IV Curso "José Gabay" para Intervencionistas em Treinamento de ProEducar - SOLACI

"Management of acute aortic syndromes"

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IN PARTNERSHIP WITH TCT
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No conflicts to declare

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DEFINITION :

J Am Coll Cardiol 1998;32(1):83–89

Heart 2001;85:365–368

ISIDRE VILACOSTA and JOSÉ ALBERTO SAN ROMÁN

Editorial

Acute aortic syndrome

Although the chest pain of acute aortic dissection is widely recognised, less consideration has been given to pain associated with other aortic pathologies. In light of contemporary concepts in aortic pathology we would like to present the pathology of a new cardiovascular syndrome—acute aortic syndrome (AAS).[1]

This syndrome embraces a heterogeneous group of patients with a similar clinical profile that includes penetrating atherosclerotic aortic ulcer, intramural aortic haematoma, and the classic aortic dissection (fig 1). The physiopathological mechanism that precipitates the appearance of each of these entities is different. However, occasionally some patients exhibit several or all of these lesions, demonstrating the existence of a link between them. In such cases it is difficult to know which was the initiating event.

AAS is characterised clinically by aortic pain in a patient with a coexisting history of hypertension. In acute coronary syndromes, the existence of a typical chest pain that, since Haberden has been called angina pectoris is well

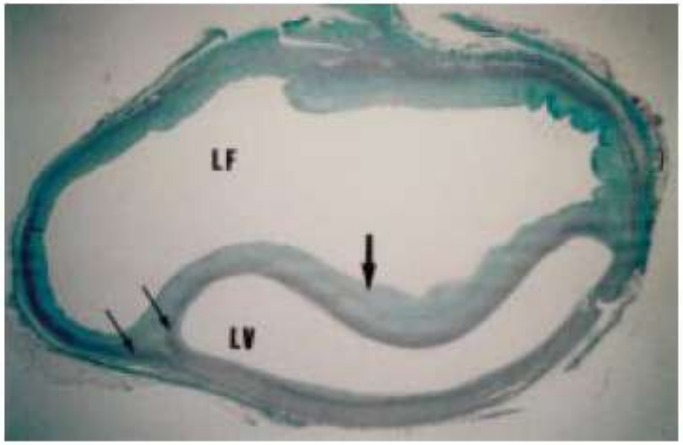

Figure 2 Histological section (Mason's technique) from a patient with aortic dissection. Muscle is stained in red and collagen in green. The aortic media (stained in red) is partitioned in two (arrows); one forms part of the dissection flap, the other forms the outer wall of the false channel. Large arrow indicates the dissection flap. LF, false lumen; LV, true lumen.

INCLUDED CONDITIONS

- ACUTE AORTIC DISSECTION
- Intra-mural haematoma (IMH)
- Penetrating ulcer (PAU)

