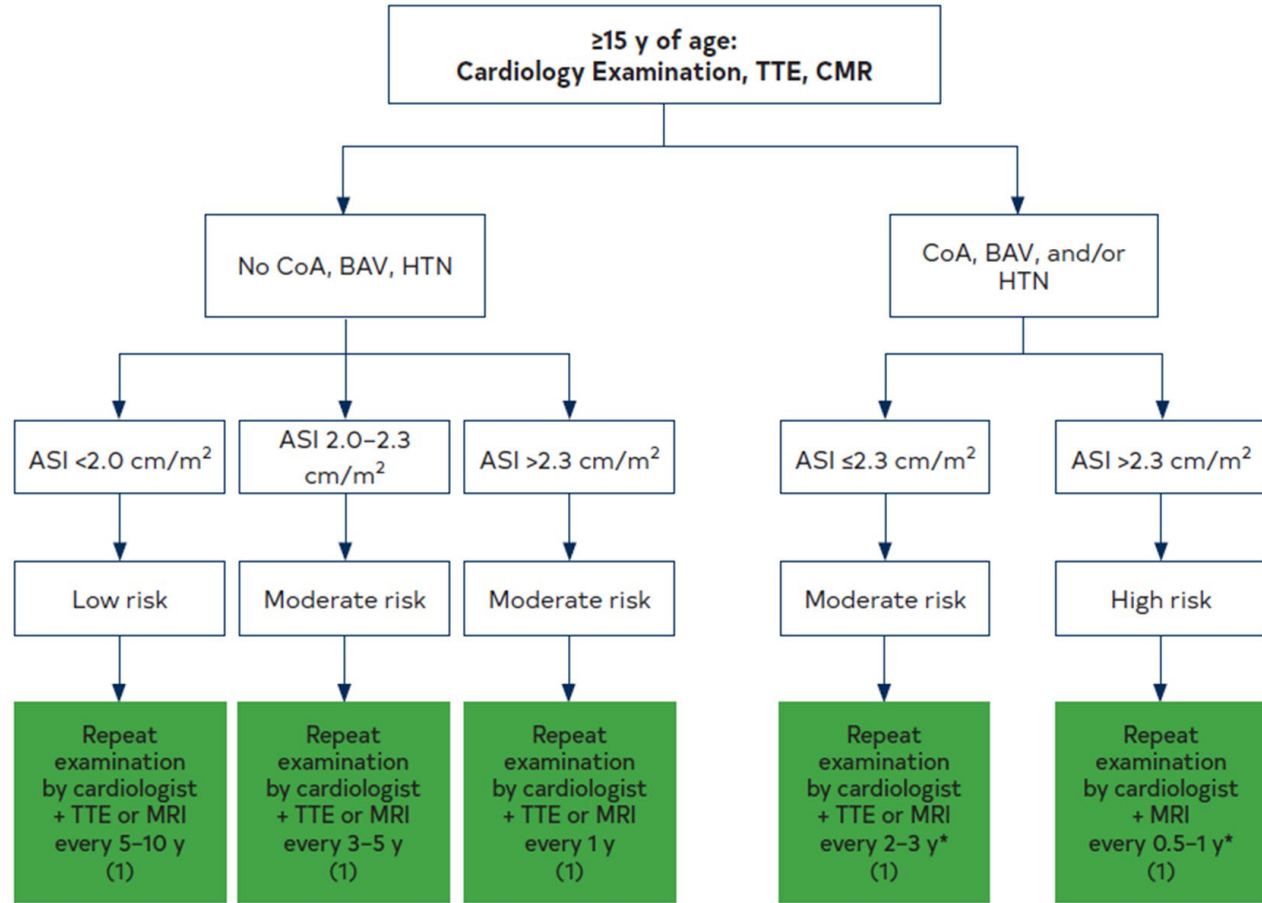


Surgery to replace aortic root and ascending aorta is recommended with an **aortic root diameter ≥ 5.0 cm**; reasonable with either an aortic root diameter **≥ 4.5 cm plus high-risk features** or with a cross-sectional aortic root area to **patient height ratio ≥ 10 cm²/m**.

Aneurysm: Loey's -Dietz Syndrome

1 C-LD	<p>1. In patients with Loey's-Dietz syndrome and aortic dilation, the surgical threshold for prophylactic aortic root and ascending aortic replacement should be informed by the specific genetic variant, aortic diameter, aortic growth rate, extra-aortic features, family history, patient age and sex, and physician and patient preferences (see Table 11).</p>
2b C-EO	<p>2. In patients with Loey's-Dietz syndrome attributable to a pathogenic variant in TGFBR1, TGFBR2, or SMAD3, surgery to replace the intact aortic arch, descending aorta, or abdominal aorta at a diameter of ≥ 4.5 cm may be considered, with the specific genetic variant, patient age, aortic growth rate, family history, presence of high-risk features (see Table 11), and surgical risk informing the decision.</p>

Aneurysms: Turner Syndrome



Surgical Approach in Sporadic Aneurysms of the Aortic Root and AAA for Patients Meeting Surgery Criteria

COR	Recommendation
1	In patients with an aneurysm of the ascending aorta who meet criteria for surgery, aneurysm resection with an interposition graft should be performed.
1	In patients undergoing aortic valve repair or replacement with a concomitant ascending aortic aneurysm, a separate aortic valve intervention and ascending aortic graft is recommended.
1	In patients undergoing aortic root replacement with an aortic valve that is not suitable for sparing or repair, a mechanical or biological valved conduit aortic root replacement is indicated.
2a	In patients undergoing aortic root replacement, valve-sparing aortic root replacement is reasonable if the aortic valve is suitable for sparing or repair and when performed by experienced surgeons in a Multidisciplinary Aortic Team.

Aneurysm: Bicuspid Aortic Valve

COR	Recommendations
1 B-NR	1. In patients with a BAV, TTE is indicated to evaluate valve morphology and function, to evaluate the diameter of the aortic root and ascending aorta , and to evaluate for aortic coarctation and other associated cardiovascular defects.
1 C-LD	2. In patients with a BAV, CT or MRI of the thoracic aorta is indicated when the diameter and morphology of the aortic root, ascending aorta, or both cannot be assessed accurately or completely by TTE .

Aneurysm: Bicuspid Aortic Valve

I	C-LD	3. In patients with a BAV and either HTAD or phenotypic features concerning for Loeys-Dietz syndrome, a medical genetics evaluation is recommended.
I	C-LD	4. In patients with a BAV and a dilated aortic root or ascending aorta, screening of all first-degree relatives by TTE is recommended to evaluate for the presence of a BAV, dilation of the aortic root and ascending aorta, or both; if the diameter and morphology of the aortic root, ascending aorta, or both cannot be assessed accurately or completely by TTE, a cardiac-gated CT or MRI of the thoracic aorta is indicated.
2a	B-NR	5. In patients with a BAV, screening of all first-degree relatives by TTE is reasonable to evaluate for the presence of a BAV, dilation of the aortic root and ascending aorta, or both.

Surgical intervention thresholds for aortic root & ascending aorta in patients with...

