



ACUTE AORTIC SYNDROMES

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ACUTE AORTIC SYNDROMES

- Aortic dissection
- Intramural hematoma (IMH) 5-20%
- Penetrating atherosclerotic ulcer (PAU) 10%?
- Aortic aneurysm leak and rupture

Incidence of Thoracic Aortic Disease in Sweden 1987-2002

- 1987 10.7/100 000 men, 7.1/100 000 women
- 2002 16.3/100 000 men, 9.1/100 000 women
- 52% increase in men and 28% in women
- 22% died outside hospital
- 30 day mortality for all who reached hospital alive was 34%
- Surgical 30 day mortality decreased from 25% to 13% during the study period

Circulation 2006;114:2611

Risk of Death in Untreated Aortic Dissection

- 25% during the first 24 hours
- 50% during the first week
- 75% during the first month
- 90% during the first year

DIAGNOSIS

CT

MRI

TEE

How to Perform the CT

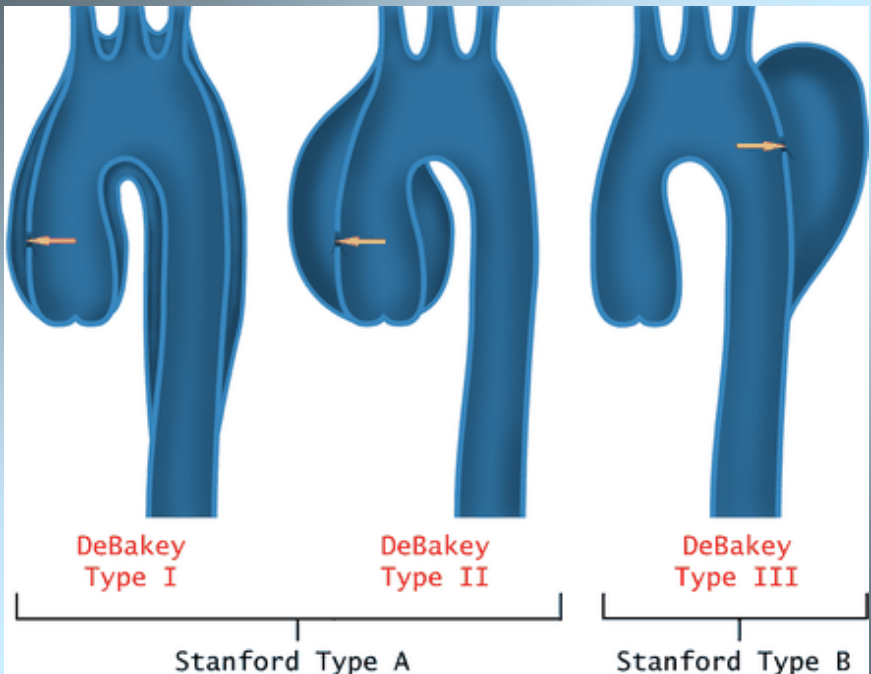
1. Unenhanced CT of the thorax
(diagnosis of IMH)

2. Contrast-enhanced CT

From a few centimeters above the aortic arch
to the common femoral arteries.

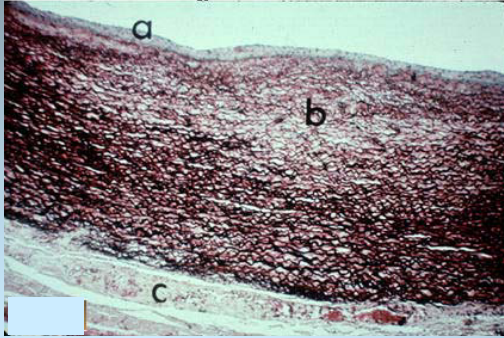
Diagnostic Goals

- Delineate the extent of AD, IMH or PAU
- Assess involvement of branches
- Detect thoracic complications: pericardial and pleural effusion
- Detect aneurysm rupture or impending rupture
- Differentiate true and false lumen
- Localise intimal tears



Aortic Wall

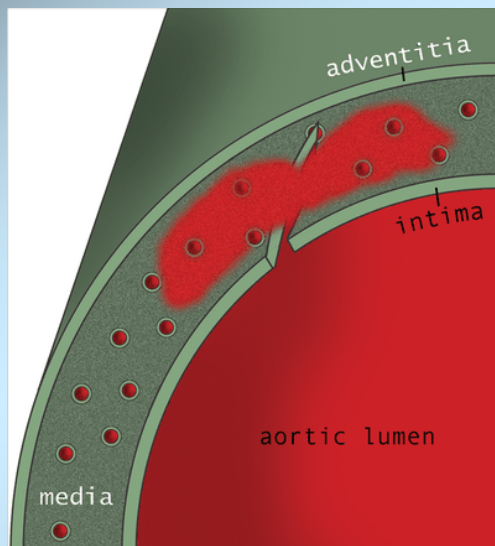
Histology Lab Part 8: Slide 18



- a = intima (endothelial lining plus thin layer of underlying c.t.).
- b = media (alternating layers of elastic membranes and smooth muscle, bound together by areolar c.t.) This is by far the thickest layer.
- c = adventitia (fairly dense c.t. carrying small blood vessels, the vasa vasorum).