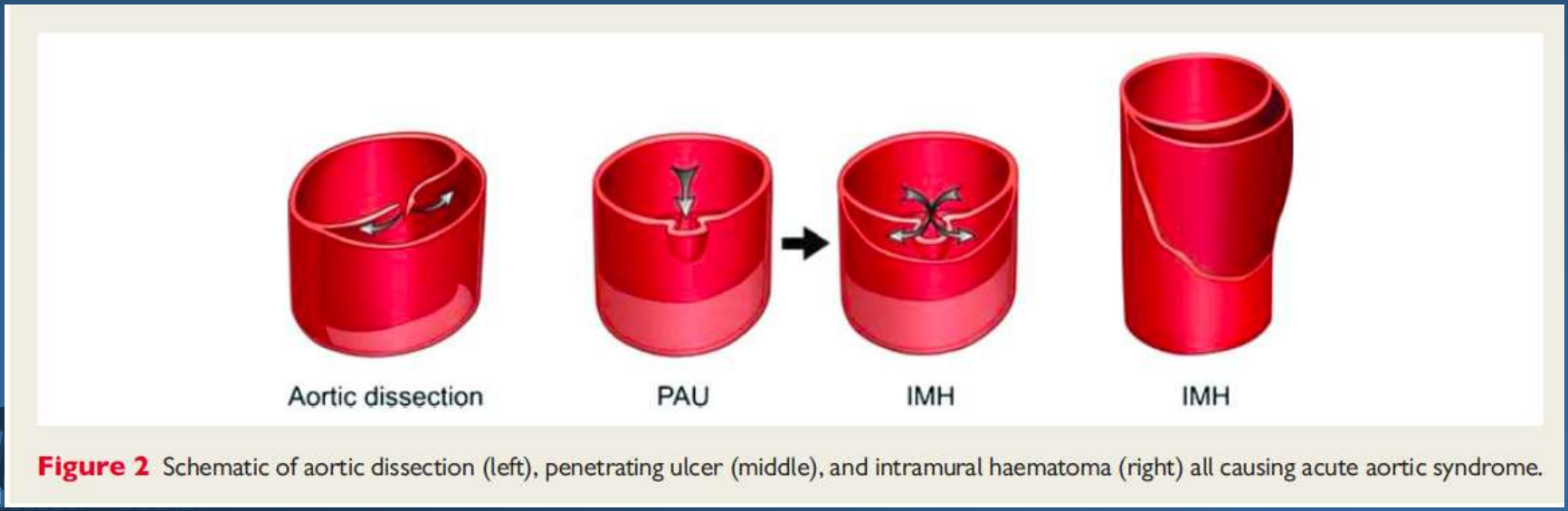

Figure 2 Schematic of aortic dissection (left), penetrating ulcer (middle), and intramural haematoma (right) all causing acute aortic syndrome.

INCLUDED CONDITIONS

- ACUTE AORTIC DISSECTION
- Intra-mural haematoma (IMH)
- Penetrating ulcer (PAU)
- Acute traumatic aortic rupture
- Ruptured aneurysm

Acute Aortic Dissection	80%
Intramural Haematoma	6-20% >asians (30-40%)
Penetrating Aortic Ulcer	2-10%

Progression between different forms is not uncommon

SAA

Classification sistems are helpfull:

- "acute" - less than 2 weeks

- Stanford's classification
- TYPE A – ascending aorta
- TYPE B – descending aorta

Clinical treatment

- large randomized controlled trials are not available in AAS→ most recommendations based on Level C evidence.
- Imediatly after suspicion
  - Anti-impulse therapy
    - betabloq/vasodilatador

Intervention

Ascending → surgical → **TEV around 30%**

Descending Aorta

INSTEAD

- non complicated Type B → medical
- Complicated → intervention Surg / TEV
  - suitable for TEV/ available team

CTAngiography is gold standard!!

- diameter and morphology;
- diameter and length of the proximal and distal necks;
- intimal flap anatomy, extent of the dissection, and true and false lumen morphologies;
- site of the primary entry tear;• re-entry site(s);
- presence of thrombus or calcifications;
- patency of the abdominal branches;
- size, tortuosity, and disease status of iliac and femoral arteries.

TECHNICAL ASPECTS
TYPE B AD

Thoracic Endovascular Aortic Repair (TEVAR) for the treatment of aortic diseases: a position statement from the European Association for Cardio-Thoracic Surgery (EACTS) and the European Society of Cardiology (ESC), in collaboration with the European Association of Percutaneous Cardiovascular Interventions (EAPCI)†

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PRACTICE GUIDELINE: EXECUTIVE SUMMARY

2010

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

A Report of 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

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Thoracic Endovascular Aortic Repair (TEVAR) for the treatment of aortic diseases: a position statement from the European Association for Cardio-Thoracic Surgery (EACTS) and the European Society of Cardiology (ESC), in collaboration with the European Association of Percutaneous Cardiovascular Interventions (EAPCI)†

Less specific anatomic requirements

TEVAR for type B aortic dissection

TEVAR is the treatment modality of choice in complicated acute type B aortic dissections.[3,27–29] The term 'complicated' means persisting or recurrent pain, uncontrolled hypertension despite full medication, early aortic expansion, malperfusion and signs of rupture (haematothorax, increasing periaortic and mediastinal haematoma).[28] Further subgroups benefiting from immediate TEVAR are being defined. In an uncomplicated type B dissection,

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In cases of penetrating aortic ulcer, treatment may be recommended, when patients are symptomatic, or the ulcer demonstrates expansion and IMH.[32] In patients with IMH, intimal lesions/laceration can often be found in the inner curvature of the aortic arch by careful CTA analysis. This may be an aim for stent-graft implantation in patients with a progressive/complicated IMH.[32]

Type B AAD
Anatomic criteria for TEV:

- 1. Proximal and distal landing zone > 20 mm
  - Short proximal neck
    - Intentional occlusion – uncovered struts
    - Branched/ chimney
    - Transposition

Type B AAD
Anatomic criteria for TEV:

- 1. Proximal and distal landing zone > 20 mm
  - S
    - Branched/ chimney
    - Transposition

PRIOR TO STENT-GRAFT COVERAGE

- *documented incomplete circle of Willis that compromises collateral flow,*
- *critical stenosis of the vertebral arteries*
- *anatomical variant of the right subclavian artery (lusorian subclavian artery)*
- *compromised collateral circulation to the left arm from variant anatomy*


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Type B AAD
Anatomic criteria for TEV:

- Short distal neck

- More difficult → oclussion of the celiac trunk is not an innocuous procedure.

