

**Echocardiography in Aortic Disease
: the Role of Echocardiography in Patients with Acute Aortic Syndrome**

CT is Enough!

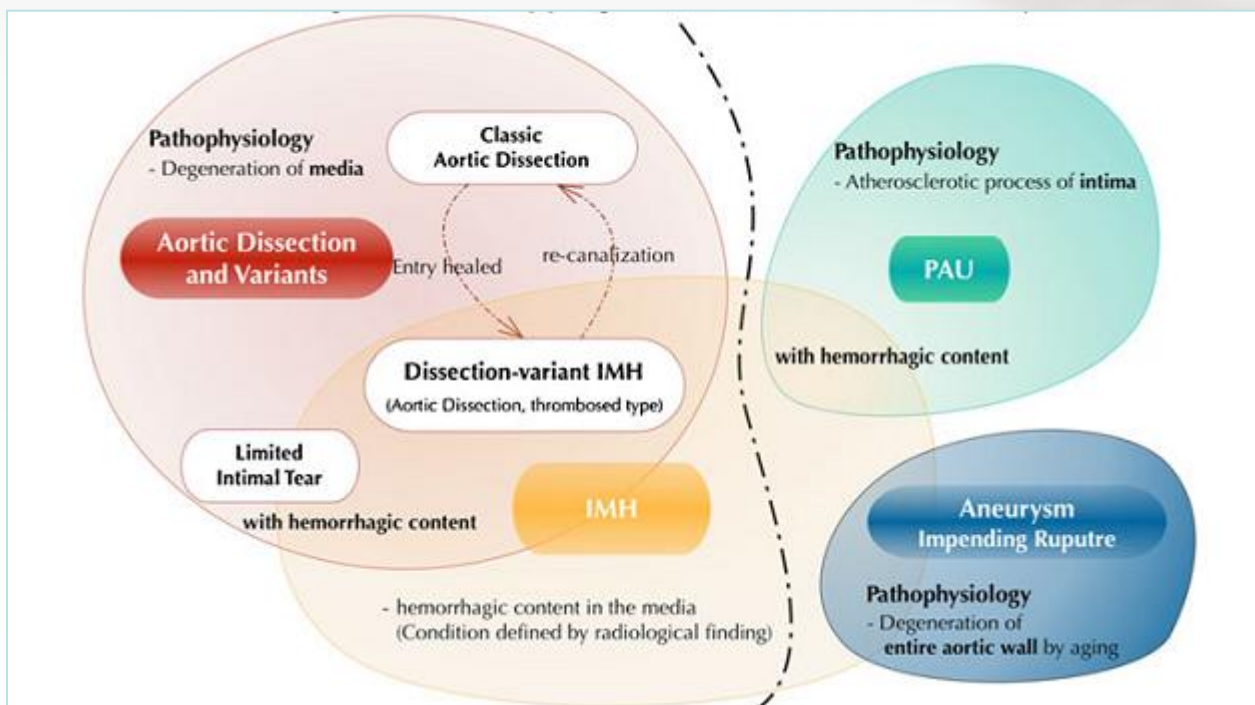
Echocardiography is a Just Optional Tool

용환석

고려대학교 구로병원 영상의학과

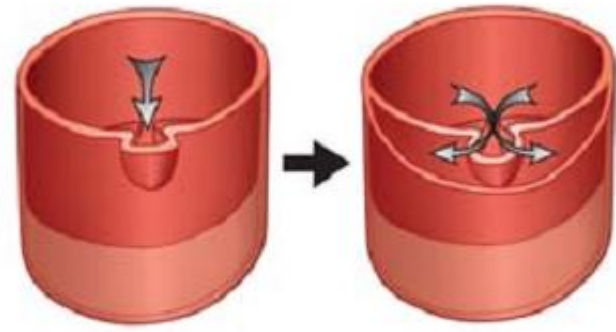
Acute aortic syndrome

- Aortic dissection (AoD)
- Intramural hematoma (IMH)
- Penetrating atherosclerotic ulcer (PAU)
- Trauma to the aorta with intimal laceration





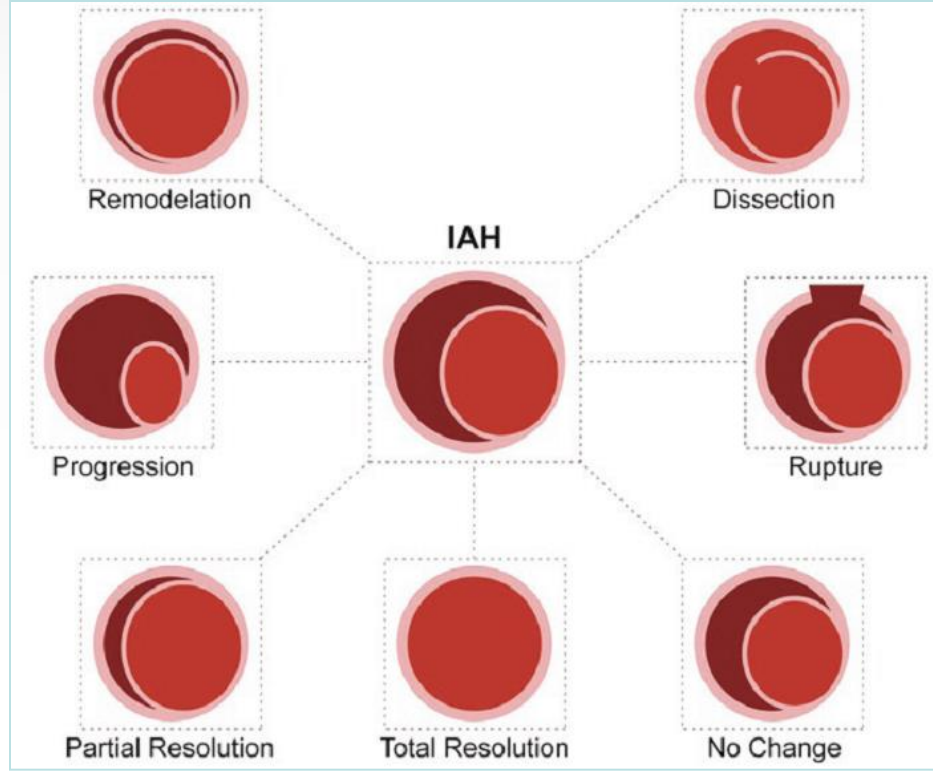
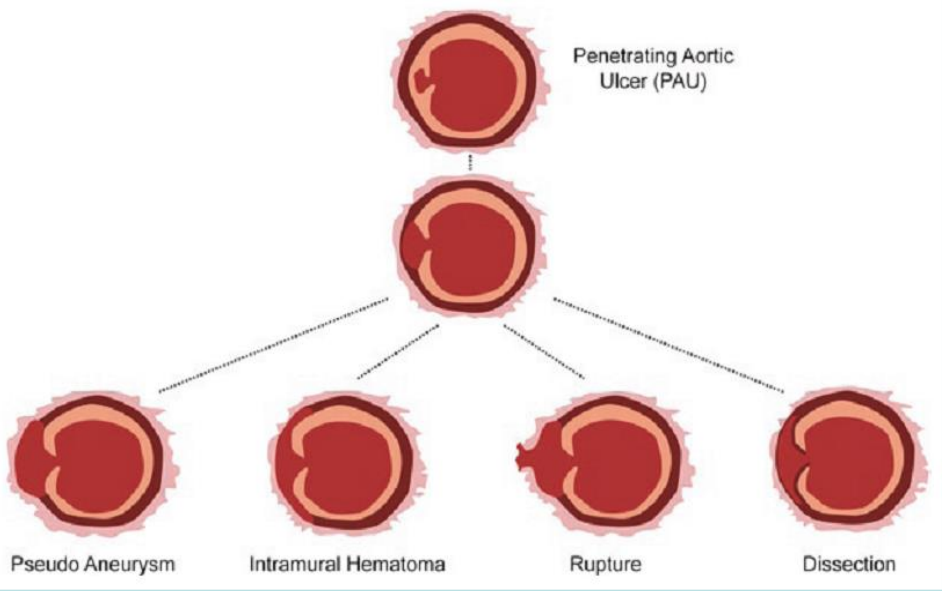
Schematic of Aortic Dissection



