Technical considerations and timing in EVAR for Type B aortic dissections

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Disclosure

Speaker name:

Dr. V. Riambau

I have the following potential conflicts of interest to report:

Consulting: Terumo Aortic/Medtronic/iVascular/VB Devices/

Stockholder of a healthcare company : Aortyx

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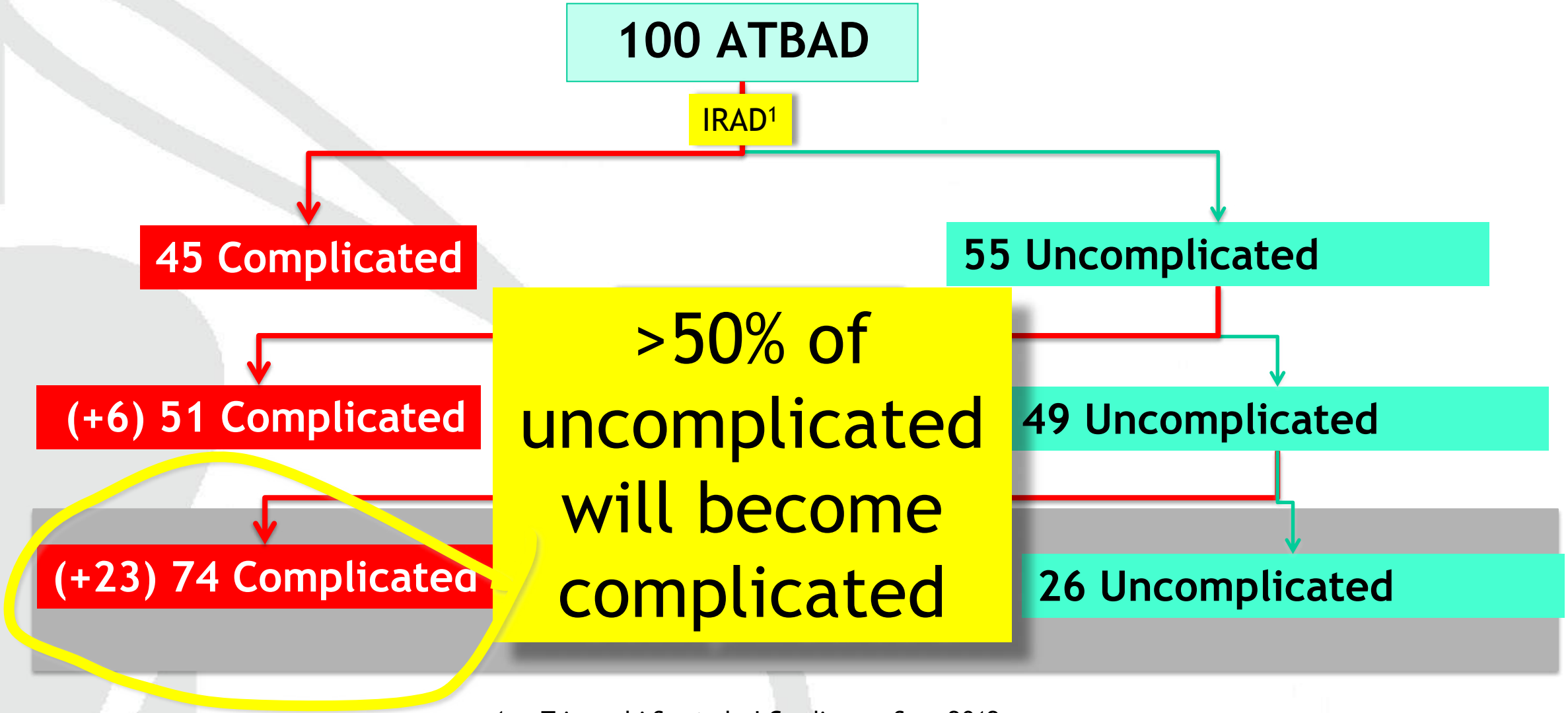
Background



1. Trimarchi S, et al, J Cardiovasc Surg 2012
2. Jonker, et al . Ann Thor Surg 2012
3. Nienaber C, et al. Cir Cardiovasc Interv 2013

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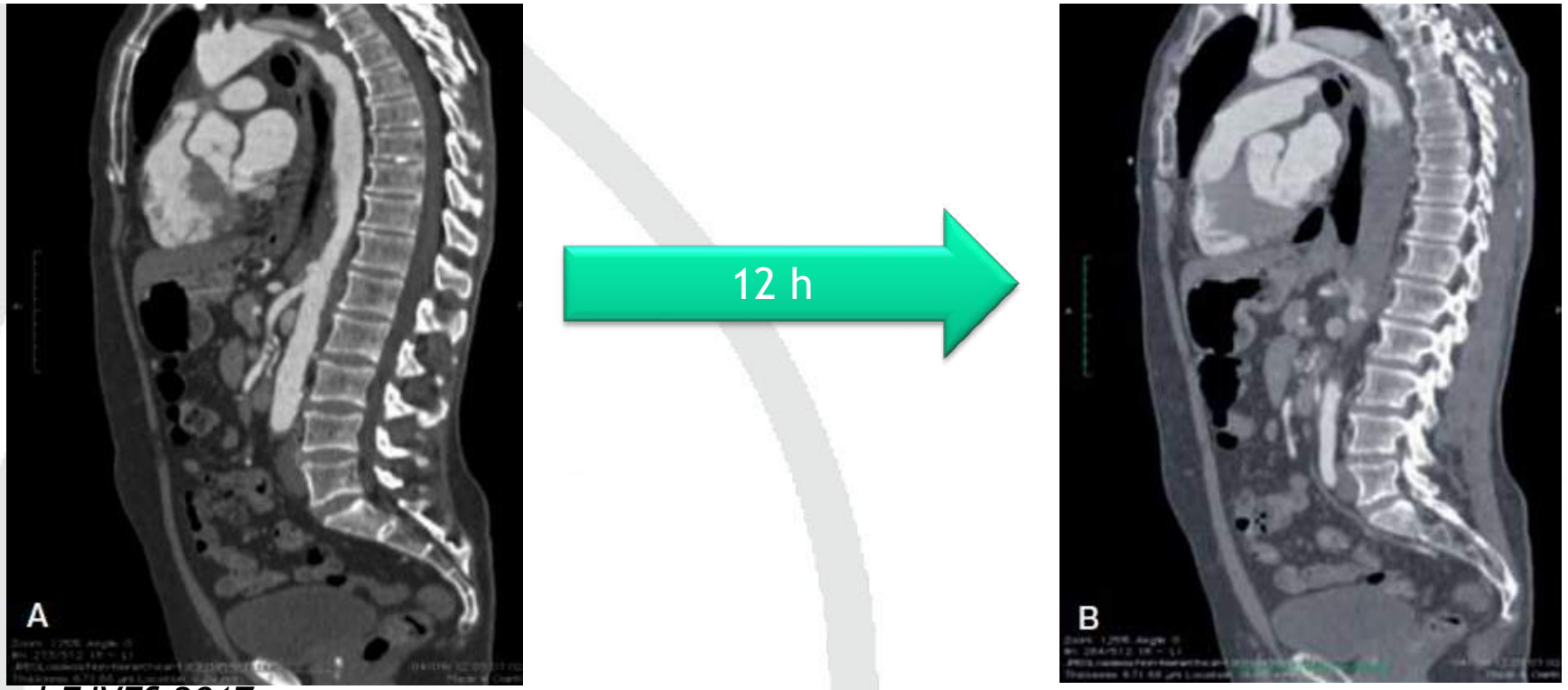
Acute Type B Aortic Dissection
An evolving entity

