

# Echocardiography in aortic diseases: EAE recommendations for clinical practice

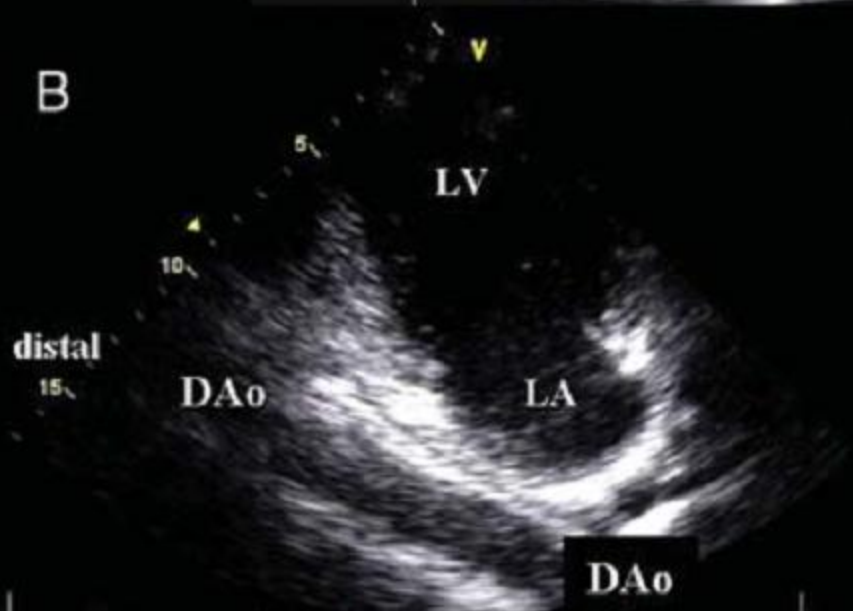
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Francesco Antonini-Canterin<sup>4</sup>, Charalambos Vlachopoulos<sup>5</sup>, Guido Rocchi<sup>6</sup>,  
Rosa Sicari<sup>7</sup>, Petros Nihoyannopoulos<sup>8</sup>, and Jose Zamorano<sup>9</sup> on behalf of the  
European Association of Echocardiography

## ACCF/AHA Guideline

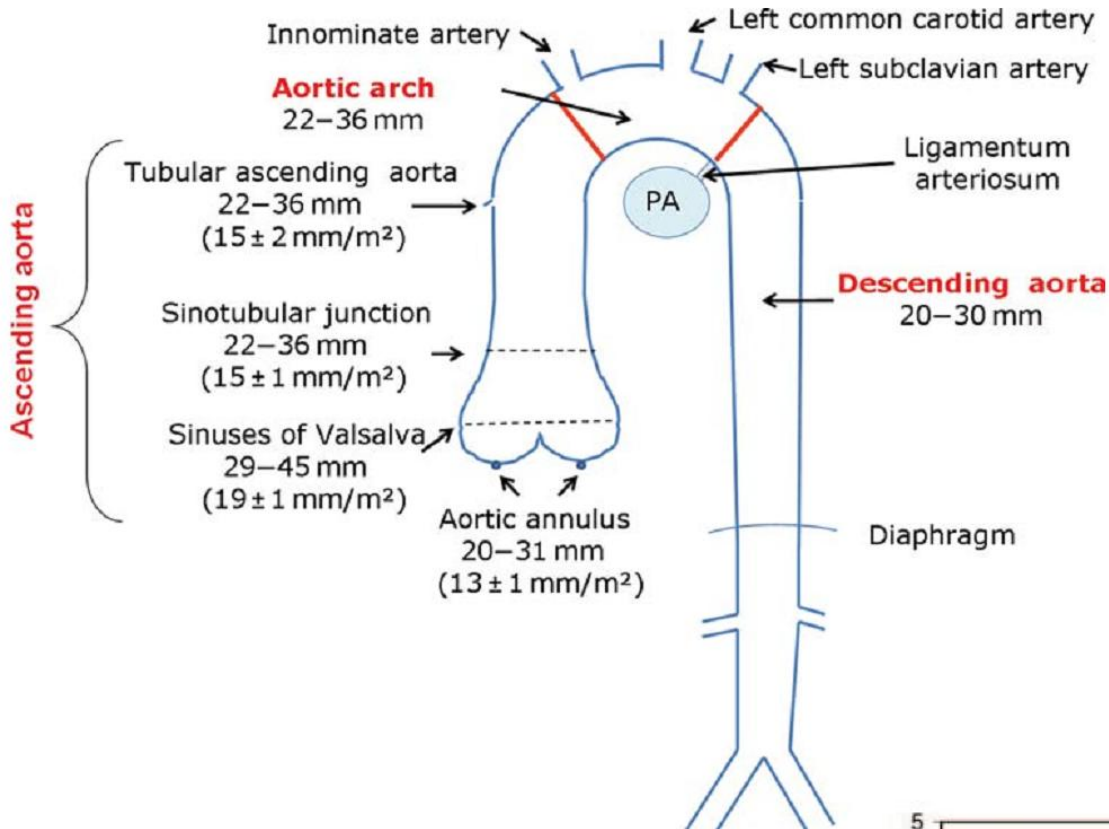
### 2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM Guidelines for the Diagnosis and Management of Patients With Thoracic Aortic Disease