Penetrating Ulcer and IMH



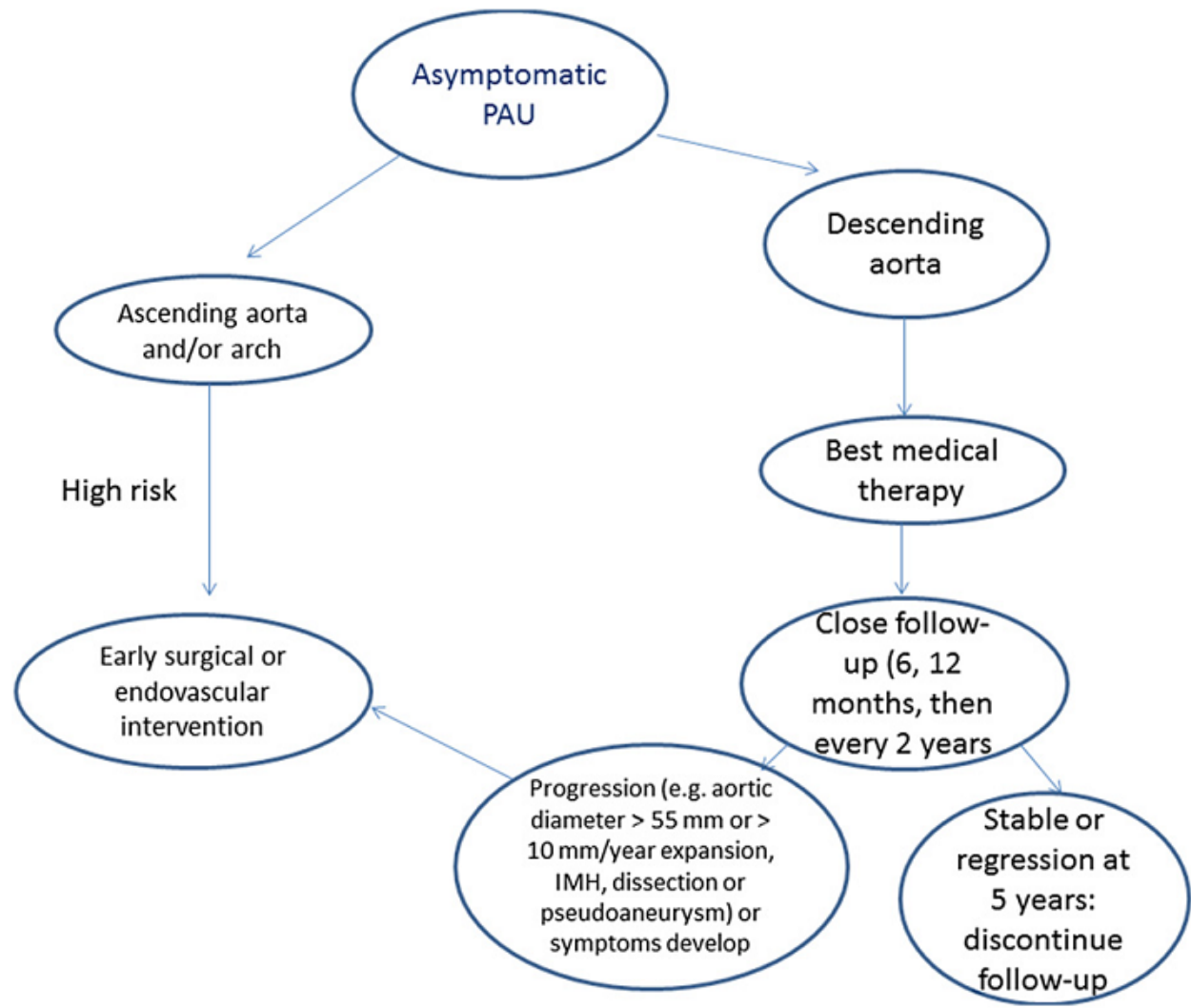
IMH



PAU: debate



UNIVERSITY MEDICAL CENTER



Choice of Computed Tomography, Transesophageal Echocardiography, Magnetic Resonance Imaging, and Aortography in Acute Aortic Dissection: International Registry of Acute Aortic Dissection (IRAD)

Andrew G. Moore, MD, Kim A. Eagle, MD, David Bruckman, MS, Brenda S. Moon, BA, Joseph F. Malouf, MD, Rossella Fattori, MD, Arturo Evangelista, MD, Eric M. Isselbacher, MD, Toru Suzuki, MD, Christoph A. Nienaber, MD, Dan Gilon, MD, and Jae K. Oh, MD