Sporadic and BAV aneurysms*:

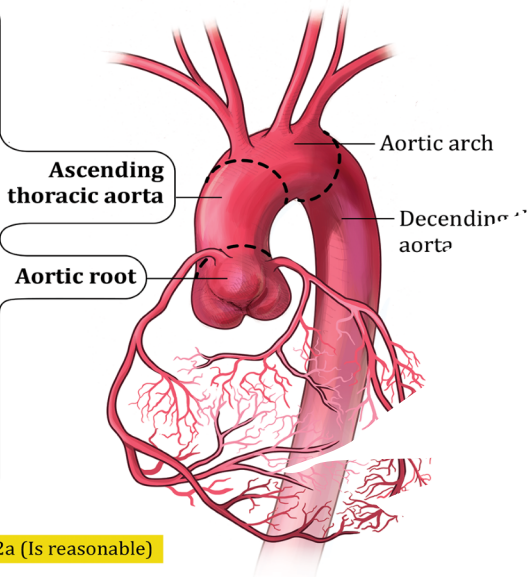
5.5 cm (COR 1)

5.0 cm by experienced surgeons in a Multidisciplinary Aortic Team (COR 2a)

Marfan syndrome#:

5.0 cm (COR 1)

≥4.5 cm in those with an increased risk of aortic dissection when performed by experienced surgeons in a Multidisciplinary Aortic Team (COR 2a)



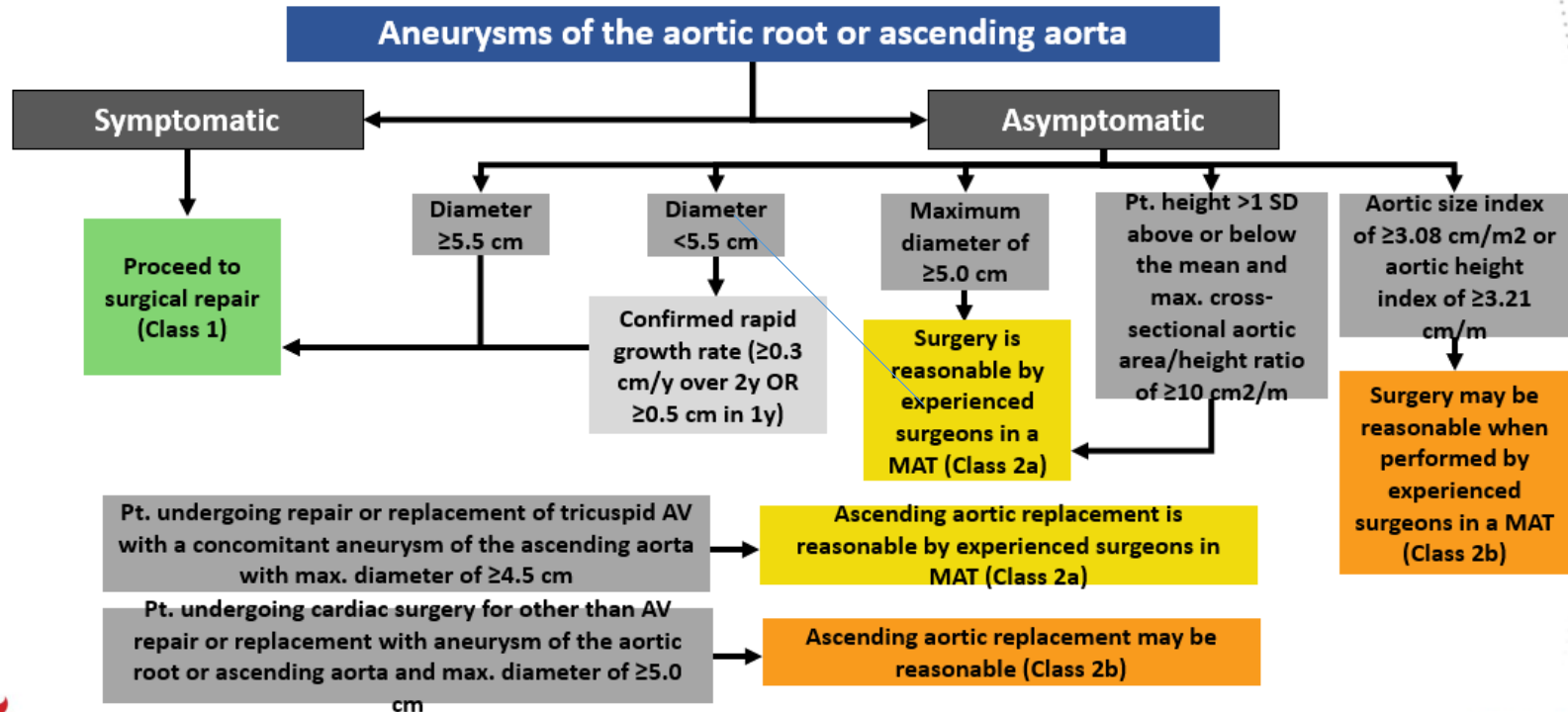
Surgical thresholds for aortic patients with Sporadic Aneurysm and BAV

COR 1 (Is recommended) COR 2a (Is reasonable)

*Surgical thresholds may be adjusted based on patient genetics, rapid aortic growth, cross-sectional aortic area/height ratio $\geq 10 \text{ cm}^2/\text{m}$, aortic size index of $\geq 3.08 \text{ cm}$ or index of $\geq 3.21 \text{ cm}/\text{m}$.

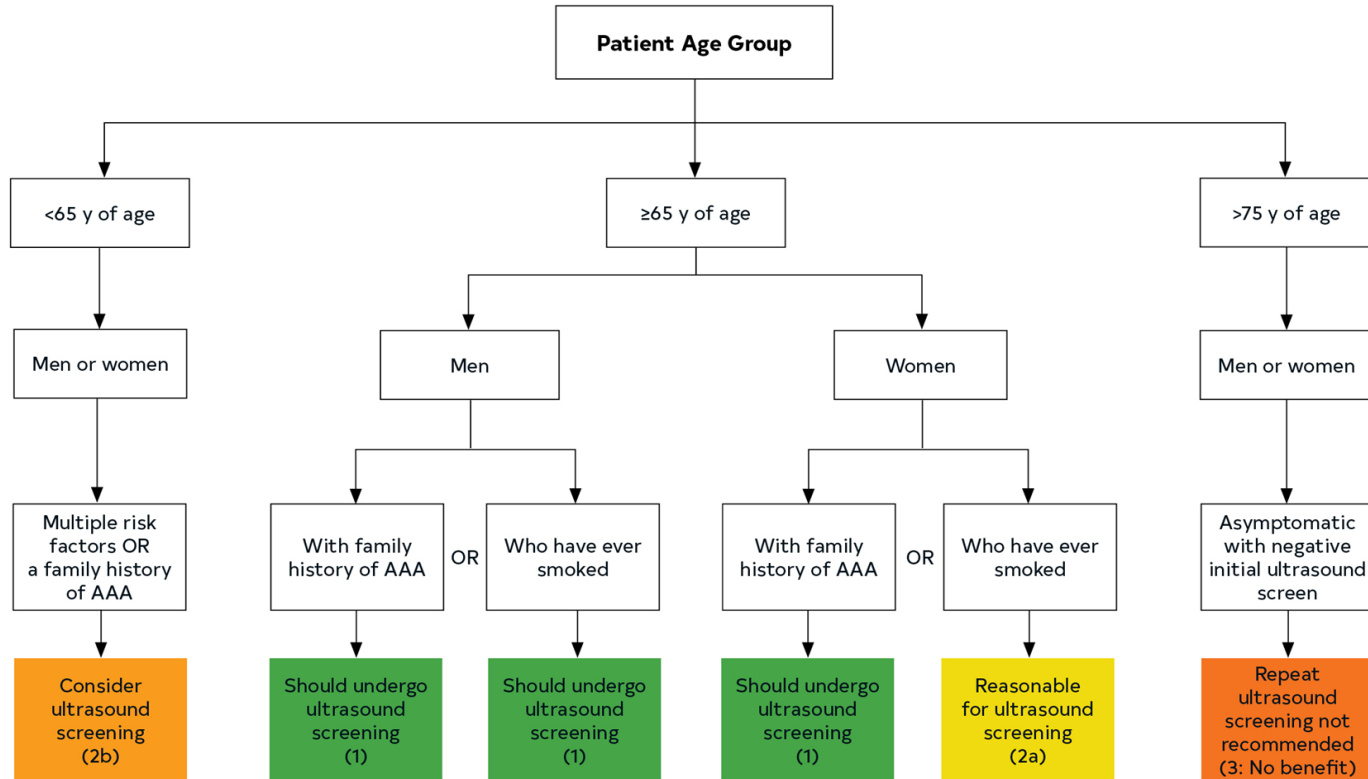
#For more on rapid aortic growth rate and patients with nonsyndromic aortic aneurysms or with genetic aortopathies other than Marfan syndrome, please see the 2022 ACC/AHA Guideline for the Diagnosis & Management of Aortic Disease.