Recommendation 12	Class	Level of evidence
Patients with acute type B aortic dissection who develop new or recurrent abdominal pain and where there is any suspicion of visceral, renal and/or limb malperfusion should undergo repeat CT imaging	I	C



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New Definitions and Classifications

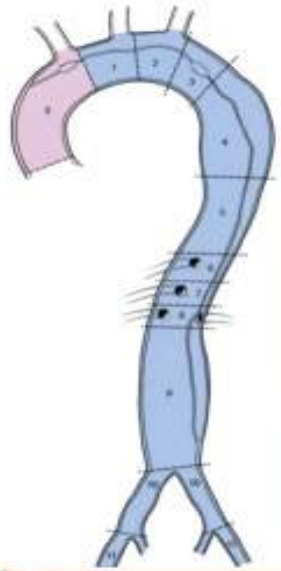
SVS/STS REPORTING STANDARDS DOCUMENT

Editors' Choice

Society for Vascular Surgery (SVS) and Society of Thoracic Surgeons (STS) reporting standards for type B aortic dissections

Joseph V. Lombardi, MD (SVS Co-Chair),[a] G. Chad Hughes, MD (STS Co-Chair),[b] Jehangir J. Appoo, MD,[c] Joseph E. Bavaria, MD,[d] Adam W. Beck, MD,[e] Richard P. Cambria, MD,[f] Kristofer Charlton-Ouw, MD,[g] Mohammad H. Eslami, MD,[h] Karen M. Kim, MD,[i] Bradley G. Leshnower, MD,[j] Thomas Maldonado, MD,[k] T. Brett Reece, MD,[l] and Grace J. Wang, MD,[d] *Camden, NJ; Durham, NC; Calgary, Alberta, Canada; Philadelphia and Pittsburgh, Pa; Birmingham, Ala; Brighton, Mass; Houston, Tex; Ann Arbor, Mich; Atlanta, Ga; New York, NY; and Denver, Colo*

JVS and ATS 2020



Type	Proximal Extent	Distal Extent
A_D Entry tear: **Zone 0**	0	0
	1	1
	2	2
	3	3
B_{PD} Entry tear: **≥Zone 1**	4	4
	5	5
	6	6
	7	7
	8	8
I_D Unidentified entry tear involving **Zone 0**	9	9
	10	10
	11	11
	12	12

Fig 7. Society for Vascular Surgery/Society of Thoracic Surgeons (SVS/STS) Aortic Dissection Classification System.

Table III. Aortic dissection acuity

Uncomplicated
No rupture
No malperfusion
No high-risk features
High risk
Refractory pain
Refractory hypertension
Bloody pleural effusion
Aortic diameter >40 mm
Radiographic only malperfusion
Readmission
Entry tear: lesser curve location
False lumen diameter >22 mm
Complicated
Rupture
Malperfusion

SVS Society for Vascular Surgery

The Society of Thoracic Surgeons

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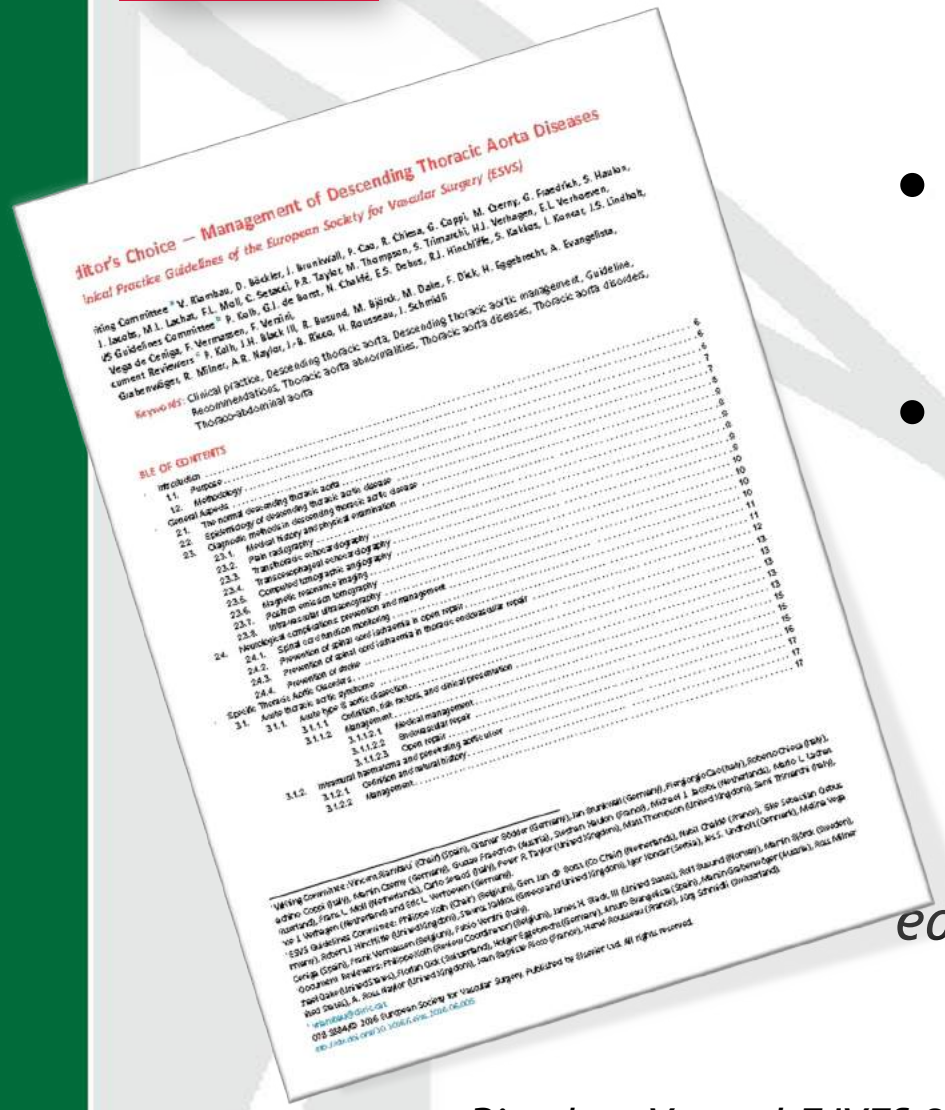
The aims of treating TBAD



- Maintain or restore perfusion of the vital organs
- Prevent both progression of the dissection and aortic rupture.