Typical Aortic Dissection

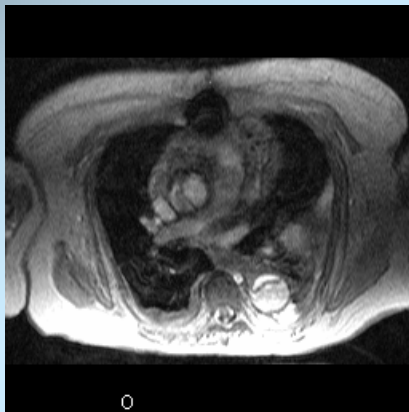
With a Tear of the Intimal Layer



Dissection Type A



Aortic Dissection Type A

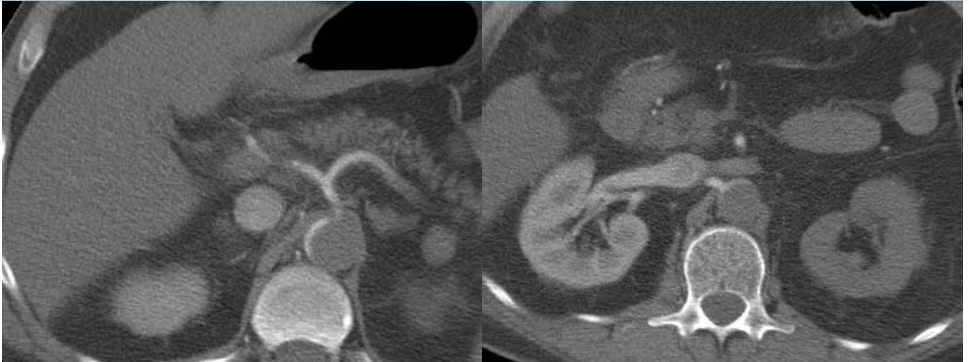
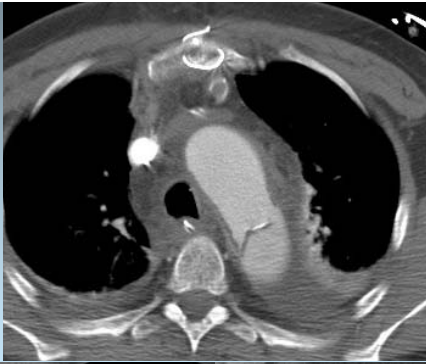


Pitfalls

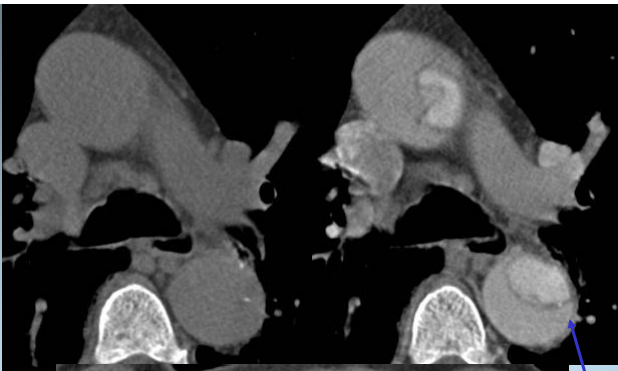
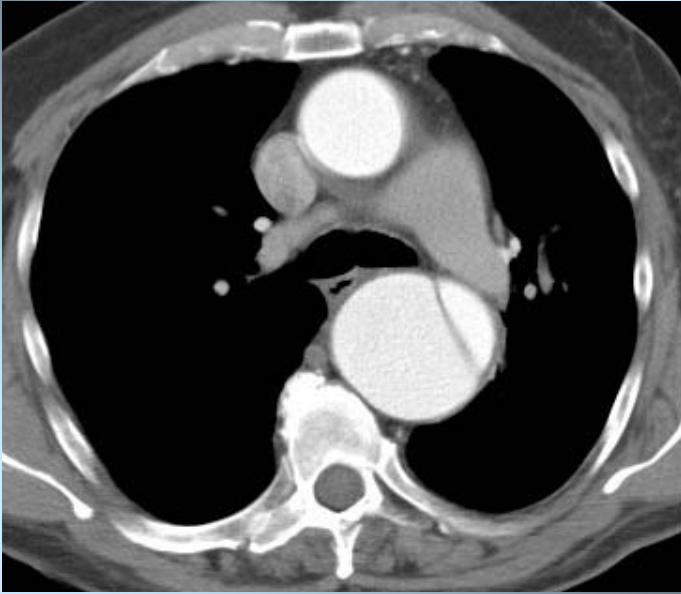
- Pulsation artefacts
- Normal periaortic anatomy can mimic dissection (great vessels, veins, atrial appendages)
- Thymus, pericardial recesses, lymphadenopathy, atelectasis can mimic periaortic hematoma