Recommendations for Surgery for Sporadic Aneurysms of the Aortic Root and Ascending Aorta



Abbreviations: AV indicates aortic valve; cm, centimeter; CT, computed tomography; y, year; MAT, multidisciplinary aortic team; max, maximal; pt, patient; SD, standard deviation; and y, year.

Aneurysms: AAA recommendations



AAA: Surveillance

- Surveillance:
 - Every 3 years in AAA diameter 3.0-3.9 cm
 - Annually in men 4.0-4.9 cm ; women 4.0-4.4 cm
 - Every 6 months in men >5.0 cm ; women >4.5 cm



AAA: Medication recommendation

- Moderate or high -intensity **statin therapy** is recommended in patients with AAA and evidence of aortic atherosclerosis.
- **Low dose ASA** may be considered in patients with AAA and concomitant atheroma or PAU

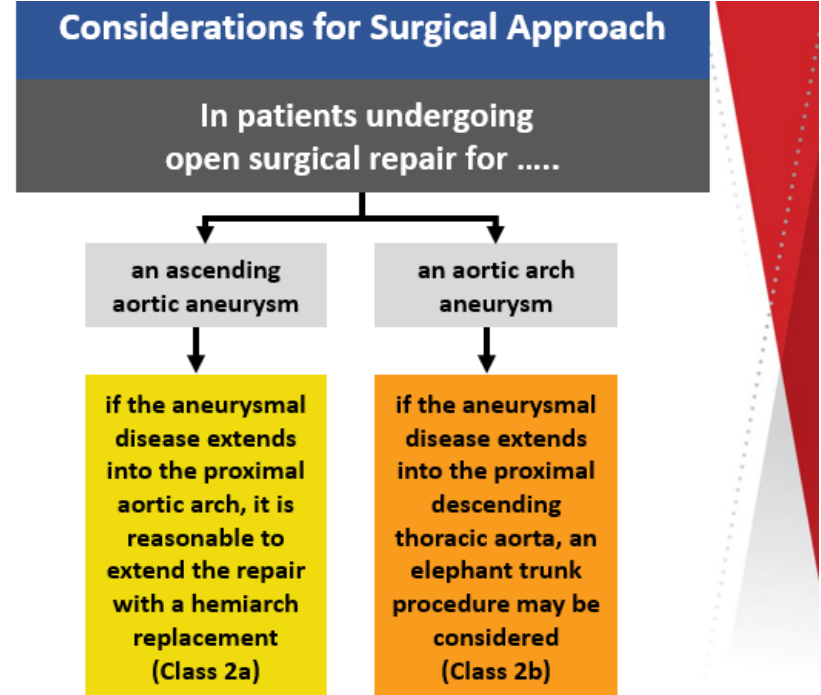
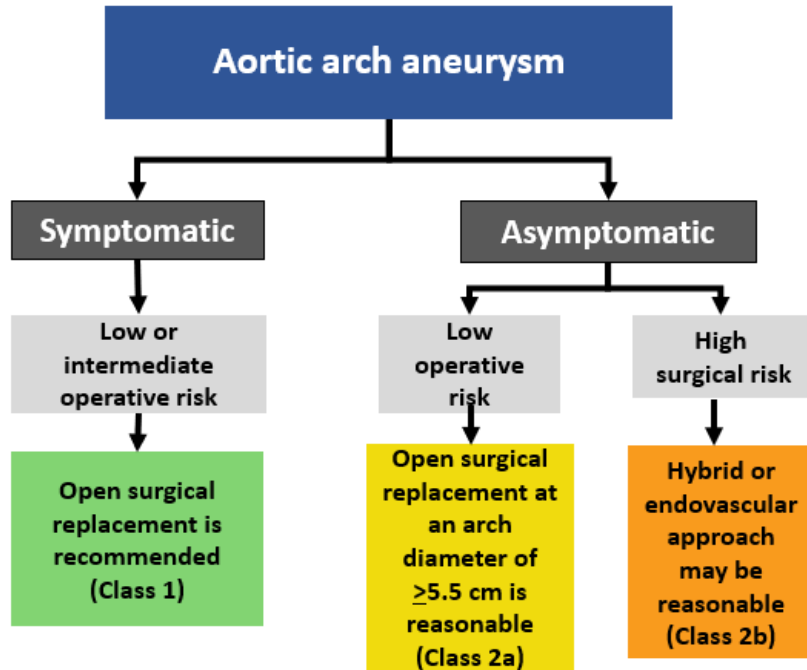


AAA: Surgical Recommendations

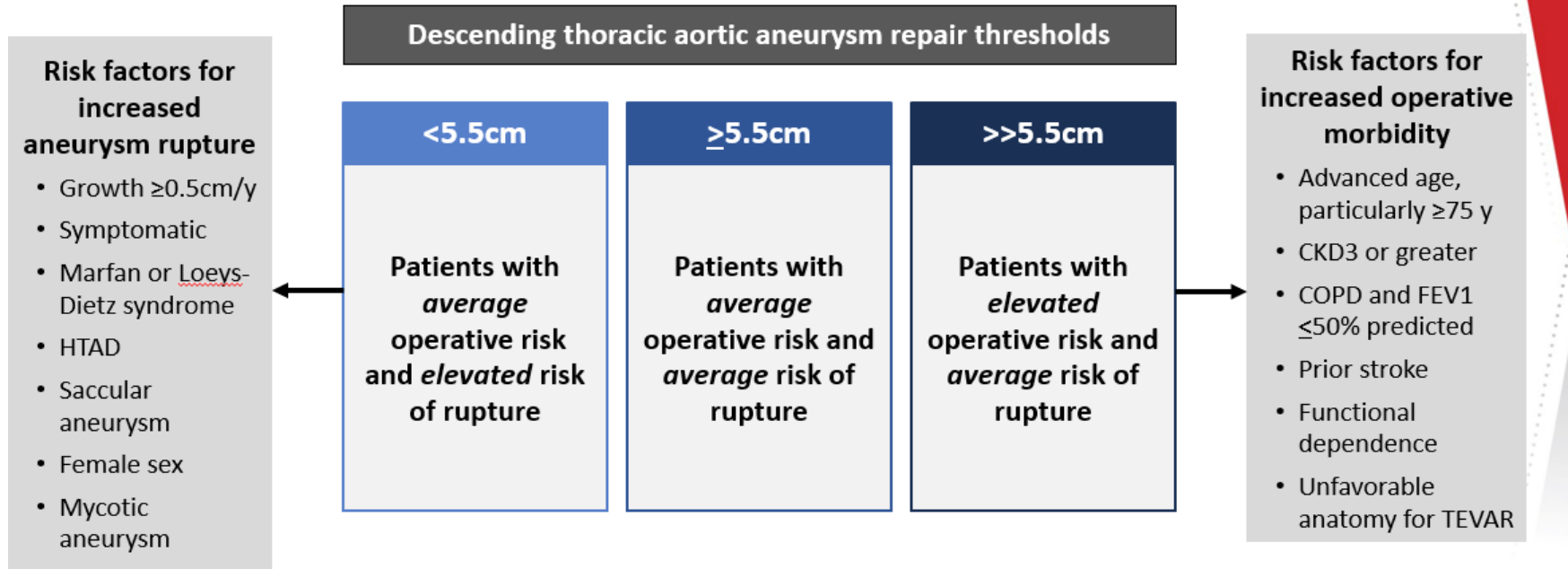
- Repair is recommended in patients
 - Men AAA diameter of > 5.5 cm
 - Women AAA diameter of > 5.0 cm
 - Symptoms attributable to the aneurysm (abdominal pain, pulsating enlargement, tender mass in abdomen)
 - Rupture- Endovascular repair (Ia)



