ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΡΗΤΗΣ

ΚΑΡΔΙΟ- ΘΩΡΑΚΟΧΕΙΡΟΥΡΓΙΚΗ

Ενότητα: Καρδιοχειρουργικής Οξύ Αορτικό Σύνδρομο

Καμπιτάκης Εμμανουήλ
Επιμελητής Καρδιοχειρουργικής Μονάδας

Ευρωπαϊκή Ένωση
Ευρωπαϊκό Κοινωνικό Ταμείο
ΕΠΙΧΕΙΡΗΣΙΑΚΟ ΠΡΟΓΡΑΜΜΑ
ΕΚΠΑΙΔΕΥΣΗ ΚΑΙ ΔΙΑ ΒΙΟΥ ΜΑΘΗΣΗ
επένδυση στην κοινωνία της γνώσης
ΥΠΟΥΡΓΕΙΟ ΠΑΙΔΕΙΑΣ & ΘΡΗΣΚΕΥΜΑΤΩΝ, ΠΟΛΙΤΙΣΜΟΥ & ΑΘΛΗΤΙΣΜΟΥ
ΕΙΔΙΚΗ ΥΠΗΡΕΣΙΑ ΔΙΑΧΕΙΡΙΣΗΣ
ΕΣΠΑ 2007-2013
πρόγραμμα για την ανάπτυξη
ΕΥΡΩΠΑΪΚΟ ΚΟΙΝΩΝΙΚΟ ΤΑΜΕΙΟ
Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης

Άδειες Χρήσης

- Το παρόν εκπαιδευτικό υλικό υπόκειται στην άδεια χρήσης Creative Commons και ειδικότερα

Αναφορά – Μη εμπορική Χρήση – Όχι Παράγωγο Έργο v.3.0

(Attribution – Non Commercial – Non-derivatives v.3.0)

[ή επιλογή ενός άλλου από τους έξι συνδυασμούς]

[και αντικατάσταση λογότυπου άδειας όπου αυτό έχει μπει (σελ. 1, σελ. 2 και τελευταία)]

- Εξαιρείται από την ως άνω άδεια υλικό που περιλαμβάνεται στις διαφάνειες του μαθήματος, και υπόκειται σε άλλου τύπου άδεια χρήσης. Η άδεια χρήσης στην οποία υπόκειται το υλικό αυτό αναφέρεται ρητώς.

Χρηματοδότηση

- Το παρόν εκπαιδευτικό υλικό έχει αναπτυχθεί στα πλαίσια του εκπαιδευτικού έργου του διδάσκοντα.
- Το έργο «Ανοικτά Ακαδημαϊκά Μαθήματα στο Πανεπιστήμιο Κρήτης» έχει χρηματοδοτήσει μόνο τη αναδιαμόρφωση του εκπαιδευτικού υλικού.
- Το έργο υλοποιείται στο πλαίσιο του Επιχειρησιακού Προγράμματος «Εκπαίδευση και Δια Βίου Μάθηση» και συγχρηματοδοτείται από την Ευρωπαϊκή Ένωση (Ευρωπαϊκό Κοινωνικό Ταμείο) και από εθνικούς πόρους.

Acute Aortic Syndrome (AAS)

- The term Acute Aortic Syndrome (**AAS**) is used to describe the following acute aortic pathologies: classic Aortic Dissection (**AD**) , Intramural Hematoma (**IMH**), Penetrating Aortic Ulcer (**PAU**) and incoplete dissection (**ID**)
  Clinically these conditions are indistinguishable.

*ID laceretion of aortic wall without dissection fo aortic media

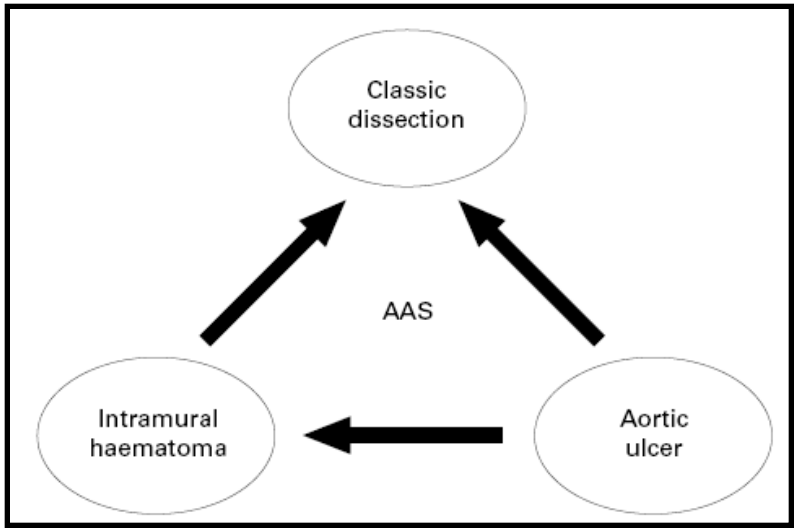
Acute Aortic Syndrome (AAS)

- The pathophysiological mechanism that precipitates the appearance of each of these entities is different.

Acute Aortic Syndrome (AAS)

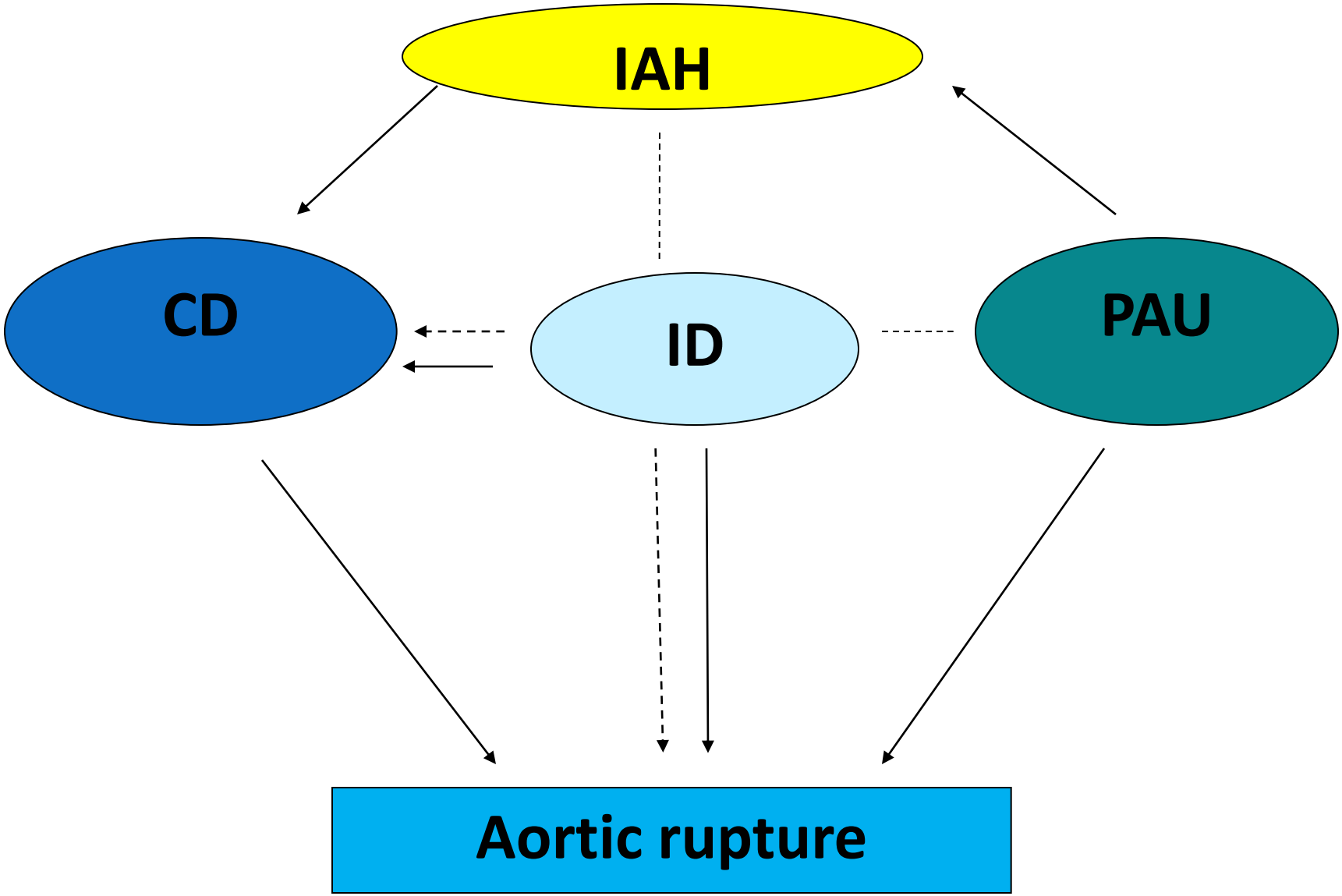
- Στο οξύ αορτικό σύνδρομο περιλαμβάνονται ασθενείς με διαφορετικές παθήσεις που όμως έχουν κοινή κλινική εικόνα.
- Ο παθογενετικός μηχανισμός είναι διαφορετικός σε αυτές τις 4 καταστάσεις όμως σε έναν ασθενή μπορεί να συνυπάρχουν παραπάνω από μία βλάβες – σύνδεσμος μεταξύ τους.

Acute Aortic Syndrome (AAS)



Acute Aortic Syndrome (AAS)

- **IAH** may in same patient evolve in to **CD**, that many cases of **PUA** are accompanied by same degree of intramural hemorage and that occasionally ulcers may acts as tha entrace tears of **AD**.


IAH
CD
ID
PAU
Aortic rupture

Acute Aortic Syndrome (AAS)

- AAS is the most frequently fatal condition in the spectrum of patients with chest pain.

- Patients with AAS are characterized by aortic pain and a long standing history of severe hypertension.

- A severely intense acute tearing or ripping, pulsating and migratory chest pain suggests that the patient might have AAS.

Acute Aortic Syndrome (AAS)

- Pain from AAS has a sudden onset with maximal intensity often at the time of onset in contrast in contrast with the more gradual increasing intensity of pain due to coronary syndromes.

- The acute rise in plasma concentrations of D-dimer and the absence of ECG changes favour the presence of AAS.

- On the contrary the increase of myocardial enzymes with ECG changes are indicative of acute coronary syndrome.

Acute Aortic Syndrome (AAS)

- The acute rise in plasma concentrations of D-dimer and the absence of ECG changes favour the presence of AAS.

- On the contrary the increase of myocardial enzymes with ECG changes are indicative of acute coronary syndromes.

- Acute coronary syndromes maybe associated with / or result from AAS.

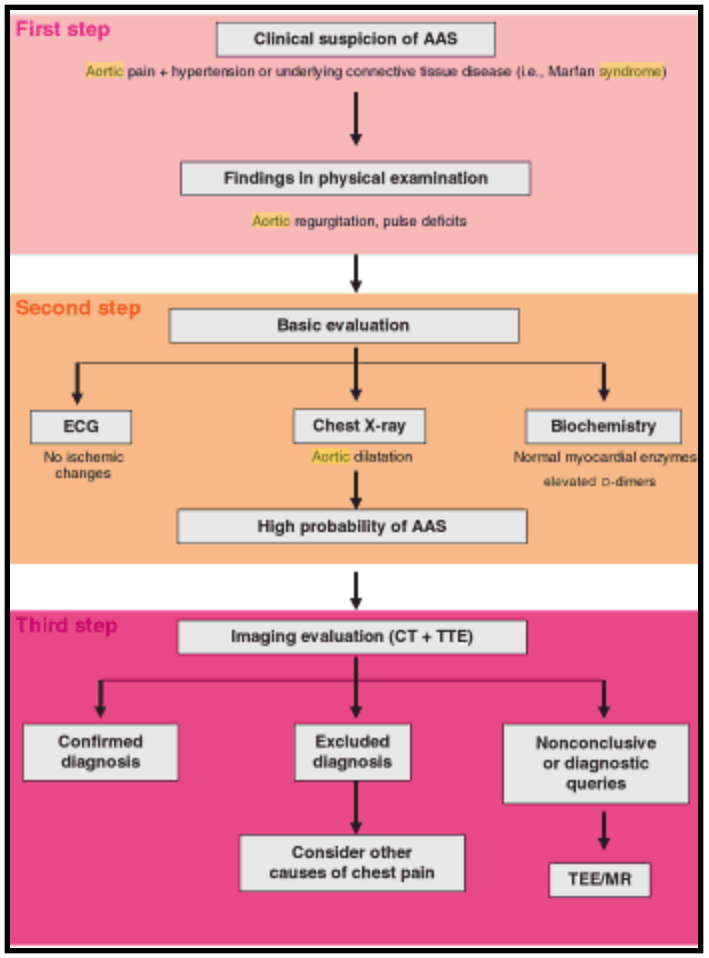
Acute Aortic Syndrome (AAS)

- Levels of D-dimers correlate significantly with the extension of the disease and are higher in patients with CD than in those with IAH.

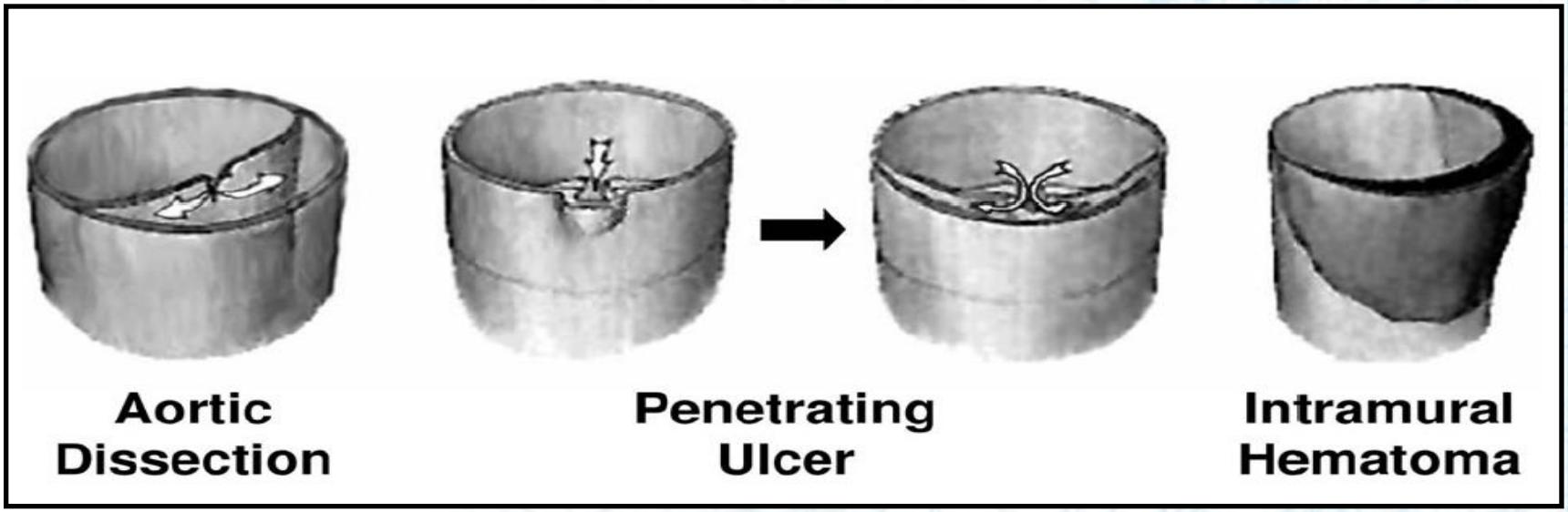
- Raised levels of D-dimers cannot distinguish between AAS and pulmonaty embolism.

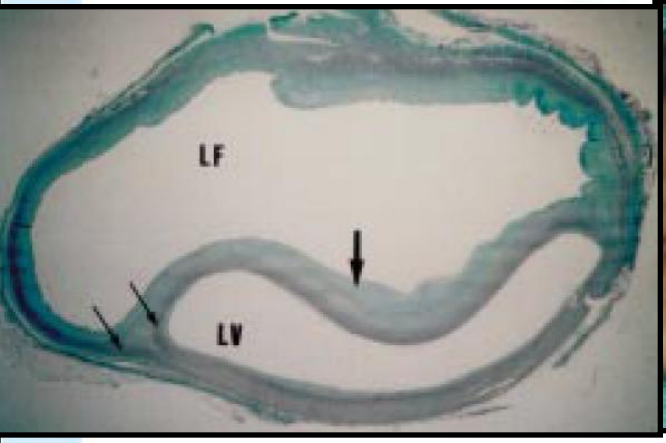
- It is important to remember that a normal chest radiograph does not exclude the presence of AAS.

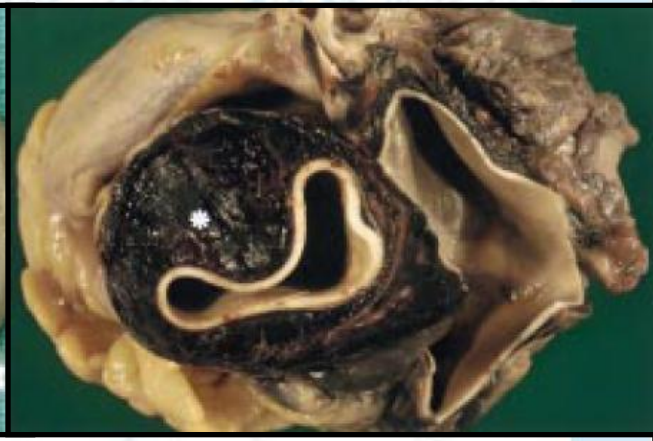
Diagnostic workup for assessing patients with suspected acute aortic syndrome



- Classic Aortic Dissection (AD),
- Intramural Hematoma (IMH) and
- Penetrating Aortic Ulcer (PAU) are distinct entities, but closely related.