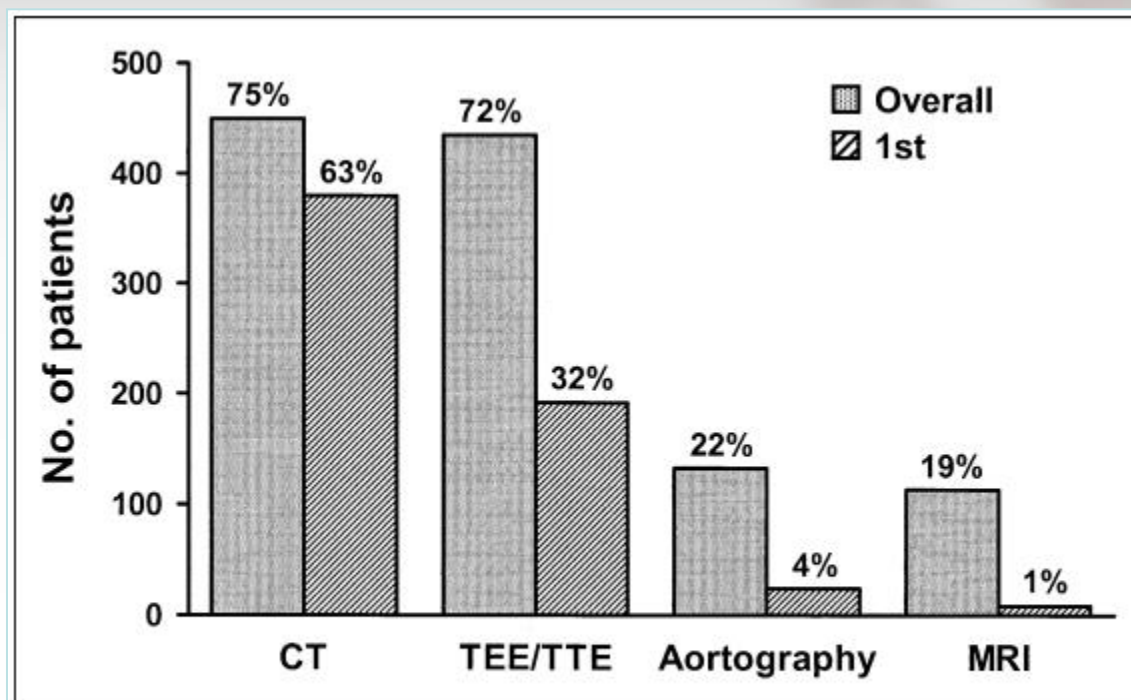


FIGURE 1. Overall number and percentage of study patients according to imaging study and the number and percentage according to imaging study of first choice. TTE = trans-thoracic echocardiography.

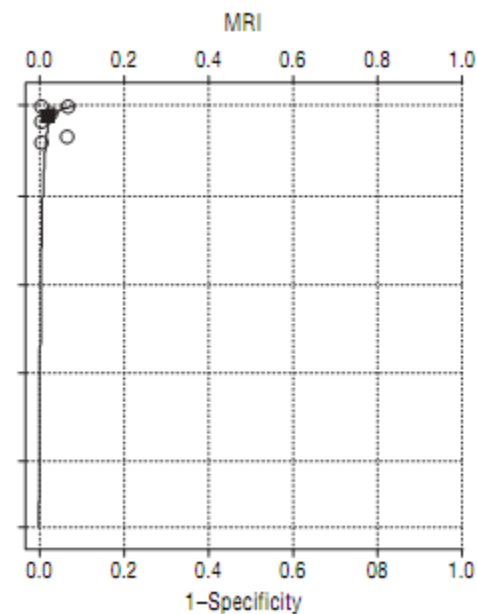
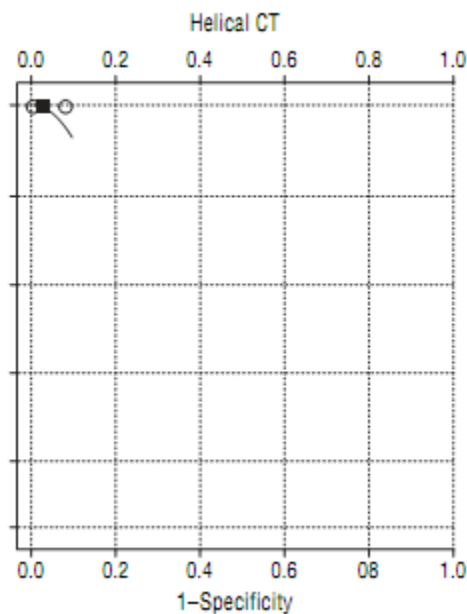
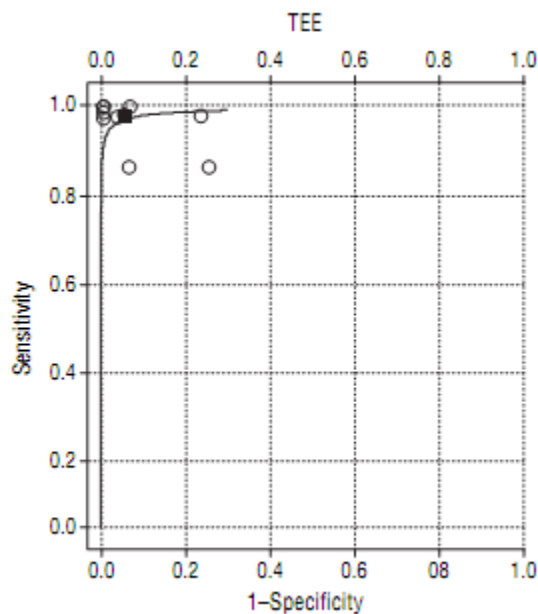
Diagnostic Accuracy of Transesophageal Echocardiography, Helical Computed Tomography, and Magnetic Resonance Imaging for Suspected Thoracic Aortic Dissection