Therefore, it is important to make a risk assessment at an early stage to determine the merits of medical, endovascular, or surgical intervention.

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Acute TBAD: Indications for Endovascular Repair

Recommendation 16	Class	Level of evidence
In patients with complicated acute type B aortic dissection, endovascular repair with thoracic endografting should be the first line intervention	I	C
Recommendation 17		
In complicated acute type B aortic dissection, endovascular fenestration should be considered to treat malperfusion	IIa	C
Recommendation 18		
To prevent aortic complications in uncomplicated acute type B aortic dissection, early thoracic endografting may be considered selectively	IIb	B

ATBAD @ risk

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The Society of Thoracic Surgeons

AATS

TYPE B AORTIC DISSECTION MANAGEMENT GUIDELINES

The Society of Thoracic Surgeons/American Association for Thoracic Surgery Clinical Practice Guidelines on the Management of Type B Aortic Dissection

Thomas E. MacGillivray, MD, Thomas G. Gleason, MD, Himanshu J. Patel, MD, Gabriel S. Aldea, MD, Joseph E. Bavaria, MD, Thomas M. Beaver, MD, Edward P. Chen, MD, Martin Czerny, MD, Anthony L. Estrera, MD, Scott Firestone, MS, Michael P. Fischbein, MD, G. Chad Hughes, MD, Dawn S. Hui, MD, Kalie Kissoon, Jennifer S. Lawton, MD, Davide Pacini, MD, T. Brett Reece, MD, Eric E. Roselli, MD, and John Stulak, MD

EXECUTIVE SUMMARY

As a result of the rapidly evolving technology and techniques to manage patients with type B aortic dissection (TBAD), The Society of Thoracic Surgeons (STS) and the American Association for Thoracic Surgery (AATS) convened a panel of expert aortic surgeons to methodically review the current data to provide recommendations on the management of patients with TBAD.

MAJOR FINDINGS. Class I recommendations include using a stepwise approach to the evaluation and treatment of patients with TBAD, followed by close clinical surveillance. Optimal medical therapy (OMT) remains the recommended treatment for patients with uncomplicated TBAD. Thoracic endovascular aortic repair (TEVAR) is indicated for complicated hyperacute, acute, or subacute TBADs and favorable anatomy for TEVAR. Open surgical repair is reasonable over TEVAR as a more durable treatment in patients with connective tissue disorders who have TBAD with progression of disease despite OMT. Revascularization of the left subclavian artery (LSA) is recommended to decrease the risk of spinal cord ischemia (SCI) if TEVAR coverage obstructs antegrade LSA flow.

MacGillivray, et al ATS 2021

The aims of treating TBAD

"The fundamental principle of intervention is to exclude the primary entry tear and restore normal blood flow into the true lumen of the aorta and its major branches."

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Acute TBAD: Indications for Endovascular Repair

The Society of Thoracic Surgeons

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- TEVAR is indicated for complicated hyperacute, acute, or subacute TBADs with rupture and/or malperfusion and favorable anatomy for TEVAR.*(Class of Recommendation [COR] I, Level of Evidence[LOE] B-nonrandomized [NR])*
- Fenestration may be considered for complicated hyperacute, acute, or subacute TBADs. *(COR IIB,LOE C-limited data [LD])*

MacGillivray et al ATS 2021

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Acute TBAD: Indications for Endovascular Repair

The Society of Thoracic Surgeons

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- Prophylactic TEVAR may be considered in patients with uncomplicated TBAD to reduce late aortic related adverse events and aortic-related death. *(COR IIB, LOE B-NR)*

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Chronic TBAD: Indications for Endovascular Repair

Recommendation 38	Class	Level of evidence
In patients with moderate to high surgical risk or with contraindications to open repair, endovascular repair of complicated chronic type B aortic dissections should be considered in dedicated centres	IIa	C
Recommendation 39		
In patients at risk of further aortic complications with suitable anatomy for endografting, endovascular repair of uncomplicated chronic type B aortic dissections should be considered in the sub-acute phase, in dedicated centres	IIa	B

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Chronic TBAD: Indications for Endovascular Repair

The Society of Thoracic Surgeons

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- TEVAR is reasonable for patients with chronic TBAD with an indication for intervention with suitable anatomy (adequate landing zone, absence of ascending or arch aneurysm) but who are at high risk for complications of open repair due to comorbidities. *(COR IIA, LOE B-NR)*
- TEVAR alone as sole therapy is not recommended in patients with chronic TBAD who have a large abdominal aortic aneurysm, an inadequate distal landing zone, and/or large distal reentry tears. *(COR III: No benefit, LOE C-LD)*

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Endovascular treatment: when?

- For **complicated** acute ATBD, as soon as possible
  HYPERACUTE (LESS 24H)

- For **UNcomplicated** acute ATBD, with aorta@risk, timing should be individualized according to the evolving clinical and radiological features
  ACUTE (BETWEEN 24H AND 2 WEEKS)
  SUBACUTE (BETWEEN 2 WEEKS AND 3 MONTHS)