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

107 pages

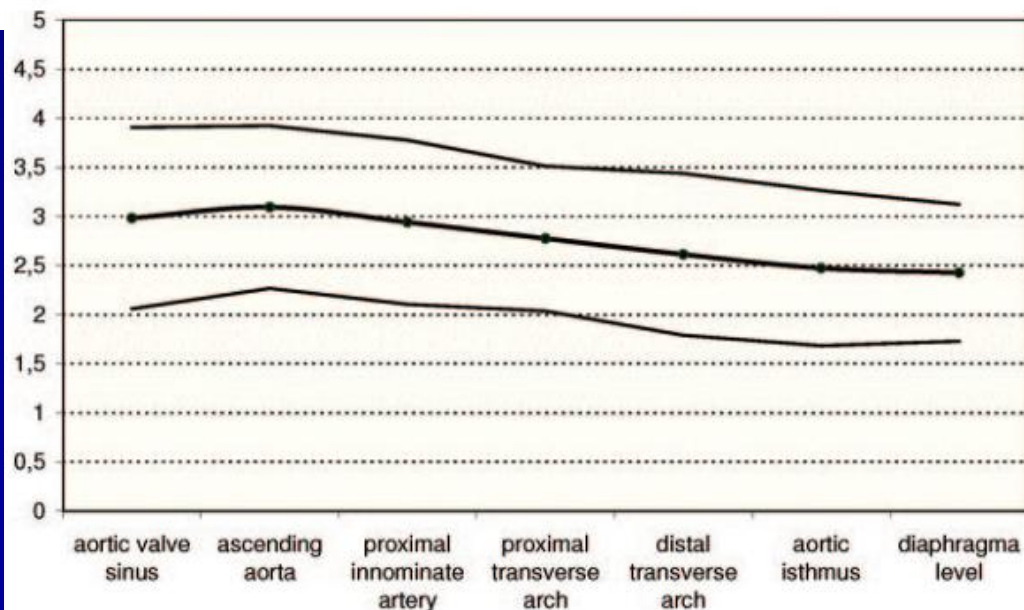


**EAE recomb. EJE'10;11:645**



**Ao Ø in adults by CT**  
**Hager et al.**  
**JThorCVSurg 02;123:1060**

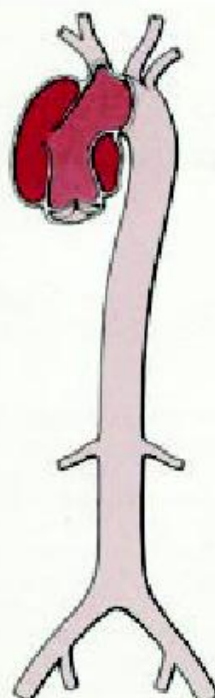
**EAE recomm.**  
**EJE'10;11:645**



# *Acute aortic syndrome (ao diss + IMH + ao ulcer) – a continuing diagnostic and therapeutic challenge*

- incidence increasing: from classically 3-4 up to 10-15 per 100 000 • year (Sweden, Olsson Circ 06)
- often overlooked and mostly initially misdiagnosed (e.g., myocardial infarction)
- dramatic mortality: 40% ? pre-hospital, 1-2% / h during first 2 days if asc.aorta involved and not operated



**De Bakey Type I****Type II****Type III****Stanford****Type A****Type B****De Bakey**

- Type I    Originates in the ascending aorta, propagates at least to the aortic arch and often beyond it distally
- Type II    Originates in and is confined to the ascending aorta
- Type III    Originates in the descending aorta and extends distally down the aorta or, rarely, retrograde into the aortic arch and ascending aorta

**Stanford**

- Type A    All dissections involving the ascending aorta, regardless of the site of origin
- Type B    All dissections not involving the ascending aorta

**Table 10. International Registry of Acute Aortic Dissection (IRAD) Physical Findings of 591 Patients With Type A Aortic Dissection**

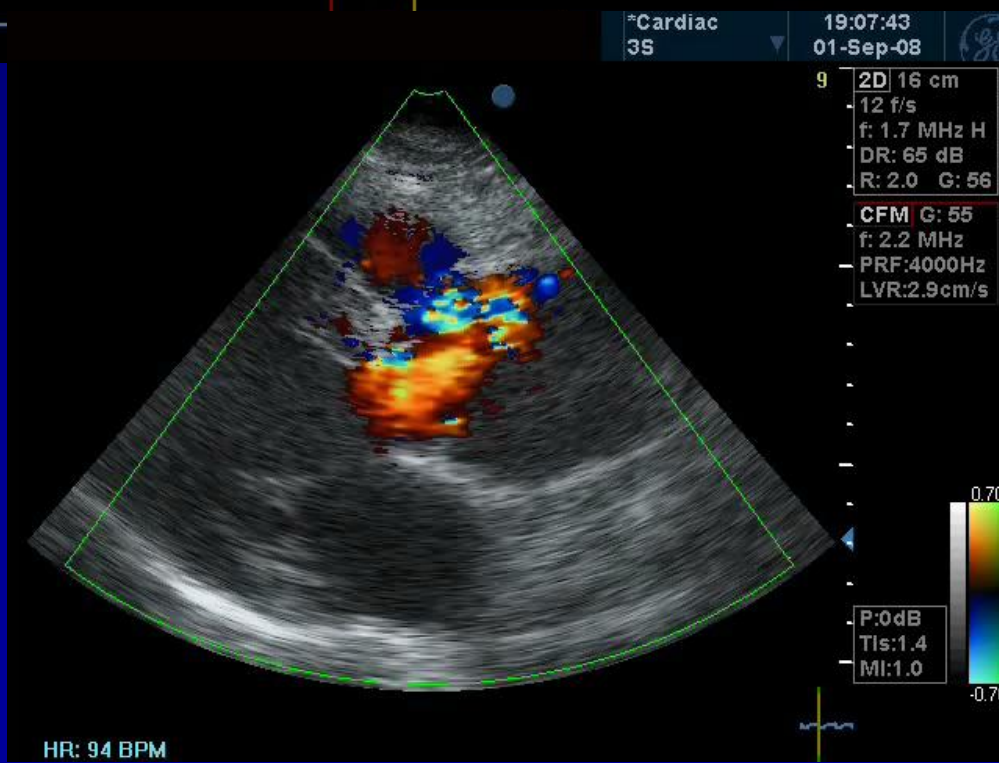
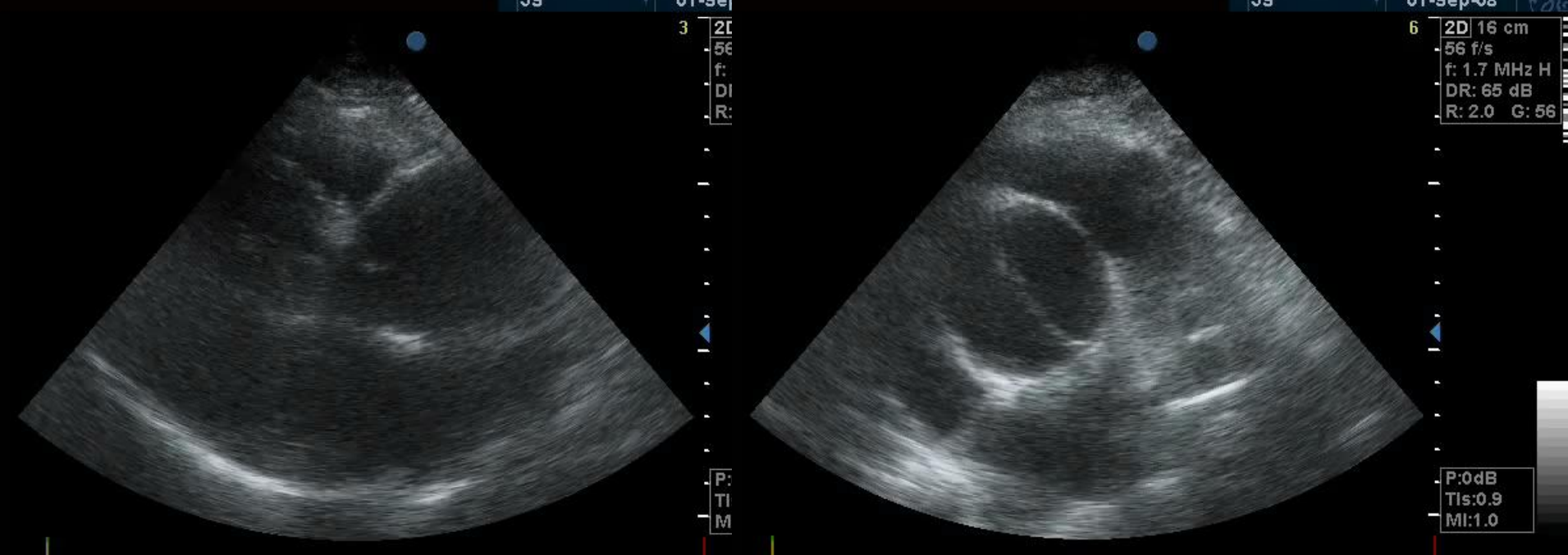
Presenting Hemodynamics and Clinical Findings	Frequency/Finding
Hypertensive	32%
Normotensive	45%
Hypotensive	14%
Shock	13%
Cardiac tamponade	5%
Murmur of aortic insufficiency	45%
Pulse deficits	26%
Pericardial friction rub	2%
Cerebrovascular accident	8%
Ischemic peripheral neuropathy	3%
Ischemic spinal cord damage	2%
Ischemic lower extremity	10%
Coma/altered consciousness	12%
Congestive heart failure	5%
First blood pressure systolic, mean	130 mm Hg
First blood pressure diastolic, mean	75 mm Hg