Systematic Review and Meta-analysis

Toshiya Shiota
Tetsuo Inoue

Table 3. Results of Meta-analysis*

| Imaging Technique | Studies Included, No. | Sensitivity | Specificity | Likelihood Ratio† | | Diagnostic Odds Ratio | Moses et al ⁷ Model (Weighted)‡ | | |
|-------------------|-----------------------|---------------|-------------|-------------------|------------------|-----------------------|--|-------|---------|
| | | | | Positive | Negative | | a | b | P Value |
| TEE | 10 | 98 (95-99) | 95 (92-97)§ | 14.1 (6.0-33.2)§ | 0.04 (0.02-0.08) | 6.1 (5.0-7.2) | 6.2 | -0.35 | .45 |
| Helical CT | 3 | 100 (96-100)§ | 98 (87-99) | 13.9 (4.2-46.0) | 0.02 (0.01-0.11) | 6.5 (4.4-8.7) | 3.9 | 3.2 | .53 |
| MRI | 7 | 98 (95-99) | 98 (95-100) | 25.3 (11.1-57.1) | 0.05 (0.03-0.10) | 6.8 (5.5-8.0) | 6.8 | 0.25 | .53 |



Relative strengths

| | CT | TTE | TEE |
|---------------------------|-----|-----|-------|
| Imaging factors | | | |
| Comprehensive assessment | +++ | + | ++ |
| Tomographic (3D) | +++ | - | - |
| Functional | + | +++ | +++ |
| Tissue characterization | +++ | - | - |
| Clinical factors | | | |
| Portability | - | +++ | ++ |
| Patient access/monitoring | ++ | +++ | ++(+) |
| Rapidity | +++ | ++ | +(+) |
| Non-contrast | + | +++ | +++ |
| Radiation exposure | + | +++ | +++ |

AHA/ACC 2010 AoD evaluation pathway

STEP 1
Identify patients at risk for acute AoD

Consider acute AoD in all patients presenting with:
• Chest, back, or abdominal pain
• Syncope
• Symptoms consistent with perfusion deficit (i.e. CNS, mesenteric, myocardial, or limb ischemia)

Boxes with accompanying text are labeled and numbered with the T symbol.

STEP 2
Bedside risk assessment

bedside pre-test risk assessment for acute AoD.

High Risk Pain Features 2

Chest, back, or abdominal pain described as the following:

- Abrupt in onset/ severe in intensity and
- Flipping/tearing/ sharp or stabbing quality

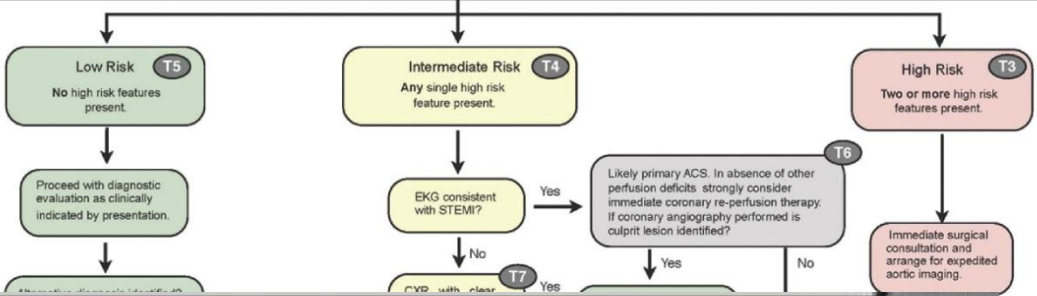
High Risk Exam Features 3

- Evidence of perfusion deficit
- Pulse deficit
- Systolic BP differential
- Focal neurologic deficit (in conjunction with pain)
- Murmur of aortic insufficiency (new or not known to be old and in conjunction with pain)
- Hypotension or shock state

• Marfan Syndrome
• Connective tissue disease
• Family history aortic disease
• Known aortic valve disease
• Recent aortic manipulation
• Known thoracic aortic aneurysm

Determine pre-test risk by combination of risk conditions, history, and exam.

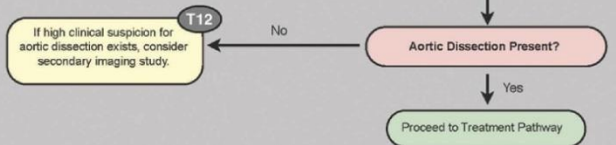
STEP 3
Risk based diagnostic evaluation



Aortic Imaging Study

- TEE (preferred if clinically unstable)
- CT (Image entire aorta: chest to pelvis)
- MR (Image entire aorta: chest to pelvis)

STEP 4
Acute AoD identified or excluded



AHA/ACC 2010 AoD management pathway

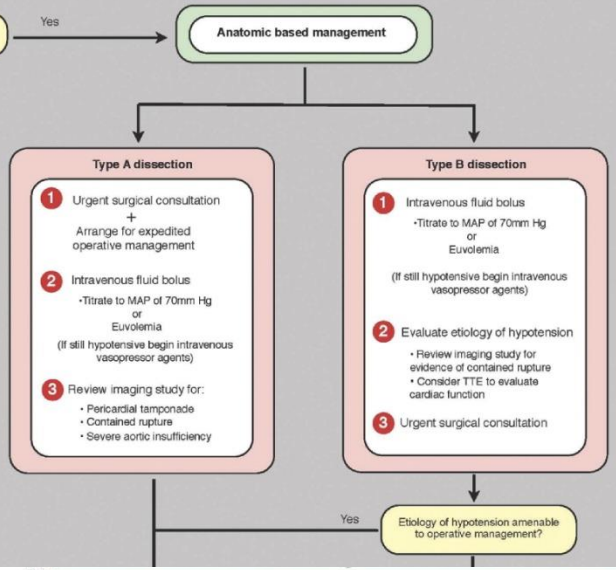
STEP 1
Immediate post diagnosis management and disposition considerations

Acute AoD Management Pathway
Arrange for definitive management
• Appropriate surgical consultation
• Inter-facility transfer if indicated based on institutional capabilities (If transfer required initiate aggressive medical management (with beta-blockers if appropriate) prior to transfer)

Ensure prior to beginning treatment
• Highest blood pressure reading

Type A dissection

- 1** Urgent surgical consultation + Arrange for expedited operative management
- 2** Intravenous fluid bolus
 - Titrate to MAP of 70mm Hg or Euvolemia
 - (If still hypotensive begin intravenous vasopressor agents)
- 3** Review imaging study for:
 - Pericardial tamponade
 - Contained rupture
 - Severe aortic insufficiency



Complications requiring operative or interventional management?

- Malperfusion syndrome
- Progression of dissection
- Aneurysm expansion
- Uncontrolled hypertension

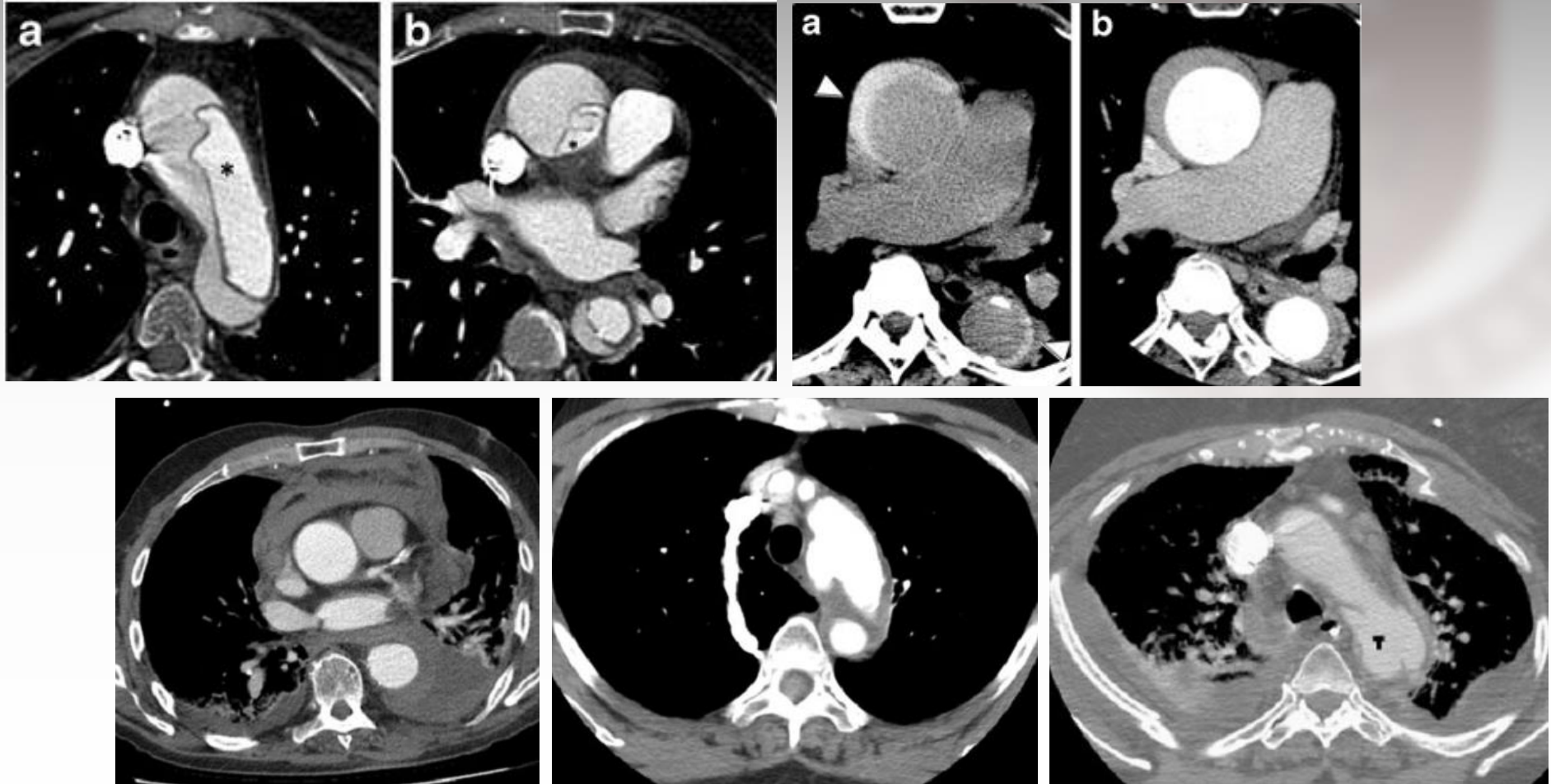
STEP 4
Transition to outpatient management and disease surveillance

Transition to oral medications (beta blockade/ antihypertensives regimen)
Outpatient disease surveillance imaging

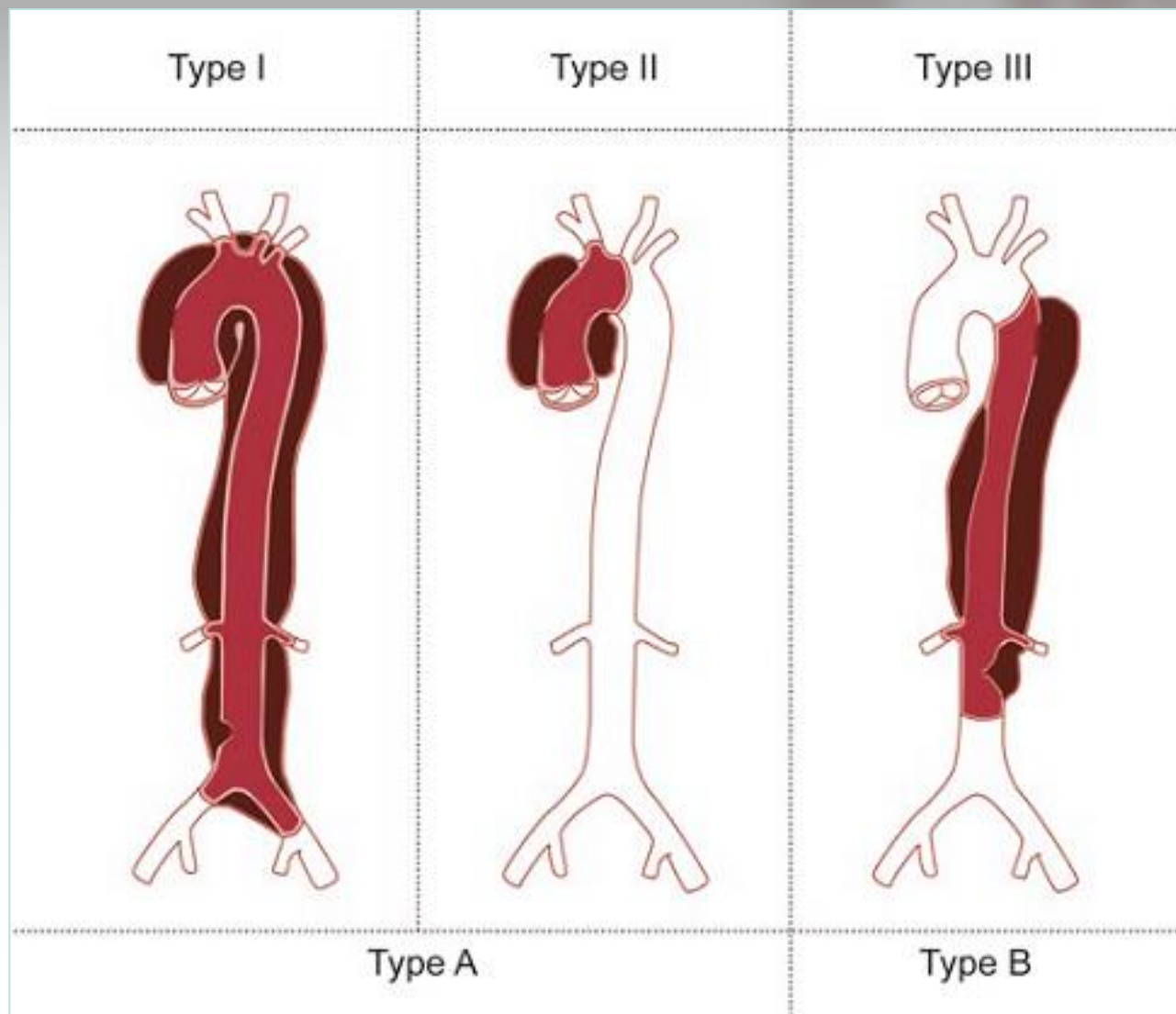
Confirmatory imaging

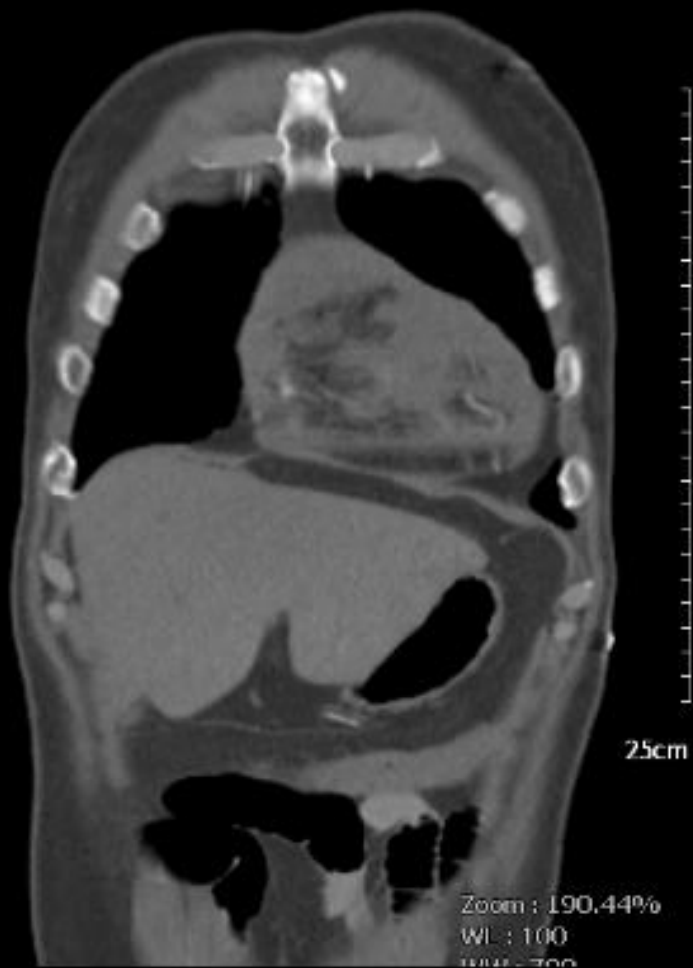
- Confirmation of clinical suspicion
- Classification of dissection
- Localization of tears
- Assessment of extent of dissection
- Assessment indicators of urgency
 - Pericardial hemorrhage/tamponade
 - Acute aortic regurgitation
 - Proximal coronary obstruction
 - Mediastinal or pleural hemorrhage

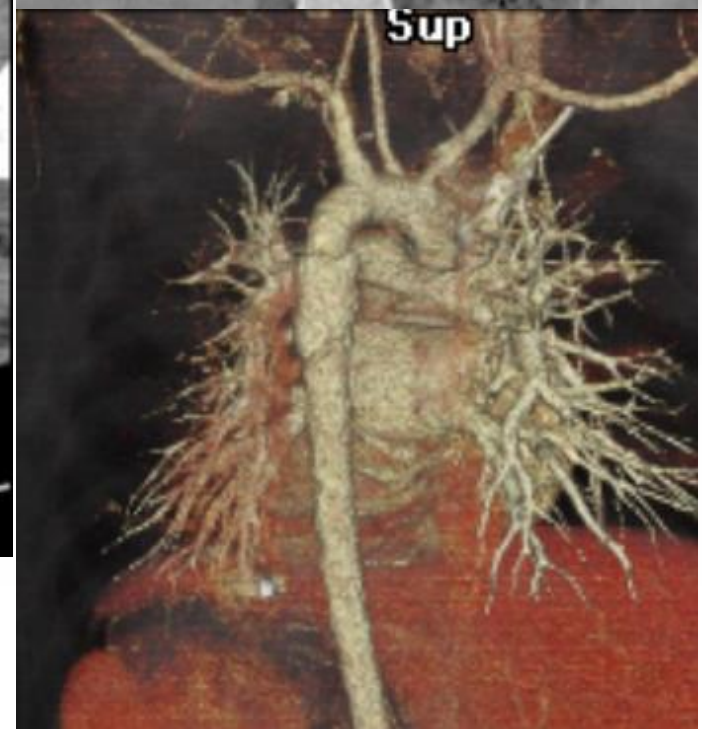
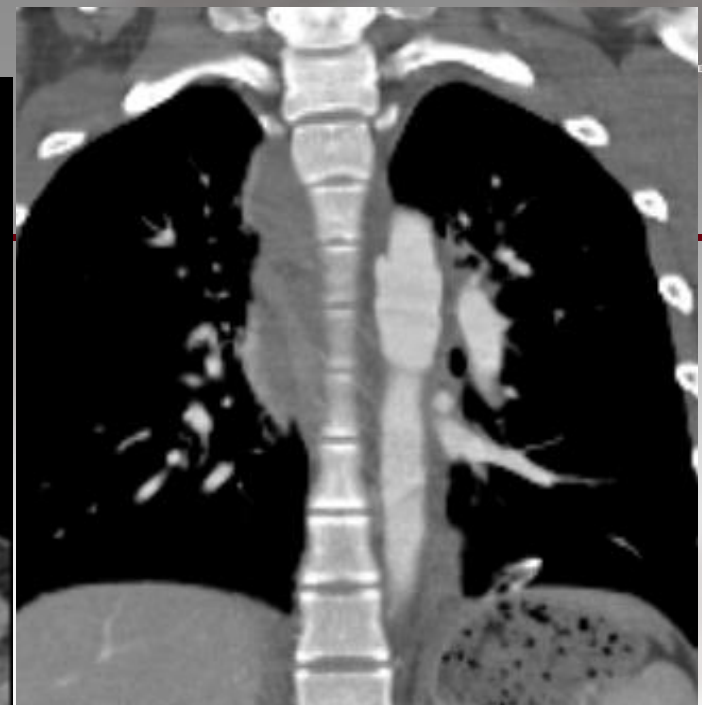
Confirmation of suspicion



Classification of dissection



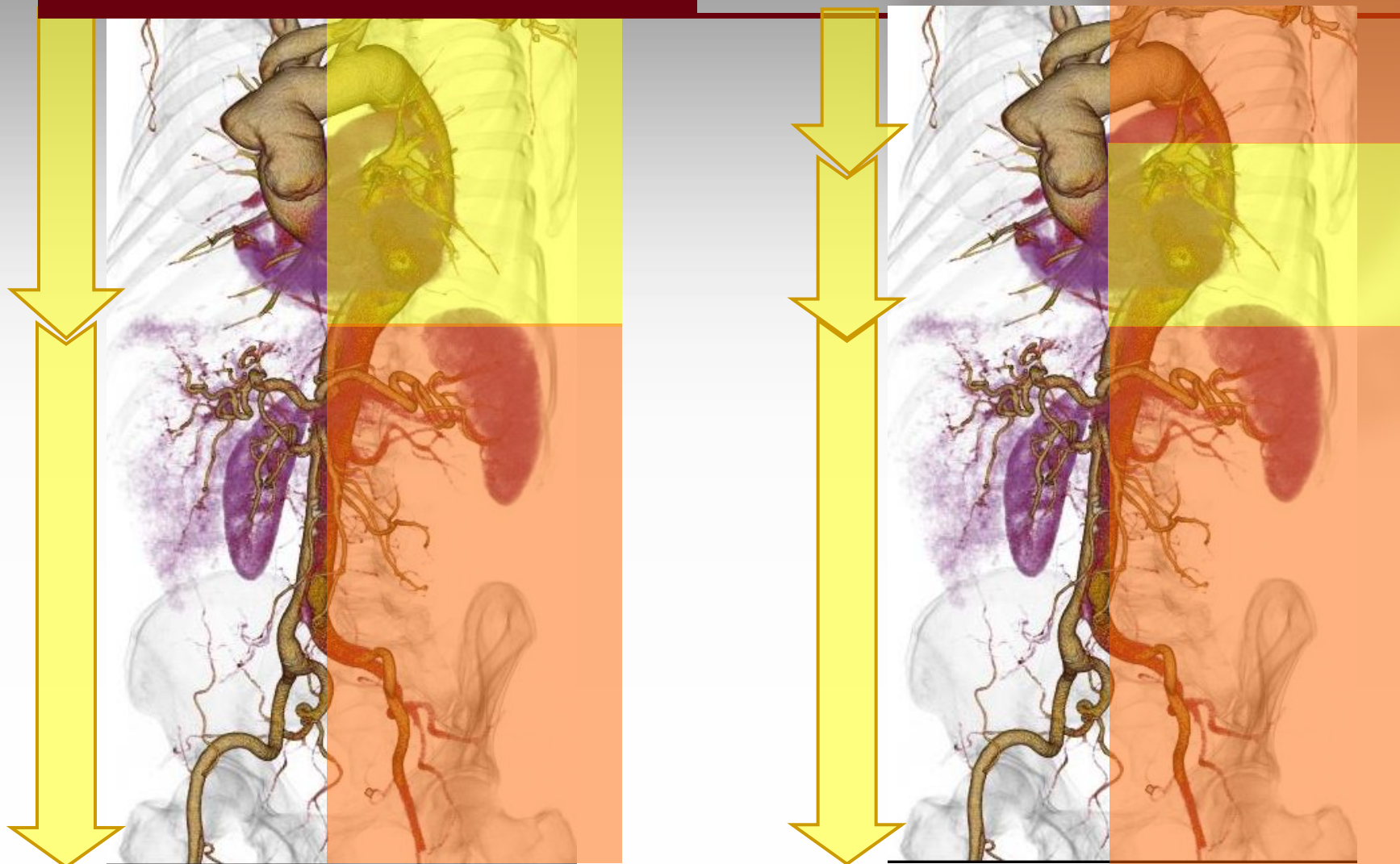




Assessment of urgency

- Pericardial hemorrhage/tamponade
- Acute aortic regurgitation
- Static or Dynamic obstruction (esp. prox coronary artery)
- Mediastinal or pleural hemorrhage