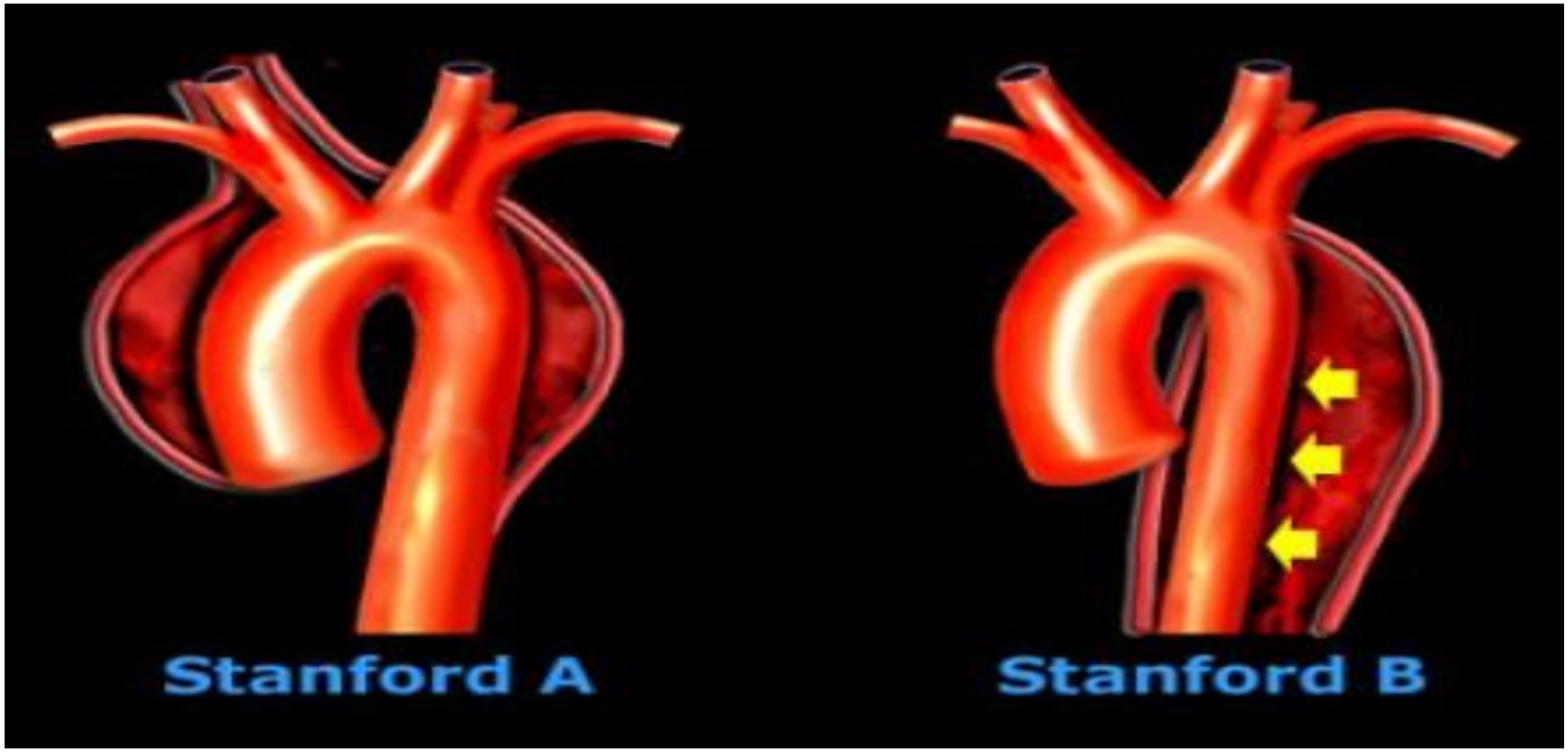

Aortic
Dissection
Penetrating
Ulcer
Intramural
Hematoma


LF
LV



Stanford classification

The Acute Aortic Syndrome (AAS) is classified according to Stanford.



- Stanford Type A lesions involve the ascending aorta and aortic arch and may or may not involve the descending aorta.
- Stanford Type B lesions involve the thoracic aorta distal to the left subclavian artery

Classic Aortic Dissection (AD)

Classic Aortic Dissection (AD)

- Frequently exhibits the presence of an intimomedial flap and an entrance tear.
- Is characterized by a separation of the aortic media of variable longitudinal and circumferential extension.
- The outer part of the aortic media with the adventitia will form the false channel outside wall, whereas the rest of the media with the intimal layer will form the intimomedial flap.

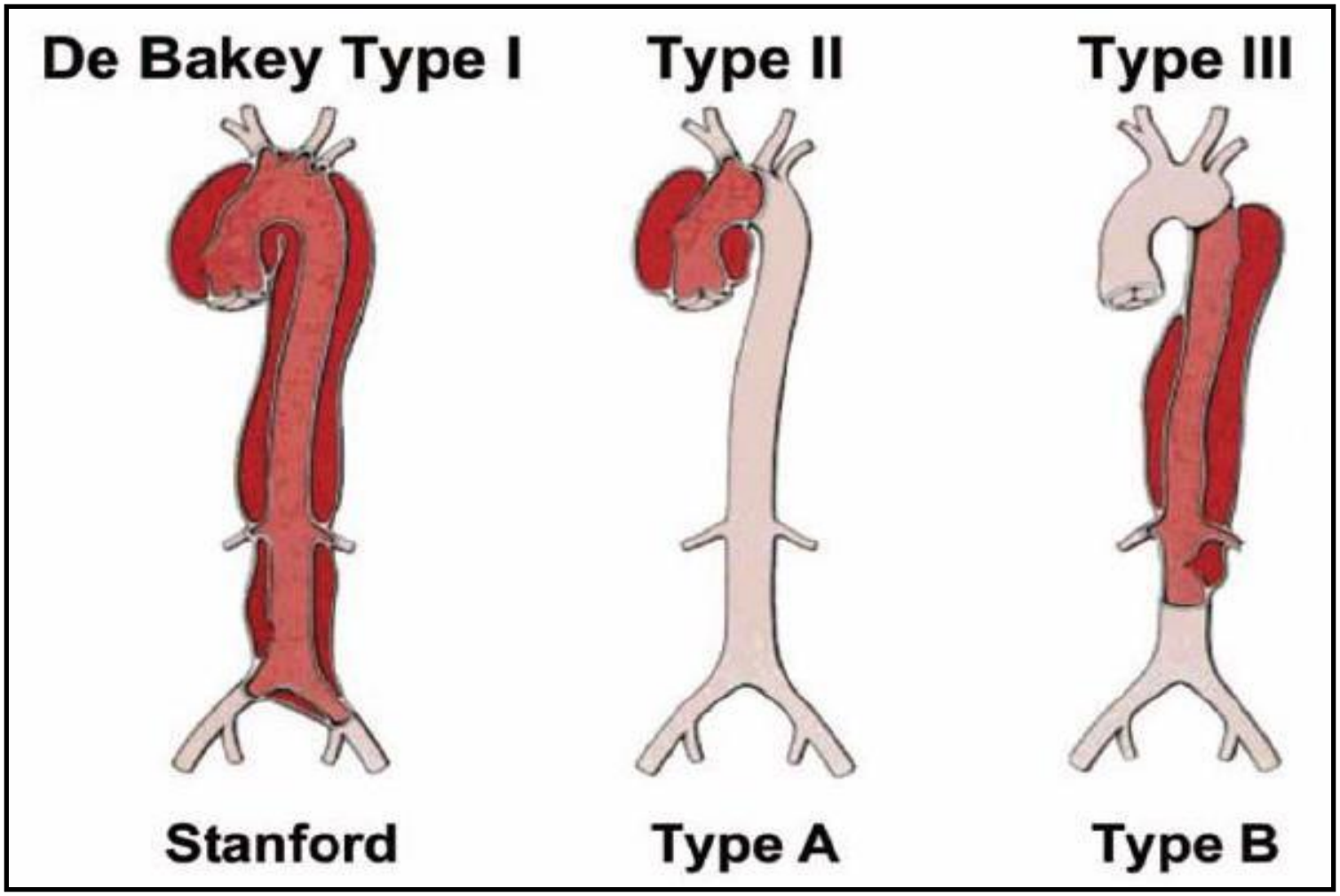
Classic Aortic Dissection (AD)

- The proportion of media that remains at the external wall of the false channel differ but will be a determinant factor.
- The entrance tear will be most frequently found at the areas of the greatest hydraulic stress.
- Many patients will also have a re-entrance tear and several communicating points between the true and false lumen.

Classic Aortic Dissection is the most common entity causing an acute aortic syndrome (70%)

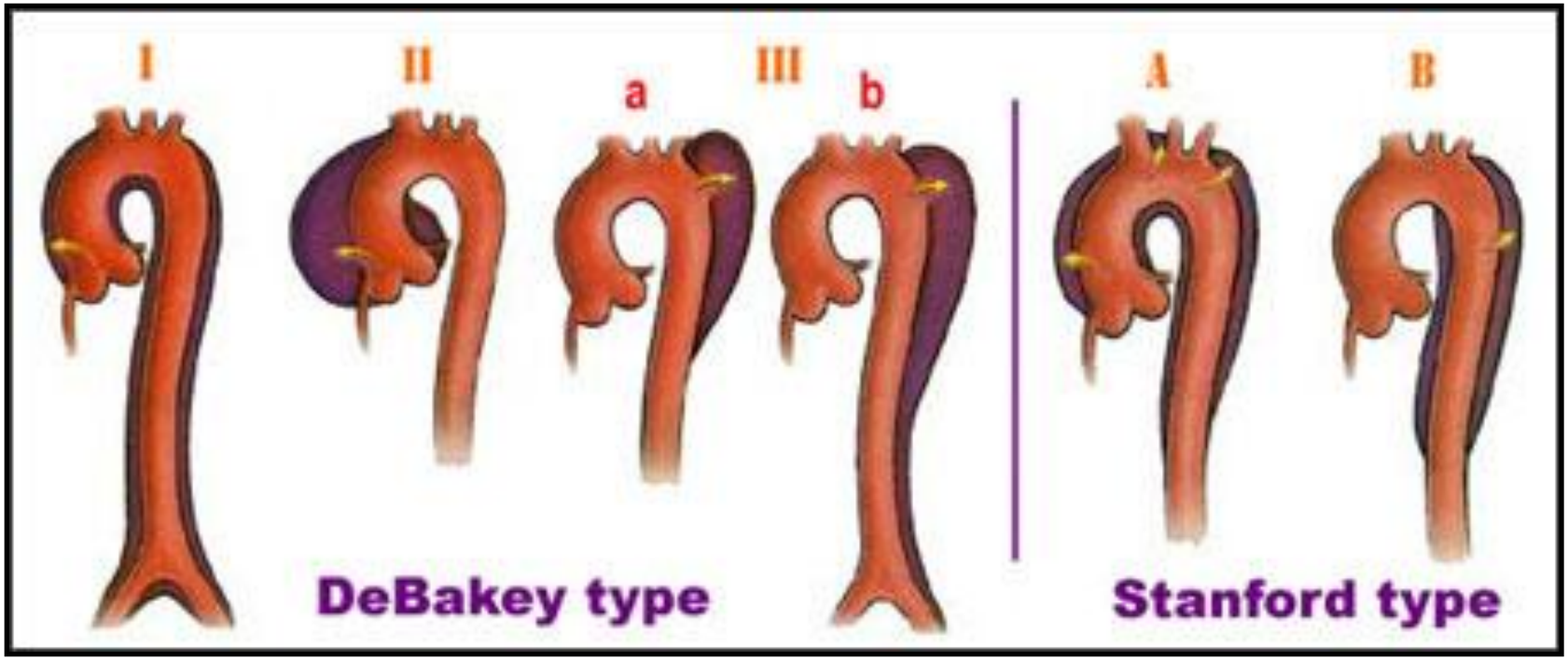
- Incidence: 1-10 : 100.000
- mostly men
- rarely
- hypertension > 70%
- Type A mortality 1-2% per hour after onset of symptoms, total up to 90% non-treated, 40% when treated.
- 1 year survival Type B up to 85% if medically treated (5 year > 70%)

ΔΙΑΧΩΡΙΣΜΟΣ ΑΟΡΤΗΣ

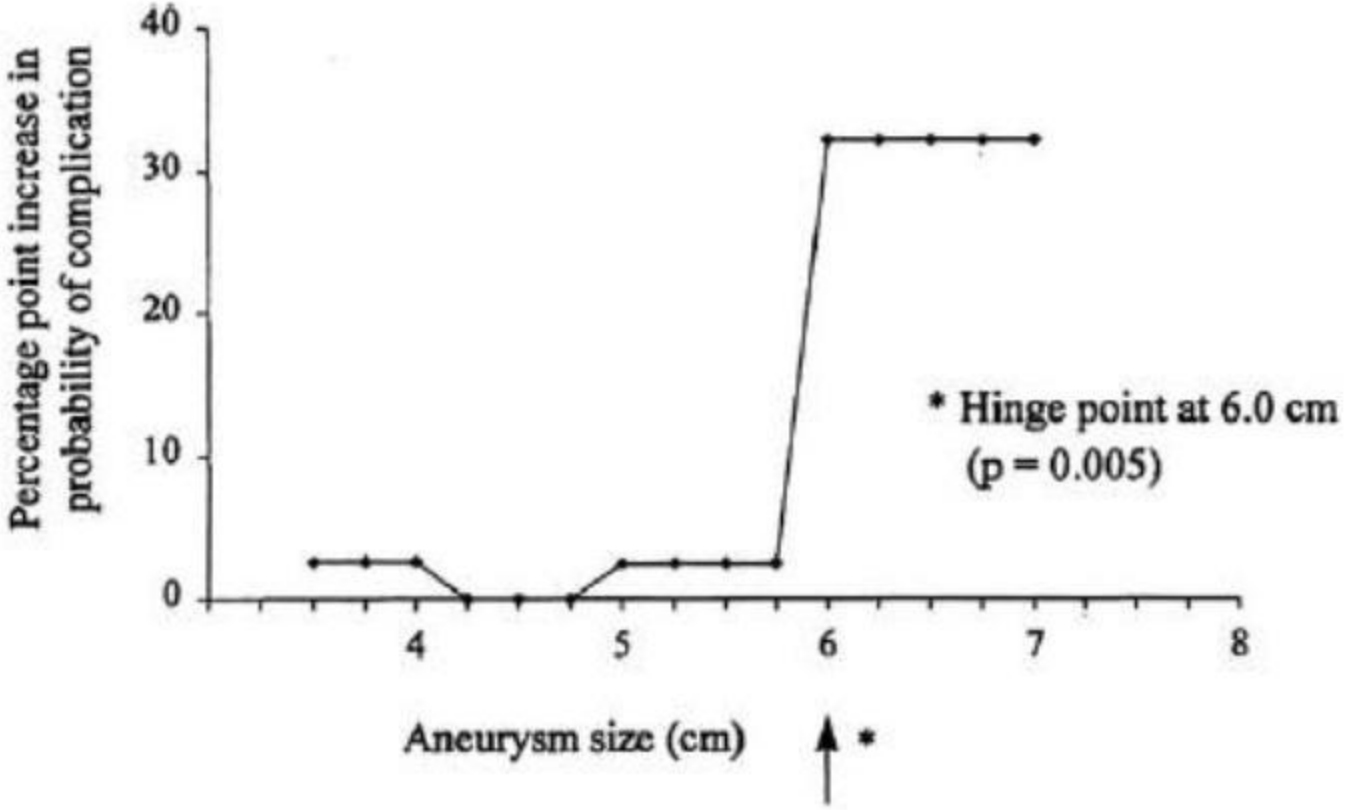


ΔΙΑΧΩΡΙΣΜΟΣ ΑΟΡΤΗΣ

Αποκόλληση μέρους του τοιχώματος (έσω και τμήμα του μέσου χιτώνα) και είσοδος αίματος εντός του τοιχώματος, με σχηματισμό flap και διαίρεση της αορτής σε δύο αυλούς



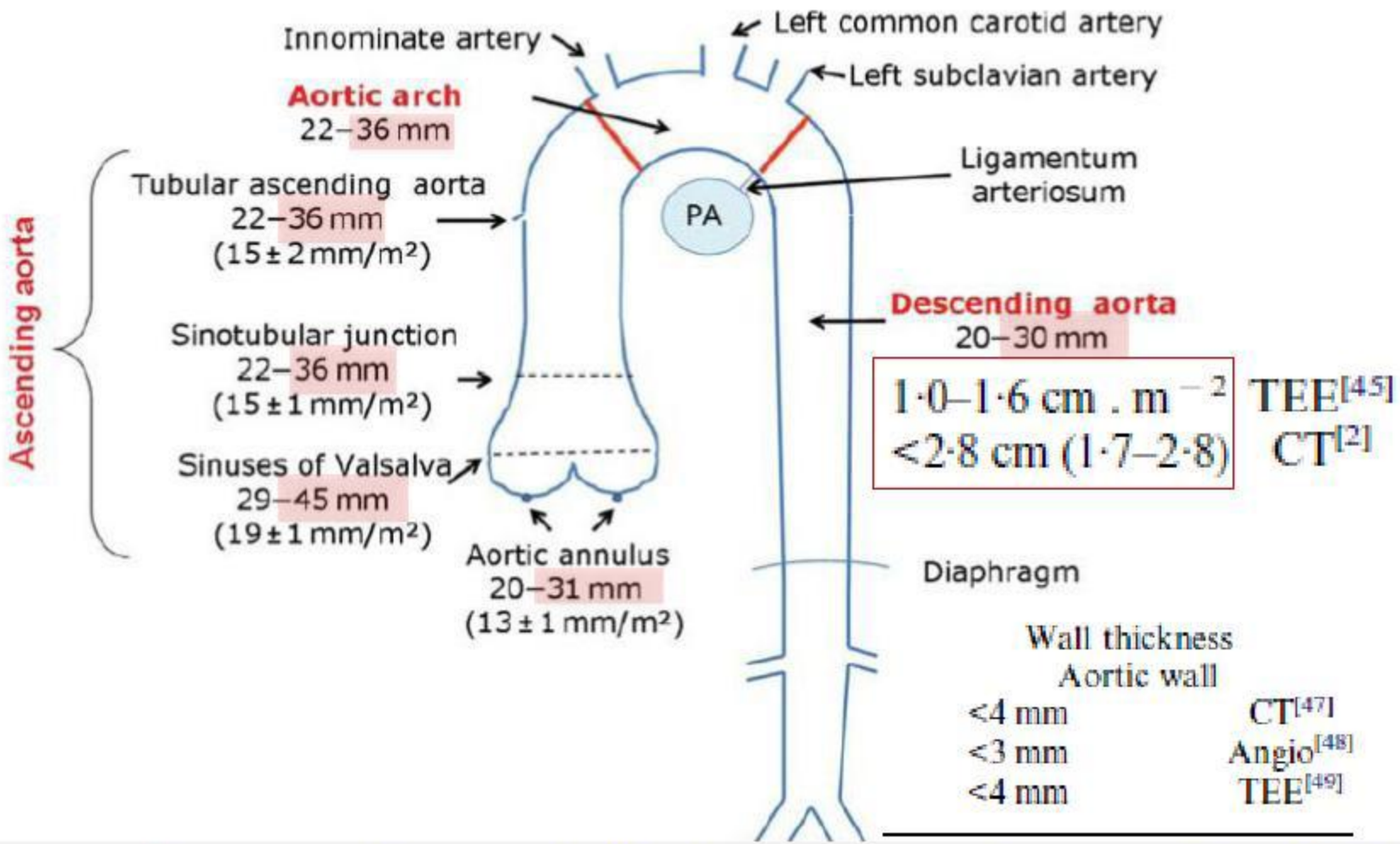
Effect of aortic aneurysms diameter on risk of complication



Estimated effect of ascending aortic aneurysm size on risk of complication.

Elefteriades et al. Ann Thorac Surg. 2002;74:S1877– 80.