***Table 8 Imaging: diagnostic goals***

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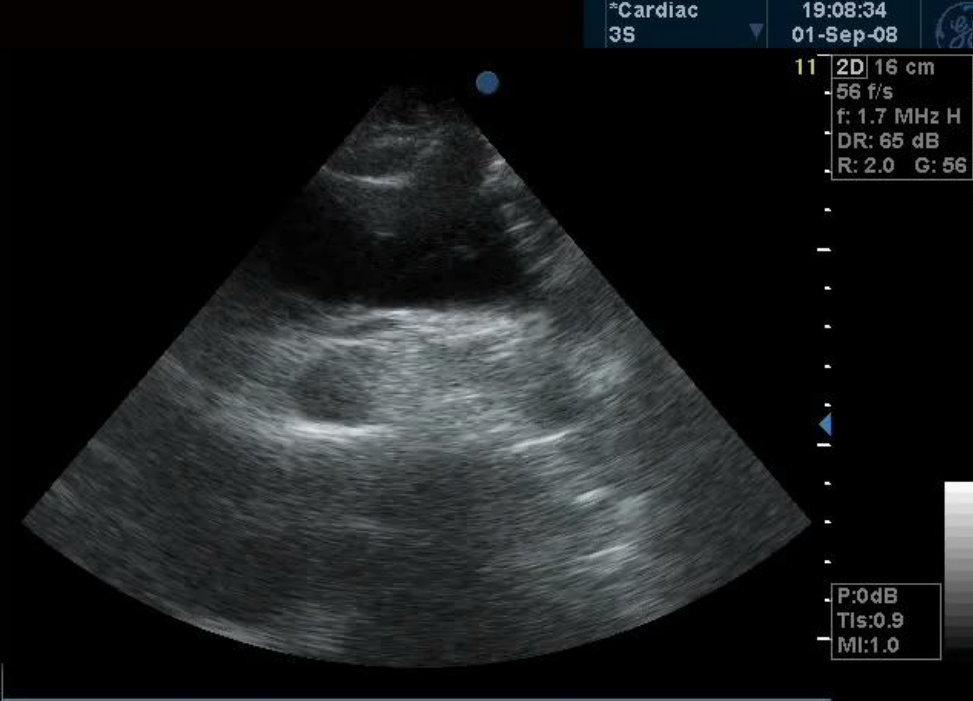
- Confirm diagnosis
- Classify the dissection/delineate the extent
- Differentiate true and false lumen
- Localize intimal tears
- Distinguish between communicating and non-communicating dissection
- Assess side branch involvement (including coronary arteries)
- Detect and grade aortic regurgitation
- Detect extravasation (periaortic or mediastinal haematoma, pleural or pericardial effusion)