Recommendations for Aortic Arch Aneurysms



Guidance for Repair of Descending Thoracic Aortic Aneurysms



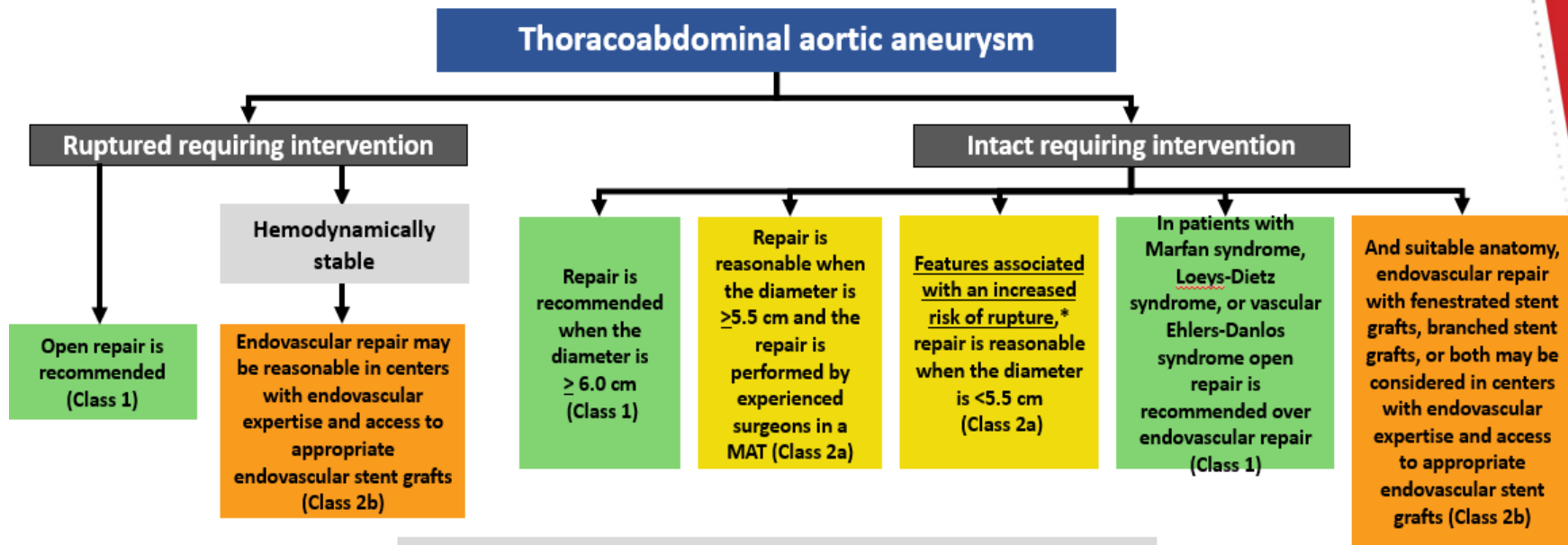
Abbreviations: cm indicates centimeter; CKD, chronic kidney disease; COPD, chronic obstructive pulmonary disease; CT, computed tomography; FEV, forced expiratory volume; HTAD, heritable thoracic aortic disease; TEVAR, thoracic endovascular aortic repair; and y, year.

Isselbacher, E. M., et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease. *Circulation*.

Endovascular Versus Open Repair of Descending TAA

Class	LOE	Recommendations
1	B-NR	1. In patients without Marfan syndrome, Loeys-Dietz syndrome, or vascular Ehlers-Danlos syndrome , who have a descending TAA that meets criteria for intervention and anatomy suitable for endovascular repair, TEVAR is recommended over open surgery.
1	B-NR	2. In patients with a descending TAA that meets criteria for repair with TEVAR, who have smaller or diseased access vessels, considerations for alternative vascular access are recommended.
2a	B-NR	3. In patients with a descending TAA that meets criteria for intervention, who have anatomy unsuitable for endovascular repair , and who are without significant comorbidities and have a life expectancy of at least 10 years, open surgical repair is reasonable.

Guidance for Repair of Thoracoabdominal Aortic Aneurysms



***Features Associated With Increased Risk of TAAA Rupture**

- Rapid growth (confirmed increase in diameter of ≥ 0.5 cm/y)
- Symptomatic aneurysm
- Significant change in aneurysm appearance
- Saccular aneurysm or presence of penetrating atherosclerotic ulcers



Abbreviations: cm indicates centimeter; CT, computed tomography; PAU, penetrating aortic ulcer; TAAA, thoracoabdominal aortic aneurysm; and y, year
 Isselbacher, E. M., et al. 2022 ACC/AHA Guidelines for the Diagnosis and Management of Aortic Disease. *Circulation*.

TAA recommendations

Spinal Cord protection (IA)

- CSF Drainage
- Timely measures to optimize spinal cord perfusion
 - Cardioversion of tachyarrhythmias
 - Insertion of CSF drain
 - Increase MAP >100
 - Transfuse Hgb > 10 g/dL
 - Volume resuscitation

Renal and Visceral organ protection

Surgical Recommendations

Left subclavian artery management

Celiac Artery Management

Ruptured Descending TAA

Access issues for TEVAR in Descending
TAA

Open Versus Endovascular Repair of TAAA

1	C-LD	3. In patients with Marfan syndrome, Loeys-Dietz syndrome, or vascular Ehlers-Danlos syndrome and intact TAAA requiring intervention, open repair is recommended over endovascular repair.
2b	B-NR	4. In patients with intact degenerative TAAA and suitable anatomy, endovascular repair with fenestrated stent grafts, branched stent grafts, or both may be considered in centers with endovascular expertise and access to appropriate endovascular stent grafts.

Acute Aortic Syndrome (AAS)

- Presentation - clinical signs and symptoms
- Diagnostic Evaluation
- Medical Management
- Surgical and Endovascular Management of AAD
- Management of IMH
- Management of PAU
- Traumatic Aortic Injury
- Long term Management and Surveillance after AAS