- Not a problem for most AAD
- Chimneys/branched...

Type B AAD
Anatomic criteria for TEV:

2. Arterial access

diameter of the stent-graft - 18–25 Fr

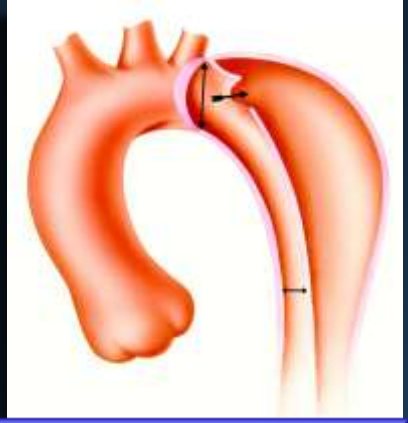
- At least 8 mm in diameter for access vessel

- surgical cutdown to expose the common femoral artery,

-completely percutaneous → percutaneous access closure devices.

-Artificial by-pass **Iliac / abdominal/etc**

Type B AAD technical aspects



midaortic arch as the target segment for measurement.

3. Sizing:

- 1 a 2 mm for AAD and variants
- 20-30% for true aneurysm

- AAD → radial force is generally sufficient to obtain good aortic wall apposition and expansion of the true lumen.
- Post dilate overlaping stents to ensure circumferential sealing between elements.

4. Controled hipotension/rapid pacing

Type B AAD technical aspects

- Length of the implant, → weighed against the risk of spinal cord ischemia.

- Extension – 20–40 mm beyond the primary intimal tear site in both the proximal and distal directions.

IMH

- 2/3 descending aorta
- Tipically related to hipertension
- Low risk of isquemic or valvular complications

Pathophysiology :rupture of the vasa vasorum that lies in the media or from hemorrhage within an atherosclerotic plaque or very low flow dissection

Intramural Hematoma and Penetrating Ulcers: Indications to Endovascular Treatment