**Erbel et al., ESC-Recommendations, EHJ 2001;22:1642**

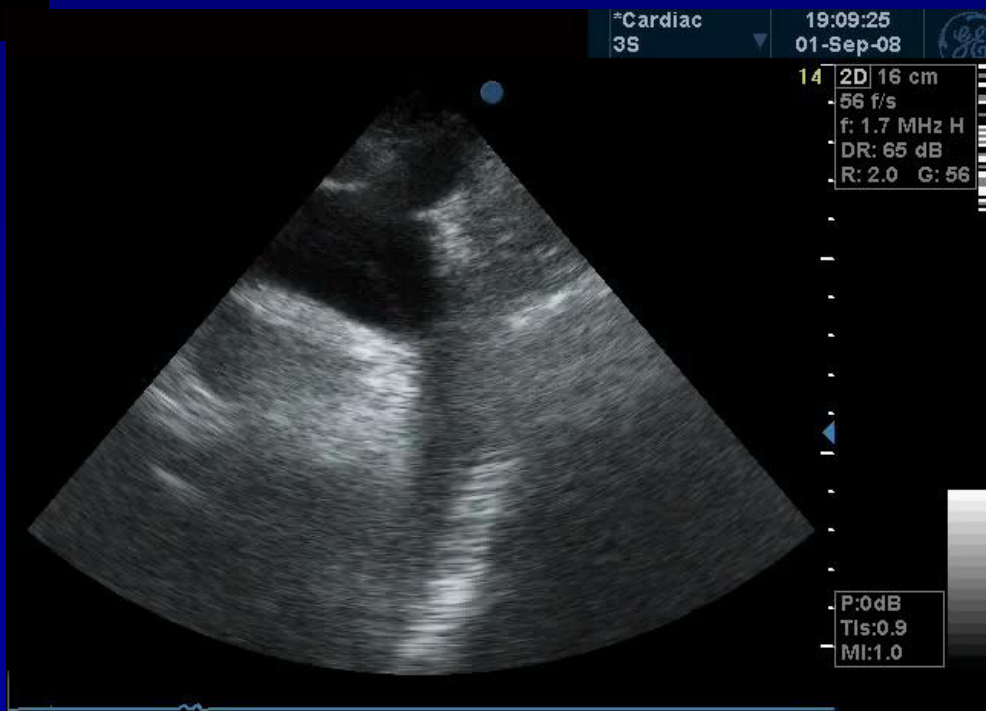


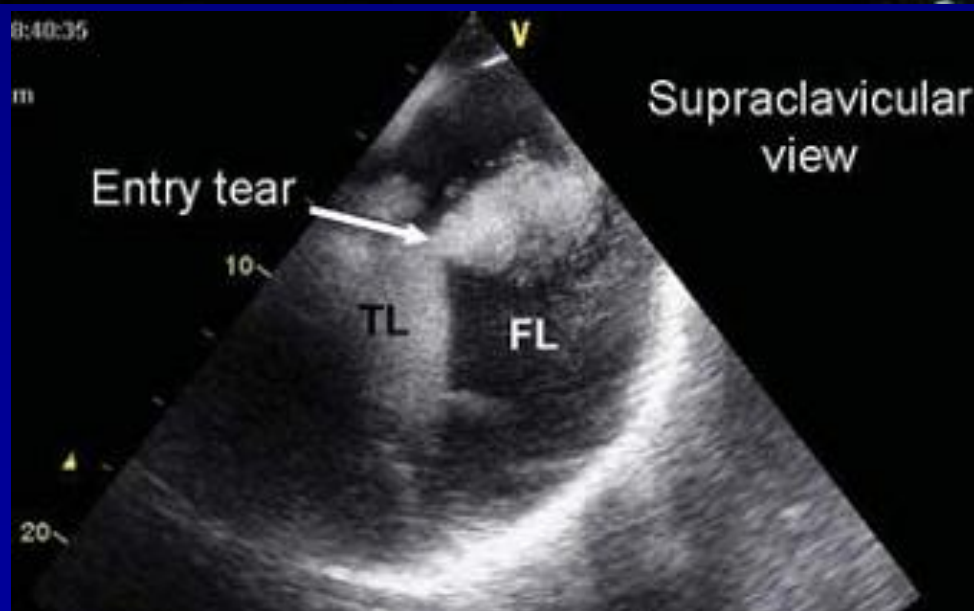
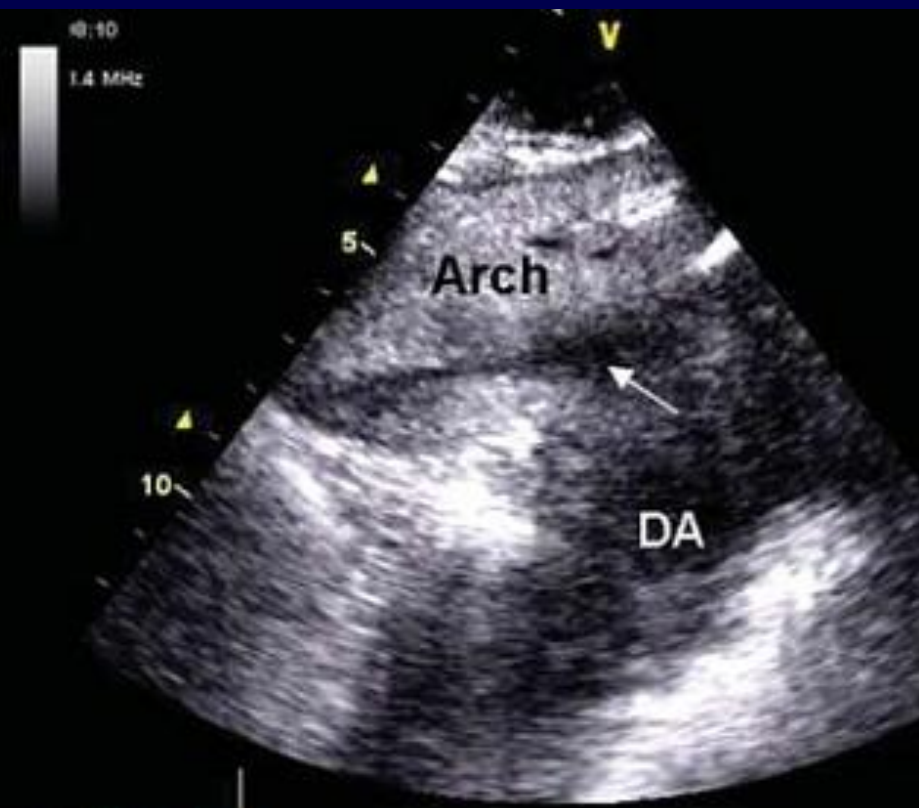
courtesy of  
Dr.Ivan Stankovic





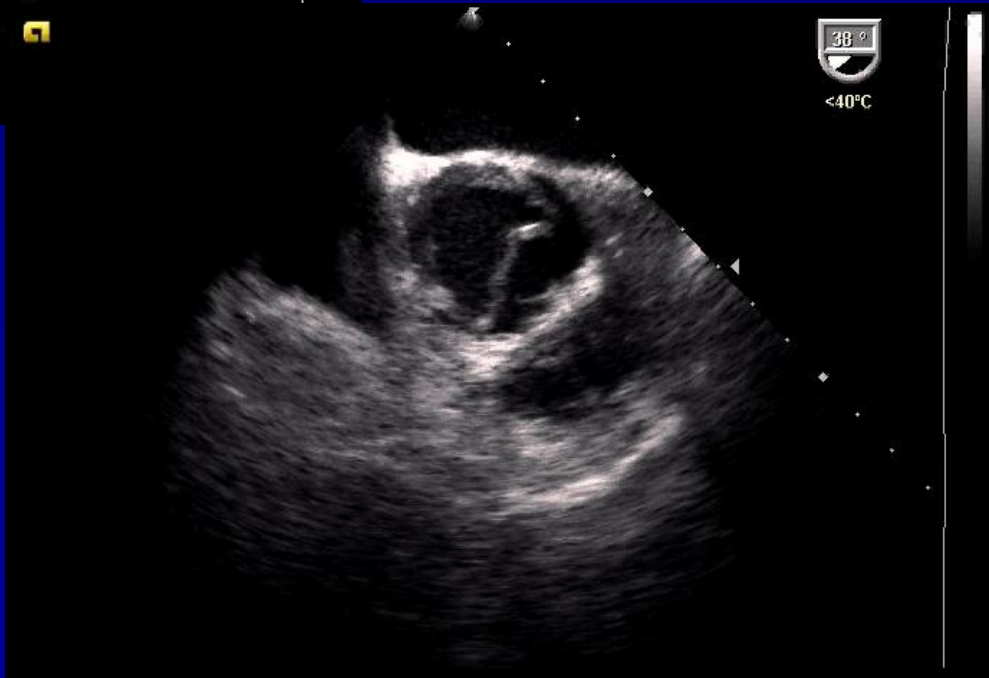
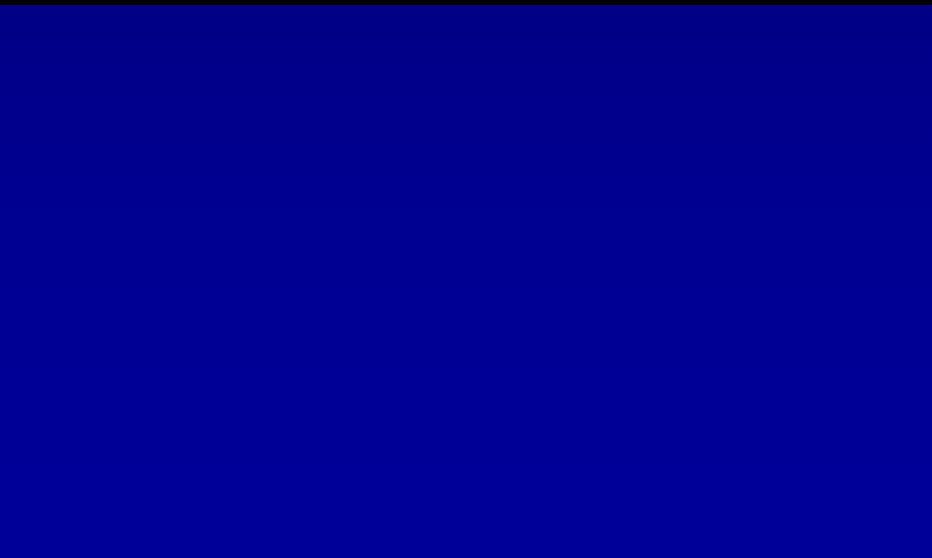
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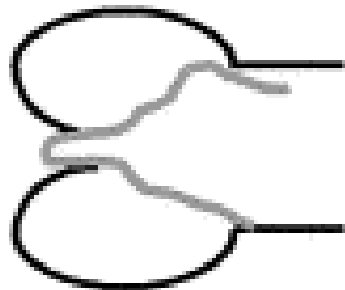
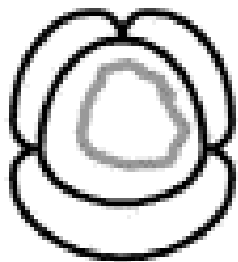
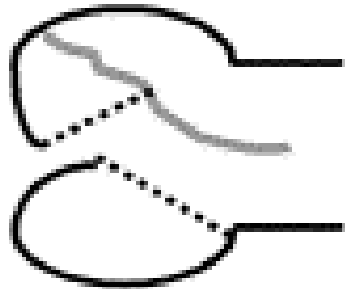
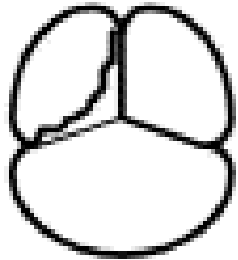
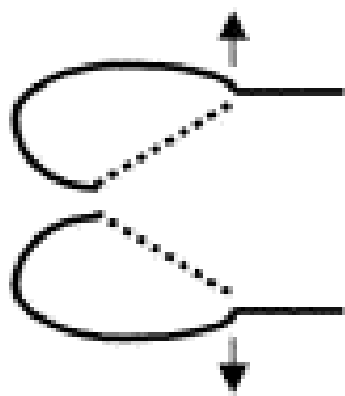