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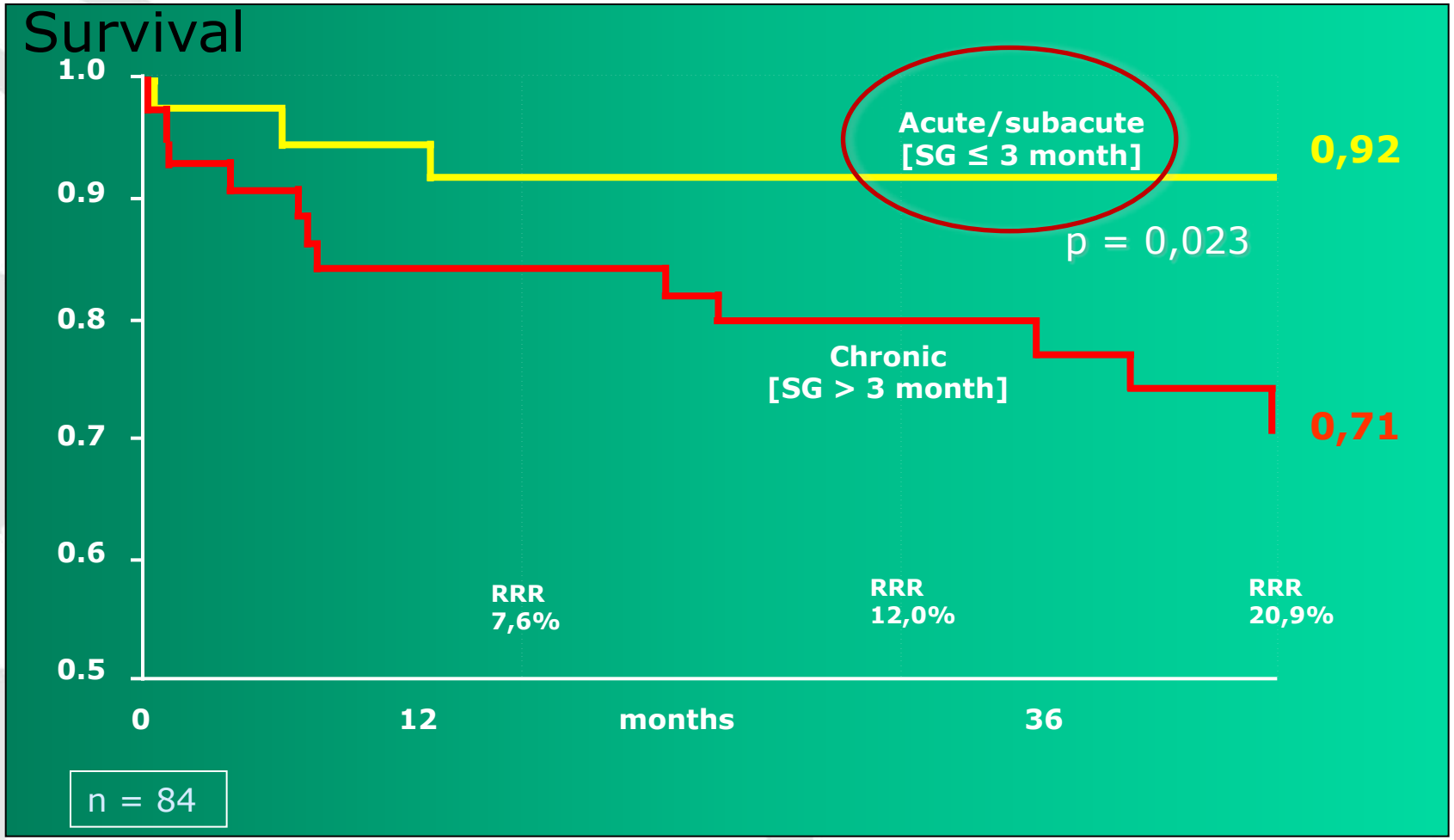
Endovascular treatment: when?



Nienaber, SITE 2005

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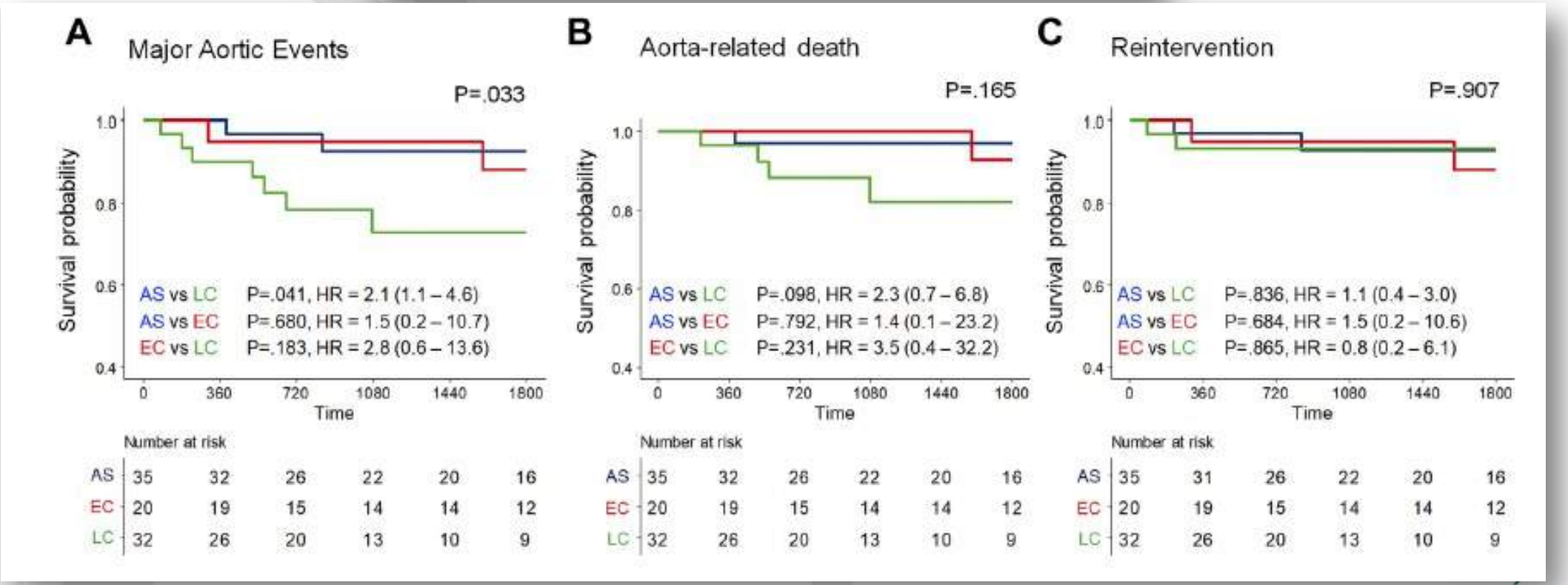
Endovascular treatment: when?