Echocardiography in aortic diseases: EAE recommendations for clinical practice



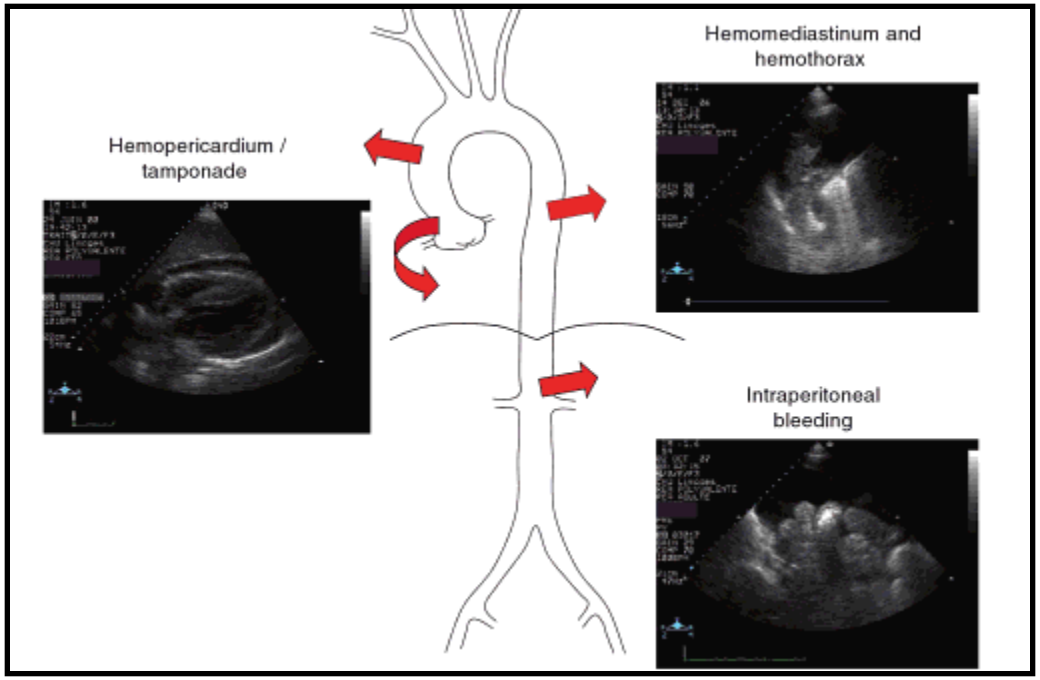
ascending aorta diameter (adults) : upper normal range - 2.1cm/m2

European Journal of Echocardiography (2010) **11**, 645–658

Diagnosis of AD

- The existence of an aortic flap and the presence of the double-channel aorta in CT, MRI and TOE.

Diagnostic field of echocardiography in pts with circulatory failure associated with acute aortic syndrome

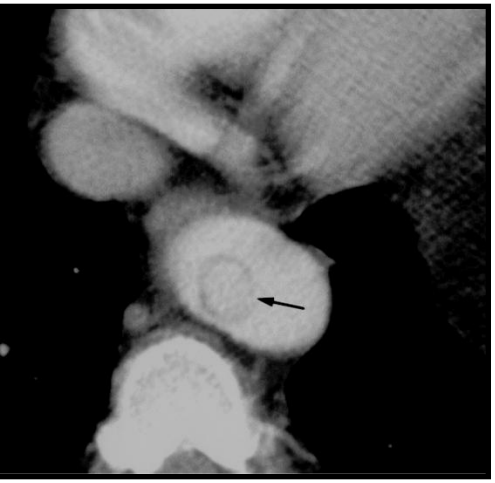


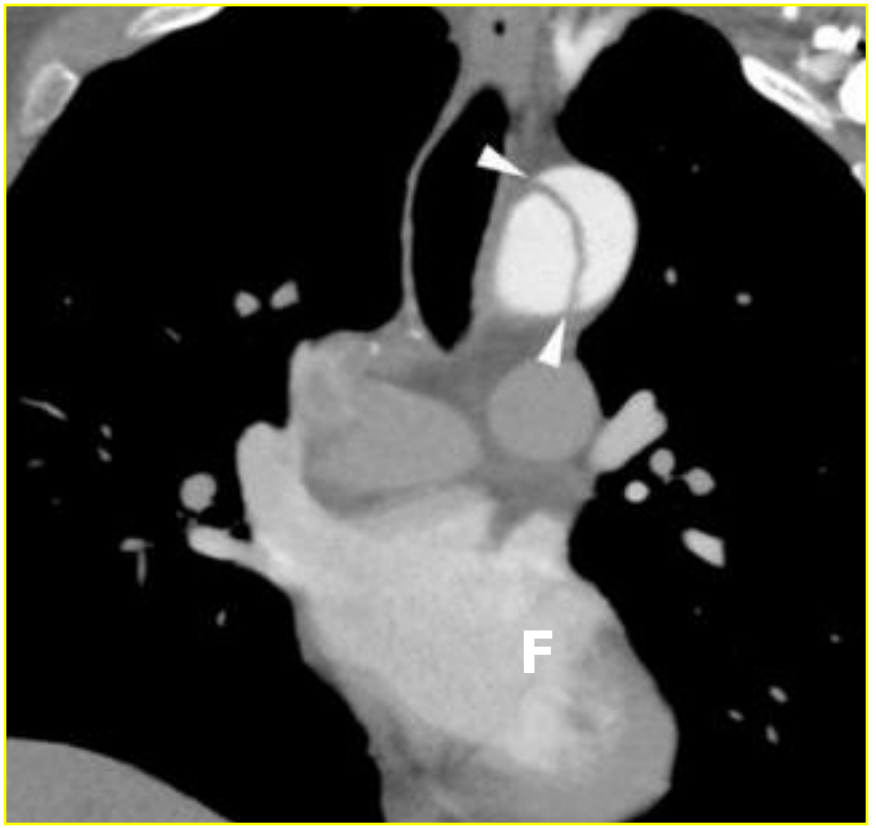
ΔΙΑΚΡΙΣΗ ΑΛΗΘΟΥΣ – ΨΕΥΔΟΥΣ ΑΥΛΟΥ ΑΠΕΙΚΟΝΙΣΤΙΚΑ ΣΗΜΕΙΑ

- ΤΟ ΠΛΕΟΝ ΑΞΙΟΠΙΣΤΟ: Κατάδειξη συνέχειας του αληθούς αυλού με το ανέπαφο τμήμα της αορτής
- ΣΗΜΕΙΟ ΡΑΜΦΟΥΣ
- COBWEBS
- ΜΕΓΑΛΥΤΕΡΗ ΔΙΑΜΕΤΡΟΣ
- ΟΤΑΝ ΕΝΑΣ ΑΥΛΟΣ ΠΕΡΙΒΑΛΛΕΙ ΤΟΝ ΑΛΛΟ
- ΕΠΑΣΒΕΣΤΩΣΗ ΕΞΩΤΕΡΙΚΟΥ ΤΟΙΧΩΜΑΤΟΣ
- ΕΚΚΕΝΤΡΗ ΕΠΑΣΒΕΣΤΩΣΗ ΤΟΥ FLAP
- ΕΝΔΟΑΥΛΙΚΟΣ ΘΡΟΜΒΟΣ
- Intimomedial tear from true to false lumen (8%, Kapoor2004)

LePage,2001

Beak sign- Σημείο ράμφους: στον ψευδή αυλό
~100% ειδικότητα και ευαισθησία





Όταν ένας αυλός περιβάλλει τον άλλο: ο κεντρικός είναι *πάντα* ο αληθής

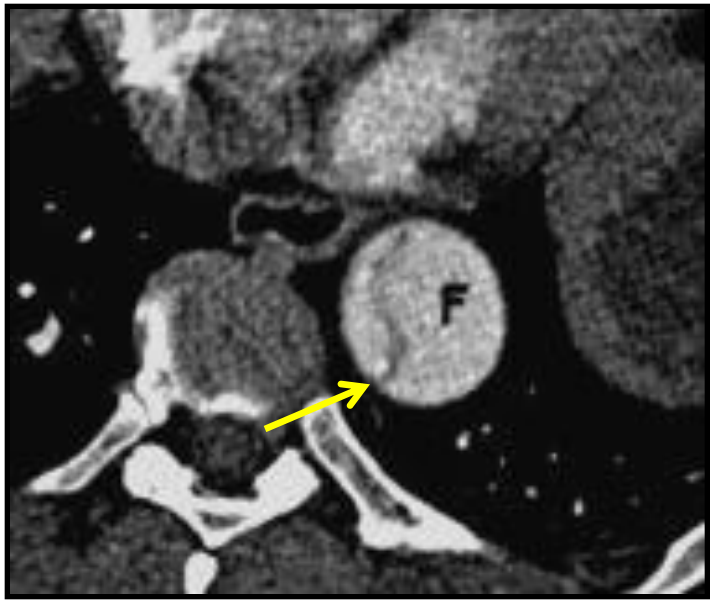
Cobwebs

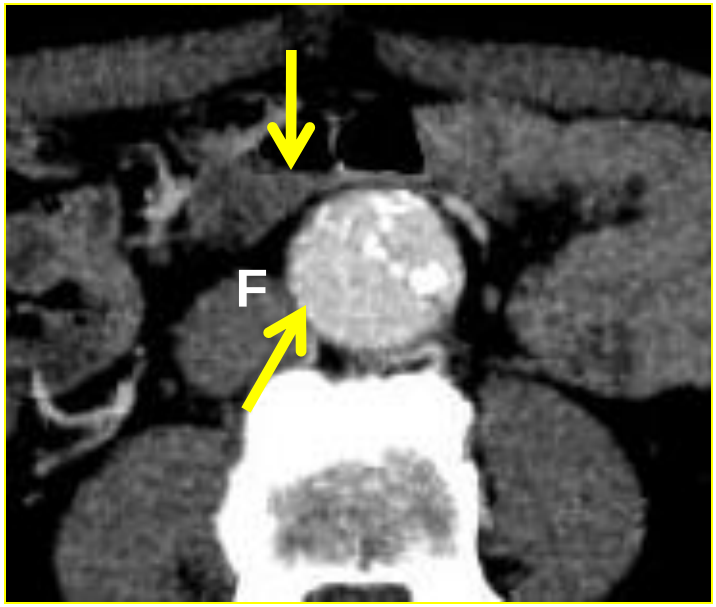
Μεγαλύτερη διάμετρος: ψευδής αυλός
(σε οξύ και χρόνιο) στο ½ έως ¾ του μήκους του διαχωρισμού

- Νηματοειδή τμήματα του μέσου χιτώνα, που δεν έχουν πλήρως αποσχιστεί
- Εντοπίζονται στον ψευδή αυλό
- Είναι ειδικό σημείο αλλά σπάνιο (9% σε οξύ / 17% σε χρόνιο)

Έκκεντρη επασβέστωση του flap στην πλευρά του αληθούς αυλού

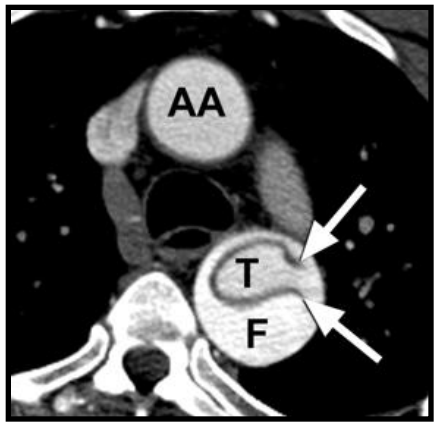
Περιφερική επασβέστωση του τοιχώματος στον αληθή αυλό σε οξύ διαχωρισμό

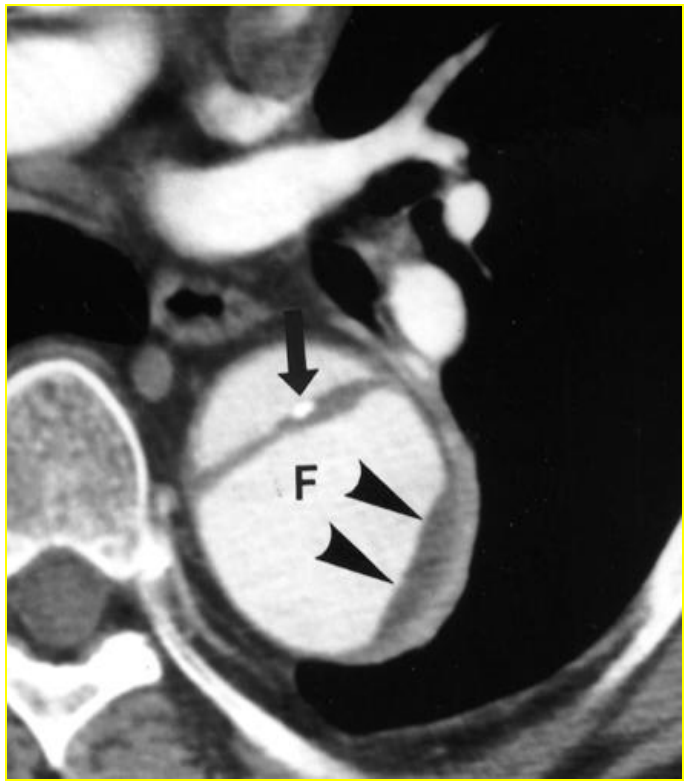




Σχάση του flap προς το τοίχωμα κατεύθυνση προς τον ψευδή αυλό (intimomedial tear)

Ενδοαυλικός θρόμβος στον ψευδή αυλό (83% σε χρόνιο)
Τάση προς θρόμβωση εμφανίζει ο ψευδής αυλός (τόσο στην οξεία όσο και στη χρόνια φάση)





AD evolutive patterns

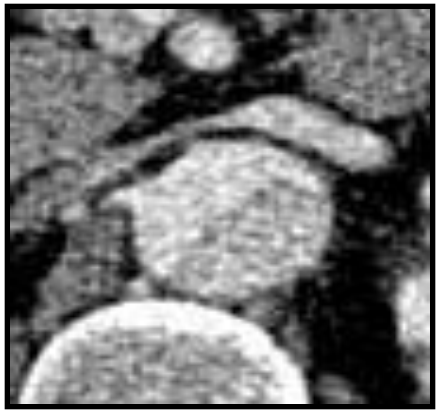
- Early rapture of the false channel external wall is fatal and usually located in the ascending aorta nearby the entrance tear and therefore is often complicated with haemopericardium and tamponade.

- Periaortic haematoma is due to slow oozing from the dissected aorta and is believed to be an harbinger of impending rupture. These patients present with haemodynamic instability.

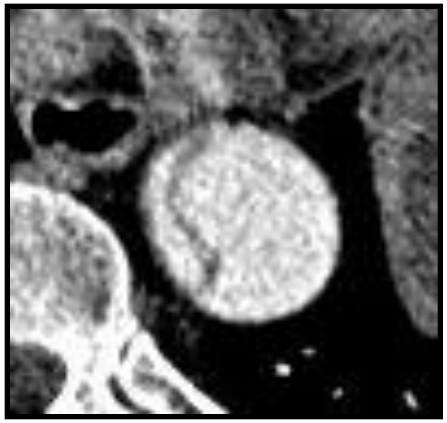
- Acute compression of the true lumen entails a dismal prognosis.

ΕΠΗΡΕΑΣΜΟΣ ΣΠΛΑΓΧΝΙΚΩΝ ΚΛΑΔΩΝ

- Η διαταραχή αιμάτωσης αφορά κατά κανόνα τα αγγεία που αναδύονται από τον αληθή αυλό
  - Στατική απόφραξη: το flap επεκτείνεται στην ανάδυση του αγγείου
  - Δυναμική απόφραξη: το flap επικαλύπτει την ανάδυση του αγγείου, χωρίς να εισέρχεται στον αυλό, προκαλώντας απόφραξη κατά τη συστολή

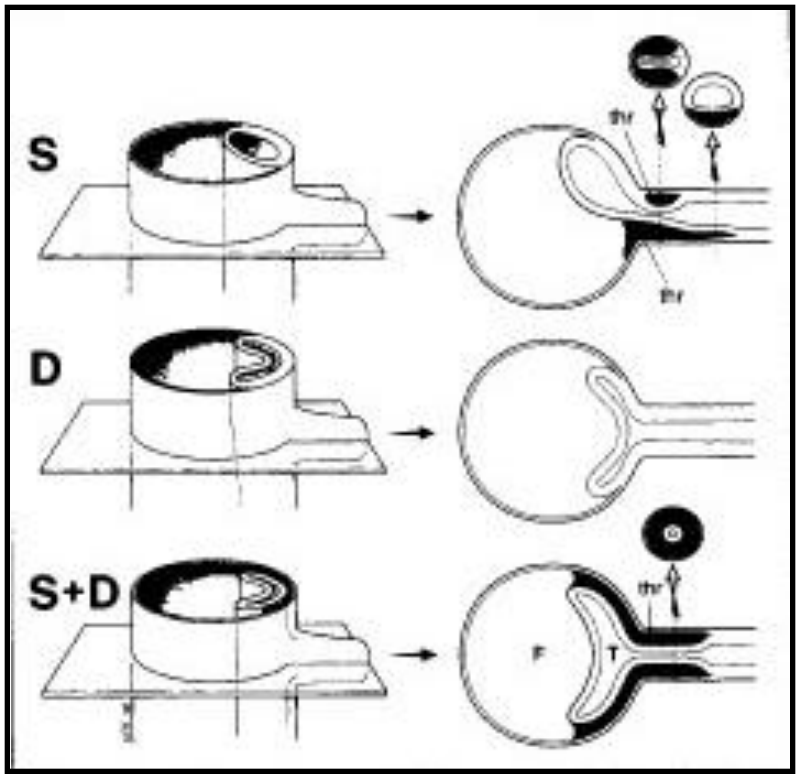


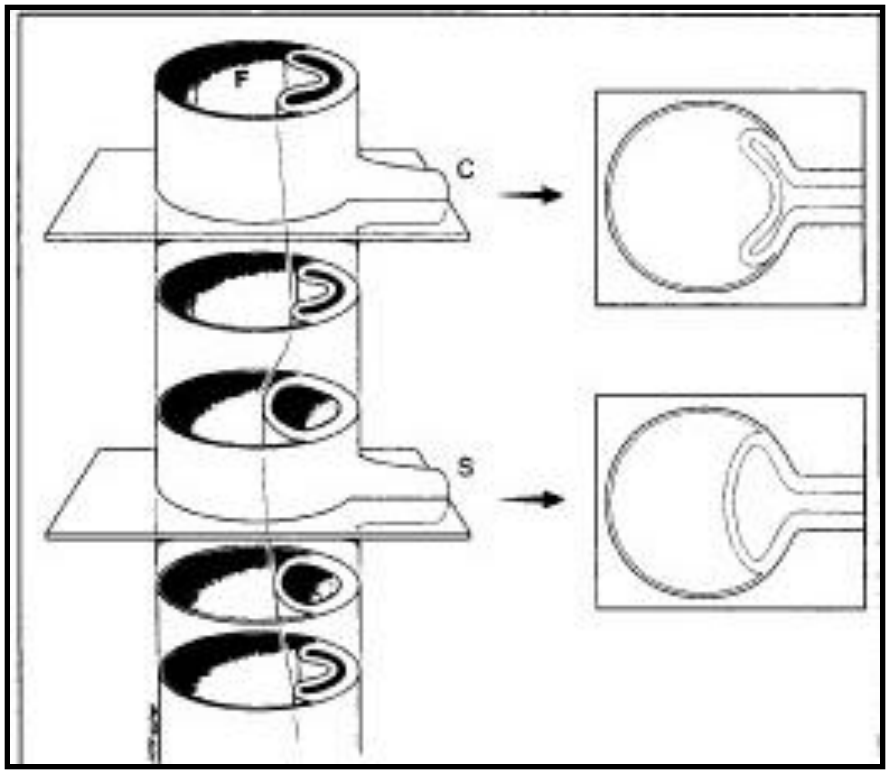
Καλοήθης διαμόρφωση



Κακοήθης διαμόρφωση

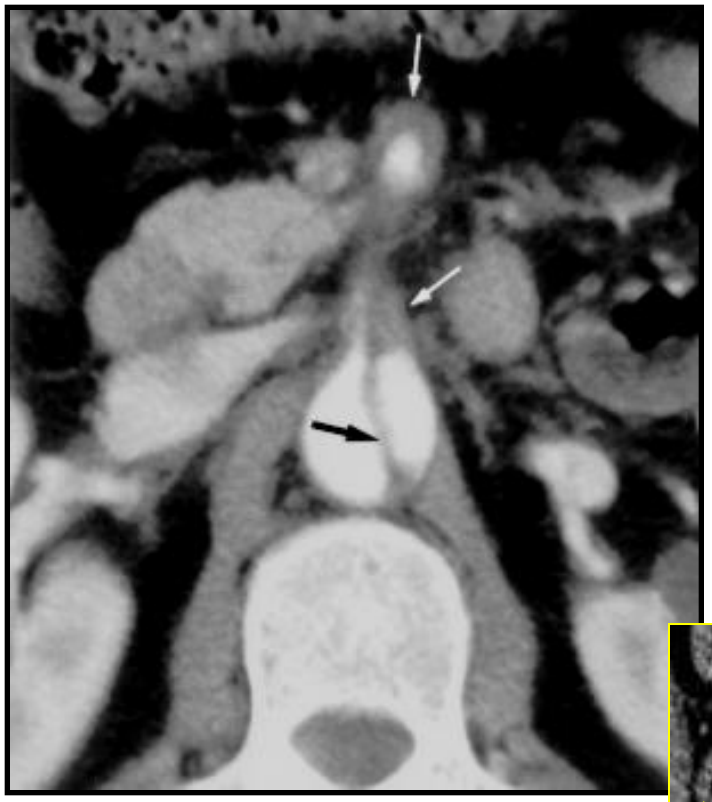
- Στατική απόφραξη: το flap επεκτείνεται στην ανάδυση του αγγείου
- Δυναμική απόφραξη: το flap επικαλύπτει την ανάδυση του αγγείου, χωρίς να εισέρχεται στον αυλό, προκαλώντας απόφραξη κατά τη συστολή
- (Δυναμική απόφραξη στη θωρακική αορτή μπορεί να επηρεάσει αιμοδυναμικά τους κλάδους της κοιλιακής αορτής)