Acute Aortic Syndrome: Presentation

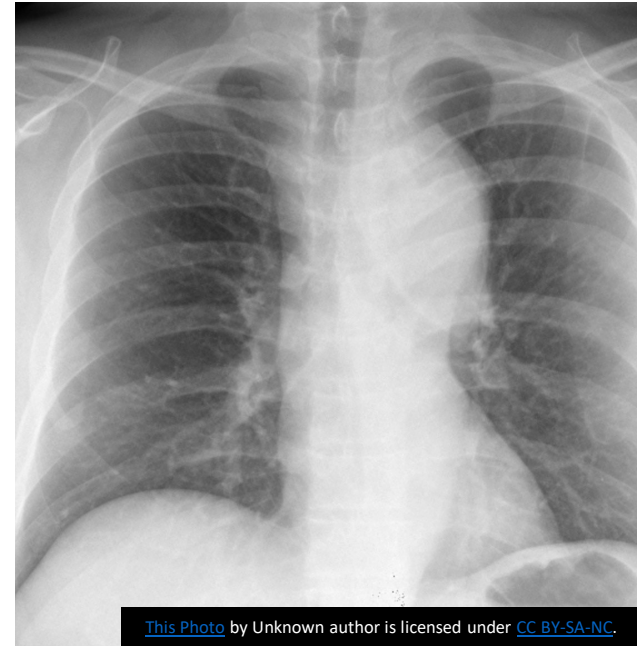
Clinical Signs and Symptoms	Cause
Asymmetric blood pressure (>20 mm Hg) between limbs	Compromise of branch artery flow
Bowel ischemia or gastrointestinal bleed	Malperfusion of the celiac or superior mesenteric artery
Dysphagia	Compression of the esophagus
Dyspnea	Compression of trachea or bronchus, congestive heart failure from aortic regurgitation, or cardiac tamponade
Hemoptysis	Vascular rupture into lung parenchyma
Hoarseness	Compression recurrent laryngeal nerve
Horner's syndrome	Compression of sympathetic chain
Myocardial ischemia or myocardial infarction	Coronary artery involvement by dissection or compression by aneurysm

Acute Aortic Syndrome: Presentation

New murmur of aortic regurgitation	Incomplete aortic valve closure secondary to leaflet tethering by the dilated aorta or cusp prolapse because of dissection into the aortic root
Oliguria or hematuria (gross)	Malperfusion of 1 or both renal arteries
Paraplegia	Spinal malperfusion attributable intercostal artery involvement
Lower extremity ischemia	Malperfusion of iliac artery
Shock	Cardiac tamponade, hemothorax, frank aortic rupture, acute severe aortic regurgitation, severe myocardial ischemia
Shortness of breath	Pericardial effusion, congestive heart failure from acute severe aortic regurgitation, or hemothorax
Stroke symptoms	Carotid or vertebral artery involved
Superior vena cava syndrome	Compression of the superior vena cava
Syncope	Carotid artery involvement or cardiac tamponade

AAS: Diagnostic Evaluation

- CT is recommended for initial imaging. (I C-LD)
 - TTE and MRI are reasonable
- CXR that could suggest Aortic dissection:
 - Mediastinal widening
 - Tracheal deviation
 - Double density appearance within aorta
 - NG deviation to the right

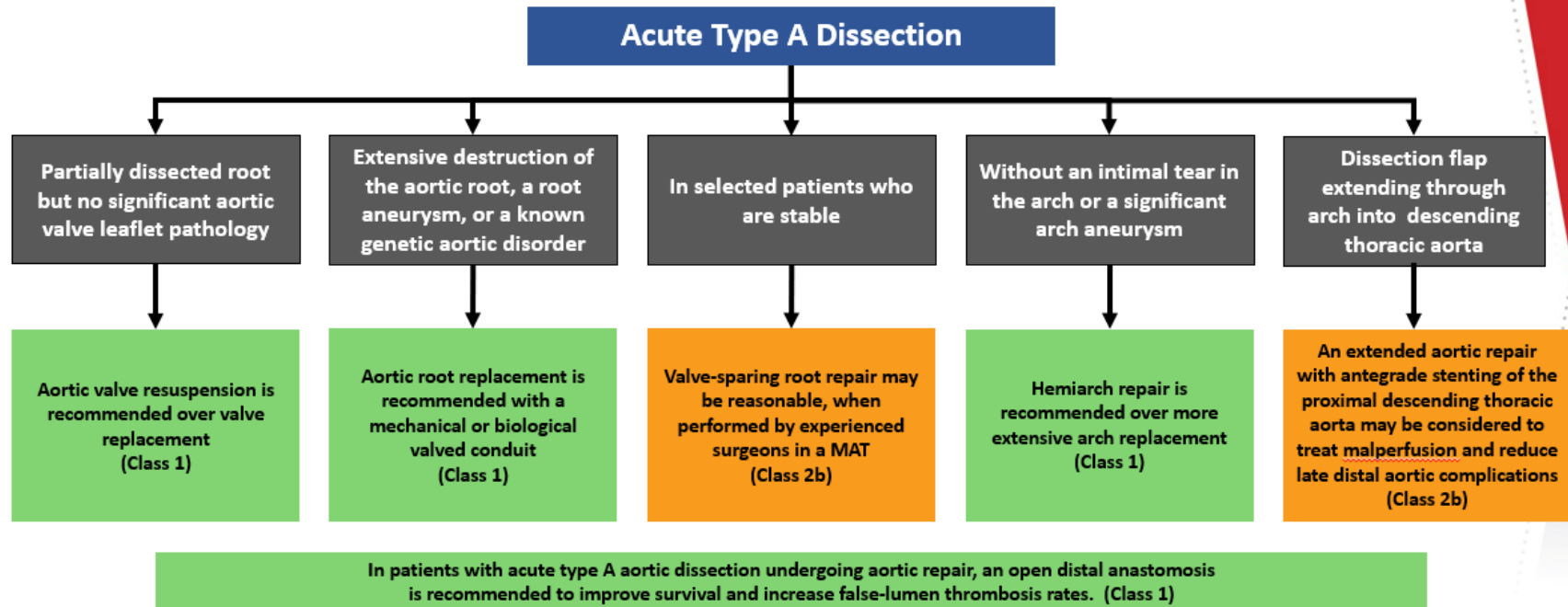


This Photo by Unknown author is licensed under [CC BY-SA-NC](https://creativecommons.org/licenses/by-sa/4.0/).