Eggebrecht

Eur J Vasc Endovasc Surg (2009) 38, 659–665

Undetected micro tears or ulcers

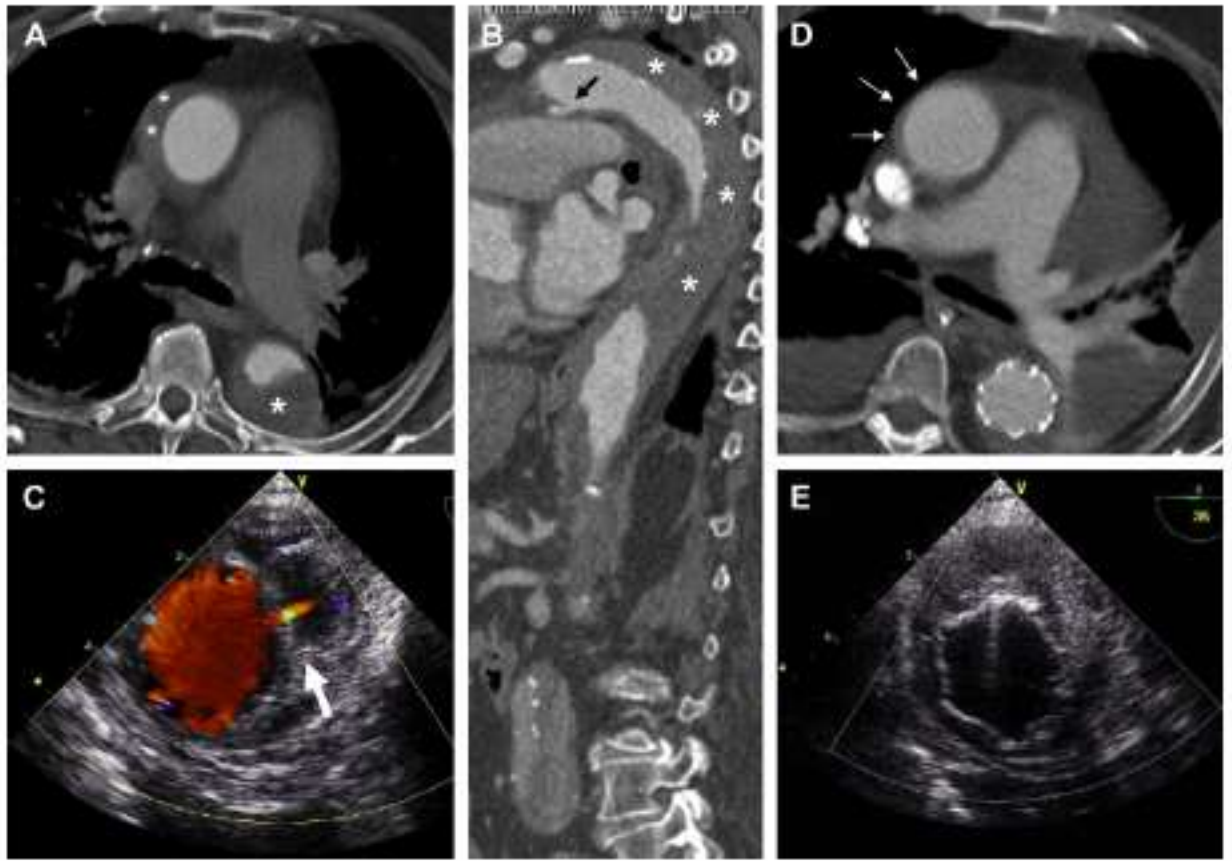


Figure 2 A. Contrast-enhanced CT of a patient presenting with acute aortic syndrome showing type A-IMH (asterisk) with evolving dissection in the descending aorta. B. Multiplanar reconstruction of the CT in parasagittal orientation delineates small intimal disruption/plaque rupture as the initial site of the IMH (arrow, asterisk-IMH). C. Transesophageal echocardiography showing active bleeding from the aortic lumen into the hematoma (arrow). D. Result after TEVAR with stent-implantation into the distal arch. Note complete reabsorption of the type A-IMH, as well as near-total resolution of descending thoracic aortic IMH. E. TEVAR result shown by intraoperative TEE, showing elimination of flow into the IMH.

IMH

- Progression to classic aortic dissection
  - 16%(IRAD) a 47%
- IRAD – Overall in-hospital mortality was not statistically different for type A IMH compared to AD
- Overall in-hospital mortality = 20%

IMH Predictors of disease progression and mortality

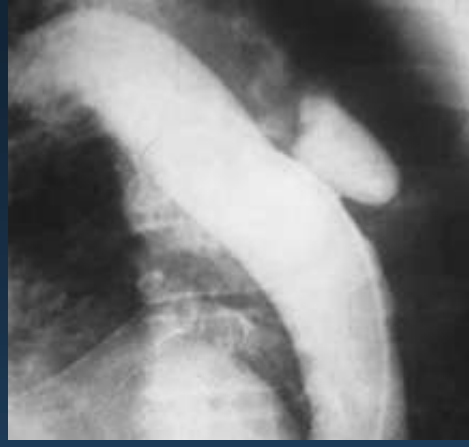
- recurrent or persistent pain,
- presence of a concomitant PAU,
- maximum aortic diameter > 45 - 50 mm
- age > 70 yo,
- thickness of the hematoma > 10 mm.

Indications for TEVAR in type B-IMH

- disease progression or evolving complications
- overt dissection and (contained) rupture
- Persistent chest pain

In general, long stent-grafts with a length of 20e25 cm should be preferred in order to cover additional intimal disruption sites.

PAU



- Most commonly → mid and distal descending thoracic aorta
- highest rate of aortic rupture: up to 42% compared with IMH or AD
- (type A PAU) rare and extremelly dangerous → imediate treatment

PAU

- Asymptomatic patients with incidentally found PAU → don't demand treatment

High risk features

- lesion size 20 mm
- depth>10 mm

Svensson et al.

Table 10. Summary of Society of Thoracic Surgeons Recommendations for Thoracic Stent Graft Insertion

Entity/Subgroup	Classification	Level of Evidence
Penetrating ulcer/intramural hematoma		
Asymptomatic	III	C
Symptomatic	IIa	C

PAU

Complications:

- Progression to IMH (vasa vasorum erosion)
- Pseudo-aneurysm
- Progression to AAD- up to 40% of patients

Intramural Hematoma and Penetrating Ulcers: Indications to Endovascular Treatment

Table 1. Overview of other published studies on TEVAR in PAU patients.