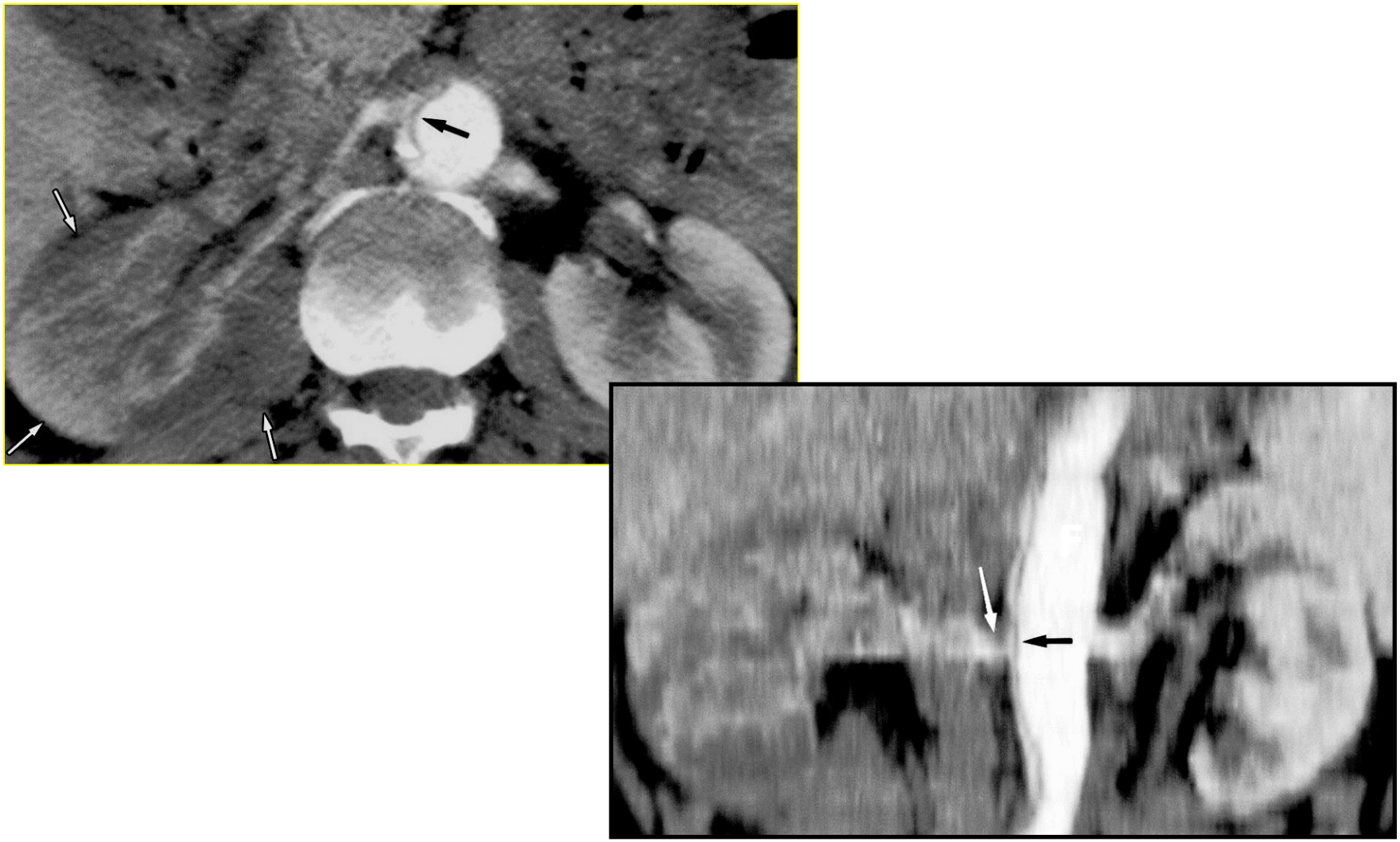


Williams,1997

Στατική απόφραξη

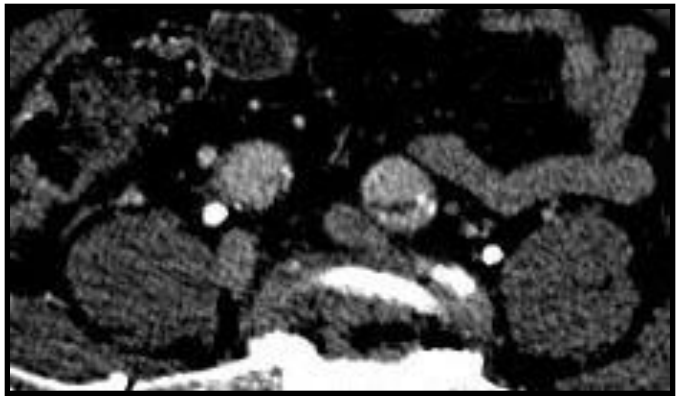


Αιμοδυναμική απόφραξη



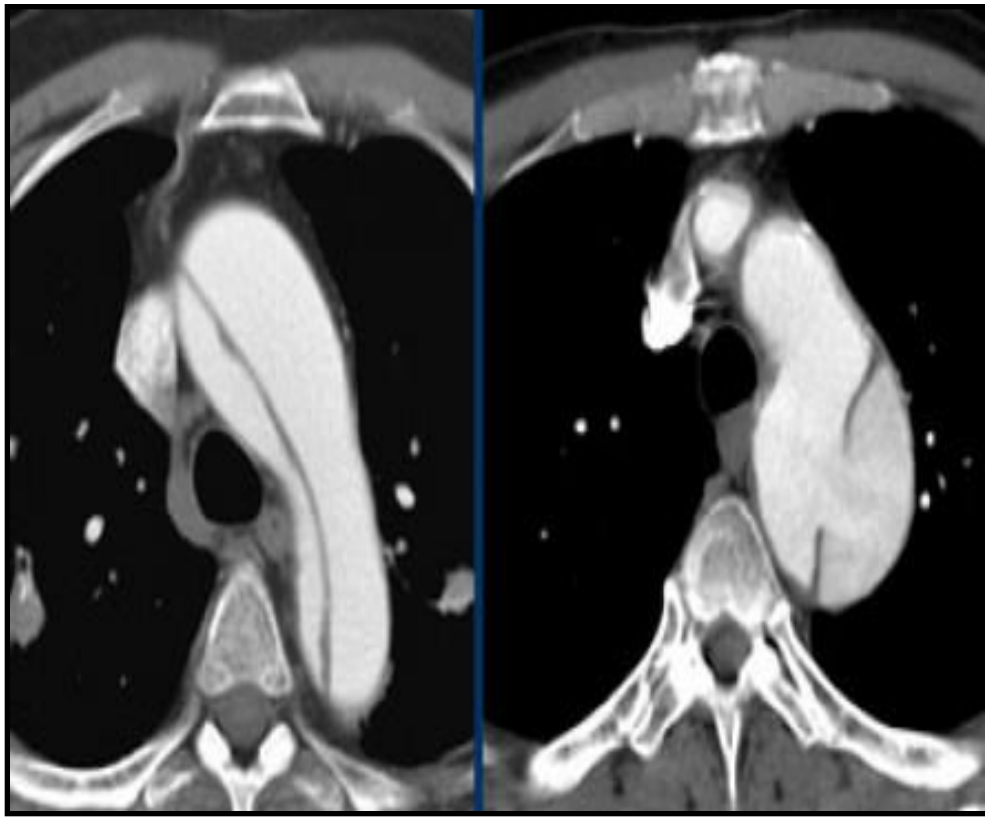
ΕΠΕΚΤΑΣΗ ΔΙΑΧΩΡΙΣΜΟΥ

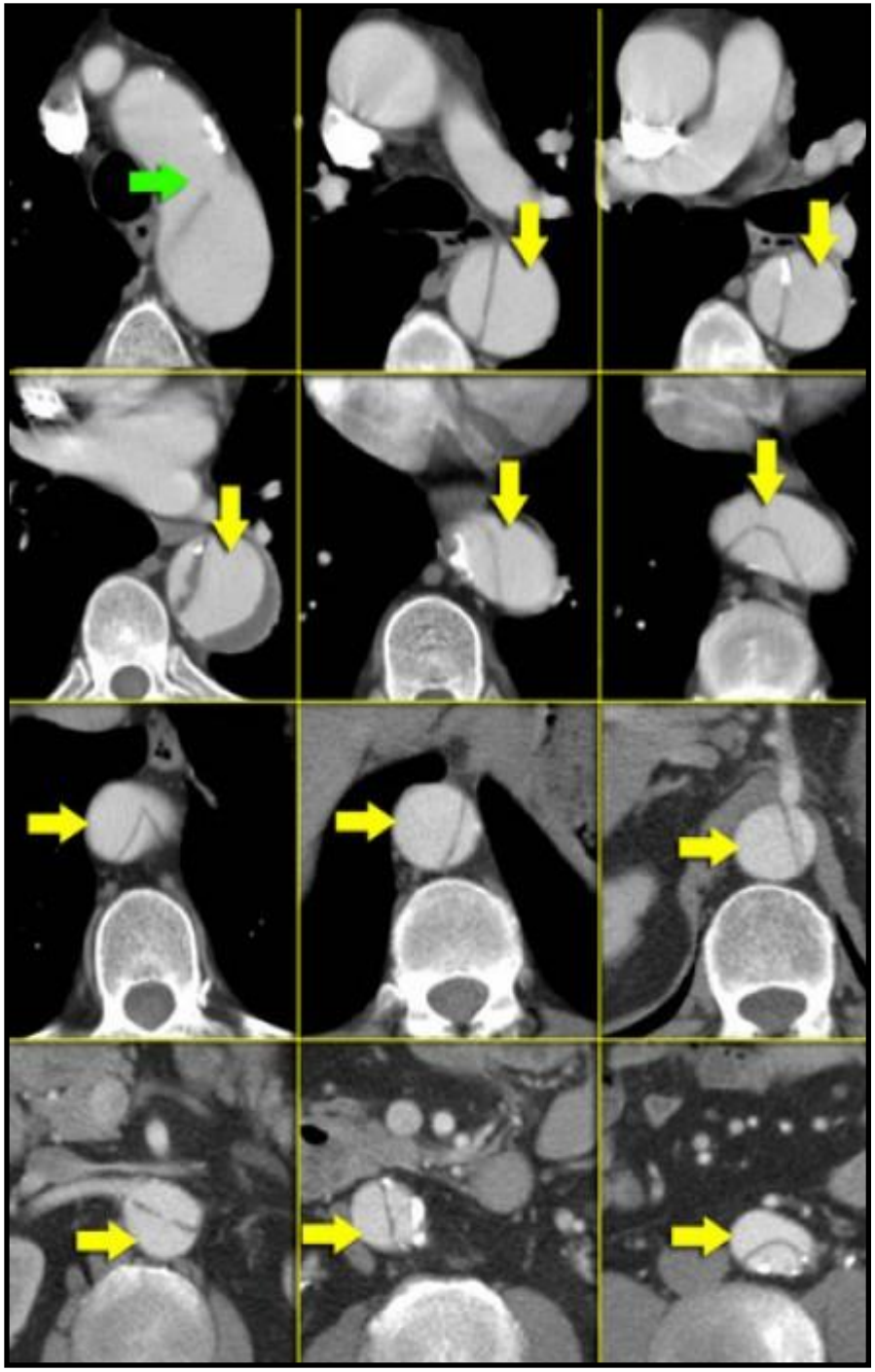
- Ιδιαίτερη σημασία έχει πιθανή επέκταση στην υποκλείδια ή τις λαγόνιες αρτηρίες, αφού ο καθετηριασμός τους μπορεί να προκαλέσει επέκταση του διαχωρισμού ή και ρήξη



Management decisions are based on the following information:

- Type A or Type B
- Place of entry & re-entry
- Side branches involved, originating from true / false lumen
- Organs at risk (1/3 of mortality is caused by organ failure)
- Complications (rupture, coronairy occlusion, aortic insufficiency, neurological)
- Diameters of true and false lumina at: proximal and distal landing zones, at entry and at minimum
- Iliac vessel tortuosity





- **Imaging features**

In Aortic dissection an intima flap is seen in only 70% of cases.
When there are 2 lumina, these will spiral around each other (figure).
On the left consecutive images are seen of a Type B dissection.
The true lumen is surrounded by calcifications.
The true lumen is smaller, as the false lumen wedges around the true lumen due to permanent systolic pressure (so called Beak-sign).
Thrombus material invariably is located in the false lumen, which enhances later than the true lumen.

- **True lumen**:

Surrounded by calcifications (if present)

Smaller than false lumen

Usually origin of celiac trunk, SMA and right renal artery

- **False lumen**:

Flow or occluded by thrombus (chronic).

Delayed enhancement

Wedges around true lumen (beak-sign)

Collageneous media-remnants (cobwebs)

Larger than true lumen

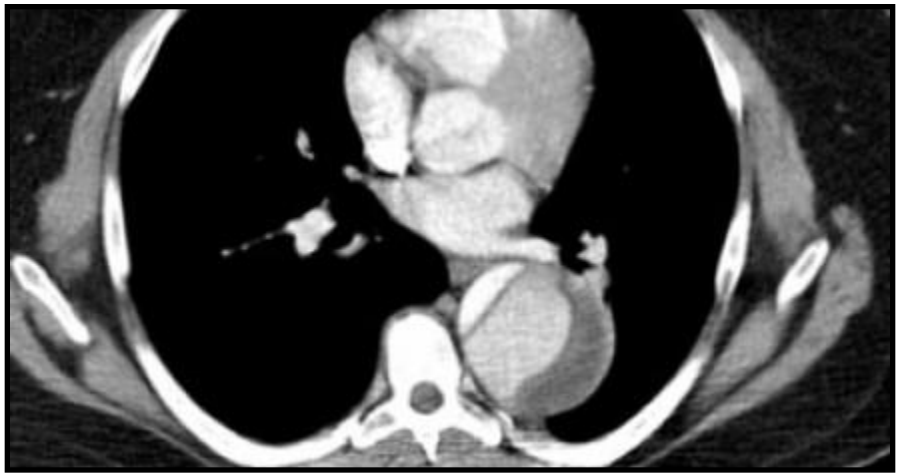
Circular configuration (persistent systolic pressure)

Outer curve of the arch

Usually origin of left renal artery

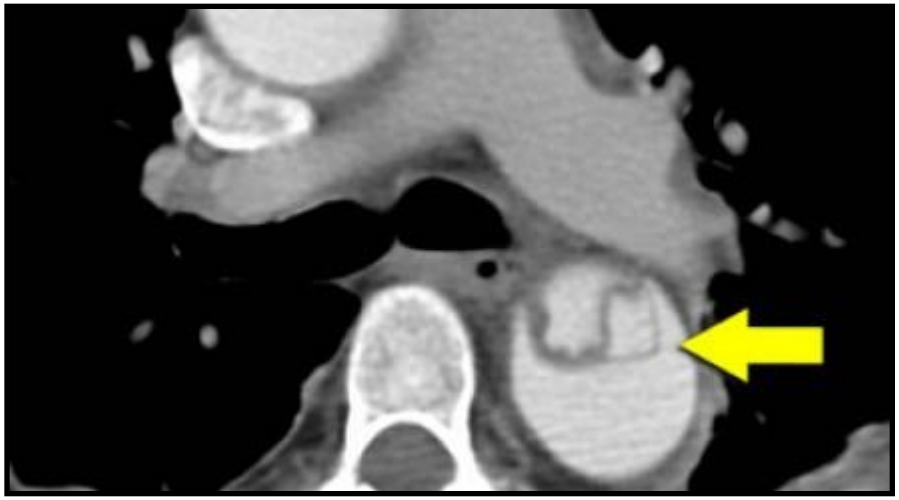
Surrounds true lumen in Type A dissection

Classic Aortic Dissection (AD)



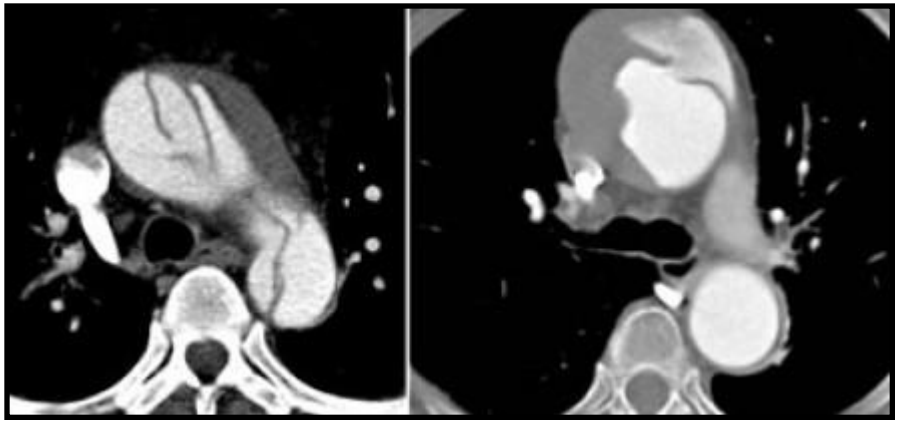
- On the left an aortic dissection is seen with a large false lumen. The compressed true lumen is seen on the inner side and is brighter than the false lumen. Thrombus formation within the false lumen.
  The true lumen usually is smaller as the false lumen wedges around the true lumen due to permanent systolic pressure.
  The false lumen usually adheres to the outer curvature of the aortic arch, as is seen in this case.