Pericardial Effusion



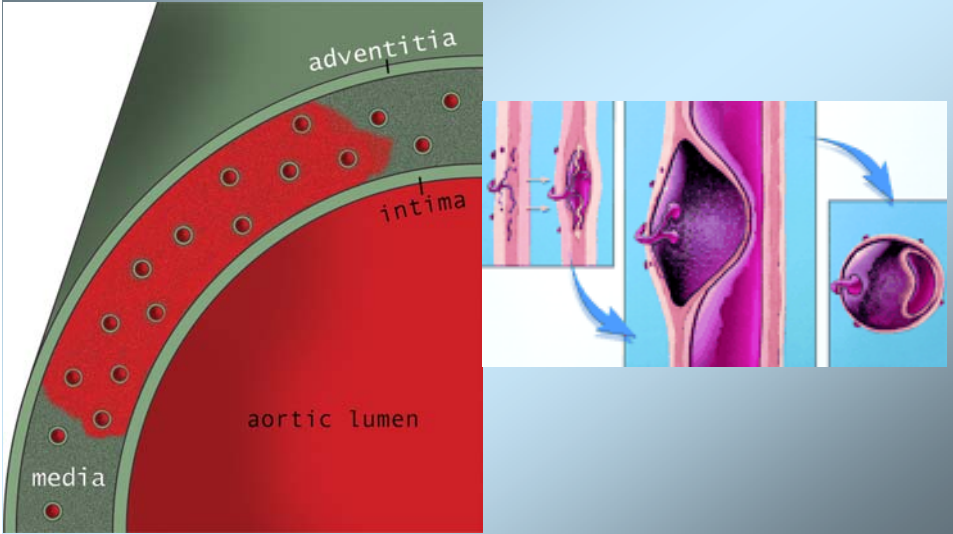


True and False Lumen

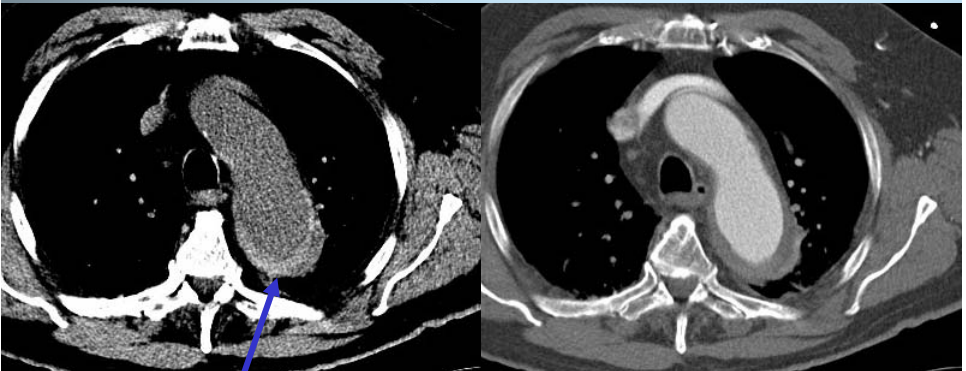


The "beak-sign"

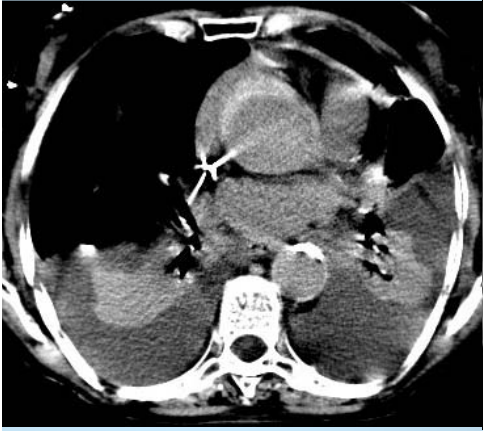
Intramural Hematoma (IMH) Without Intimal Tear