Authors	*n*	Technical success	Complete sealing of PAU	Neurologic complications	In-hospital mortality	Additional endovascular procedures required	Aorta-re mortali follow-up	)
Dake et al. 1994	5	5/5 (100%)	Not specified	0	0	0	0	11,6
Murgo et al. 1998	4	4/4 (100%)	3/4 (75%)	1 (25%)	1 (25%)	1 (25%)	1 (25%)	7,7
Brittenden et al. 1999	2	2/2 (100%)	2/2 (100%)	0	0	0	0	12
Maruyama et al. 2000	1	1/1 (100%)	1/1 (100%)	0	1 (100%)	0	Not specified	Not specified
Sailer et al. 2001	4	4/4 (100%)	4/4 (100%)	0	0	0	0	8,5
Haulon et al. 2002	2	2/2 (100%)	Not specified	0	0	Not specified	0	7,3
Pitton et al. 2002	1	1/1 (100%)	1/1 (100%)	0	0	0	0	12
Schoder et al. 2002	8	8/8 (100%)	8/8 (100%)	1 (13%)	0	0	1 (12.5%)	14,1
Kos et al. 2002	10	10/10 (100%)	9/10 (90%)	1 (10%)	0	1 (10%)	0	9
Faries et al. 2002	1	1/1 (100%)	1/1 (100%)	0	0	0	0	18
Ganaha et al. 2002	6	6/6 (100%)	6/6 (100%)	0	1 (17%)	Not specified	Not specified	Not specified
Eggebrecht et al. 2003	10	10/10 (100%)	9/10 (90%)	0	0	1 (10%)	0	24,4
Crane et al. 2003	1	1/1 (100%)	1/1 (100%)	0	0	0	0	12
Demers et al. 2004	26	26/27 (100%)	24/26 (92%)	2 (8%)	3 (12%)	1 (4%)	1 (4%)	Not specified
Eggebrecht et al. 2005	22	21/22 (96%)	21/22 (96%)	1 (5%)	0	1 (5%)	0	27
Brinster et al. 2006	21	21/21 (100%)	21/21 (100%)	0	0	Not specified	0	14,4
Dalainas et al. 2007	18	18/18 (100%)	18/18 (100%)	0	0	0	0	Not specified
Botta et al. 2008	19	18/19 (95%)	Not specified	0	2 (11%)	0	0	22
Geisbüsch et al. 2008	48	45/48 (94%)	Not specified	2 (4%)	7 (15%)	4 (9%)	0	Not specified
Total	209	204/209 (98%)	129/135 (96%)	8 (4%)	15 (7%)	9 (5%)	3 (2%)	14,3

“ideal” target

Eur J Vasc Endovasc Surg (2009) 38, 659–665

Recent data suggest that evaluation of inflammation accompanying acute aortic syndrome by PET-CT may help to identify patients at risk for disease progression

Eur J Vasc Endovasc Surg (2009) 38, 659–665

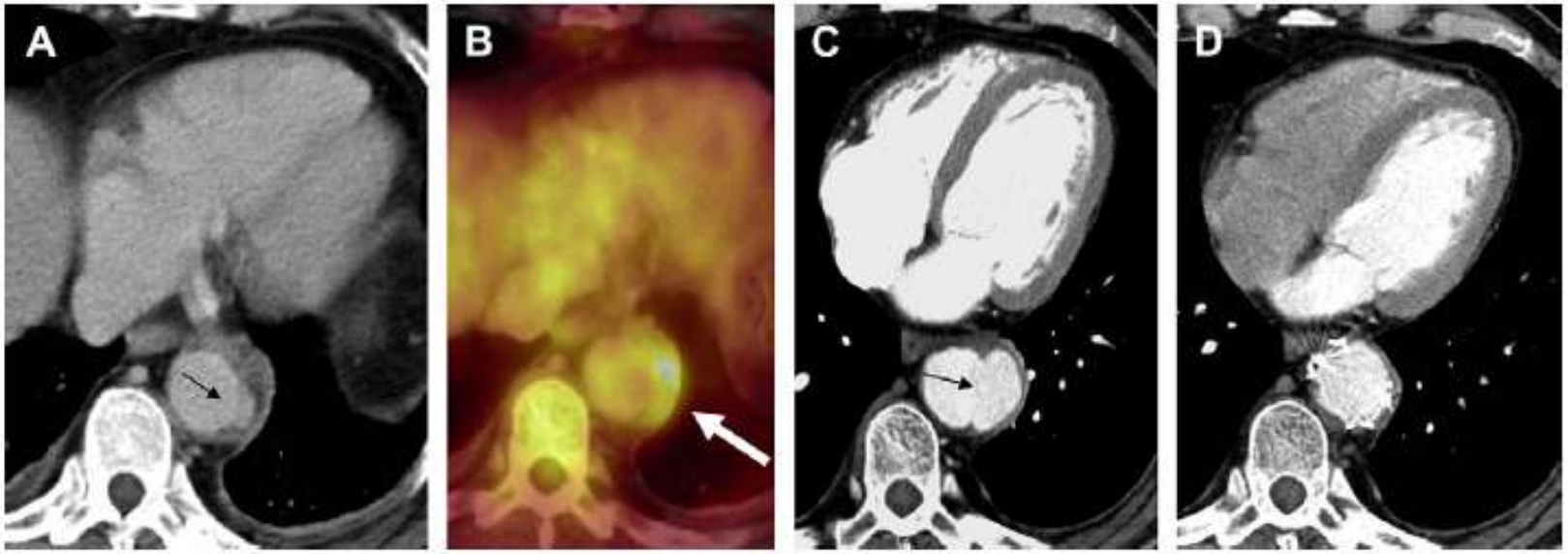


Figure 3 A. Penetrating aortic ulcer (arrow) in an acute aortic syndrome patient. B. Fused PET-CT image showing increased glucose metabolism within the PAU (arrow). C. Progression towards pseudoaneurysm formation (arrow) under medical treatment. D. Result after TEVAR with complete resolution of the ulcer.

TECHNICAL ASPECTS ACUTE TRAUMATIC AORTIC RUPTURE

Acute traumatic aortic rupture

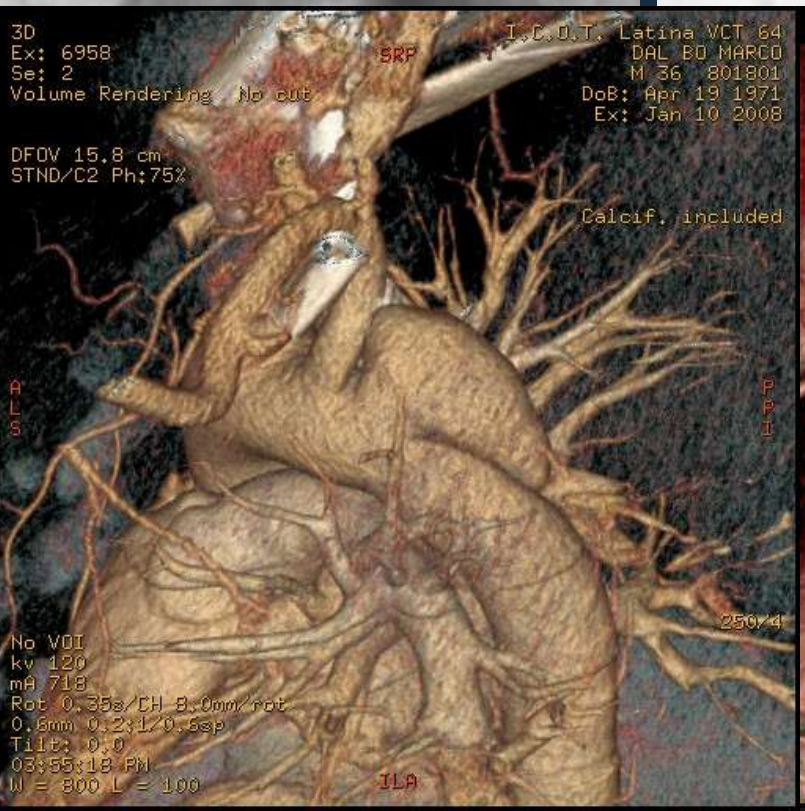
In the USA → 40 000 motor vehicle deaths annually → likely that around 8000 of the victims had aortic rupture.

Only 9–14% of the patients reach a hospital alive and only 2% ultimately survive.

Acute traumatic aortic rupture

The aortic tear is most commonly found

- 45% at the aortic isthmus,
- 23% in the ascending aorta
- 13% in the descending aorta
- 8% in the transverse aorta
- 5% in the abdominal aorta,
- 6% multiple sites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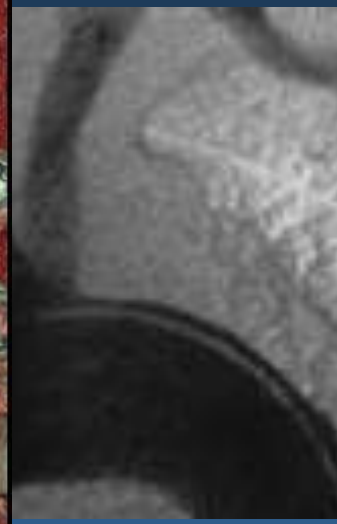