Classic Aortic Dissection (AD)



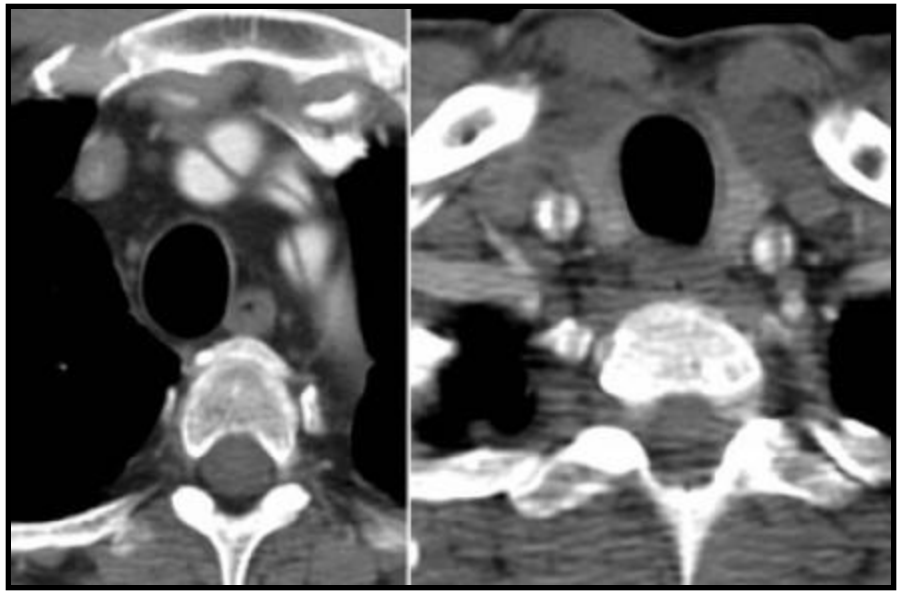
- Collageneous media-remnants (cobwebs) are only seen in the false lumen.
  The same holds true for thrombusmaterial

Classic Aortic Dissection (AD)



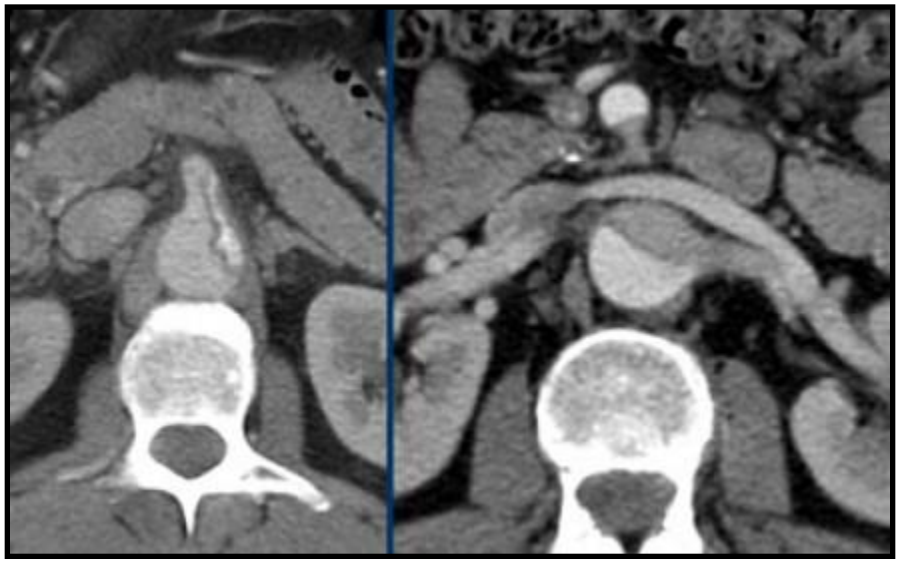
If one of the lumina is surrounded by the other, it invariably is the true lumen.
This almost only occurs in type A dissections.
The figures on the left both show a type A dissection with clear entry points in the ascending aorta.
The true lumen is surrounded by the false lumen, which is bigger and wedges around the true lumen due to permanent systolic pressure.

Classic Aortic Dissection (AD)



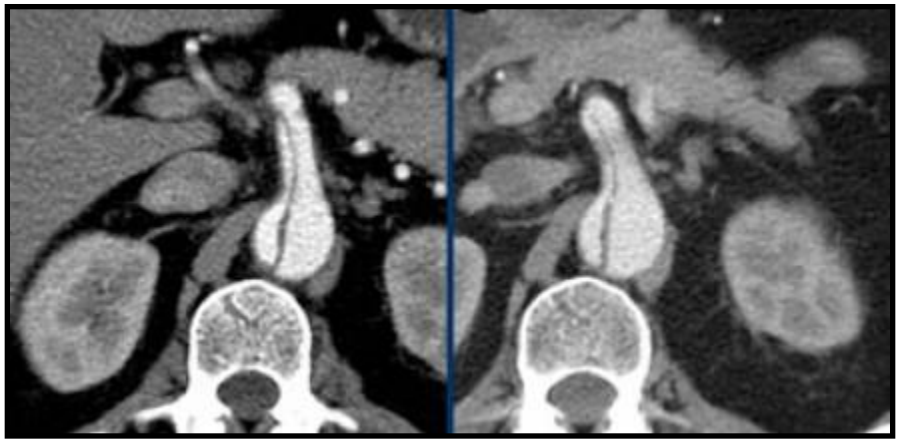
- Dissection into brachiocephalic arteries
- Carefully sort out which branches of the aortic arch are involved. Make sure from which lumina they arise.

Classic Aortic Dissection (AD)



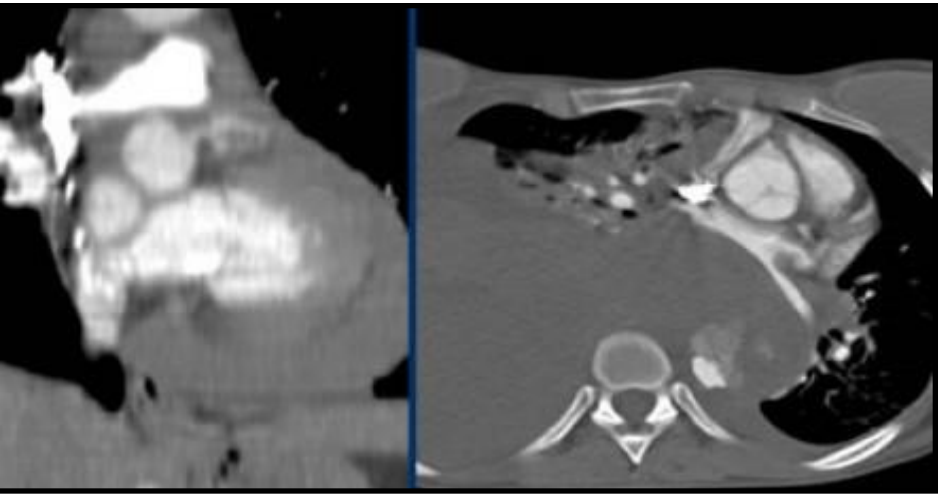
- Dissection into abdominal arteries
- The celiac trunc, SMA and right renal artery flow usually originates from the true lumen.
  Left renal artery flow mostly originates from the false lumen.
  Impaired perfusion of end-organs can be due to 2 mechanisms:
  1) static = continuing dissection in the feeding artery (usually treated by stenting)
  2) dynamic = dissection flap hanging in front of ostium like a curtain (usually treated with fenestration).
  This may be hard to discern, MPR's can be helpfull.
- Look for the re-entry point, usually to be found in the iliac tract.
  Provide information about tortuisity and calcifications of the iliac tract if endovascular procedures are being considered.

Classic Aortic Dissection (AD)



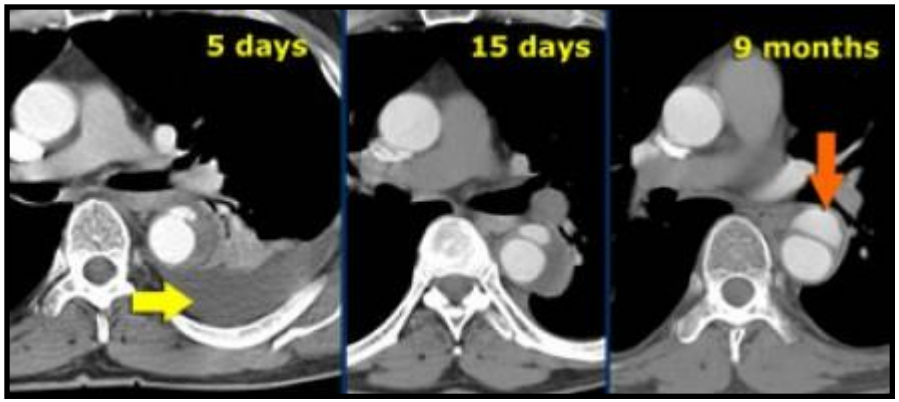
- When no end-organs are compromised and there is sufficient perfusion, dissection can be left alone. This may persist for a long time without clinical consequence, as is seen in the patient on the left with follow-up of 2 years. Some dissections remained unchanged during a follow up of more than 5 years.

Classic Aortic Dissection (AD)



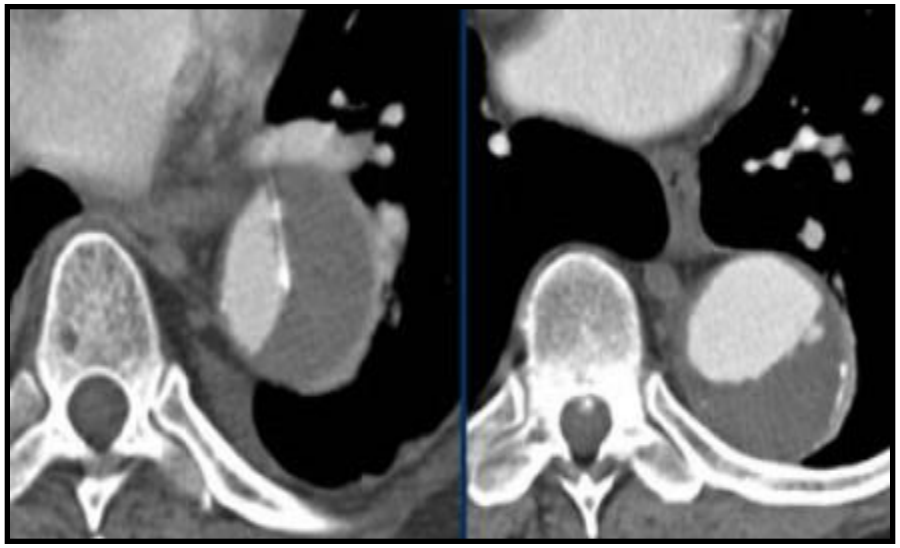
- Rupture into pericardium and thoracic cavity
- Even the slightest amount of fluid in pericardium, mediastinum or pleural cavity is suggestive of rupture of the dissection.
  The cases on the left show evident rupture, with presence of extensive hematoma in above mentioned locations.
  Note extreme hematothorax and hematomediastinum, causing shift of the mediastinum and compression on the pulmonary veins and even aorta.
  No pericardial effusion visible.

Classic Aortic Dissection (AD)



- The case on the left is a patient who presented with a fully thrombosed false lumen.
  5 days after initial presentation this patient complained of acute chest pain mimicking the earlier episode.
  Re-examination showed recurrence of flow in the false lumen, locally contained, but with alarming adhering pleural effusion.
  The patient could not undergo surgical or endovascular repair for various reasons and was treated consevatively.

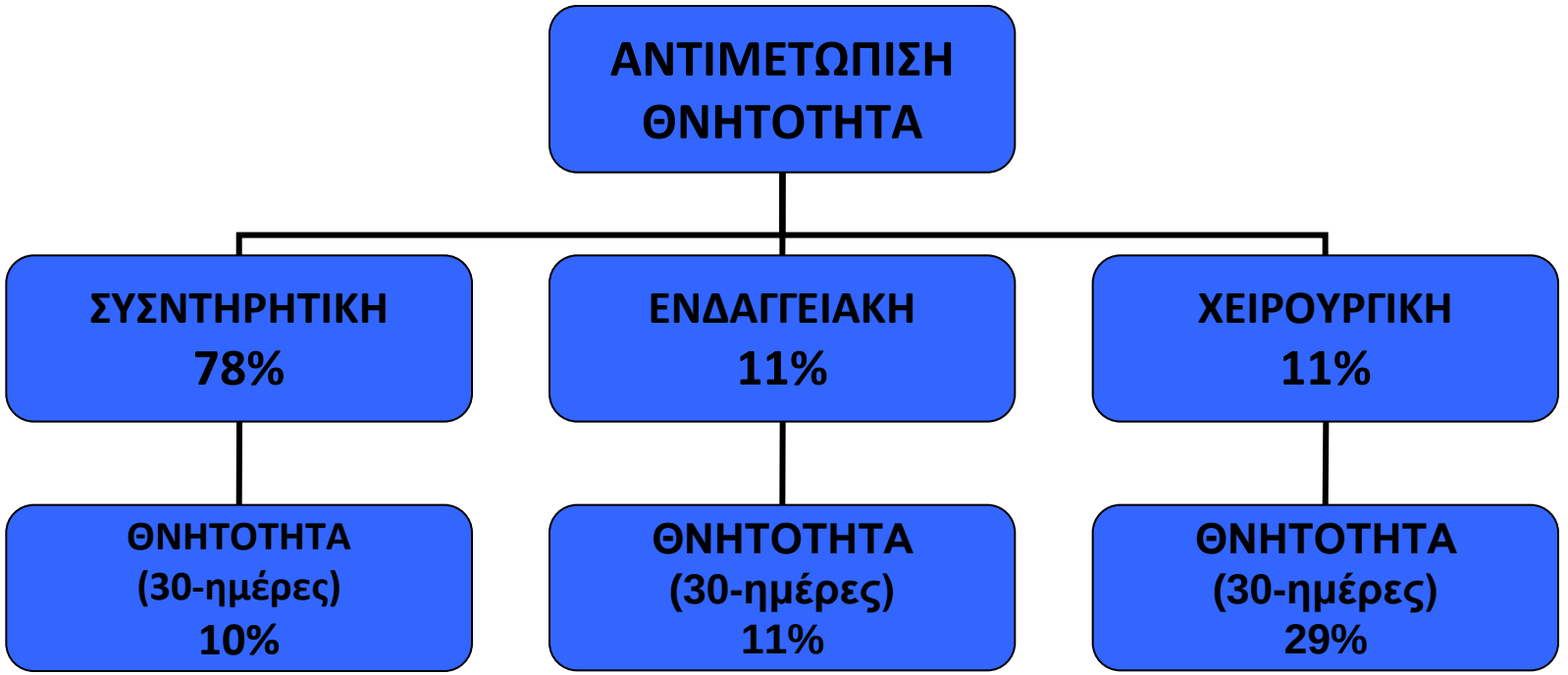
Classic Aortic Dissection (AD)



- Aneurysm with thrombus versus thrombosed dissection
- It can be difficult to differentiate an aneurysm with thrombus from a dissection with a thrombosed false lumen.
  If there are intima calcifications this will be very helpfull.
  A false lumen displaces the intimal calcifications.

ΑΝΤΙΜΕΤΩΠΙΣΗ ΔΙΑΧΩΡΙΣΜΟΥ ΑΟΡΤΗΣ

- ΤΥΠΟΥ Α: ΧΕΙΡΟΥΡΓΙΚΗ ΕΠΕΜΒΑΣΗ
- ΤΥΠΟΥ Β: ΣΥΝΤΗΡΗΤΙΚΗ ΑΓΩΓΗ
  - ΕΝΔΑΓΓΕΙΑΚΗ ΑΝΤΙΜΕΤΩΠΙΣΗ ΕΠΙ ΕΠΙΠΛΩΚΩΝ ΣΕ ΟΞΕΙΑ ΦΑΣΗ
  - ΕΝΔΑΓΓΕΙΑΚΗ ΑΝΤΙΜΕΤΩΠΙΣΗ ΕΠΙ ΣΧΗΜΑΤΙΣΜΟΥ ΑΝΕΥΡΥΣΜΑΤΟΣ ΣΤΗ ΧΡΟΝΙΑ ΦΑΣΗ
  - ΜΑΚΡΟΧΡΟΝΙΑ ΠΑΡΑΚΟΛΟΥΘΗΣΗ ΤΟΥ ΑΣΘΕΝΟΥΣ

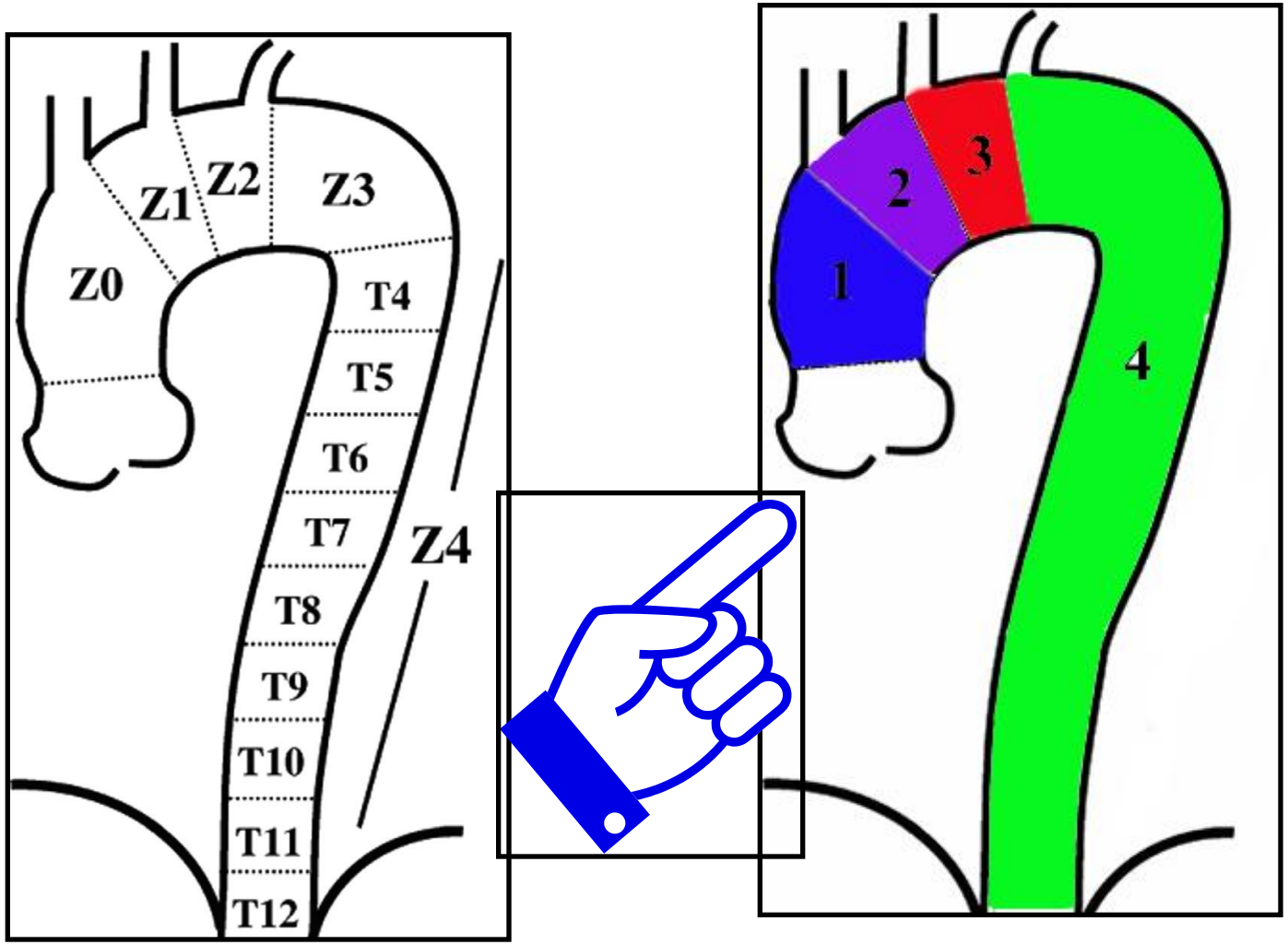


ΑΝΤΙΜΕΤΩΠΙΣΗ ΔΙΑΧΩΡΙΣΜΟΥ
ΕΝΔΕΙΞΕΙΣ

Table 1 Distribution of differential therapeutic strategies in aortic dissection

Surgery	Medical	Interventional
Type A aortic dissection	Uncomplicated acute type B dissection	Unstable acute/chronic type B dissection
Acute type B dissection complicated by	Stable isolated aortic arch dissection	Malperfusion
Retrograde extension into the ascending aorta	Uncomplicated chronic type B dissection	Rapid expansion (>1 cm/year)
Dissection in fibrilinopathies (e.g., Marfan syndrome, Ehlers–Danlos syndrome)		Critical diameter (≥5.5 cm)
		Refractory pain
		Type B dissection with retrograde extension into the ascending aorta
		Hybrid procedure for extended type A aortic dissection