**Evangelista**  
**EHJ '10;31:472**







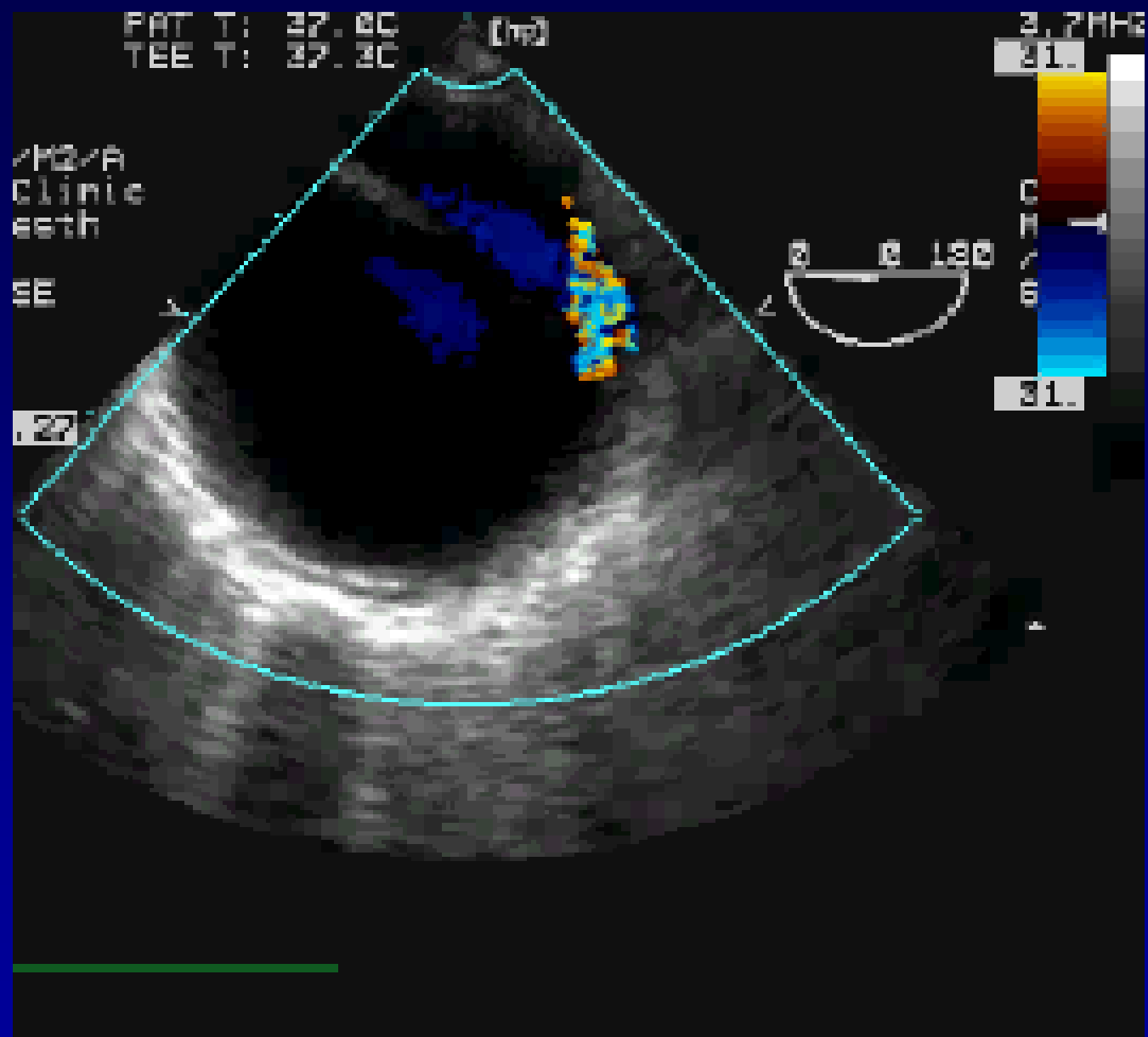
- may be repairable
- Marfan syndrome and bicuspid aortic valve less often repairable



PAT T: 27.0C [m]  
TEE T: 27.2C [m]

MDA  
Clinic  
esth

EE





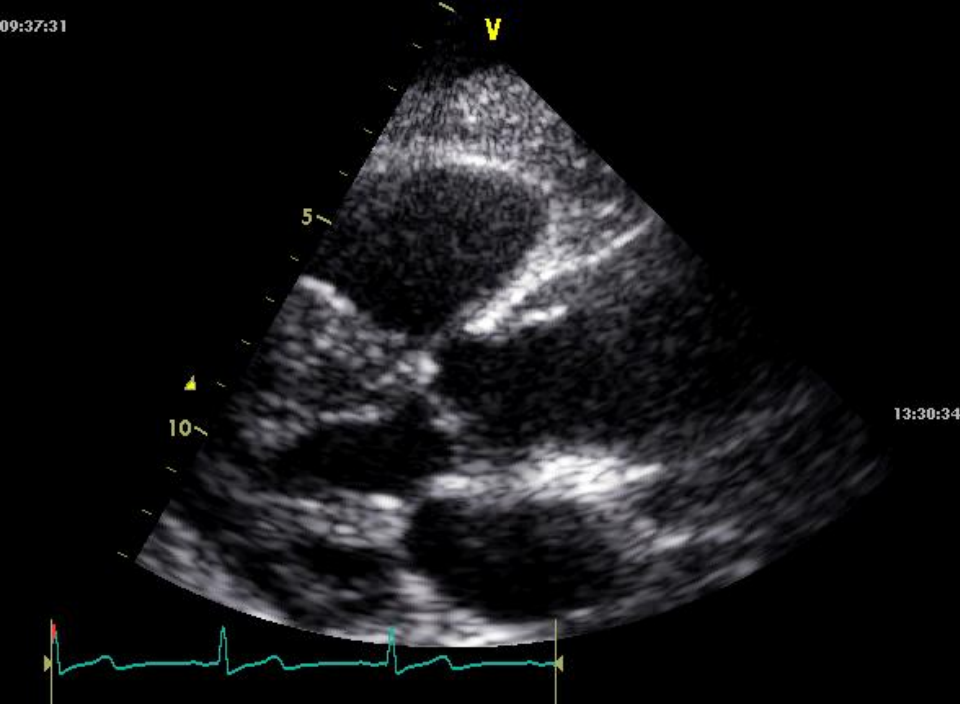
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VSM 8.0  
B/Sek 66s