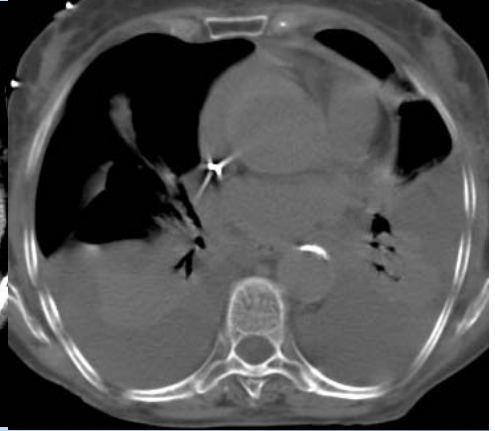
Intramural Hematoma



High attenuation crescent
on unenhanced CT scan



ww 100 wl 40

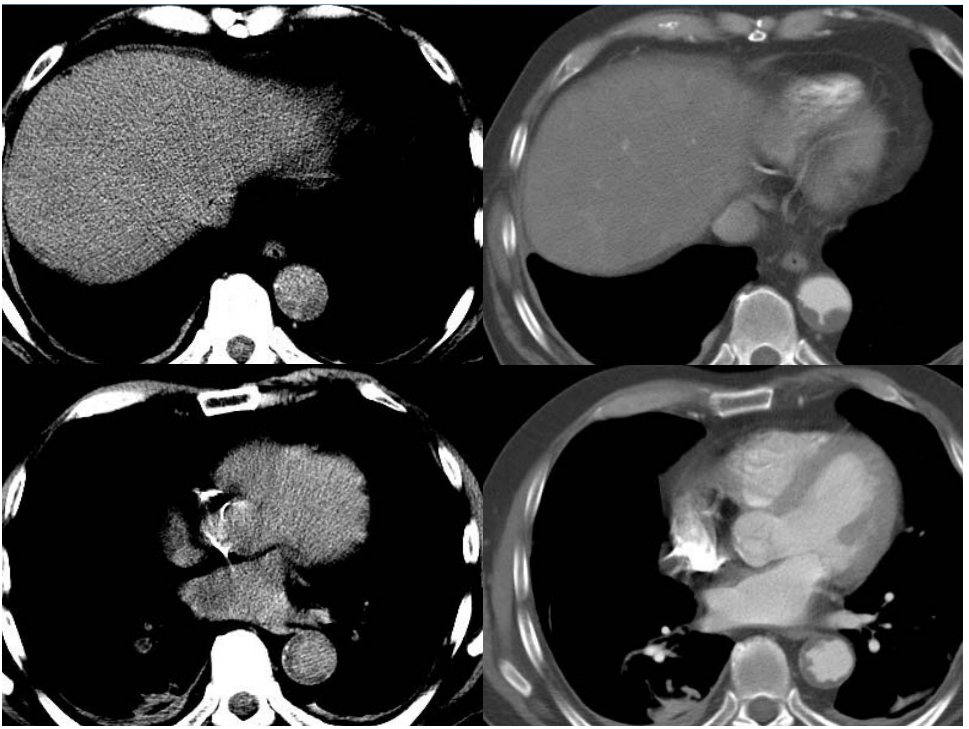


ww 700 wl 100

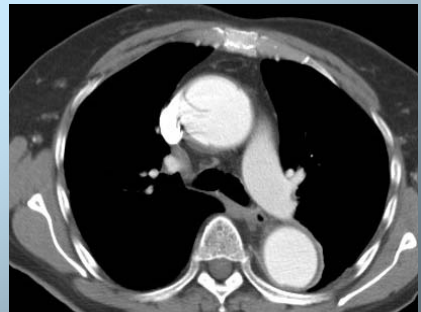
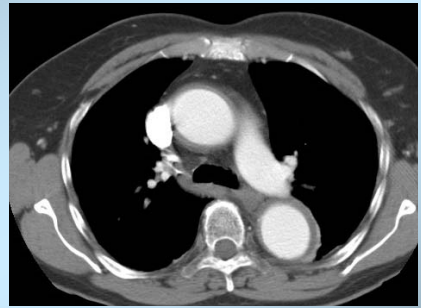
Thrombus in the Aortic Wall