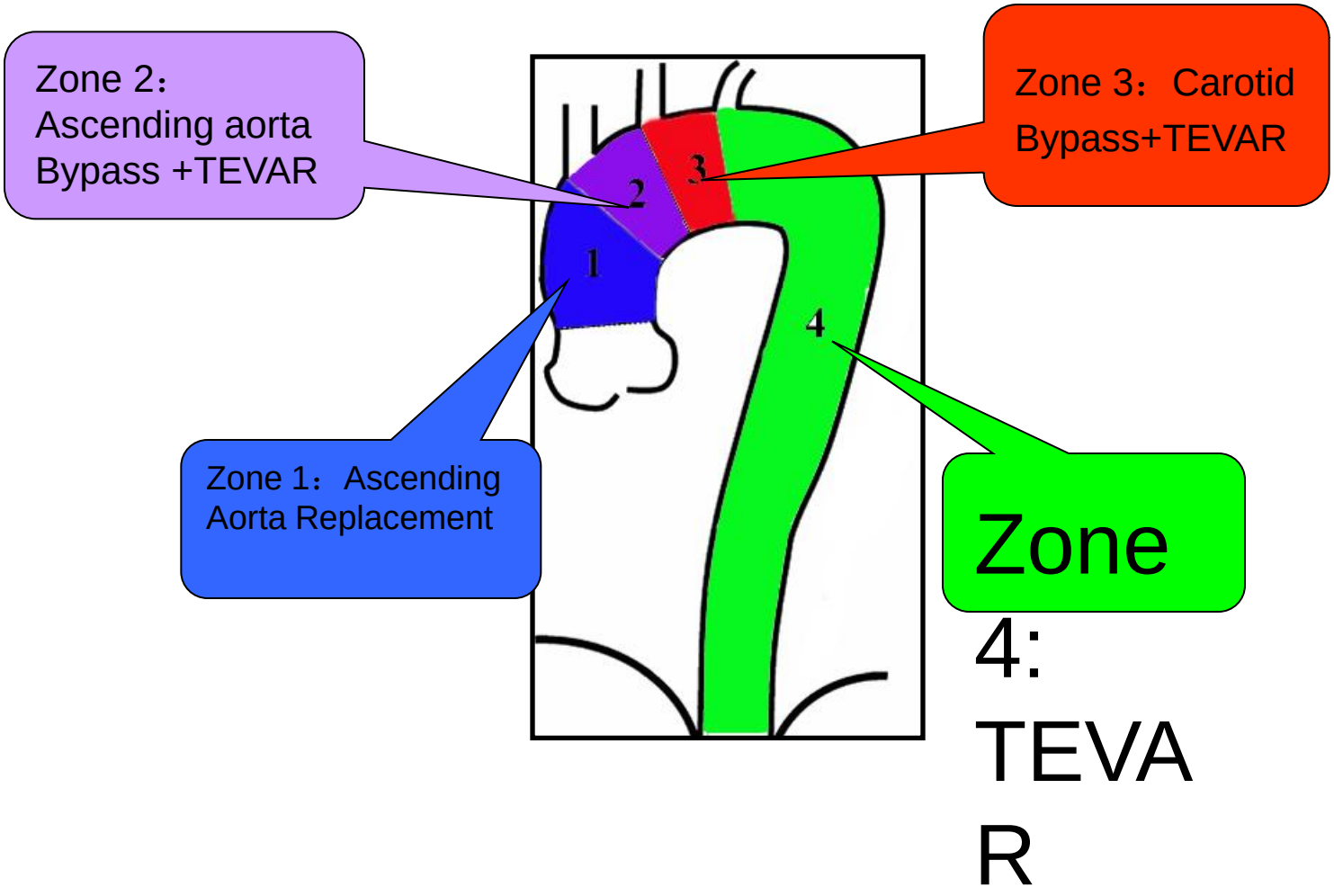
ΘΩΡΑΚΙΚΗ ΑΟΡΤΗ - ΖΩΝΕΣ

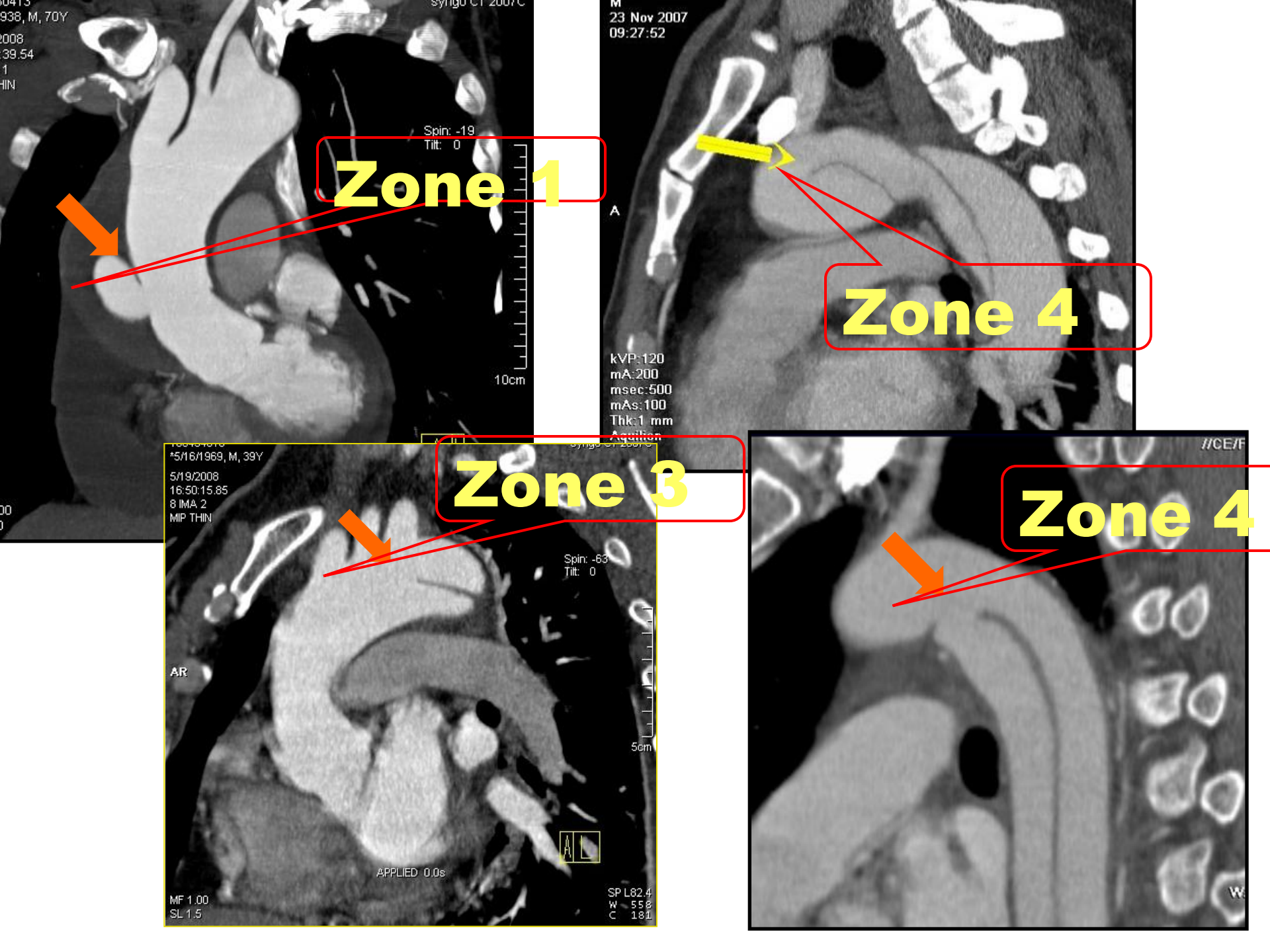


Criado Zonation ， 2005 (According to stent graft, suitable for aneurysm)

Xijing Classification, 2006 （ According to primary tear, suitable for dissection ）

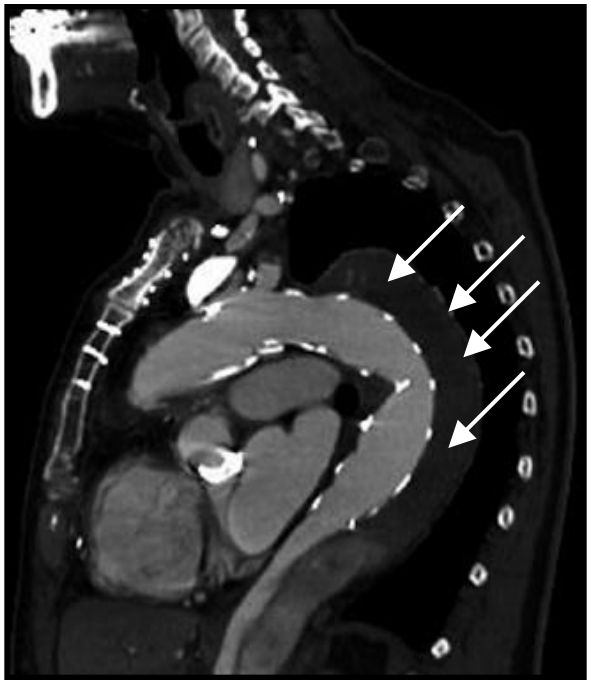
ΚΑΘΟΡΙΣΜΟΣ ΖΩΝΩΝ ΘΩΡΑΚΙΚΗΣ ΑΟΡΤΗΣ ΣΥΜΦΩΝΑ ΜΕ ΤΗΝ ΚΥΡΙΑ ΠΥΛΗ ΕΙΣΟΔΟΥ



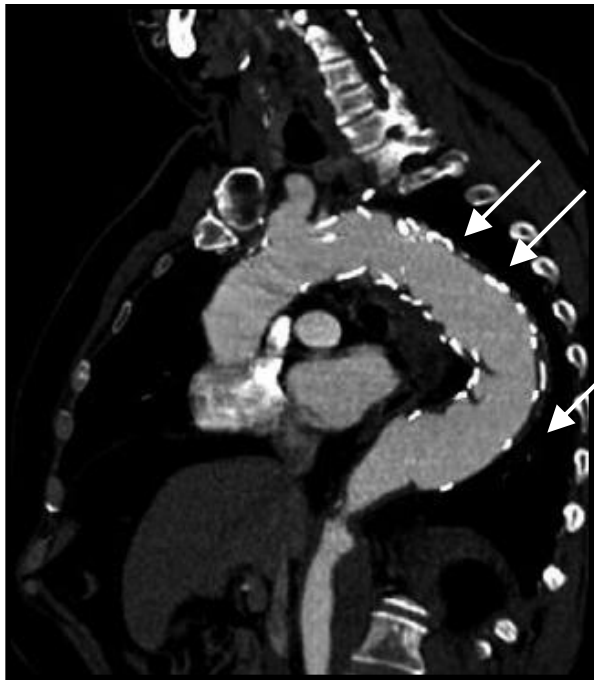

Zone 1
Zone 4
Zone 3
Zone 4
Spin: -19
Tilt: 0
10cm
23 Nov 2007
09:27:52
kVP:120
mA:200
msec:500
mAs:100
Thk:1 mm
*5/16/1969, M, 39Y
5/19/2008
16:50:15.85
8 IMA 2
MIP THIN
Spin: -63
Tilt: 0
AR
5cm
APPLIED 0.0s
MF 1.00
SL 1.5
SP L82.4
W 558
C 181

ΘΡΟΜΒΩΣΗ ΨΕΥΔΟΥΣ ΑΥΛΟΥ

ΠΡΟΕΓΧΕΙΡΗΤΙΚΑ



ΜΕΤΑ ΑΠΌ 1 ΜΗΝΑ



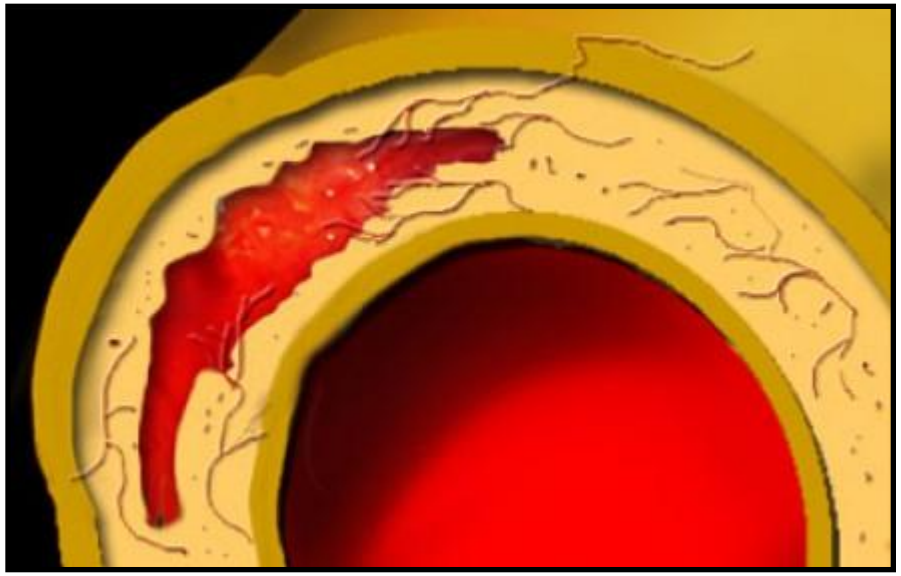
ΜΕΤΑ ΑΠΌ 12 ΜΗΝΕΣ

Intramural Haematoma (IMH)

Intramural Haematoma (IMH)

- Has been defined as a variant of AD characterized by the absence of an entrance tear.
- The false lumen is created by a haemorrhage into the aortic media after rhexis of the vasa vasorum.
- It may also be the result of a traumatic rapture of healthy vasa vasorum.
- Fracture of an atherosclerotic plaque may also lead to an IAH.

Intramural Hematoma (IMH)



Brief facts:

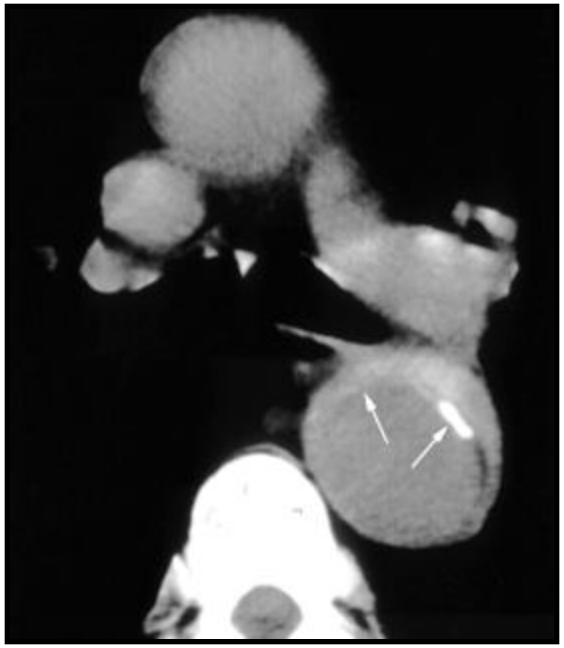
- Spontaneous hemorrhage caused by rupture of vasa vasorum in media
- 13% of dissections, usually no pulse deficit
- Difficult to distinguish from thrombosed AD
- Can proceed to classic dissection (16-47%)
- Long time to diagnosis: usually overlooked due to lack of non-enhanced scan
- Mortality at 1 year after dismission ~ 25%

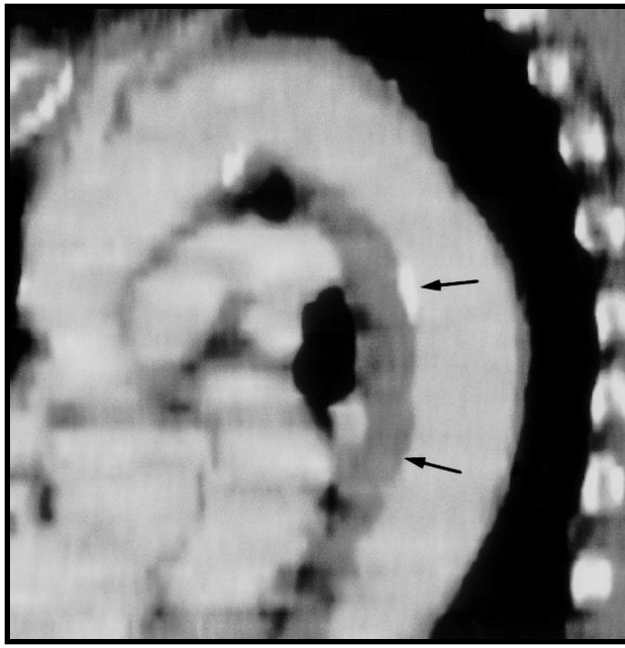
Intramural Haematoma (IMH)

- The presence of flow (contrast medium or color Doppler) within the haematoma is not seen because there is no entrance tear.