Aortic Remodeling and Clinical Outcomes in Type B Aortic Dissection According to the Timing of Thoracic Endovascular Aortic Repair

Seung-Jun Lee,[1] Woong Chol Kang,[2] Young-Guk Ko,[1] Yeongmin Woo,[3] Chul-Min Ahn,[1] Jong Youn Won,[4] Do-Yun Lee,[5] Sung-Jin Hong,[1] Jung-Sun Kim,[1] Byeong-Keuk Kim,[1] Donghoon Choi,[1] Myeong-Ki Hong,[1] and Yangsoo Jang,[1] Seoul, Incheon and Cheonan, South Korea

Ann Vasc Surg 2020



AS: Acute/Subacute <3months. EC: early chronic >3m <1year. LC: Late Chronic >1year.

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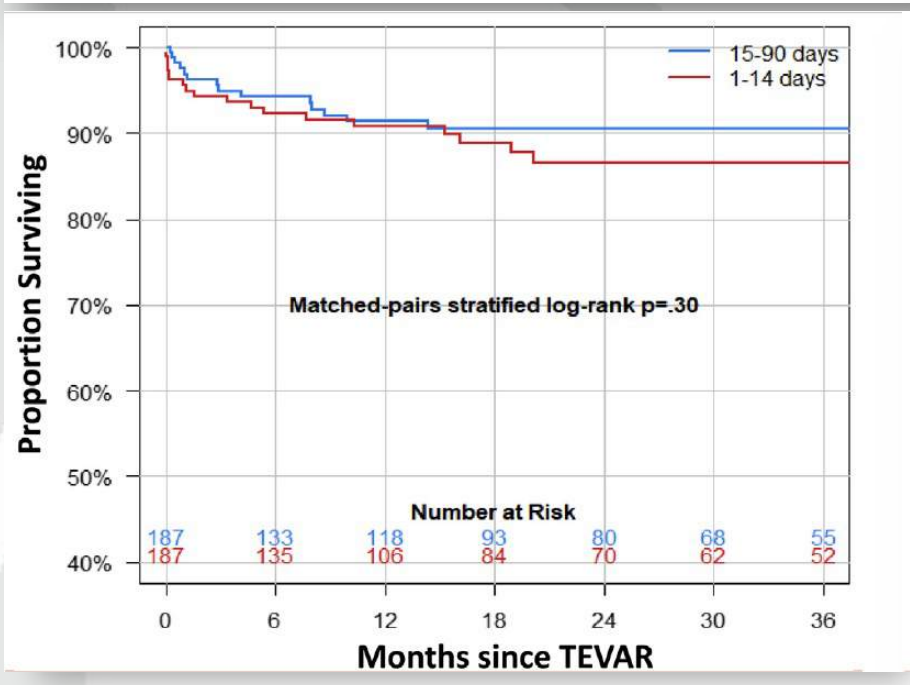
Endovascular treatment: when?

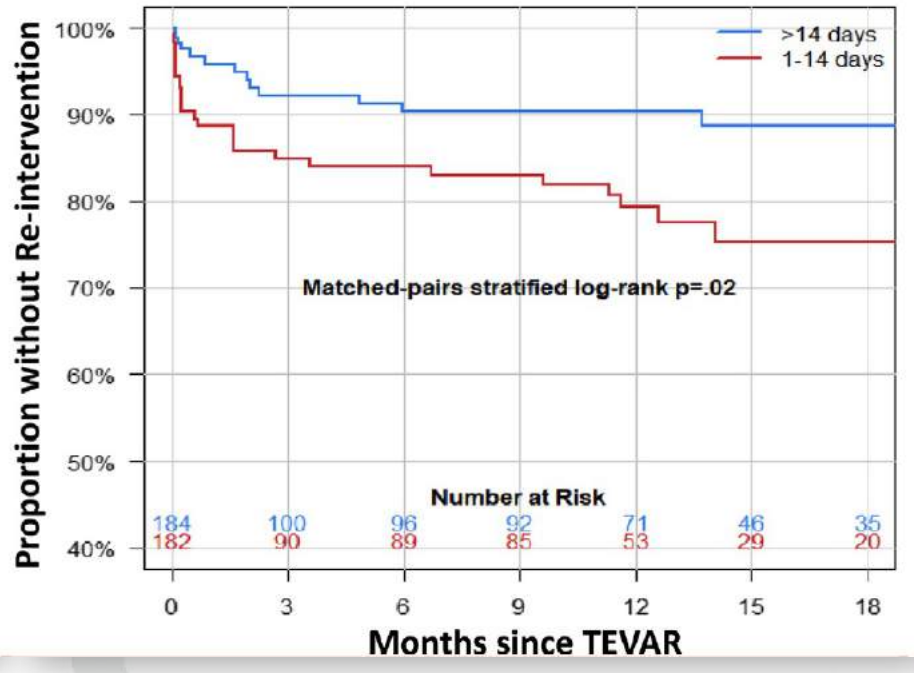
From the Society for Vascular Surgery

Timing of thoracic endovascular aortic repair for uncomplicated acute type B aortic dissection and the association with complications

Daniel J. Torrent, MD, MPH,[a] Graeme E. McFarland, MD,[a] Grace Wang, MD, MSCE,[b] Mahmoud Malas, MD, MHS,[c] Benjamin J. Pearce, MD,[a] Victoria Aucoin, MD,[a] Dan Neal, MS,[d] Emily L. Spangler, MD,[a] Zdenek Novak, MD, PhD,[a] Salvatore T. Scali, MD,[d] *and* Adam W. Beck, MD,[a]
Birmingham, Ala; Philadelphia, Pa; San Diego, Calif; and Gainesville, Fla

VQI TEVAR Procedures
(N = 15,053)





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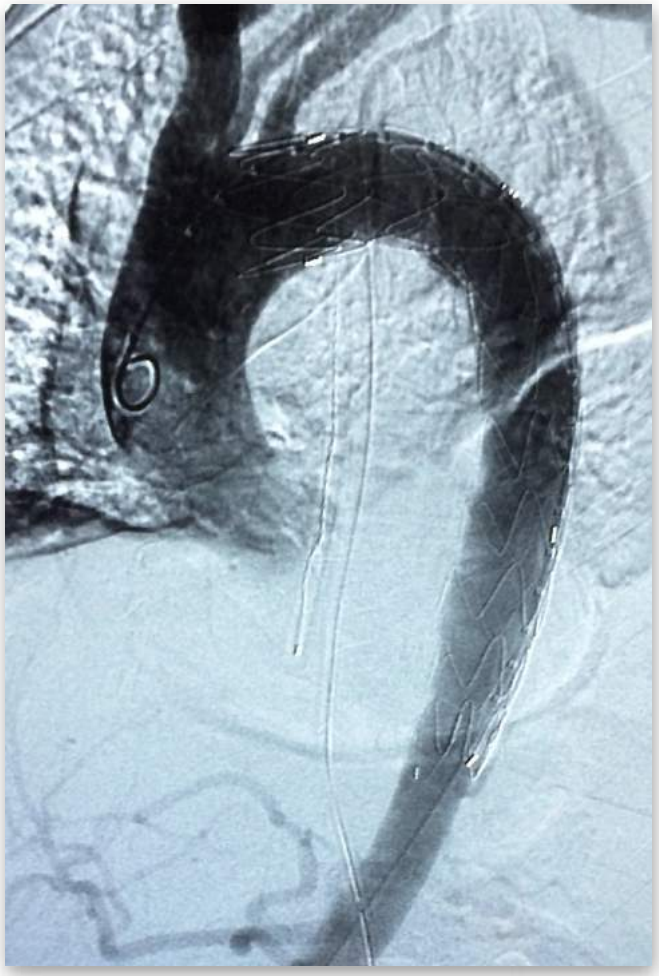
2. Vascular Access
3. Navigation
4. Endograft Selection
5. Deployment and landing zones
6. Dealing with supra-aortic trunks
7. Neuro protection