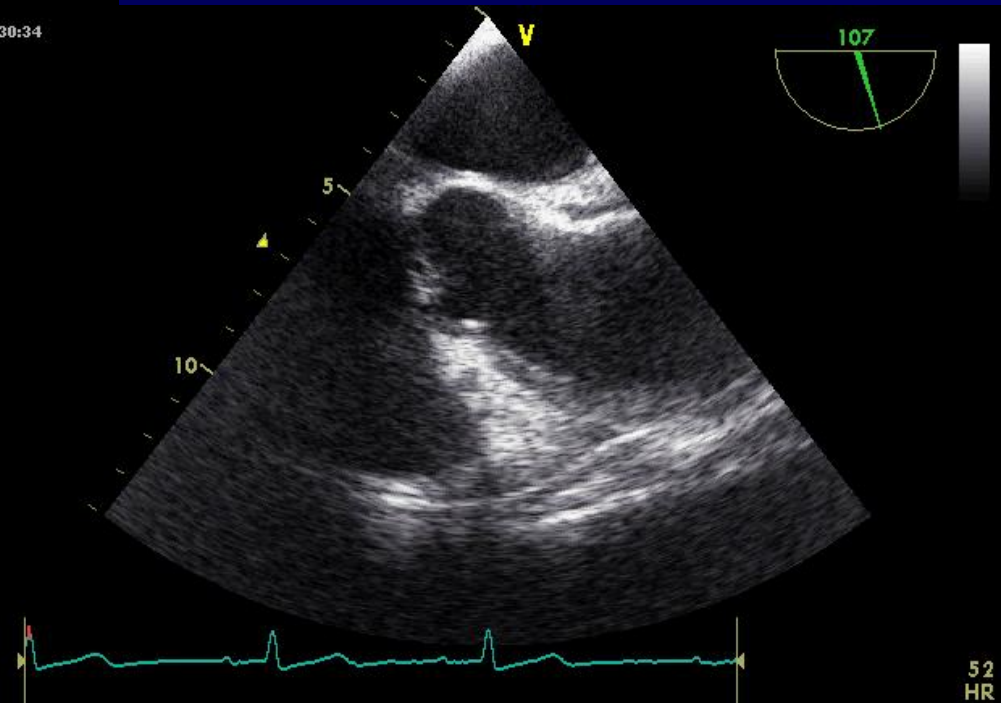
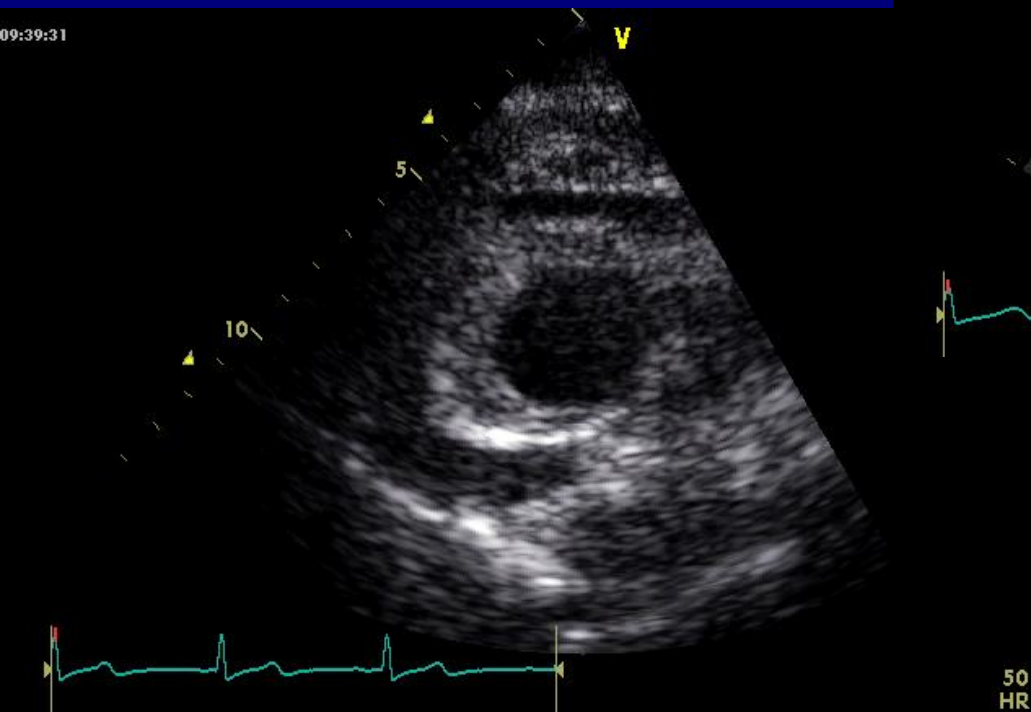
# *Intramural hematoma: an even more difficult diagnosis*

- Variant, precursor, or coexisting with classic dissection
- aortic wall thickening  $> 5-7$  mm, smooth luminal border, displacement of aortic plaque inward, possible echo-free spaces but no flow (DD severe atherosclerosis or dissection with thrombosed false lumen)
- more frequent in the descending than in the ascending aorta
- similar prognosis and treatment as frank dissection