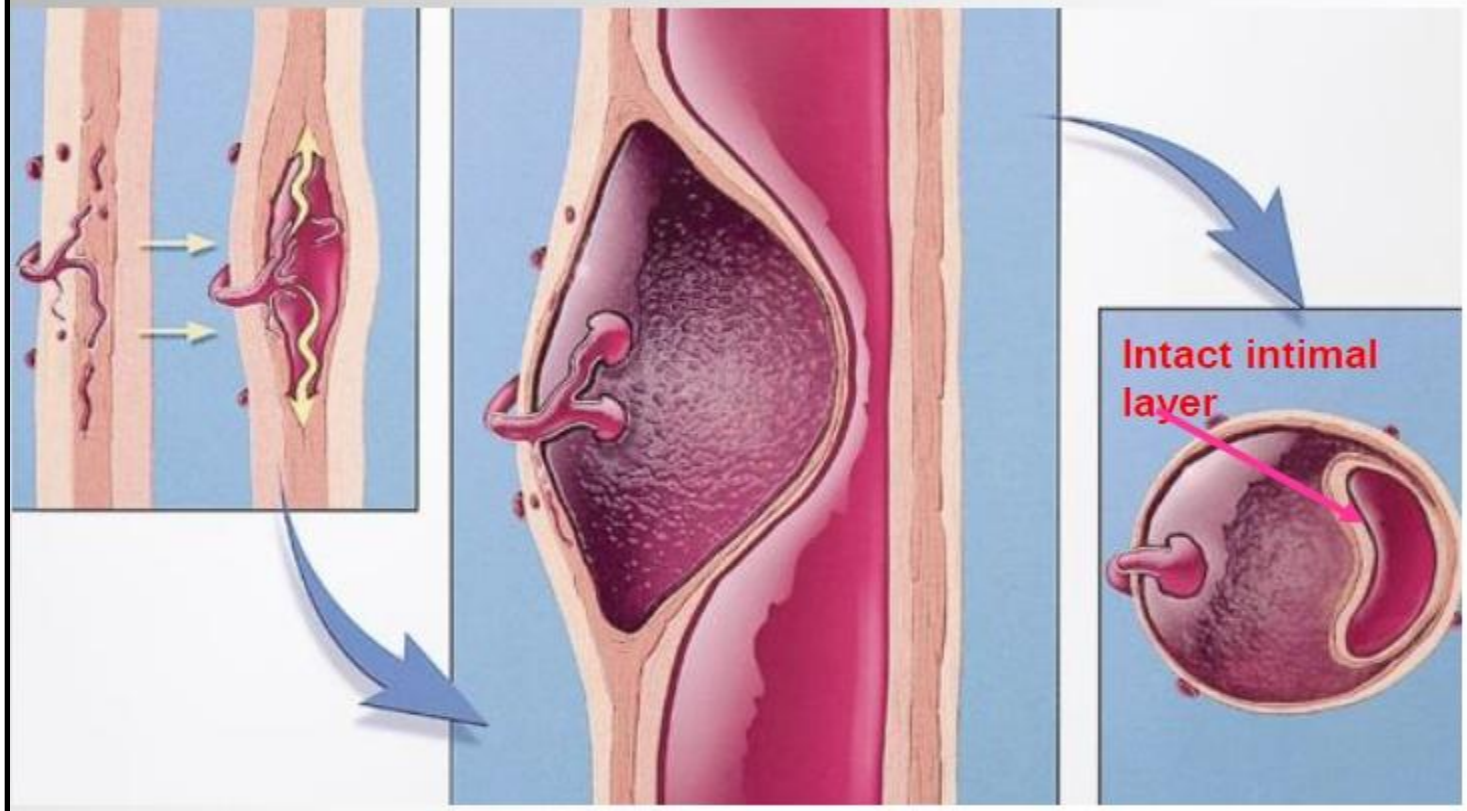
ΕΝΔΟΤΟΙΧΩΜΑΤΙΚΟ ΑΙΜΑΤΩΜΑ

- Ρήξη των vasa vasorum
- Αιμάτωμα μέσα στο τοίχωμα
- ➢ Υπέρπυκνος περιφερικός μηνίσκος πριν την έγχυση σκιαστικού
- ➢ Δεν εμπλουτίζεται μετά την έγχυση





Intramural Hematoma (IMH)
Dissection without tear



Events leading to intramural hematoma, from rupture of vasa vasorum feeding aortic media to creation of intramedial hematoma with intact intimal layer.

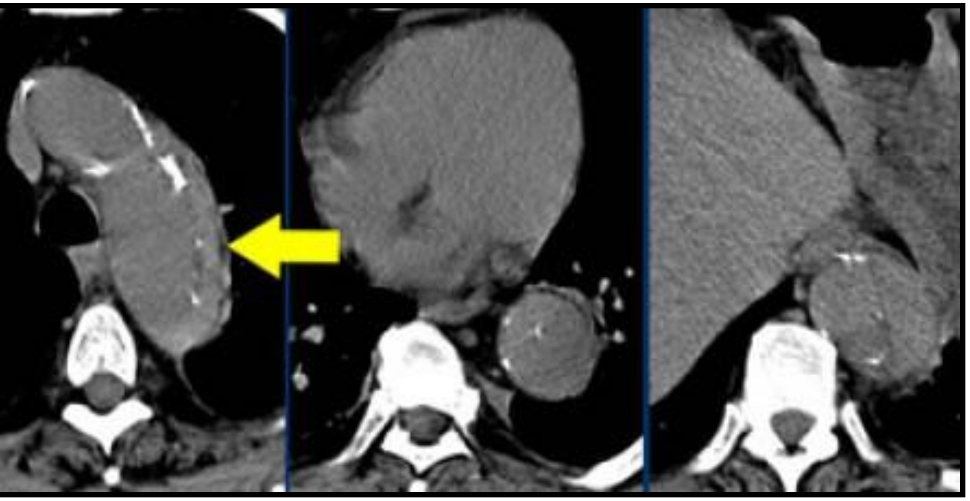
Evolutive patterns of IMH

- Aortic rupture and bleeding into adjacent structures, leading to a pericardial, pleural and mediastinal haemorrhage

Indicators of intramural aortic haematoma progression

- Involvement of the ascending aorta
- Maximum aortic diameter (>50mm) on initial diagnostic imaging
- Severe pericardial effusion
- Huge or progressively increasing pleural effusion
- Progressive aortic dilatation at follow-up
- Persistent pain or haemodynamic onstability, or both
- Increment of the aortic wall thickness
- Large intimal erosion

Intramural Hematoma (IMH)

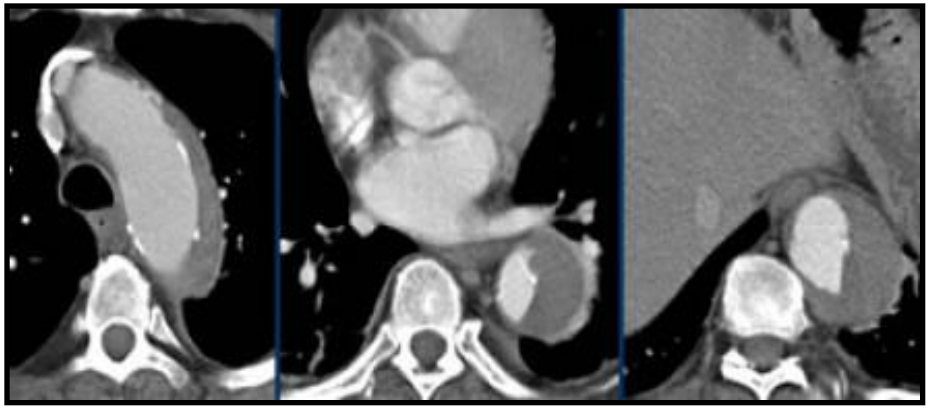


What the clinician needs to know

- Type A or Type B
- Regression of aortic ? to normal in 80% of patients
- Predictors of mortality:
  - Ascending Aorta > 5 cm ?
  - IMH thickness > 2 cm
  - Pericardial effusion (to less extend pleural effusion)
- IMH may persist or evolve into aneurysm or PAU
- Associated PAU - worse prognostic outcome

On the left a Intramural hematoma, hyperdense on a NECT.

Intramural Hematoma (IMH)



- Same case contrast enhanced CT. Note that the IMH does not spiral around the true lumen, like in classic AD, helping to differentiate both.
- Essentially, this is not important, therapeutical decision will be made by whether this IMH is classified as Type A or Type B IMH!
- Note that there is no pericardial effusion.
- IMH thickness stays below 2 cm, making regression of this Type B IMH likely (up to 80%).

Intramural heamatoma
IMH

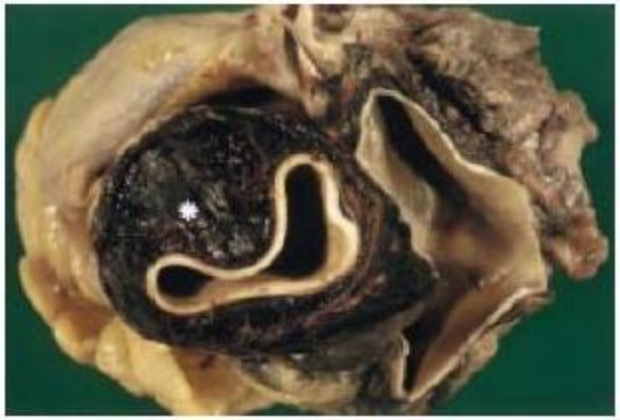
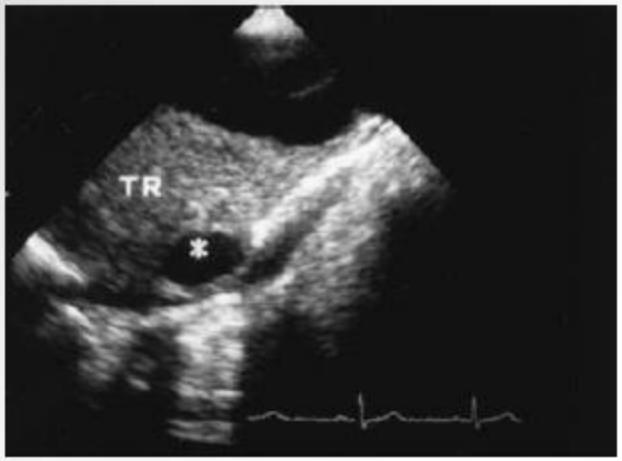


Figure 6 Anatomical cross section of the ascending aorta. An intramural aortic haematoma can be observed (asterisk).

Figure 8 Histological section (Mason's technique) of a patient with intramural haematoma. Splitting of the aortic media by a haematoma (asterisk) is well documented.



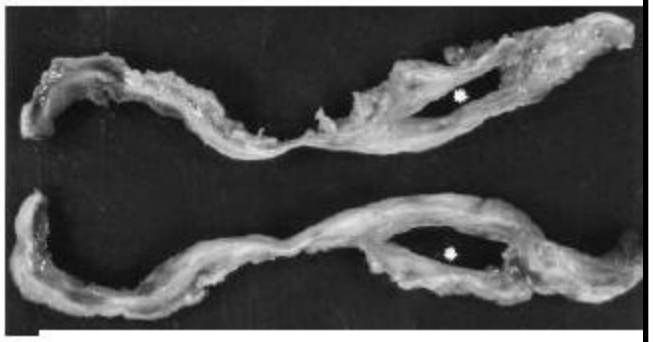


Figure 2. Patient 1. TEE scan **(top)** and corresponding anato specimen **(bottom)** showing intramural aortic hematoma **(asterisks** the descending thoracic aorta. TR – thrombus.

High risk imaging features of IMH

Table 3 High risk features in IMH

Location: type A
Age > 70 years
Hematoma thickness > 10 mm
Presence of penetrating ulcers
Aortic dimension > 4.5 cm
Presence of rebleed
Presence of extension

Int J Cardiovasc Imaging (2010) 26:65–76

IMH: in hospital mortality according to site

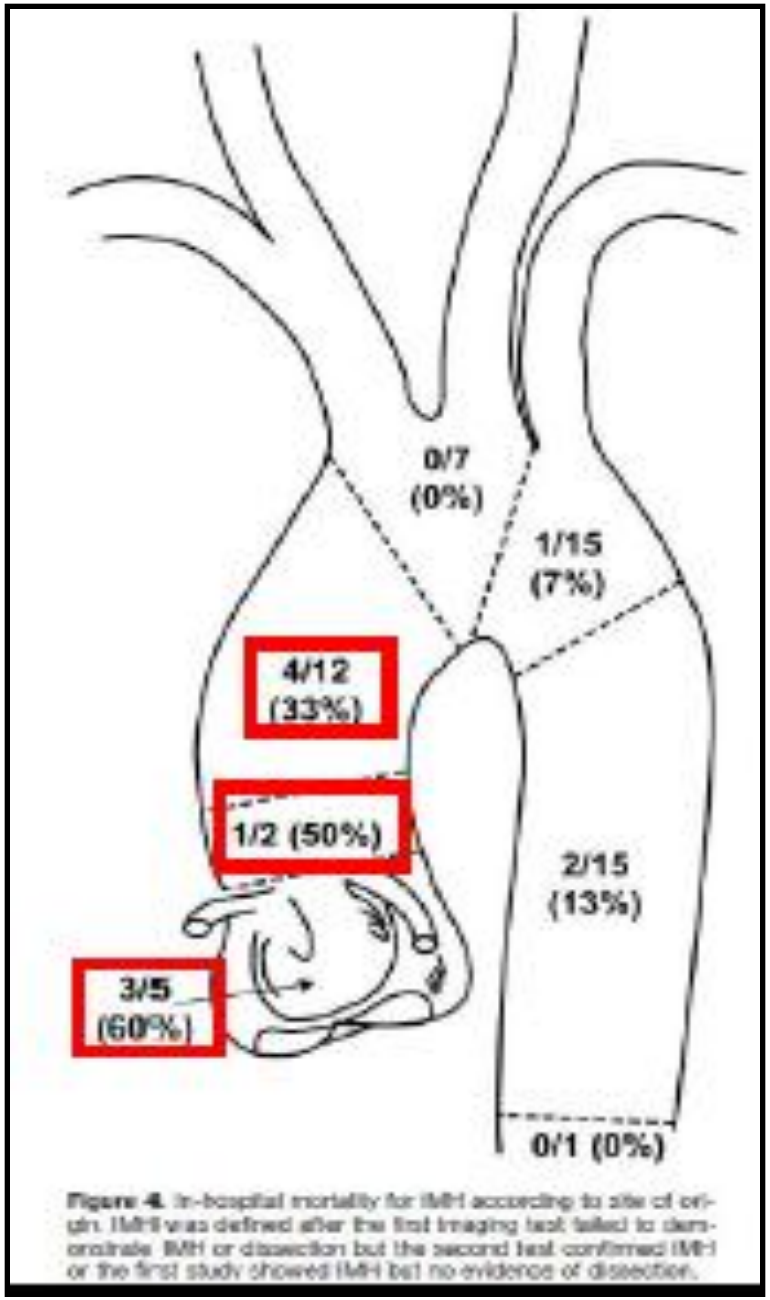
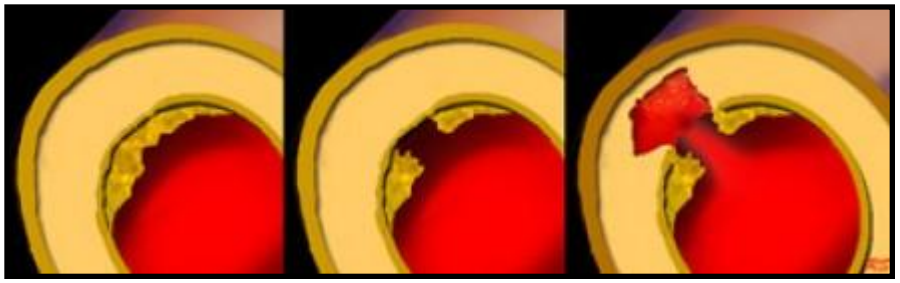


Figure 4. In-hospital mortality for IMH according to site of origin. IMH was defined after the first imaging test failed to demonstrate IMH or dissection but the second test confirmed IMH or the first study showed IMH but no evidence of dissection.

Penetrating Atherosclerotic Ulcer (PAU).

Penetrating Atherosclerotic Ulcer (PAU).

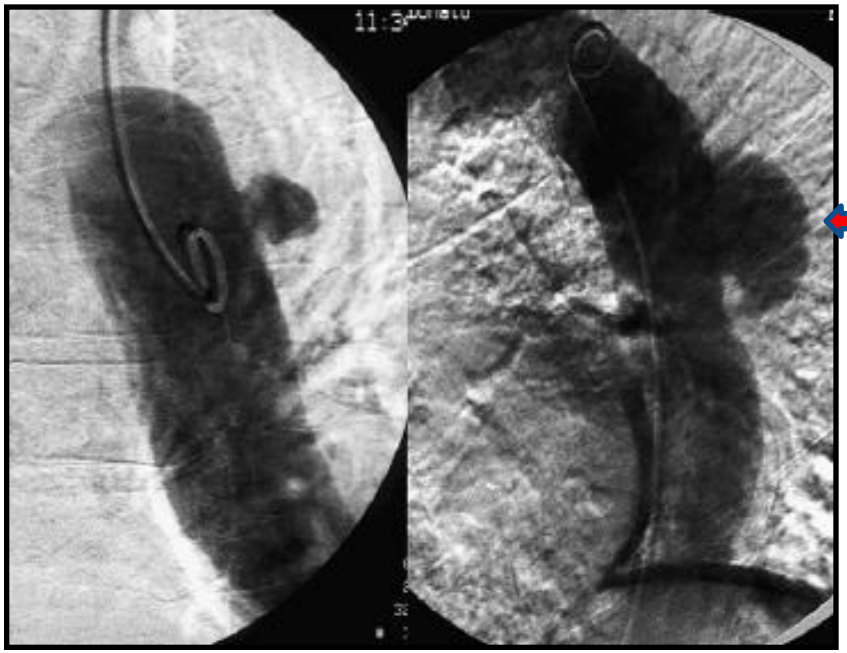


PAU is defined as an ulceration of an atheromatous plaque that has eroded the inner elastic layer of the aortic wall.
It has reached the media and produced a hematoma within the media.