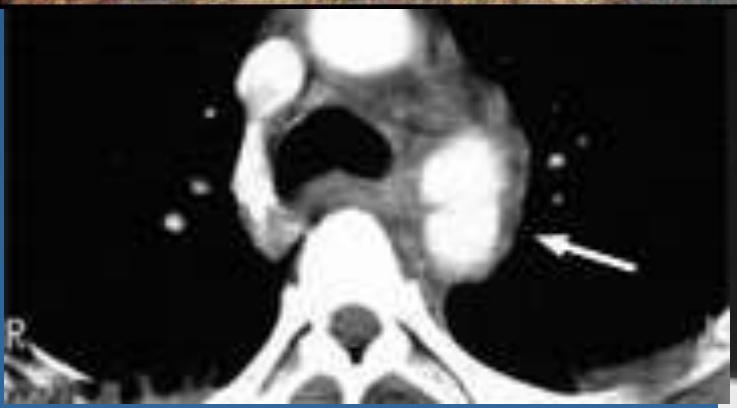
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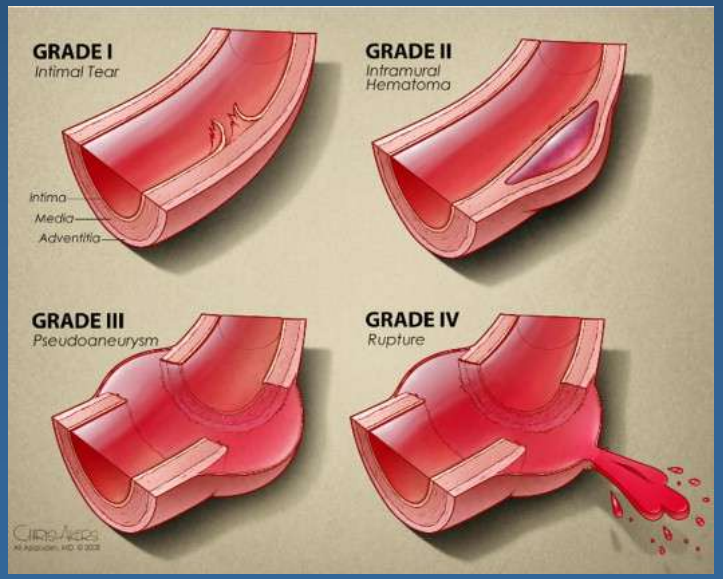
Acute traumatic aortic rupture