Low attenuation on unenhanced scan





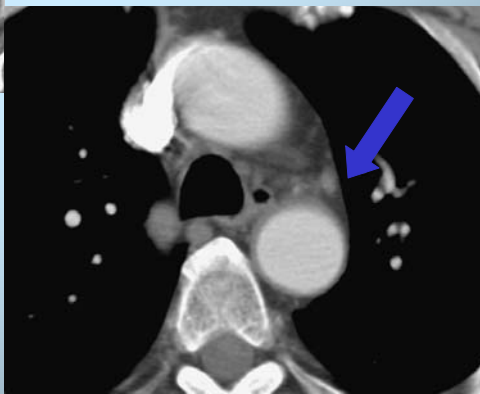
Evolution of IMH



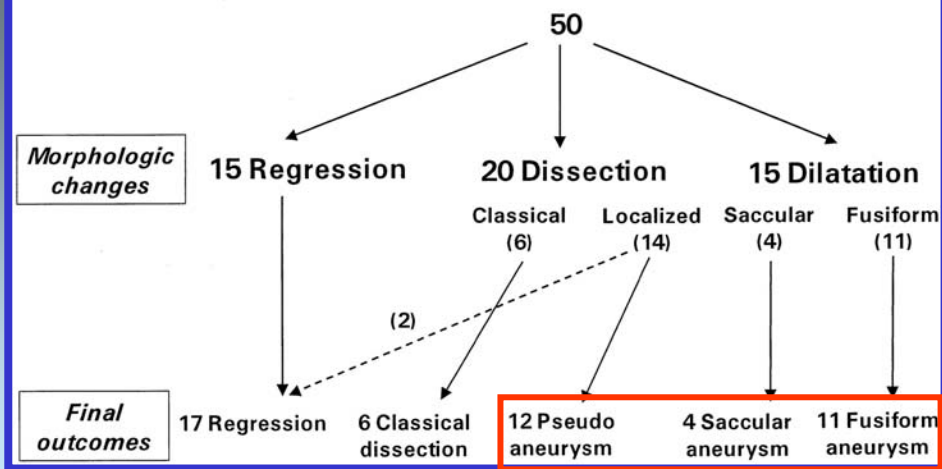
Evolution of IMH

ACUTE

FOLLOW UP



Aortic Intramural Hematoma



54%

Final Morphological Outcomes

Baseline Findings	Regression, n=17	Classical Dissection, n=6	Pseudoaneurysm, n=12	Aneurysm, Saccular, n=4	Aneurysm, Fusiform, n=11
Type A (%)	2 (40)	2 (40)	0	0	1 (20)
Type B (%)	15 (33)	4 (9)	12 (27)	4 (9)	10 (22)
Maximum diameter, mm	38.9±4.5*	45.0±5.7	46.2±8.7	46.1±5.6	47.6±6.1 [†]
Maximum thickness, mm	11.8±4.1 [†]	12.2±3.6	14.4±3.7	14.8±3.0	14.3±4.7
Echolucent areas (%)	7 (28)	5 (20)	10 (40) [†]	1 (4)	3 (12)
Extensive (%)	9 (24)	6 (16)	11 (30)	3 (8)	8 (22)
Circular shape (%)	5 (31)	1 (6)	6 (38)	1 (6)	3 (19)
Ulcerated plaque (%)	2 (20)	1 (10)	0	4 (40)*	3 (30)

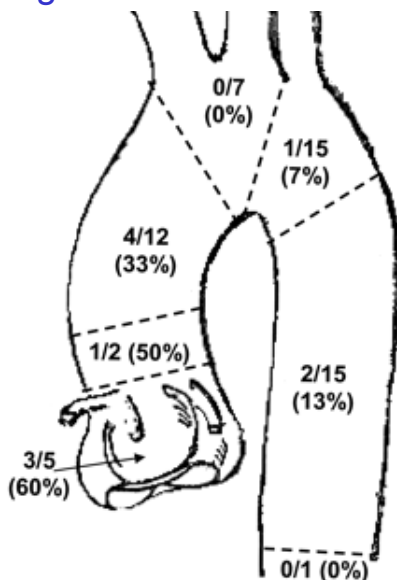
*P<0.001,

[†]P<0.05 for comparisons with the remaining values in each row.

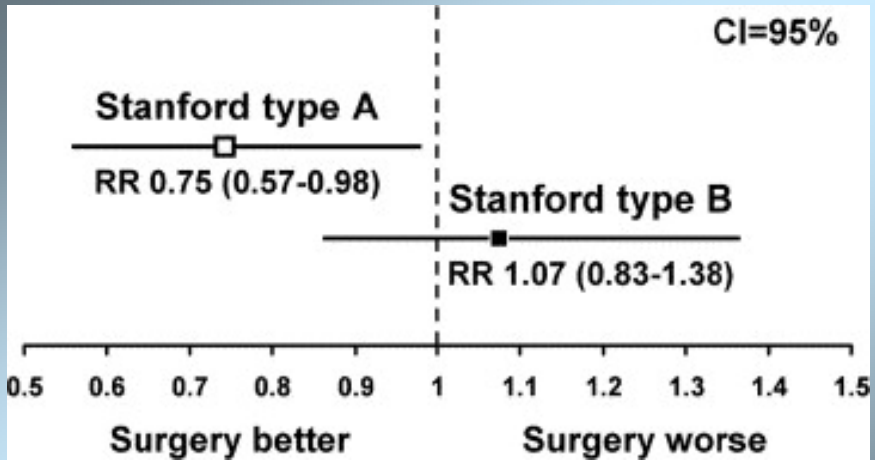
Evangelista A et al. Circulation 2003; 108:583-9

1010 patients with acute aortic syndrome.
 58 (5,7%) had IMH.
 IMH in the ascending aorta had a mortality of 39.1%.