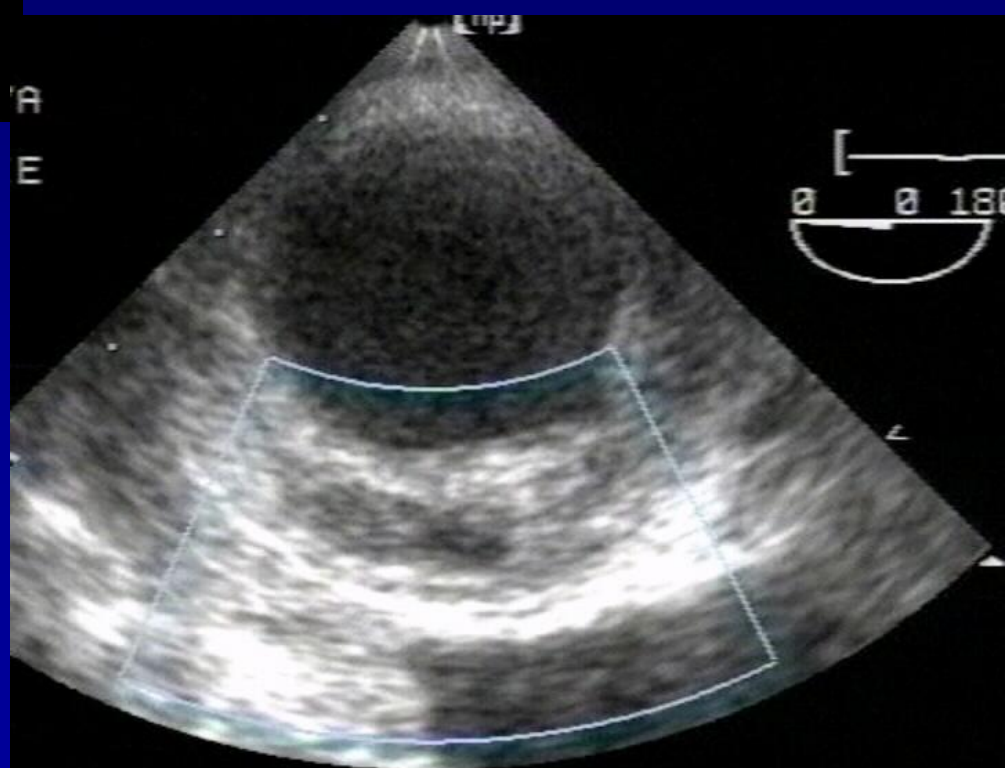
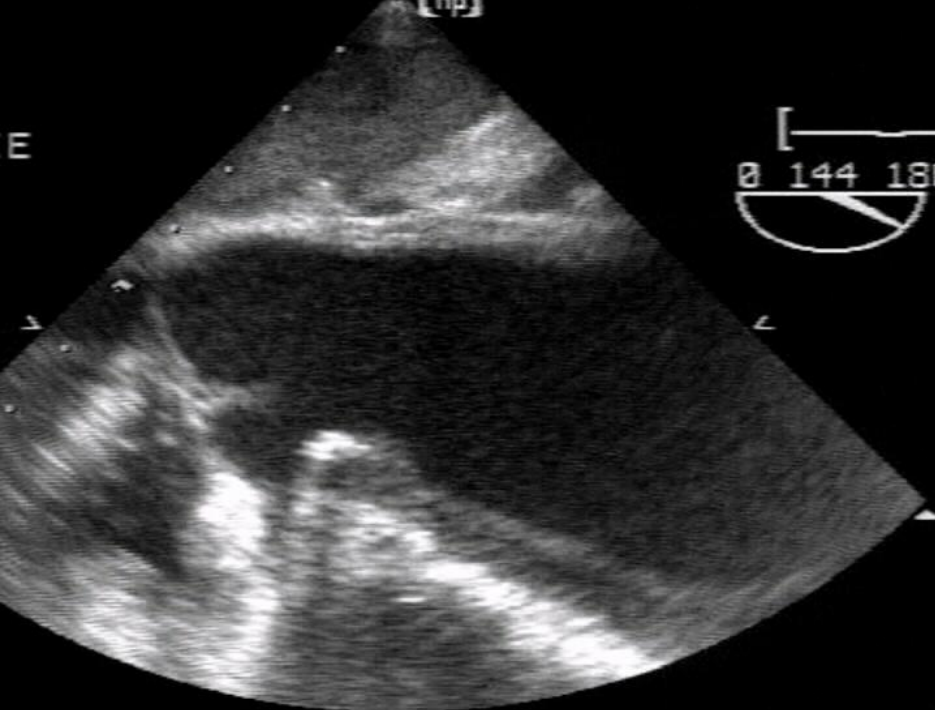
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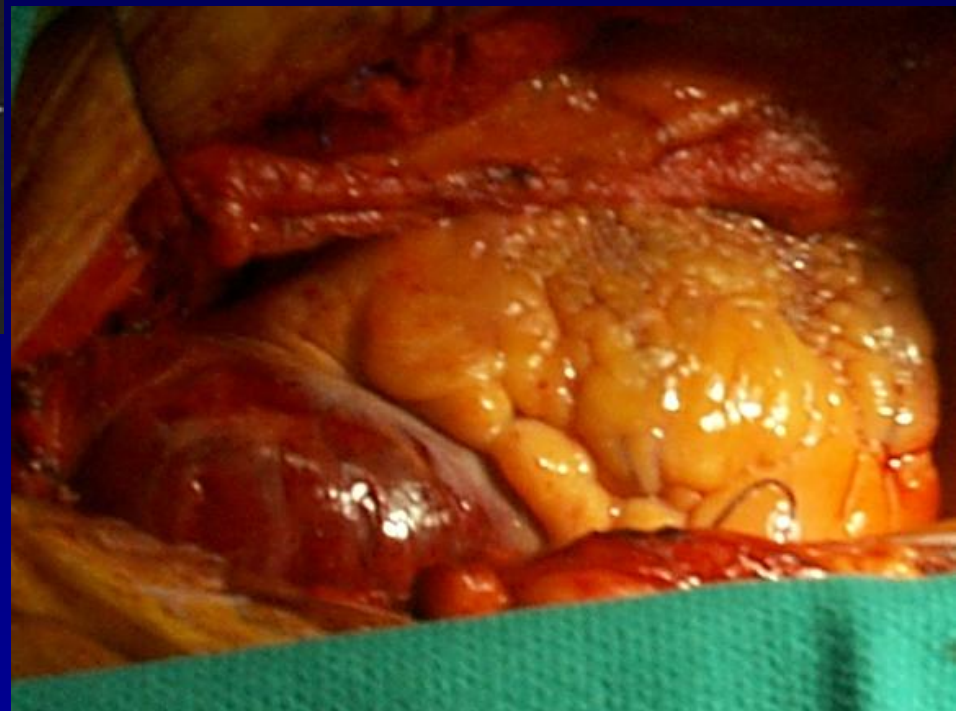
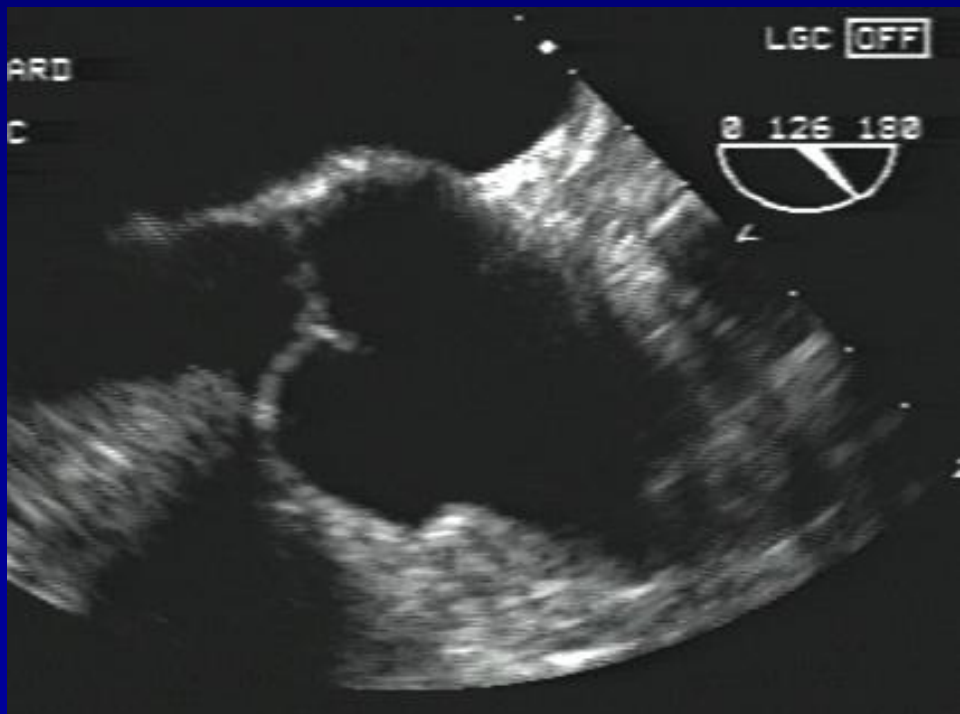
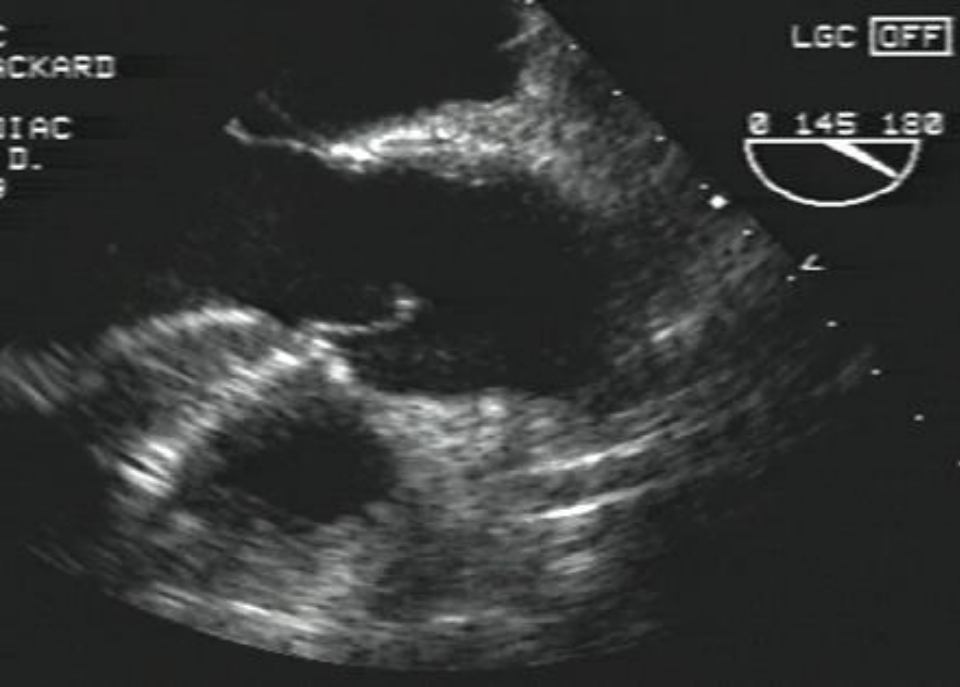
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courtesy of  
**Dr.Ivan Stankovic**







**Flachskampf JASE 1999;12:866**

# *TEE: does it suffice ?*

- echo/TEE usually first line assessment to prove or exclude
  - presence of a dissection (= intimal flap)
  - involvement of ascending aorta
- enough to diagnose asc.aorta dissection and send patient to OR
- insufficient for conclusive assessment of type III / B

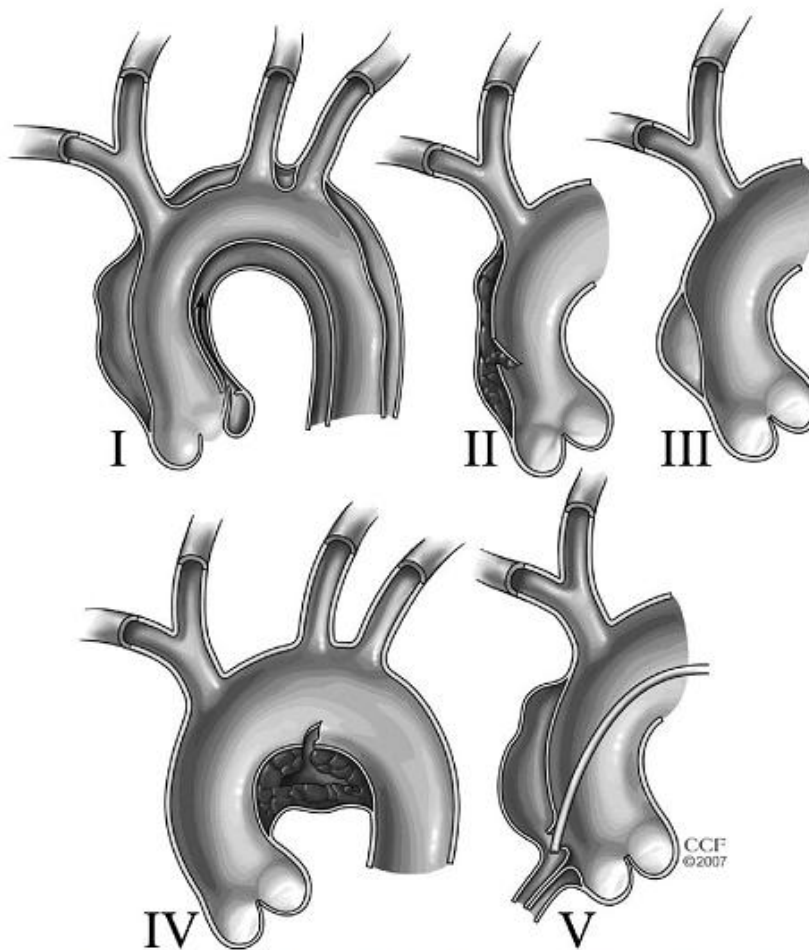
However, echo often inconclusive: is this really a flap ?

→ CT/CMR

Hagan et al., IRAD, JAMA 2000;283:897		Present, No. Reported (%)	Type A, No. (%)	Type B, No. (%)	
Initial modality (n = 453)					
Computed tomography		277 (61.1)	145 (50.2)	132 (75.4)	<.001
Echocardiogram (TEE and/or TTE)		148 (32.7)	122 (42.2)	26 (14.9)	<.001
Aortography		20 (4.4)	12 (4.2)	8 (4.6)	.92
Magnetic resonance imaging		8 (1.8)	2 (0.7)	6 (3.4)	.36
Images performed per patient, mean (SD)		1.83 (0.82)	1.64 (0.69)	2.15 (0.91)	<.001

# *Summary*

- acute aortic syndromes are often difficult to recognize and mostly misinterpreted at the beginning; unexplained body pain, aortic regurgitation, or syncope/neurologic symptoms should raise suspicion
- on echo, aortic regurgitation and/or pericardial effusion should raise a red flag
- TEE is essential for exclusion of the diagnosis
- time is essential
- don't hesitate to use second imaging technique



**Figure 17.** Classes of intimal tears. I. Classic dissection with intimal tear and double lumen separated by septum. Communication between lumens is typically in descending aorta at sheared-off intercostal arteries or distal reentry site. II. IMH. No intimal tear or septum is imaged but is usually found at surgery or autopsy. DeBakey Types II and IIIa are common extent of this lesion. III. Intimal tear without medial hematoma (limited dissection) and eccentric aortic wall bulge. Rare and difficult to detect by TEE or CT. Patients with Marfan syndrome prone to this type. May result in aortic rupture or extravasation. IV. PAU usually to the adventitia with localized hematoma or saccular aneurysm. May propagate to Class I dissection, particularly when involving ascending aorta or aortic arch. V. Iatrogenic (catheter angiography or intervention)/traumatic (deceleration) dissection.

## Svensson classification AHA/ACC 2010

# *Published errors in TEE diagnosis of ascending aortic dissection*

- 1 false negative due to localized type II dissection; 2 false positives in ectatic aorta (n=164 suspected AD; Erbel Lancet 1989;1:457)
- 2/65 false negatives due to localized type II dissection (Bansal JACC 1995;25:1393)
- 3 false negatives: 1 small dissection close to aortic valve, 2 with thrombosed false lumen; 2 false positives: 1 with asc.aortic graft and 1 in ectatic aorta (n=112; Keren JACC 1996;28:627)