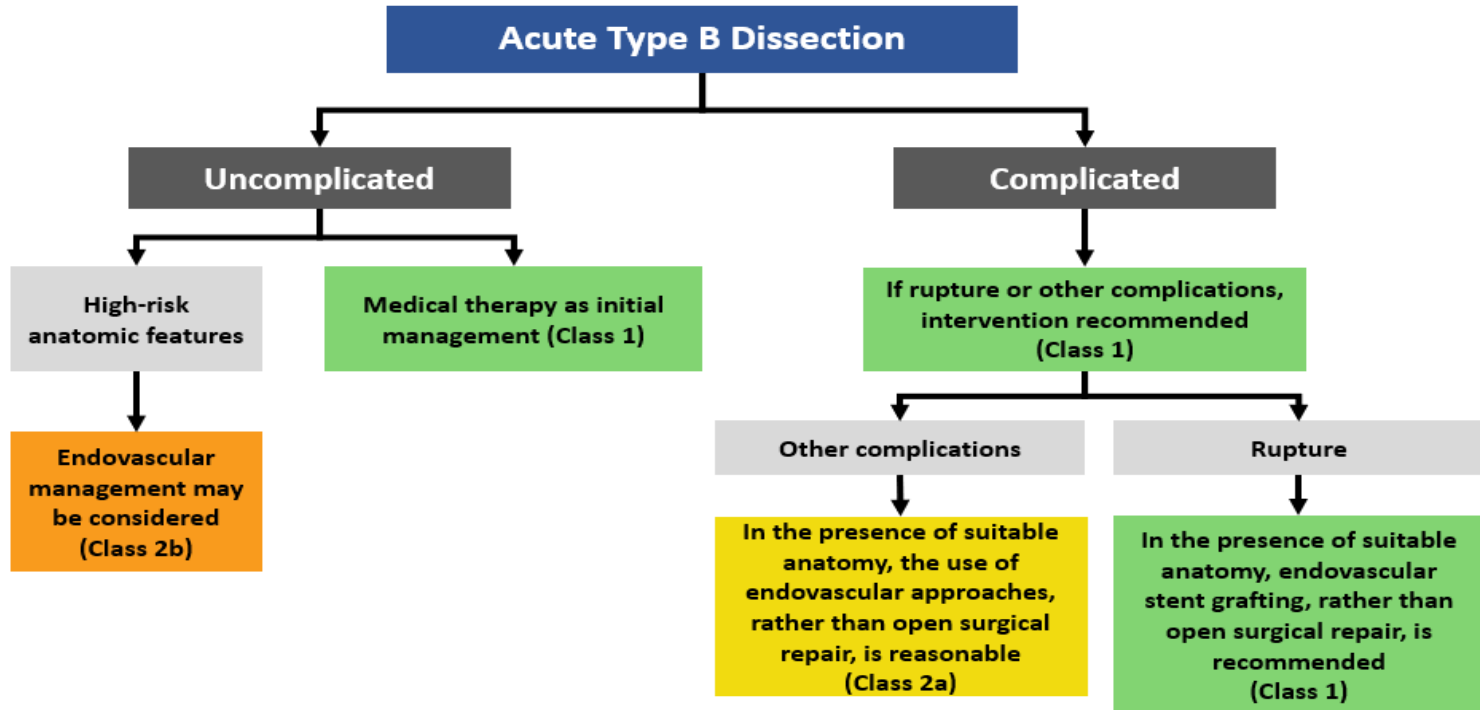
Acute Medical Management of AAS

COR	LOE	Recommendation
1	B-NR	Prompt treatment with anti-impulse therapy with invasive Monitoring of BP with arterial line in ICU
1	C-LD	Patients with AAS should be treated to a SBP < 120H or to lowest BP that maintains end-organ perfusion as well as target HR 60-80bpm .
1	B-NR	AAS initial management should include IV beta-blockers unless contraindicated
2a	B-NR	In those with contraindications to IV BB, initial management with non-dihydropyridine calcium channel blocker is reasonable for HR control.
1	C-LD	AAS initial management should include IV vasodilators if BP no well controlled after initiation of BB therapy
1	C-EO	AAS should be treated with pain control as needed to help with hemodynamic management

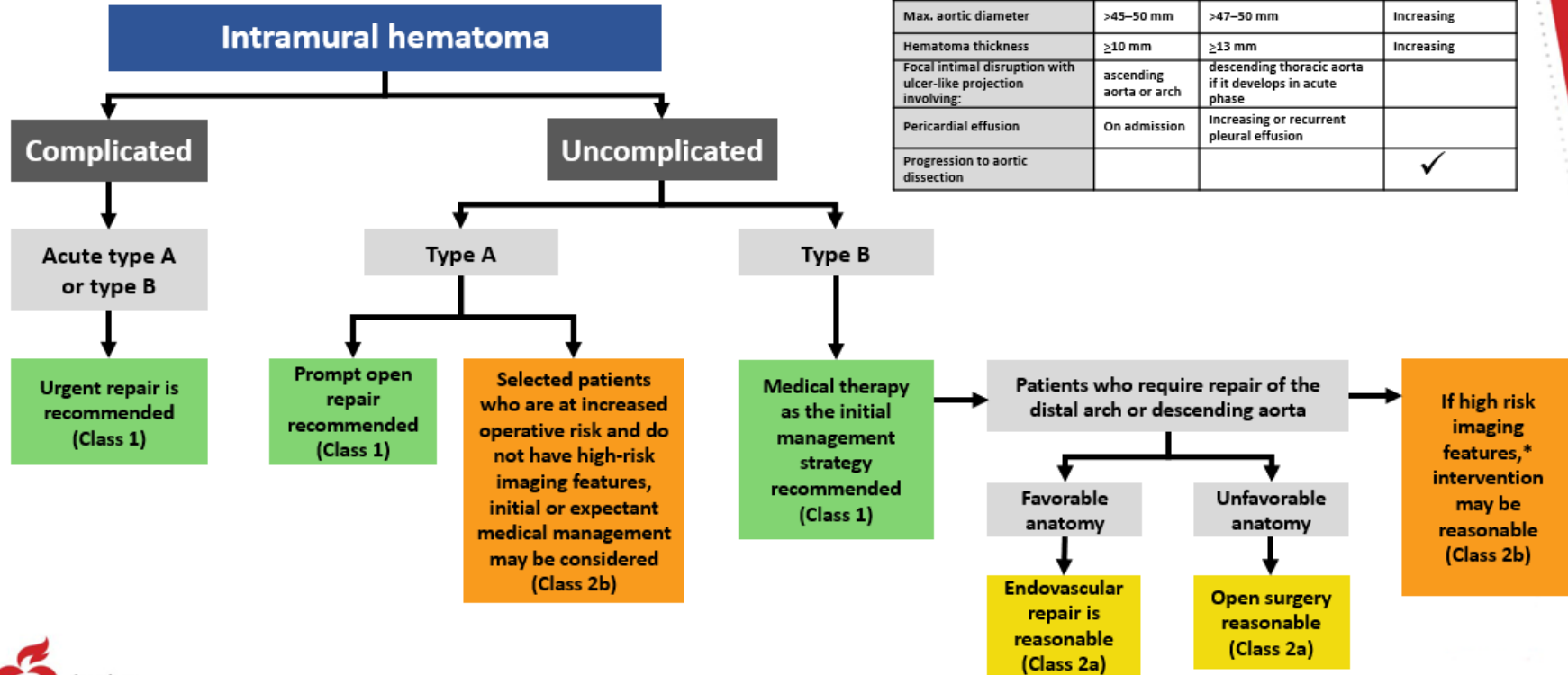
Recommendations for Surgical Repair Strategies in Acute Type A Aortic Dissection