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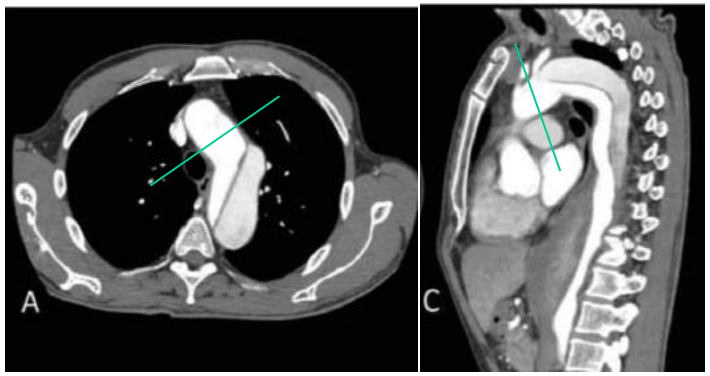

ECG gated angioCT

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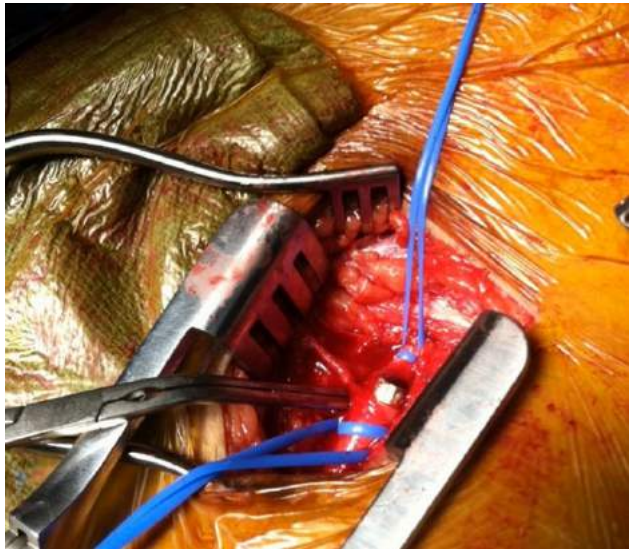

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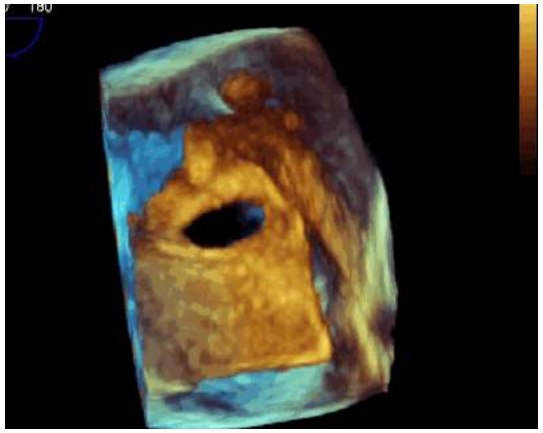