In-hospital mortality for IMH according to site of origin



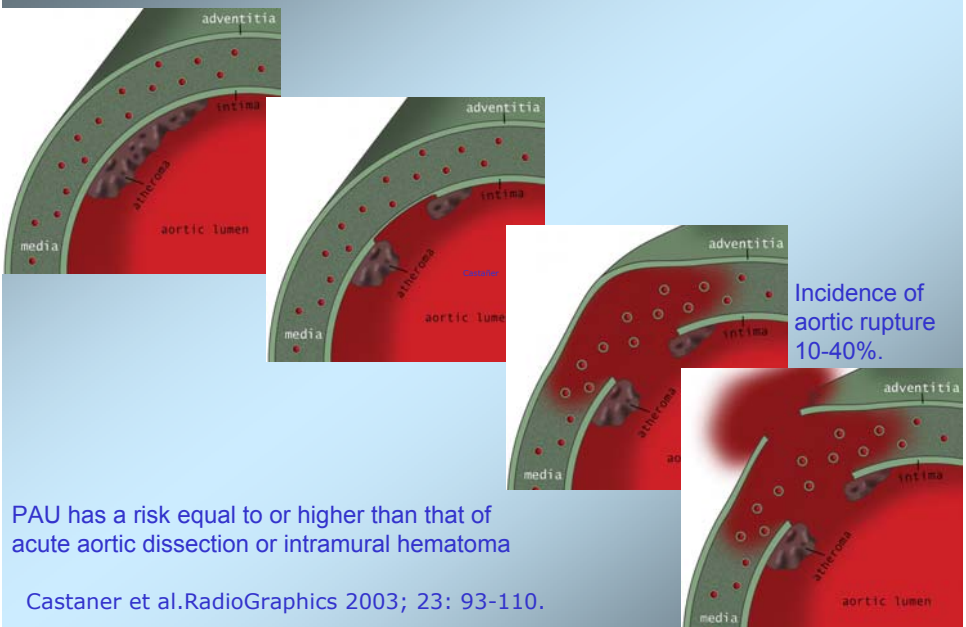
Evangelista et al. Circulation 2005; 111:1063



Meta-analysis of the out-come of 143 cases of IMH confirms the appropriateness of operative therapy for those involving the ascending aorta, and nonoperative management of those sparing the ascending aorta.

The Annals of Thoracic Surgery 2007;83:S835

The Four Stages in the Formation of a Penetrating Atherosclerotic Ulcer (PAU)