Recommendations for the Management of Acute Type B Aortic Dissection

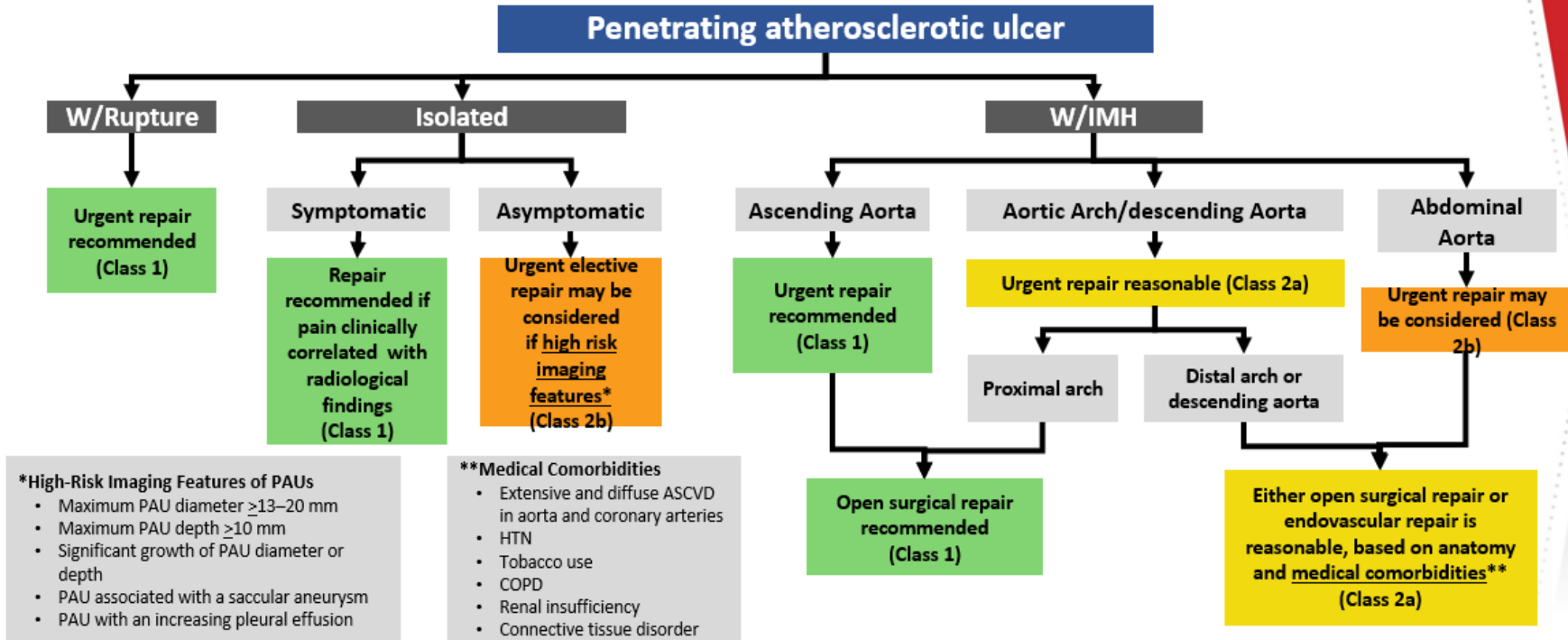


Recommendations for Management of Intramural Hematoma



	Type A IMH	Type B IMH	Both Type A and Type B IMH
Max. aortic diameter	>45–50 mm	>47–50 mm	Increasing
Hematoma thickness	≥10 mm	≥13 mm	Increasing
Focal intimal disruption with ulcer-like projection involving:	ascending aorta or arch	descending thoracic aorta if it develops in acute phase	
Pericardial effusion	On admission	Increasing or recurrent pleural effusion	
Progression to aortic dissection			✓

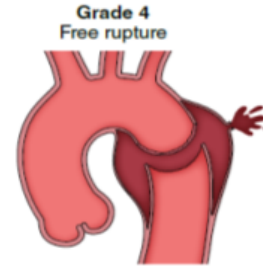
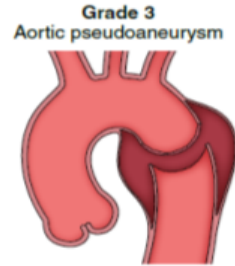
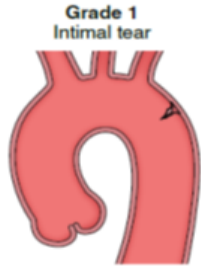
Recommendations for Penetrating Atherosclerotic Ulcer and Type of Repair



Abbreviations: ASCVD indicates atherosclerotic cardiovascular disease; COPD, chronic obstructive pulmonary disease; HTN, hypertension; IMH, intramural hematoma; mm, millimeter; and PAU, penetrating atherosclerotic ulcer.

Approach to the Initial Management of Blunt Traumatic Thoracic Aortic Injury

COR	RECOMMENDATIONS
1	Management and treatment at a trauma center with the facilities to treat aortic pathology is recommended.
1	Anti-impulse therapy to reduce the risk of injury extension and rupture should be implemented, except in patients with hypotension or hypovolemic shock.



Medical management	
COR	RECOMMENDATIONS
1	Nonoperative management and f/u imaging are recommended.

COR	RECOMMENDATIONS
2a	With <u>high-risk imaging features*</u> aortic intervention is reasonable.
2b	<u>Without high-risk imaging features</u> , nonoperative management and follow-up surveillance imaging may be reasonable.

Operative repair	
COR	RECOMMENDATIONS
1	With <u>nonprohibitive</u> comorbidities or injuries, aortic intervention is recommended

*High-Risk Imaging Features of BTTAI

- Posterior mediastinal hematoma >10 mm
- Lesion to normal aortic diameter ratio >1.4
- Mediastinal hematoma causing mass effect
- Pseudocoarctation of the aorta
- Large left hemothorax
- Ascending aortic, aortic arch, or great vessel involvement
- Aortic arch hematoma

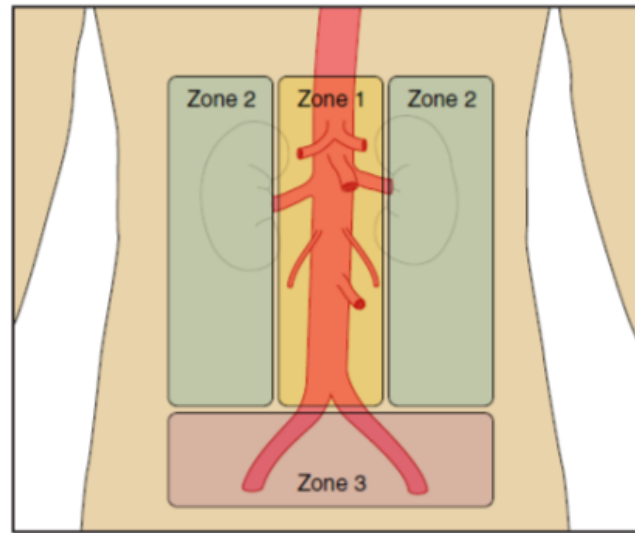
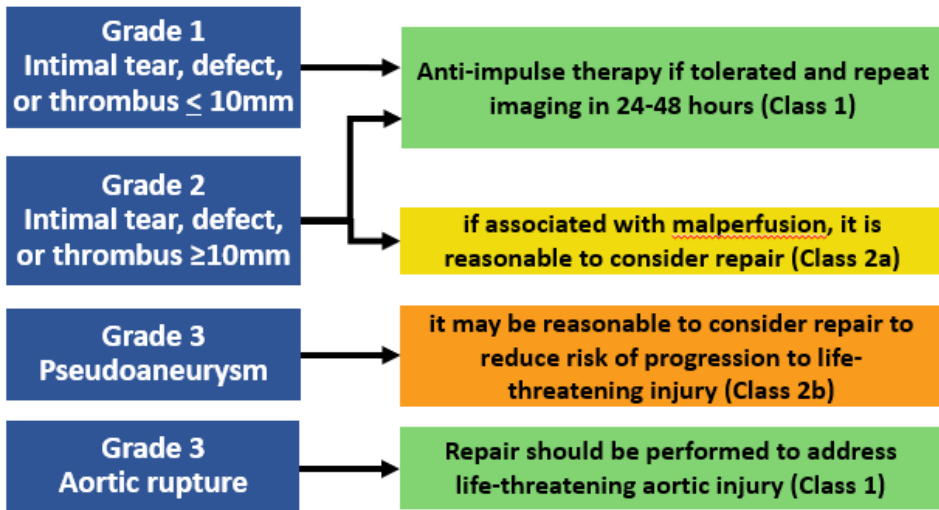


Abbreviations: BTTAI indicates blunt traumatic thoracic aortic injury f/u, follow-up; and mm, millimeter.

Isselbacher, E. M., et al. 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease. *Circulation*.

Approach to Initial Management of Blunt Traumatic Aortic Injury

Treatment with either endovascular or open repair is reasonable and depends on degree of injury, aortic anatomy, and the patient's overall clinical status (Class 2a)



Aortic injury zones: Some Zone 1 and 3 injuries are typically amenable to endovascular approaches, while Zone 2 injuries are not.