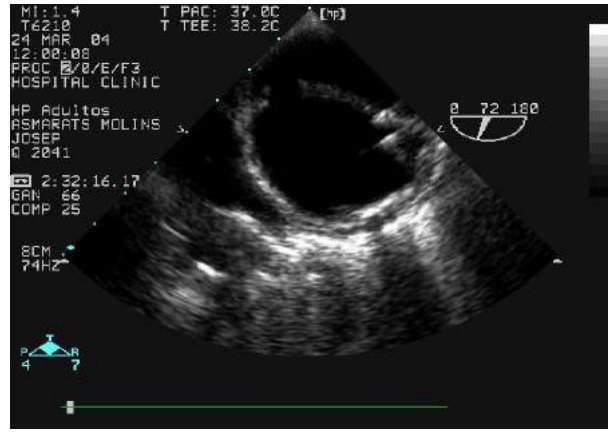

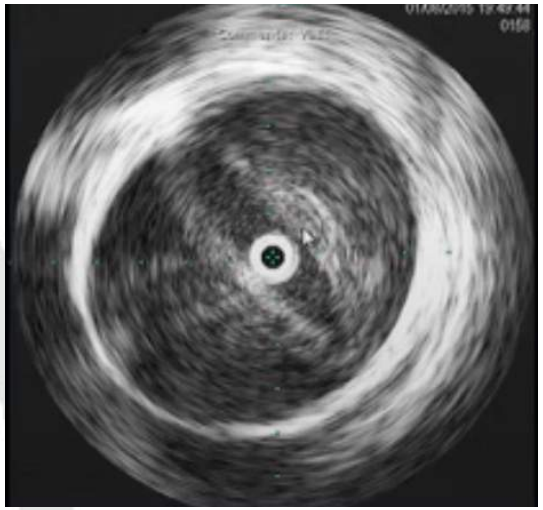

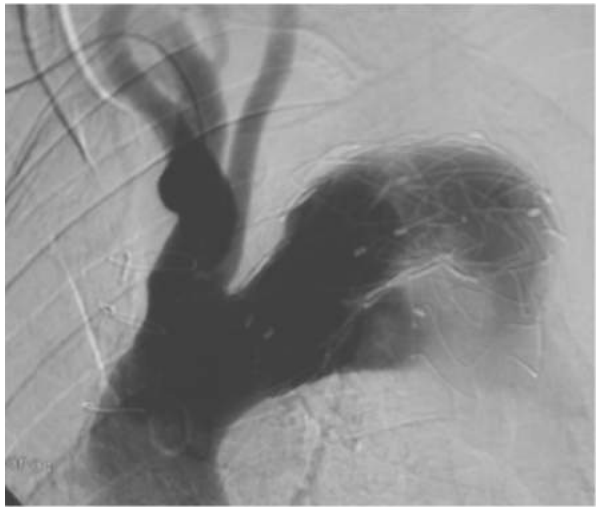

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Technical considerations

1. Planning and sizing
2. Vascular Access
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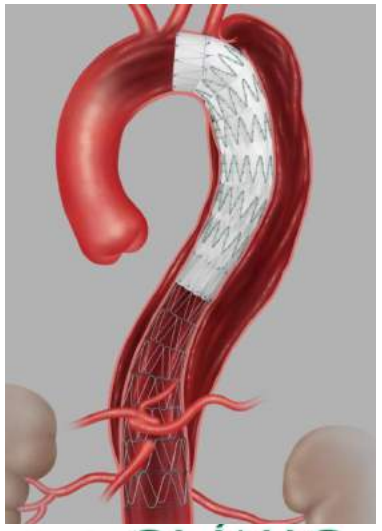
6. Dealing with supra-aortic trunks
7. Neuro protection

- Conformable
- Oversize 0-10%
- 200mm long
- Tapered (?)



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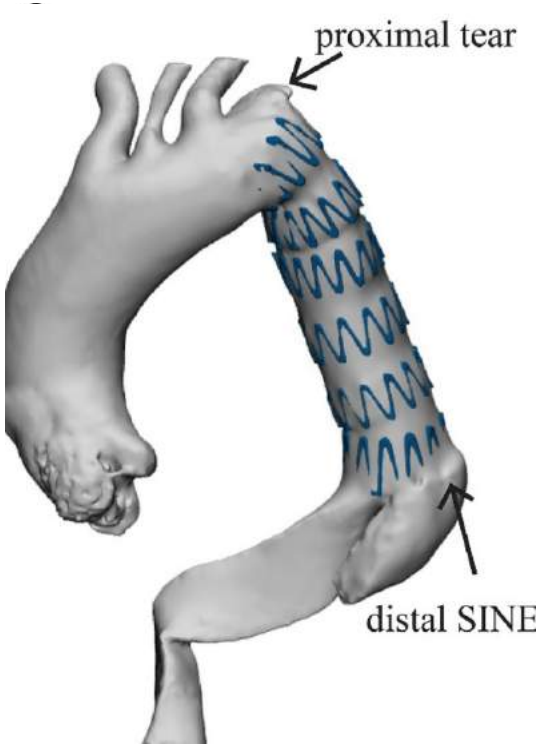
Technical considerations

1. Planning and sizing
2. Vascular Access
3. Navigation (TEE and IVUS and pigtail)
4. Endograft Selection
5. Deployment and landing zones
6. Dealing with supra-aortic trunks
7. Neuro protection



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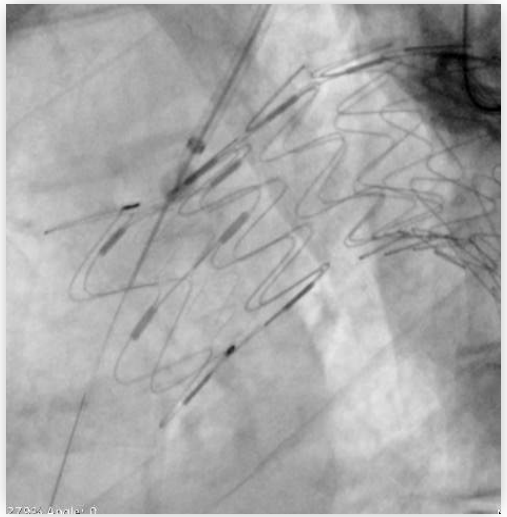

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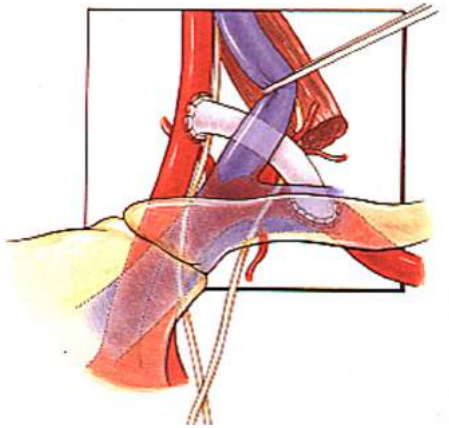