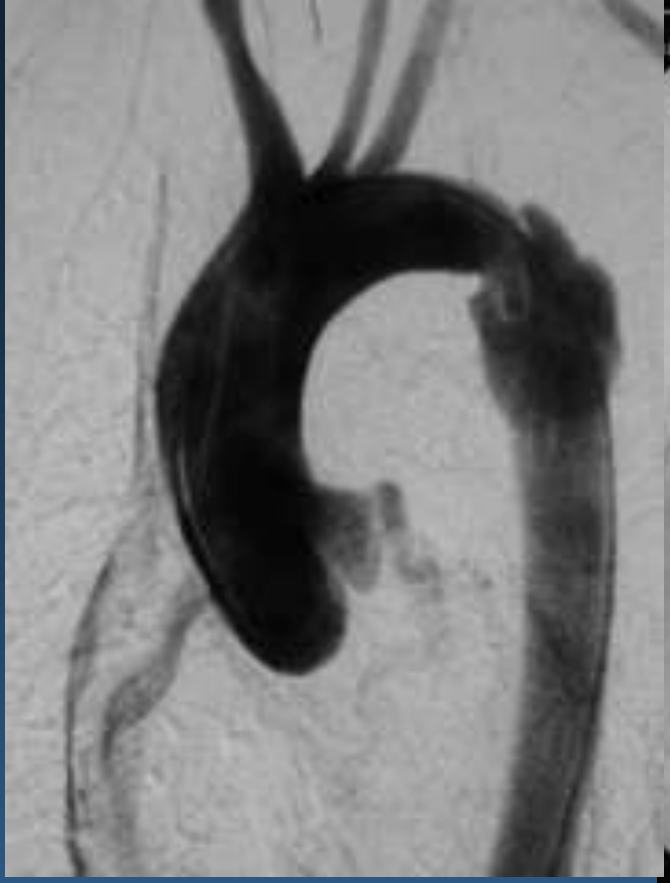
Immediate treatment

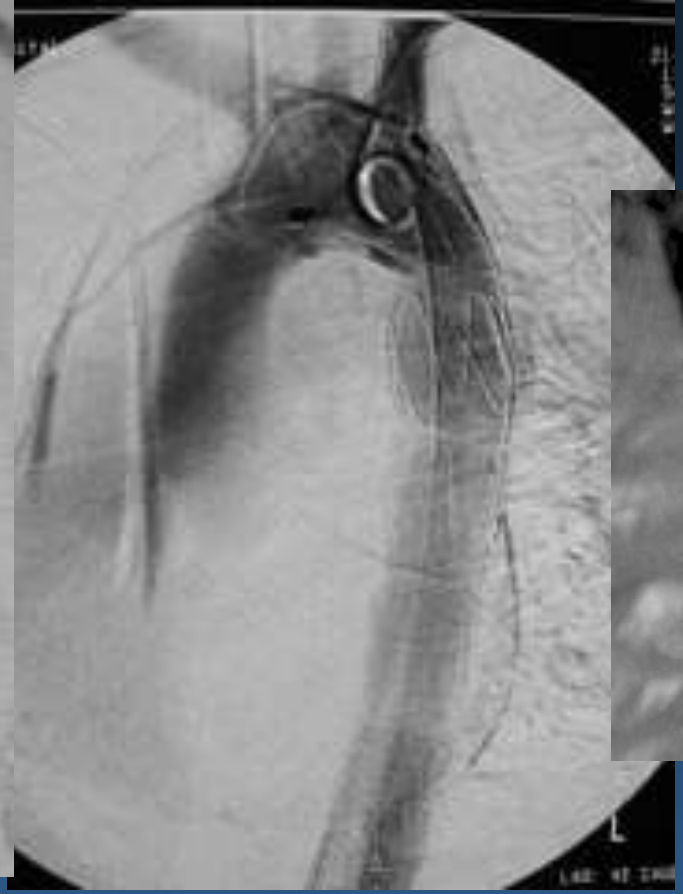
- pats with complete transsection into mediastinum
- Pseudocoarctation syndrome
- Abnormal aortic external contour

Delayed treatment

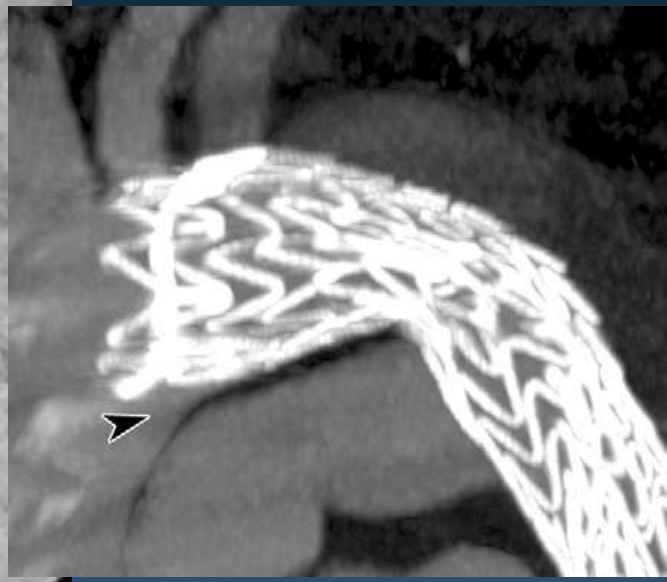
- cases where media and adventitia are intact (intimal Tear < 10 mm)





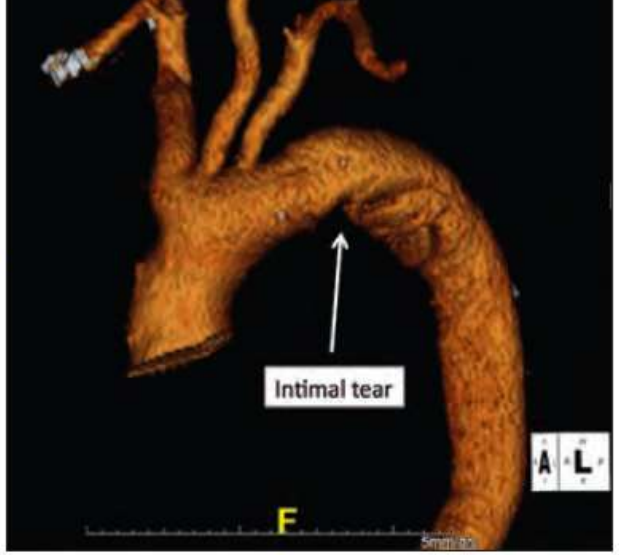


bird-beak configuration



Stent sizing – oversize 10%–20%,
Around 33% needs LSA intentional occlusion

Chalenges : small curvature aposition due to poor conformability of stiff devices in acutely angulated arches **/ small Ao diameter/**
small-diameter access vessels



Figures 1. CT with sagittal view showing the location of the intimal defect (dimensional reconstruction shows the location of the intimal defect (B).

Conformable Gore TAG®

Acute traumatic aortic rupture

	ENDOVASCULAR	SURGERY
MORTALITY	2-6%	20-40%
PARAPLEGIA	0-6%	7-15%

→ Continuous surveillance during follow-up – probably fair to increase intervals after 3 to 5 years of stable dimensions

Follow-up after TEVAR

- Life long!!
- IMEDIATELY after procedure – confirming control/exclusion
- 30 days
- 6 months/ 12 months
- Annually

Thank you!

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