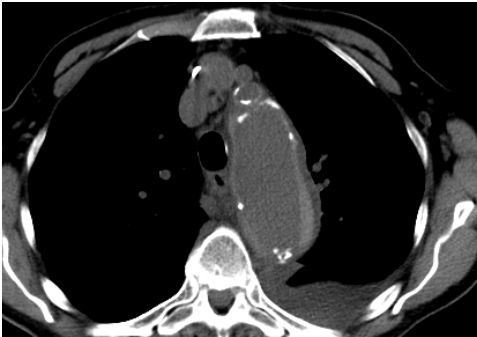
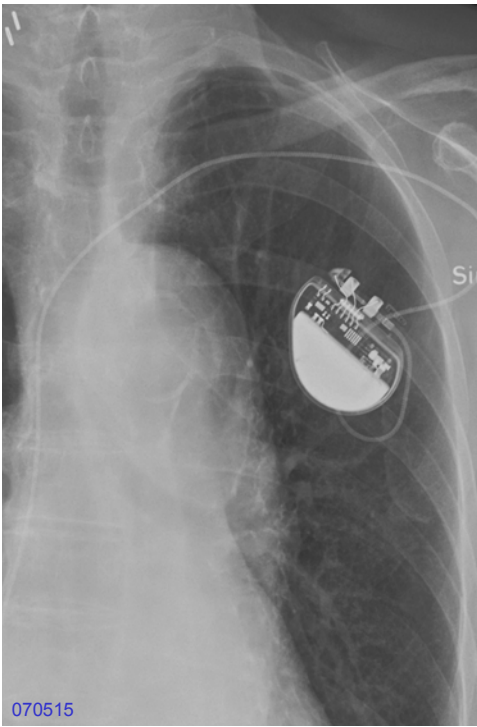
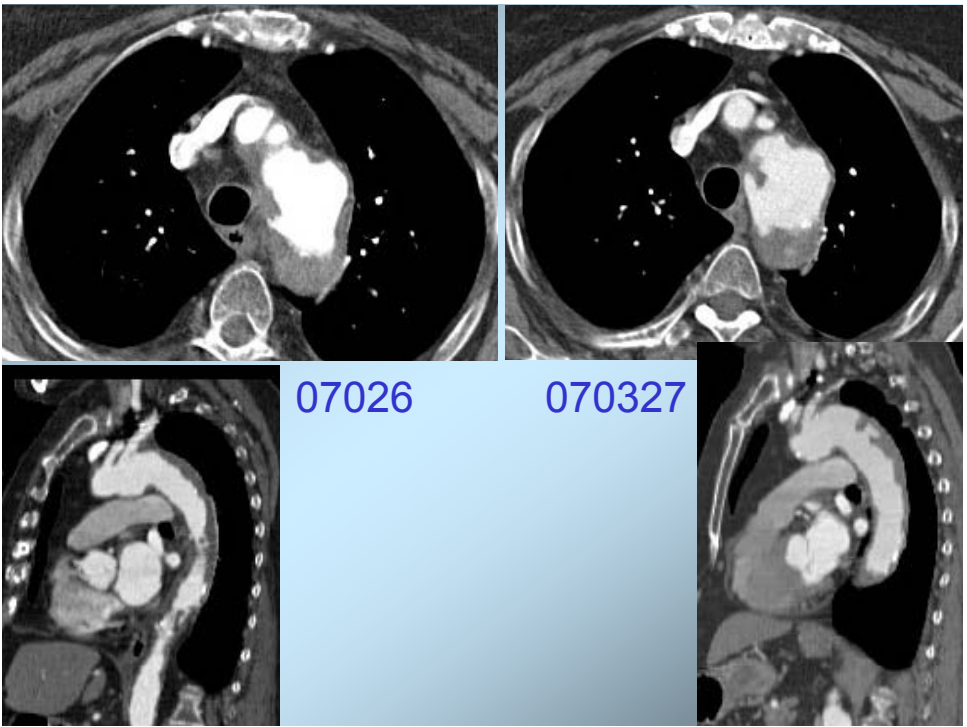




TABLE 4. Disease Course of IMH in Group 1 and 2 Patients

Group 1 IMH caused by PAU Group 2 IMH without PAU	Group 1 (n=25)	Group 2 (n=24)	<i>P</i>
Stable course	13	22	0.002
No change	11	20	
Regression	2	2	
Progressive course	12	2	
Aortic rupture	4	1	
IMH expansion	5	0	
Propagation to double-barreled dissection	3	1	

91% in group 1 had IMH type B
 IMH type A more common without PAU
 IMH type B with PAU had more progressive disease

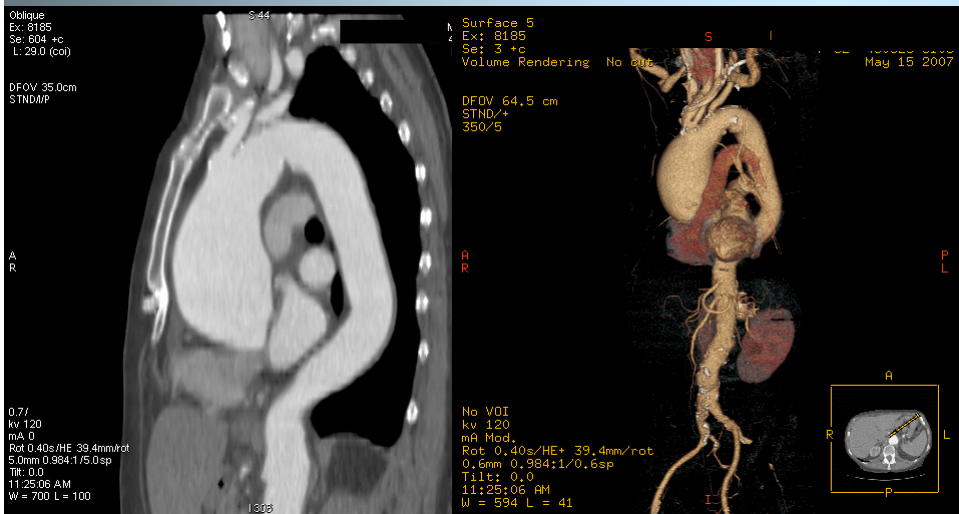


IMH with PAU Indicators and Predictors of Disease Progression

- Uncontrollable pain
- Increasing pleural effusion
- Diameter of PAU >20mm or depth >10mm; early surgical or endovascular treatment recommended
- PAU in ascending aorta, aortic arch or proximal descending aorta

Aneurysm

- Aortic aneurysm is defined as irreversible dilation of the aorta to twice its normal diameter.
- Aortic diameter varies with age and gender.
- Thoracic aortic diameter >5 cm = aneurysm.



Pseudoaneurysm

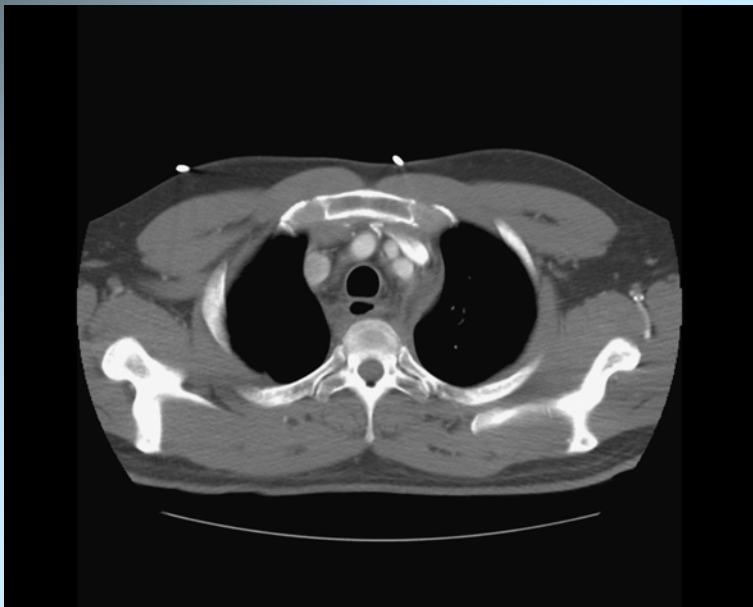


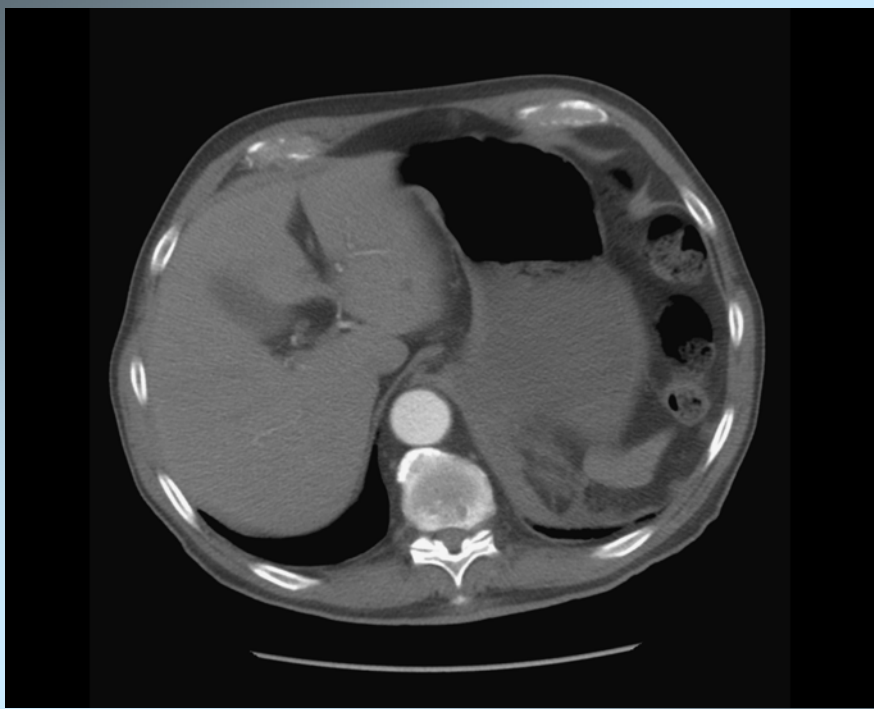
Complications

- Rupture
- Dissection
- Aortic regurgitation
- Compression of adjacent structures

Acute or Impending Rupture

- Hemorrhage (mediastinal or retroperitoneal)
- High attenuation crescent of blood within a mural thrombus
- The "draped aorta sign"





The "draped" aorta sign



Acute Chest-“Triple Rule Out”

- Acute pulmonary embolism
- Aortic dissection
- Coronary arteries

54-year-old man with dyspnea and pleuritic chest pain since 12 hours. Appears weak and pale. Systolic murmur I 4 sin.

Pulmonary embolism?

We performed an ECG-triggered MDCT of the aorta and pulmonary arteries.