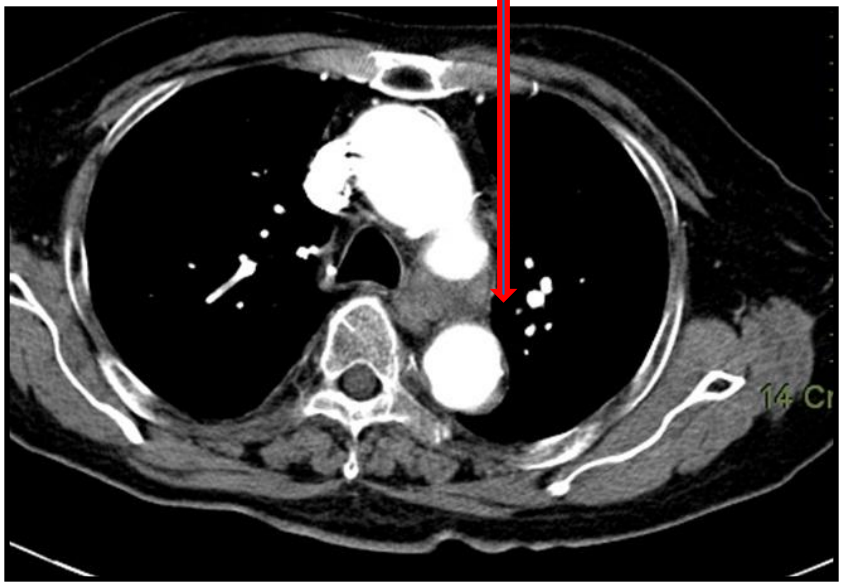
Brief facts:

- Patients with severe systemic atherosclerosis
- Rarely rupture, yet worse prognosis due to extensive atherosclerosis which causes organfailure (e.g. acute myocardial infarction)
- Cause of most saccular aneurysms
- Located in arch and descending aorta
- Often multiple (therefore surgical treatment difficult, mostly treated medically)

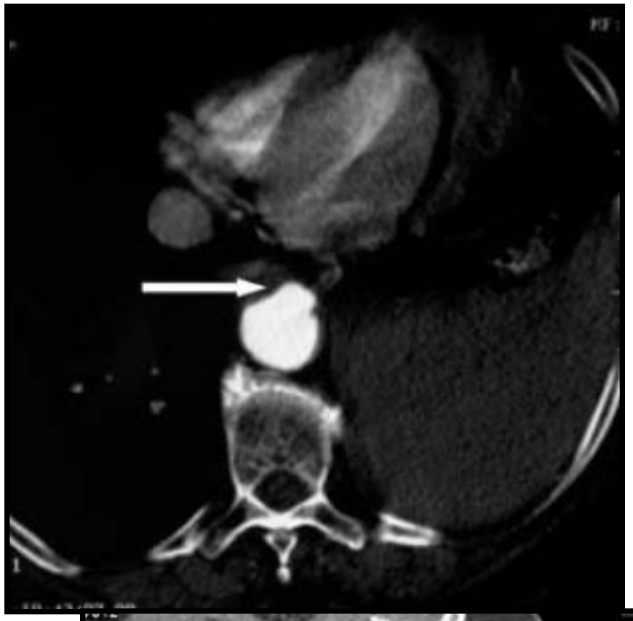
ΔΙΑΤΡΙΤΡΑΙΝΩΝ ΕΛΚΟΣ ΑΟΡΤΗ
PENETRATING AORTIC ULCER

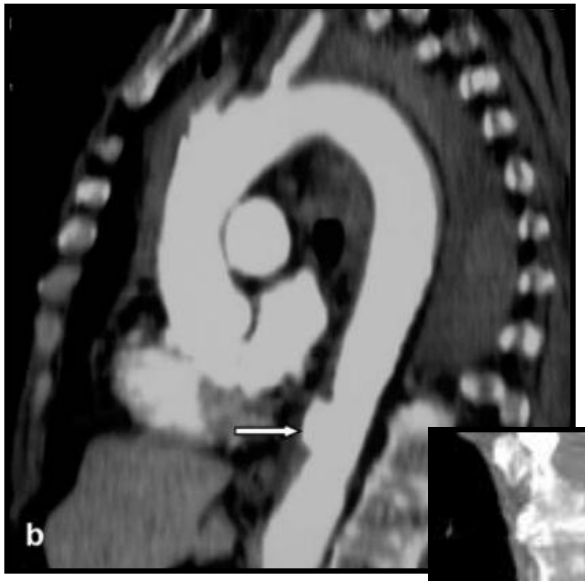


PAU



- **ΣΥΧΝΟΤΕΡΗ ΕΝΤΟΠΙΣΗ Η ΚΑΤΙΟΥΣΑ ΘΩΡΑΚΙΚΗ ΑΟΡΤΗ**
- **ΣΕ ΕΝΑ ΜΙΚΡΟ ΠΟΣΟΣΤΟ ΕΝΤΟΠΙΖΕΤΑΙ ΣΤΗΝ ΚΟΙΛΙΑΚΗ ΑΟΡΤΗ**





Distinctive features of dissections secondary to aortic ulcers

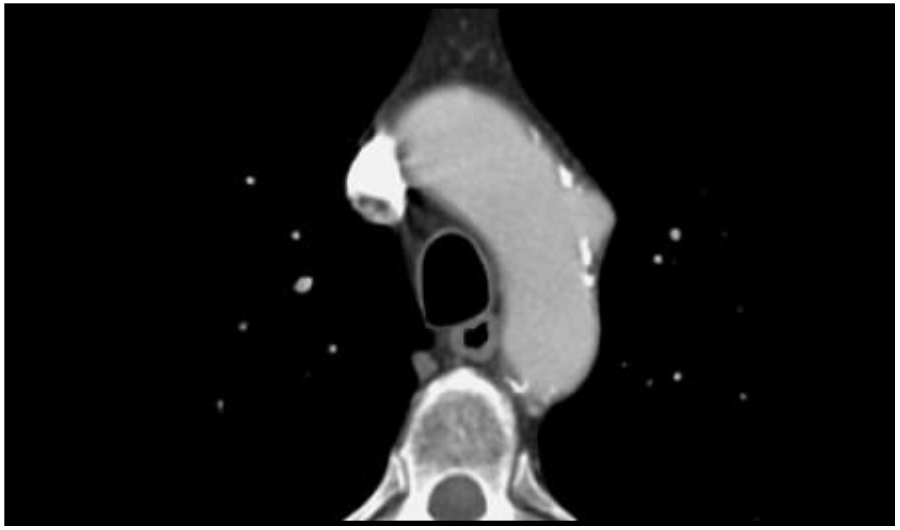
- Distal (type B) dissection
- Localised dissection (short longitudinal extension)
- Port of entry away from classic entrance tears
- Thick, calcified and static intimomedial flap
- True lumen equal or larger than the false lumen
- Retrograde direction

Penetrating Atherosclerotic Ulcer (PAU).

What the clinician needs to know

- Type A or Type B
- Single or multiple
- Associated IMH (if not present, be cautious to mention PAU, clinical symptoms might not be caused by PAU, which is probably stable)
- Possibility of endovascular treatment

Penetrating Atherosclerotic Ulcer (PAU).



Imaging features

- Extensive atherosclerosis with severe intima calcifications and atherosclerotic plaques
- Focally displaced and separated intimacalcifications
- Crater and/or contrast extravasation
- -Focal IMH, longitudinal spread limited by mediafibrosis
- Possibly enhancing aortic wall

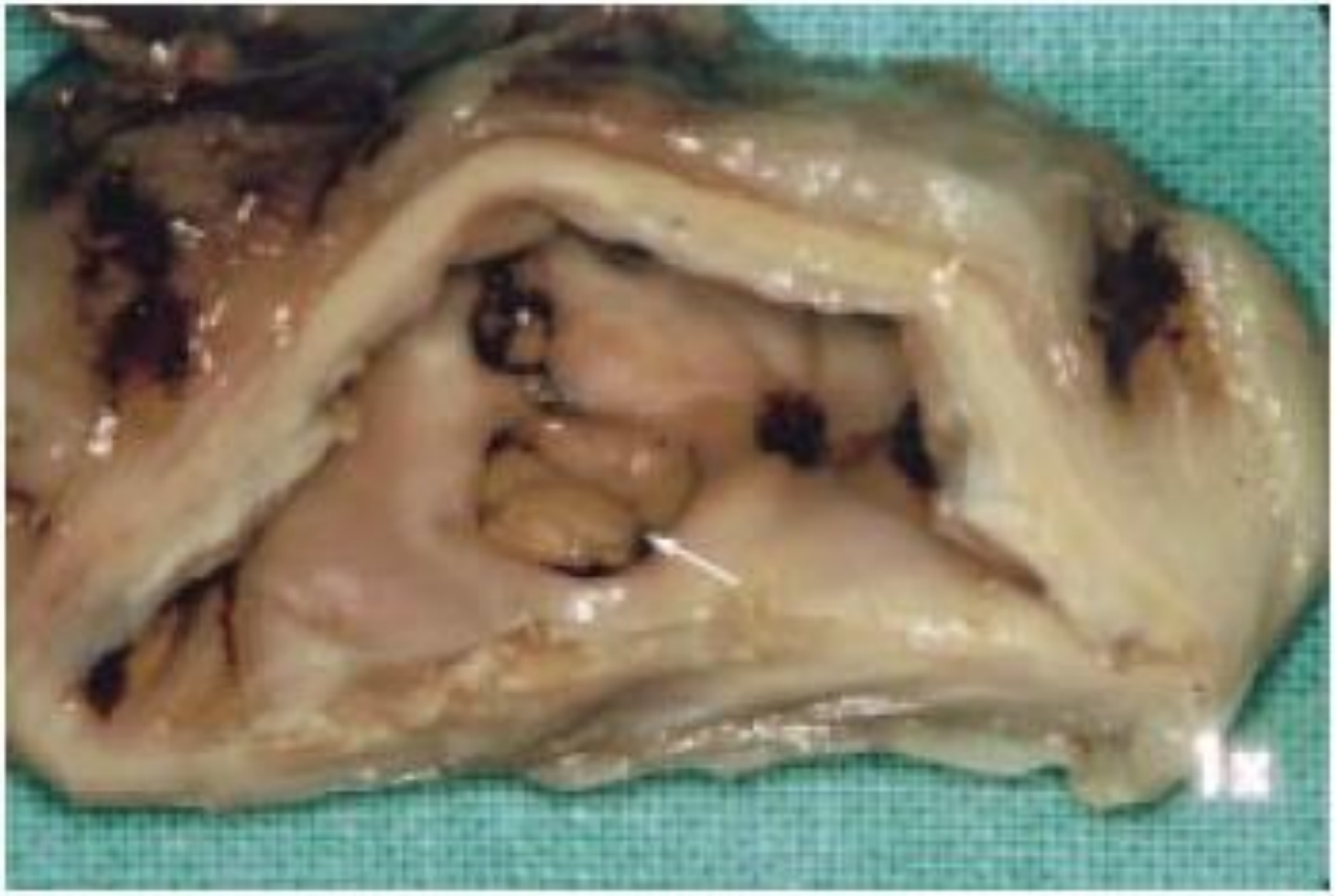
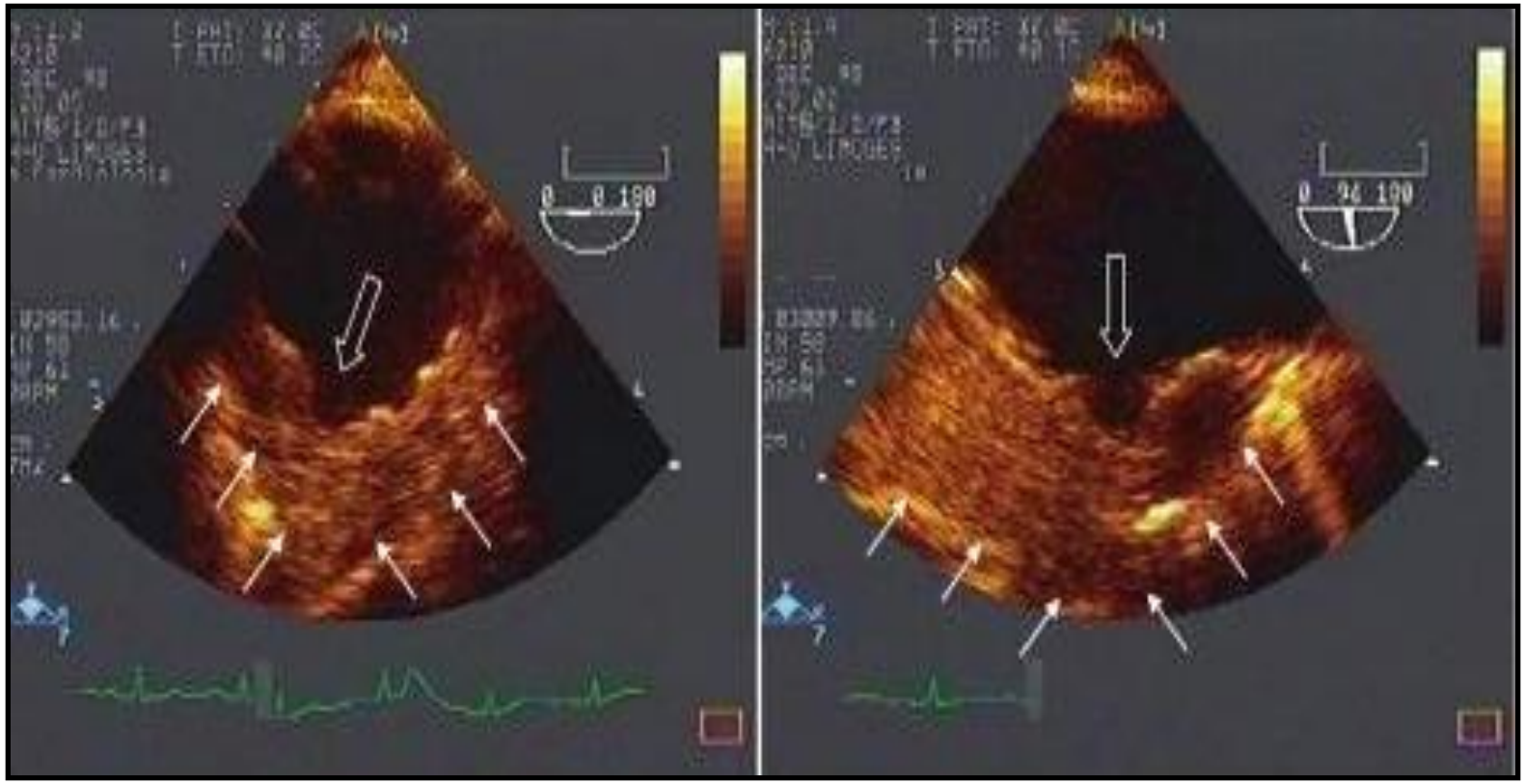
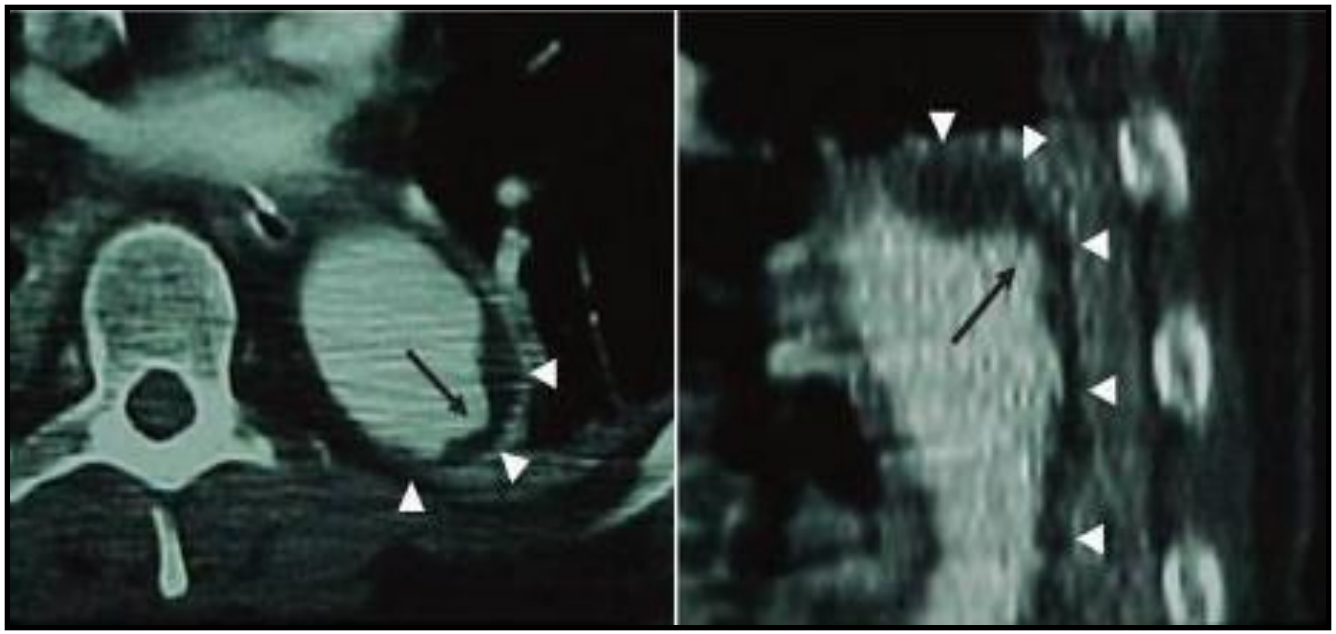


Figure 9 Anatomical cross section of the descending thoracic aorta. A penetrating atherosclerotic aortic ulcer is indicated by an arrow.

Hematoma around penetrating aortic lesion



ulceration of the aortic wall



- Hematoma

Penetrating Atherosclerotic Ulcer (PAU).

Complications

The complications of a Penetrating Atherosclerotic Ulcer include:

- Saccular aneurysm formation
- Compression of nearby structures
- Rupture

However most patients have a poor prognosis because of generalized atherosclerosis leading to diffuse organ failure.

Incoplete Dissection

- Laceration of the intima and subjacent media (dissection tear) without significant intramural dissection.
- The base of lacerated area contain some media and adventitia.
- Accompanied by subadventitia haematoma between adventitia and media.
- This dissection has been clarified as type III in the recent description of Svensnon et (subtle or discrete dissection.

Incoplete Dissection

- Mostly occur in the ascending aorta.
- Tears are located on the posterior aspect of the ascending aorta immediately above the left coronary artery ostium.
- May cause loss of commissural support and/or laceration of one or more aortic cusps – and may be assosiated with aortic insufficiency.

Diagnosis of Incoplete Dissection

- In the most cases the ascending aorta is dilated.
- The key diagnostic finding is the existence of a subtle ecentric bulge at tear site.
- Many patients have significant aortic insufficiency.
- Aortography have been successful when the current non-invasive imaging are inadequate for diagnosing this type of AAS.
- TOE, CT, MR should be detect subtle ecentric bulge in the external perimeter or minor irregularities in the intr\erna aortic lumen conour.

Diagnosis of Incoplete Dissection

Chirillo and al could identify in all

- Stellate or linear discintinuity of the aortic wall.
- Small aortic fragments oscillating wthin the lumen.
- Systolic bulging of the posterior aortic wall.

Criteria	Classic dissection	IAH	Incomplete dissection
Dissection flap	Yes	No	No
Double aortic lumen	Yes	No	No
Entrance tear	Yes	No	Yes
Aortic wall thickening	No	Yes	Yes
Decreased aortic lumen	Yes	Yes	No

Conclusion

- Early surgery for patients with AAS type A
- Medical treatment for patients with AAS type B is the currently accepted treatment when the lesion is stable.
- **Type B that are unstable or complicated (persistent pain, lesion progression on serial imaging, signs of imminent rupture or end organ ischaemia should be managed either with surgery or endovascular reprair.**

Τέλος Ενότητας

Ευρωπαϊκή Ένωση
Ευρωπαϊκό Κοινωνικό Ταμείο
ΕΠΙΧΕΙΡΗΣΙΑΚΟ ΠΡΟΓΡΑΜΜΑ
ΕΚΠΑΙΔΕΥΣΗ ΚΑΙ ΔΙΑ ΒΙΟΥ ΜΑΘΗΣΗ
επένδυση στην κοινωνία της γνώσης
ΥΠΟΥΡΓΕΙΟ ΠΑΙΔΕΙΑΣ & ΘΡΗΣΚΕΥΜΑΤΩΝ, ΠΟΛΙΤΙΣΜΟΥ & ΑΘΛΗΤΙΣΜΟΥ
ΕΙΔΙΚΗ ΥΠΗΡΕΣΙΑ ΔΙΑΧΕΙΡΙΣΗΣ
ΕΣΠΑ 2007-2013
ΕΥΡΩΠΑΪΚΟ ΚΟΙΝΩΝΙΚΟ ΤΑΜΕΙΟ
Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης