

### **Resident Forum**

### Novelties in the Open Approach of the Arch

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### Background

• The Global Burden Disease 2010 project demonstrated that

the overall global death rate from Aortic Aneurysms and Dissections

increased from 2.49 per 100 000 to 2.78 per 100 000 inhabitants between 1990 and 2010, with higher rates for men.

www.escardio.org/guidelines European Heart Journal (2014); 35:2873-2926 - doi:10.1093/eurheartj/ehu281

### ESC Guidelines 2014



### ACC/AHA Guidelines 2010





**ACCIANA Pocket Guideline** 

Exteri on the 2018 ACCRARAWATS/ ACRASASCASCARSEISTS/SYM

Guidelines for the Diagnosis and Management of Patients With Thoracic Aortic Disease

March 2010

### The Grading System in Guidelines.

#### SIZE OF TREATMENT EFFECT

	CLASS I Benefit >>> Risk Procedure/Treatment SHOULD be performed/ administered	CLASS IIa Benefit >> Risk focused objectives needed IT IS REASONABLE to per- form procedure/administer treatment	CLASS IIb Benefit ≥ Risk objectives needed; additional registry data would be helpful Procedure/Treatment MAY BE CONSIDERED	CLASS III Risk ≥ Benefit Procedure/Treatment should NOT be performed/adminis- tered SINCE IT IS NOT HELP- FUL AND MAY BE HARMFUL
LEVEL A Multiple populations evaluated* Data derived from multiple randomized clinical trials or meta-analyses	<ul> <li>Recommendation that procedure or treatment is useful/effective</li> <li>Sufficient evidence from multiple randomized trials or meta-analyses</li> </ul>	<ul> <li>Recommendation in favor of treatment or procedure being useful/effective</li> <li>Some conflicting evidence from multiple randomized trials or meta-analyses</li> </ul>	<ul> <li>Recommendation's usefulness/efficacy less well established</li> <li>Greater conflicting evidence from multiple randomized trials or meta-analyses</li> </ul>	<ul> <li>Recommendation that procedure or treatment is not useful/effective and may be harmful</li> <li>Sufficient evidence from multiple randomized trials or meta-analyses</li> </ul>
LEVEL B Limited populations evaluated* Data derived from a single randomized trial or nonrandomized studies	<ul> <li>Recommendation that procedure or treatment is useful/effective</li> <li>Evidence from single randomized trial or nonrandomized studies</li> </ul>	<ul> <li>Recommendation in favor of treatment or procedure being useful/effective</li> <li>Some conflicting evidence from single randomized trial or nonrandomized studies</li> </ul>	<ul> <li>Recommendation's usefulness/efficacy less well established</li> <li>Greater conflicting evidence from single randomized trial or nonrandomized studies</li> </ul>	<ul> <li>Recommendation that procedure or treatment is not useful/effective and may be harmful</li> <li>Evidence from single randomized trial or nonrandomized studies</li> </ul>
LEVEL C Very limited populations evaluated* Only consensus opinion of experts, case studies, or standard of care	<ul> <li>Recommendation that procedure or treatment is useful/effective</li> <li>Only expert opinion, case studies, or standard of care</li> </ul>	<ul> <li>Recommendation in favor of treatment or procedure being useful/effective</li> <li>Only diverging expert opinion, case studies, or standard of care</li> </ul>	<ul> <li>Recommendation's usefulness/efficacy less well established</li> <li>Only diverging expert opinion, case studies, or standard of care</li> </ul>	<ul> <li>Recommendation that procedure or treatment is not useful/effective and may be harmful</li> <li>Only expert opinion, case studies, or standard of care</li> </ul>
Suggested phrases for writing recommendations <sup>†</sup>	should is recommended is indicated is useful/effective/beneficial	is reasonable can be useful/effective/beneficial is probably recommended or indicated	may/might be considered may/might be reasonable userumess/enecuveness is unknown/unclear/uncertain or not well established	is not recommended is not indicated should not is not useful/effective/beneficial may be harmful





Aorta



Aorta



### Aneurysms and Chronic Dissections





Eric M. Isselbacher. Circulation. Thoracic and Abdominal Aortic Aneurysms, Volume: 111, Issue: 6, Pages: 816-828, DOI: (10.1161/01.CIR.0000154569.08857.7A)

### **Intervention on Thoracic Aortic Aneurysm**

The main principle of surgery for ascending aortic aneurysms:

is preventing the risk of dissection or rupture by

restoring the normal dimension of the ascending aorta.



### **Intervention on Thoracic Aortic Aneurysm**

Recommendations		Level
Interventions on ascending aorta		
Surgery is indicated in patients who have aortic root aneurysm, with maximal aortic diameter ≥50 mm for patients with Marfan syndrome.		С
Surgery should be considered in patients who have aortic root aneurysm, with maximal ascending aortic diameter: ≥45 mm for patients with Marfan syndrome with risk factors. ≥50 mm for patients with bicuspid valve with risk factors. ≥55 mm for other patients with no elastopathy.	IIa	c
Lower thresholds for intervention may be considered according to body surface area in patients of small stature or in the case of rapid progression, aortic valve regurgitation, planned pregnancy, and patient's preference.		с
Interventions on aortic arch aneurysms		
Surgery should be considered in patients who have isolated aortic arch aneurysm with maximal diameter $\geq$ 55 mm.	IIa	с
Aortic arch repair may be considered in patients with aortic arch aneurysm who already have an indication for surgery of an adjacent aneurysm located in the ascending or descending aorta.	IIÞ	с



### Asymptomatic Patients with Ascending Aortic Aneurysm

#### **Class I**

- 1. Asymptomatic patients with degenerative thoracic aneurysm, chronic aortic dissection, intramural hematoma, penetrating atherosclerotic ulcer, mycotic aneurysm, or pseudoaneurysm, who are otherwise suitable candidates and for whom the ascending aorta or aortic sinus diameter is 55 mm or greater should be evaluated for surgical repair (Level of Evidence: C).
- 2. Patients with Marfan syndrome or other genetically mediated disorders (vascular Ehlers-Danlos syndrome, Turner syndrome, bicuspid aortic valve, or familial thoracic aortic aneurysm and dissection) should undergo elective operation at smaller diameters (45 to 55 cm depending on the condition) to avoid acute dissection or rupture (Level of Evidence: C).
- 3. Patients with a growth rate of more than 5 mm/y in an aorta that is less than 55 mm in diameter should be considered for operation (Level of Evidence: C).
- 4. Patients undergoing aortic valve repair or replacement and who have an ascending aorta or aortic root of greater than 45 mm should be considered for concomitant repair of the aortic root or replacement of the ascending aorta (Level of Evidence: C).



### Asymptomatic Patients with Aortic Arch Aneurysms

#### **Class I**

For patients with isolated Aortic Arch Aneurysms, surgery indicated when the arch diameter exceeds 55 mm. **(Level of Evidence: B)** 



### Symptomatic Patients with Thoracic Aortic Aneurysm

### **Class I**

Patients with symptoms suggestive of expansion of a thoracic aneurysm should be evaluated for prompt surgical intervention unless life expectancy from comorbid conditions is limited or quality of life is substantially impaired. **(Level of Evidence: C)** 



### **Recommendations for Open Surgery Technique for Ascending Aortic and Arch Aneurysm**

#### **Class I**

- 1. Separate valve and ascending aortic replacement are recommended in patients without significant aortic root dilatation, in elderly patients, or in young patients with minimal dilatation who have aortic valve disease (Level of Evidence: C).
- 2. Patients with Marfan, Loeys-Dietz, and Ehlers- Danlos syndromes and other patients with dilatation of the aortic root and sinuses of Valsalva should undergo a modified David reimplantation operation if technically feasible or, if not, root replacement with valved graft conduit **(Level of Evidence: B).**





### **Recommendations for Ascending Aortic Aneurysm**





### **Recommendations for Ascending Aortic Aneurysm**





### **Chronic Aortic Dissection.**

It is recently accepted to divide the time course of AD into :

- acute (14 days),
- **sub-acute** (15 90 days),
- and chronic (90 days) phases.

Chronic AD can either be:

- **uncomplicated**, with a stable disease;
- complicated by progressive aneurysmal degeneration, chronic visceral or limb malperfusion, and persisting or recurrent pain or even rupture.

Patients with chronic AD also include those previously operated for Type A AD, with persisting dissection of the descending aorta.



### **Chronic Aortic Dissection. Management**

Recommendations		Level
Chronic aortic dissection		
Contrast CT or MRI is recommended to confirm the diagnosis of chronic aortic dissection.	I	с
Initial close imaging surveillance of patients with chronic aortic dissection is indicated to detect signs of complications as soon as possible.	I	с
In asymptomatic patients with chronic dissection of the ascending aorta, elective surgery should be considered.	IIa	с
In patients with chronic aortic dissection, tight blood pressure control <130/80 is indicated.	I	с



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In patients with chronic aortic dissection, tight blood pressure control <130/80 is indicated.	I	с
The Optimal Timing and Technique of Intervention in Chronic AD st	till und	clear !



### **Recommendations for Chronic Dissections**

 Open surgical repair is recommended for chronic dissection in case of a connective tissue disorder and a descending thoracic aortic diameter > 55 mm.
 (Class I, Level of Evidence: B)

Usually, an Elephant trunk procedure is required.





- Arch replacement is recommended for arch diameter > 55 mm in asymptomatic, low-risk patients with isolated degenerative or atherosclerotic aneurysms.
- (Class IIa, Level of Evidence: B)

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### **Recommendations for Chronic Dissections**

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(Class I, Level of Evidence: B)

The new type of prostheses including both cardiovascular and endovascular technologies seems to be beneficial.

- Arch replacement is recommended for arch diameter > 55 mm in asymptomatic, low-risk patients with isolated degenerative or atherosclerotic aneurysms.
- (Class IIa, Level of Evidence: B)

### **Surgical Technique and Management**

Recommendations	Class	Level
Cerebrospinal fluid drainage is recommended in surgery of the thoracoabdominal aorta to reduce the risk of paraplegia.		В
Aortic valve repair using the reimplantation technique or remodelling with aortic annuloplasty is recommended in young patients with aortic root dilatation and tricuspid aortic valves.	I	с
For repair of acute type-A aortic dissection (AD), an open distal anastomotic technique avoiding aortic clamping (hemiarch/complete arch) is recommended.	I	с
In patients with connective tissue disorders requiring aortic surgery, the replacement of aortic sinuses is indicated.	I	с
Selective antegrade cerebral perfusion should be considered in aortic arch surgery to reduce the risk of stroke.	IIa	В
The axillary artery should be considered as first choice for cannulation for surgery of the aortic arch and in aortic dissection.	IIa	с



# Brain protection during ascending aortic and transverse aortic arch surgery

 For repair of the distal ascending aorta and transverse arch, a brain protection strategy is needed to prevent stroke and preserve cognition function
 (Class I, Level of Evidence: B).

• Deep hypothermic circulatory arrest, selective antegrade brain perfusion, and retrograde brain perfusion are possible techniques to minimize brain injury during surgical repairs of the ascending aorta and transverse aortic arch (Class IIa, Level of Evidence: B).



### Life-Time follow Up for Aortic Dissections

- After a Type A or B aortic dissection, computed tomographic imaging (CT) or magnetic resonance imaging (MRI) of the aorta is reasonable at a schedule of 1-, 3-, 6-, and 12-month postdissection
  (Class IIa, Level of Evidence: C) [3].
- Then, if stable, the same imaging modality can be obtained annually thereafter

(Class IIa, Level of Evidence: C) [3].

 Similarly, patients with intramural hematoma (IMH) undergo same guidelines as aortic dissections
 (Class IIa, Level of Evidence: C) [3].



### Coclusions

- Value of 55 seems to be crucial in general for aortic arch aneurisms and chronic dissections.
- However for some groups 55 is lowering to 50 or 45. In this point of view genetics data are important.
- The disease is mostly surgical but not only of course. The hybrid approach should be involved in the in the treatment.
- The complexity and high risk of this pathology turn into lack of new proven data for the decade.

### **Future Developments**

• The Installation of Hybrid Operation Rooms

• Developing Aortic Teams and Centers

• More evidence in the field of Aortic diseases.



## Thank You for Your Attention !