The usefulness of routine application of REBOA for hemorrhage control is unclear and in some cases may cause harm. (Class 3:Harm)

Long Term Surveillance and Management following TAA

- TAA with TEVAR
 - CT recommended after 1mo, 12mo, and then annually if stable
- TAA with Open repair
 - CT within 1year, and then every 5 year (2a) in absence of residual aortopathy
 - Annual imaging if residual aortopathy or abnormal findings (2a)



Long Term Surveillance and Management following Acute Aortic Syndrome

- In Acute Aortic Dissection & IMH:
 - Treated with open repair or TEVAR with residual disease or medical management
 - Recommended F/u imaging at 1, 6, and 12 month, then annually (1A)
- In Penetrating Aortic Ulcer (PAU) treated with repair: Imaging same as TAA (1mo, 12mo, annually)
- PAU medically managed: imaging at 1mo, every 6 mo for 2 years, then based on age and PAU



Counseling and Management of Aortic Disease in Pregnancy and Postpartum

Prepregnancy

COR	RECOMMENDATIONS
1	<u>MFS, LDS, vEDS, and nonsyndromic HTAD</u> Genetic counseling before pregnancy: Heritable nature of aortic condition (Class 1)
1	<u>MFS, LDS, vEDS, nonsyndromic HTAD, TS and BAV with aortic dilation</u> Aortic imaging: TTE and or MRI or CT (Class 1)
1	<u>MFS, LDS, vEDS, nonsyndromic HTAD, TS and BAV with aortic dilation</u> Counseling before pregnancy: Risk of <u>AoD</u> (Class 1)

During Pregnancy

COR	RECOMMENDATIONS
2b	Multidisciplinary team management Maternal fetal medicine Cardiology Cardiac Surgery (Class 2b)
1	Guideline treatment of hypertension (Class 1)
1	Beta-blocker therapy during pregnancy and postpartum (Class 1)
1	TTE aortic root and ascending aorta surveillance each trimester and postpartum (Class 1)
1	Non-contrast MRI surveillance of aortic arch, descending or abdominal aorta (Class 1)

Delivery

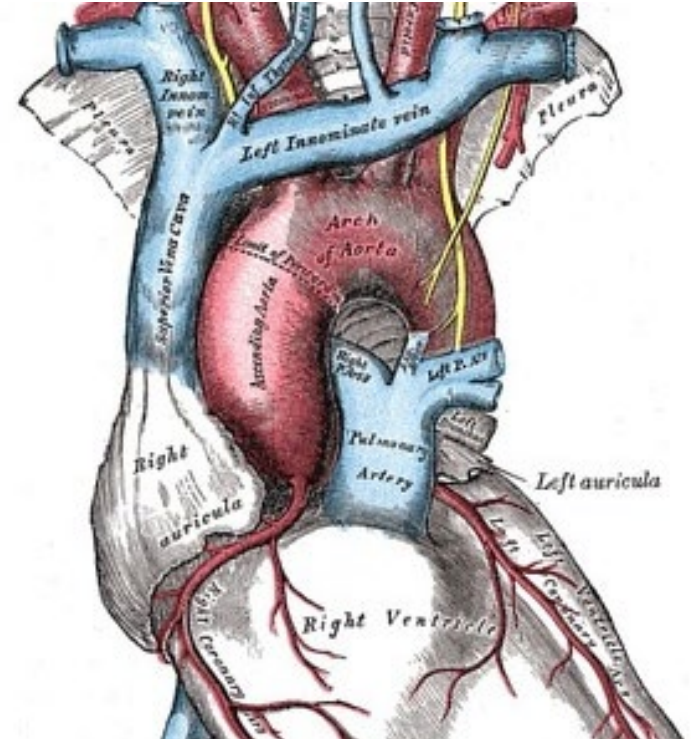
COR	RECOMMENDATIONS
1	Cesarean delivery if history of chronic <u>AoD</u> (Class 1)
1	Vaginal delivery if aortic diameter <4.0 cm (Class 1)
2a	Cesarean delivery if aortic diameter ≥4.5 cm (Class 2a)
2b	Vaginal delivery with regional anesthesia, expedited second stage and assisted delivery if aortic diameter 4.0-4.5 cm (Class 2b)
2b	Cesarean delivery for syndromic or <u>nonsyndromic</u> HTAD with aortic diameter 4.0-4.5 cm (Class 2b)

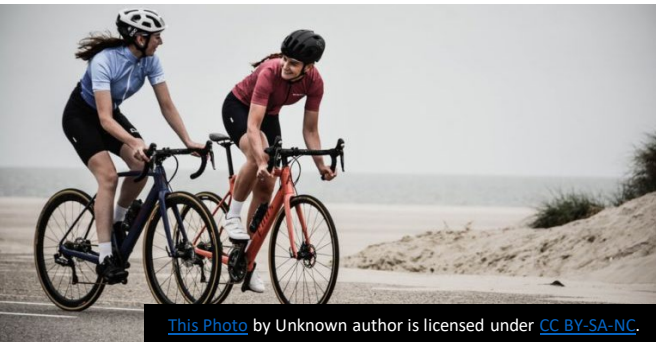


Abbreviations: AoD indicates aortic dissection; BAV, bicuspid aortic valve; cm, centimeter; CT, computed tomography; HTAD, heritable thoracic aortic diseases; LDS, Loeys-Dietz Syndrome; MFS, Marfan Syndrome; MRI, magnetic resonance imaging; TTE, transthoracic echocardiography; TS, Turner Syndrome; and vEDS, Vascular Ehlers-Danlos Syndrome.

Other Aortic Conditions

- Inflammatory Aortic Disease
 - Giant Cell Arteritis
 - Takayasu Arteritis
- Prosthetic Aortic Graft Infection
- Aortic Atherosclerotic Disease
- Aortic Thrombus and Occlusion





This Photo by Unknown author is licensed under [CC BY-SA-NC](#).



Physical Quality of Life

COR	RECOMMENDATIONS
1	For patients with significant aortic disease, education and guidance should be provided about avoiding intense isometric exercises, burst exertion/activities, and collision sports (Class 1)
1	For patients who have undergone surgery for aortic aneurysm or dissection, postoperative cardiac rehabilitation is recommended (Class 1)
2a	In patients with thoracic or abdominal aortic aneurysms whose BP is adequately controlled, it is reasonable to encourage 30 to 60 minutes of mild-to-moderate intensity aerobic activity at least 3 to 4 days per week (Class 2a)
2a	For patients with clinically significant aortic disease, it is reasonable to screen for anxiety, depression, and post-traumatic stress disorder and, when indicated, provide resources for support (Class 2a)

References




- Beck, D. S. (2022, November 02). ACC/AHA Aortic Disease Guideline Key Perspectives. American College of Cardiology. <https://www.acc.org/Latest-in-Cardiology/ten-points-to-remember/2022/11/01/12/21/2022-guideline-on-aortic-disease-2-gl-ad>
- Erwin III, J, Cibotti-Sun, M. et al. (2022) Aortic Disease Guideline-at-a-Glance. *J Am Coll Cardiol*. 2022 Dec, 80 (24) 2348–2352. <https://doi.org/10.1016/j.jacc.2022.10.001>
- Isselbacher, E. M. Proventza, O., Black, J., Augustosides, J. Beck, A. et al (2022). 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease: A report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines. *Circulation*, 2 Publication: *Circulation Publisher: Wolters Kluwer Health, Inc. Date: Nov 2, 2022*, 334–432. <https://www.ahajournals.org/doi/epub/10.1161/CIR.0000000000001106>
- Murphy, S. P., Dalal, A. R., Holscher, C., Louis, C., Luc, J. G. Y., Sorber, R., Pedroza, A., Bezanson, J. L., & Antman, E. M. (2022). AHA Clinical Update; Adapted from: 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease: A Guideline From the American Heart Association [PowerPoint slides]. Retrieved from <https://professional.heart.org/en/science-news>.

Thank You!



Department of
**Cardiothoracic &
Vascular Surgery**

 **UTHealth** Houston
McGovern Medical School

   **UTH_CVSurgery**
info.ctvs@uth.tmc.edu
<https://med.uth.edu/cvs/>