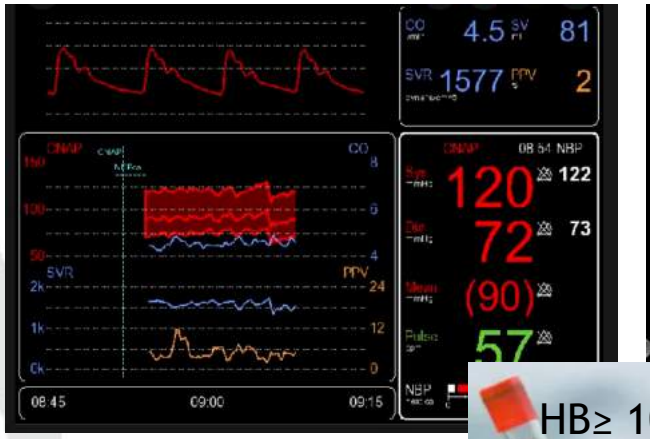

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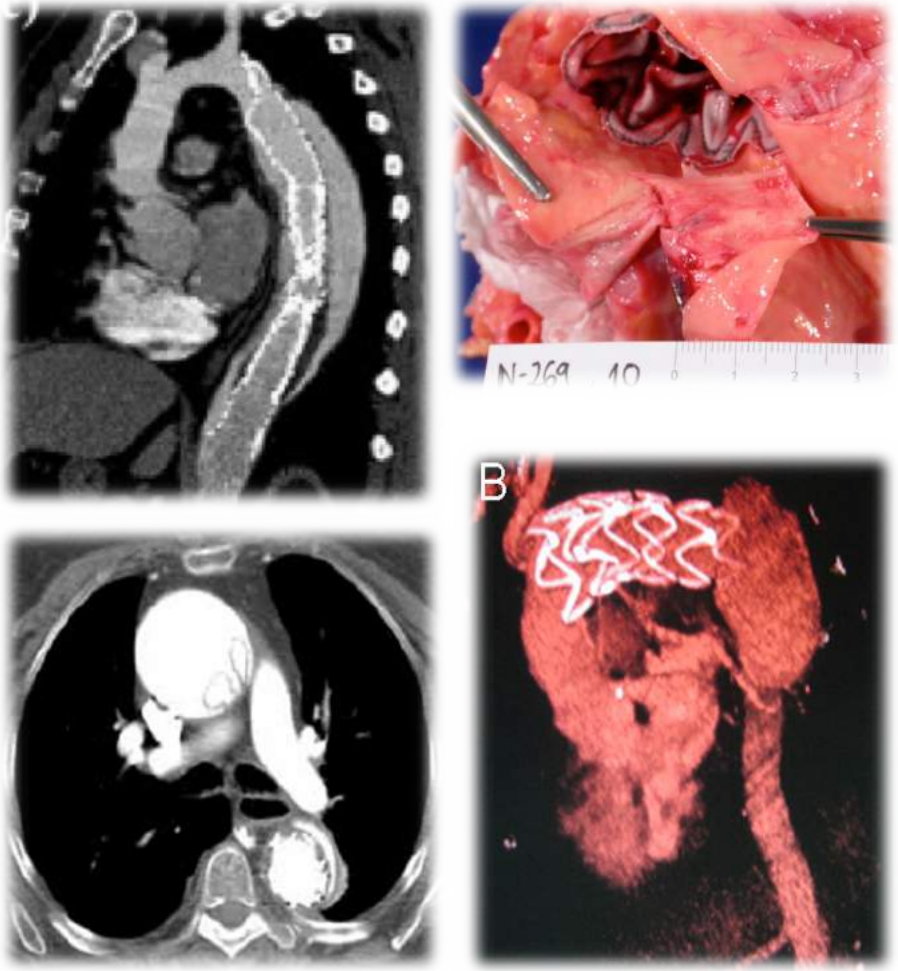
Device and procedure related complications

Complications	Rates
Stroke	3-10%
Spinal cord ischemia	1%
Aortic rupture	1%
Stent-graft collapse	< 1%
Proximal and distal tears	2%
Retrograde type A dissection	2%
Reinterventions	15% @ 1 y
Heart failure / Endograft stiffness	?



A word of caution

Buth et al. JVS 2007
Rampoldi et al Ann Thor Surg 2004
Feezor et al Ann Thor 2008
Kasirajan et al. JVS 2011
Eggebrecht et al Circulation 2009
Mani et al. EJVES 2012
Moulakakis KG, et al, Ann Vasc Surg 2016

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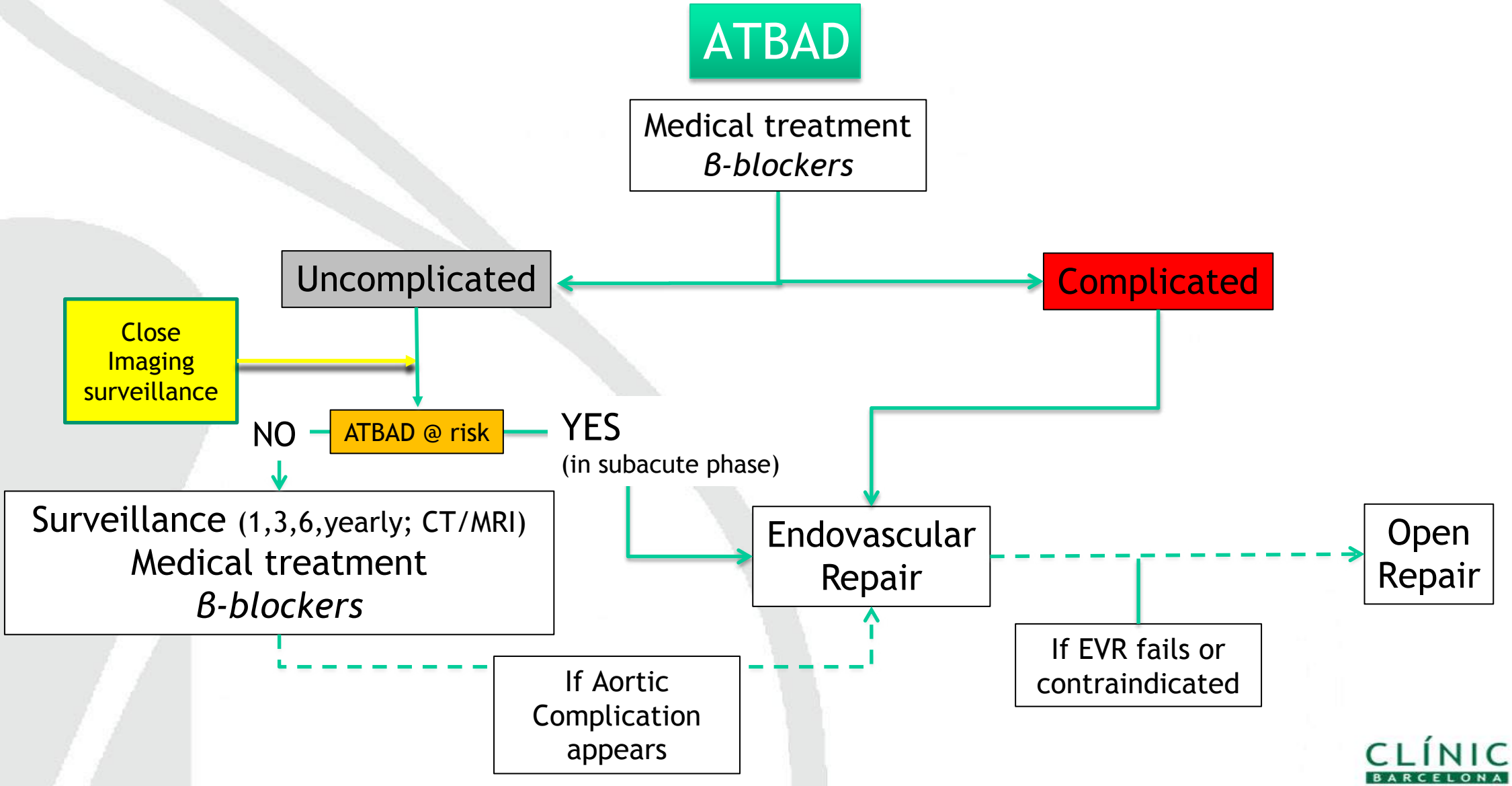
Algorithm



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Summary

- **Complicated** ATBAD **should be intervened** by endovascular means in emergency setting
- **>50%** uncomplicated ATBAD will become complicated
- Identify **ATBAD @ risk** is key: Some morphological factors have been identified
- **ATBAD @ risk** should/may be considered for endovascular repair **in acute / subacute phase according to the clinical and radiological features**
- There are some **technical rules** for a successful TEVAR
- Some procedure **limitations** and device-related complications remain to be overcome.