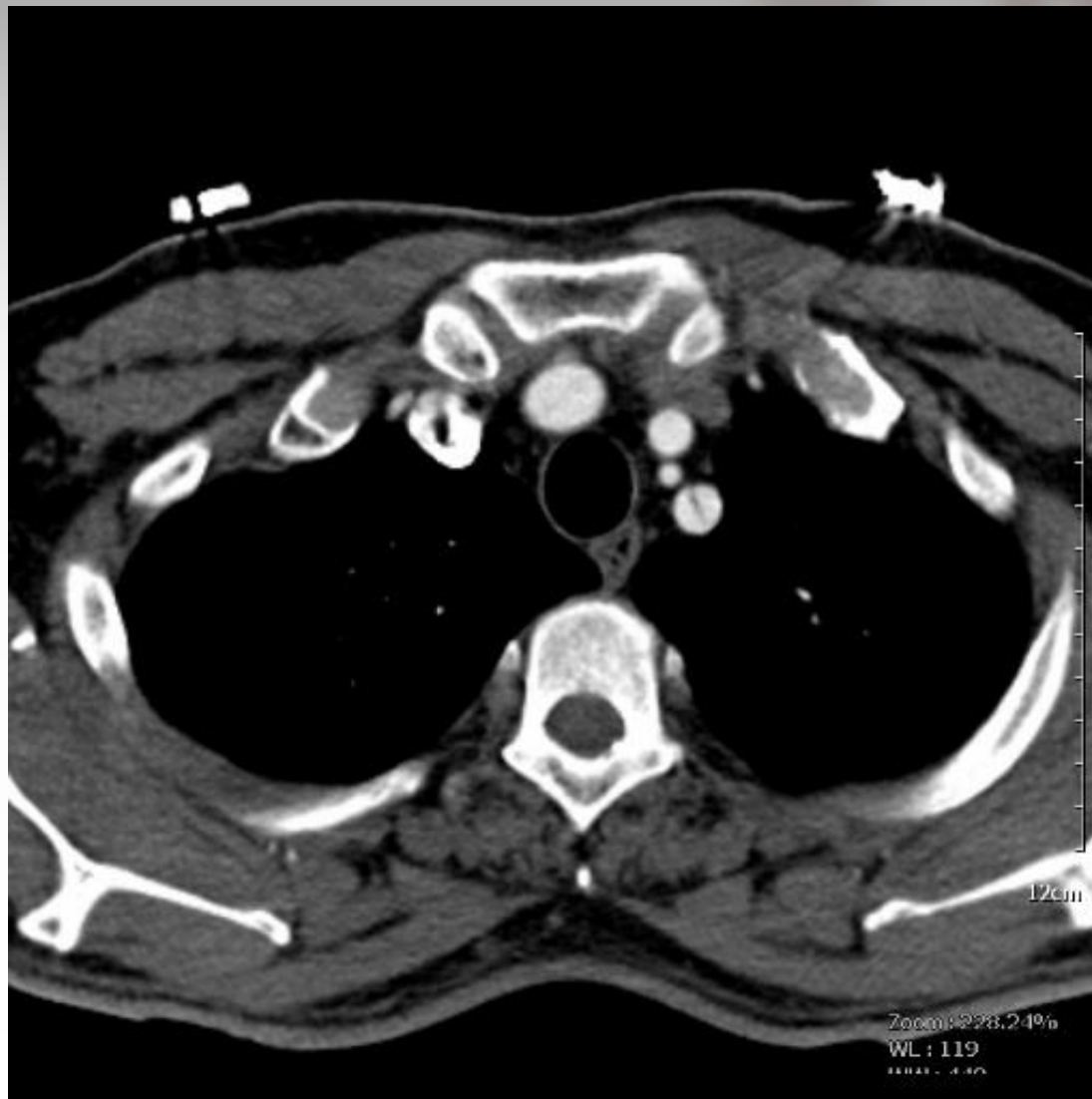
Variable Pitch



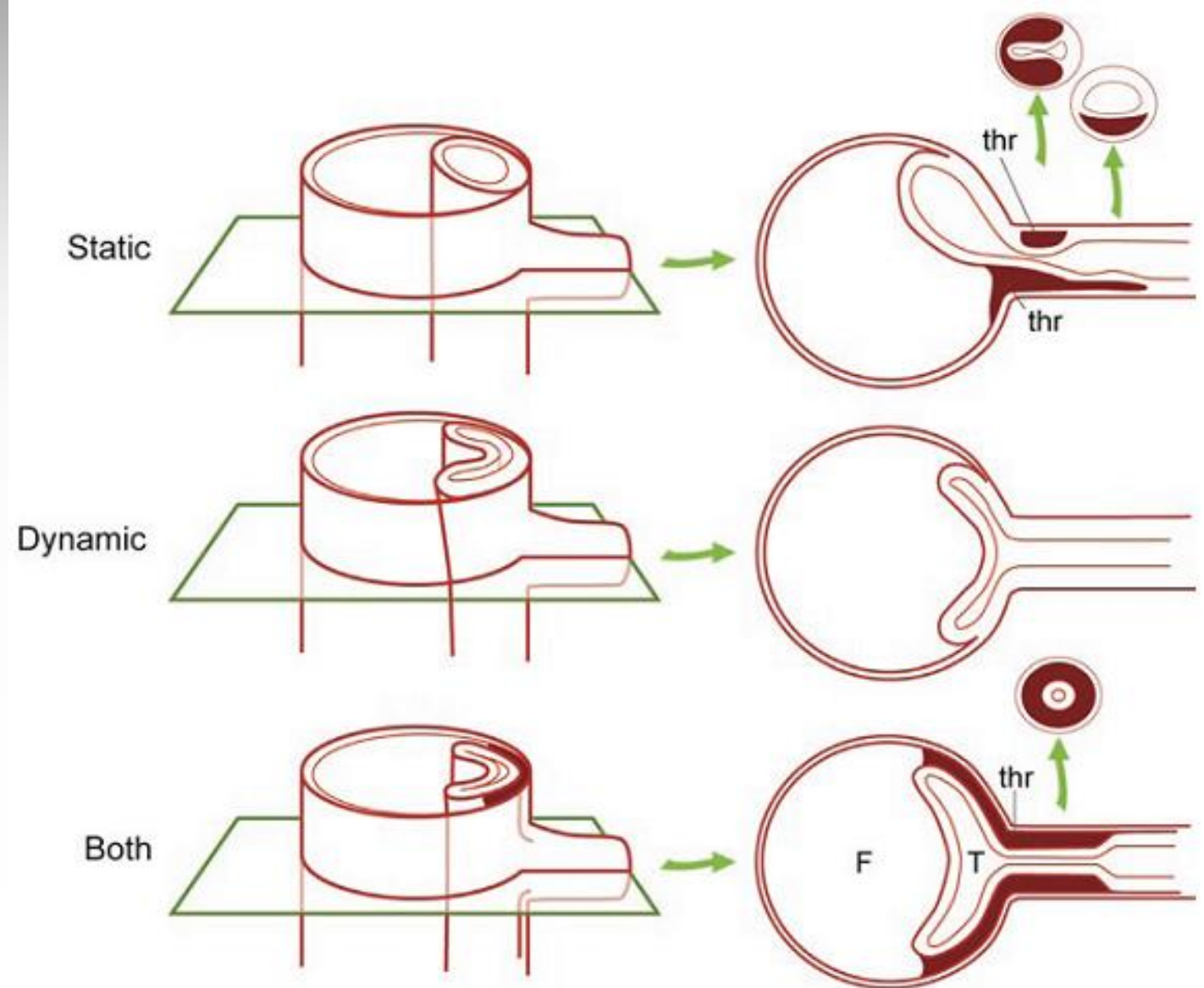
Pericardial hemorrhage



Acute aortic regurgitation



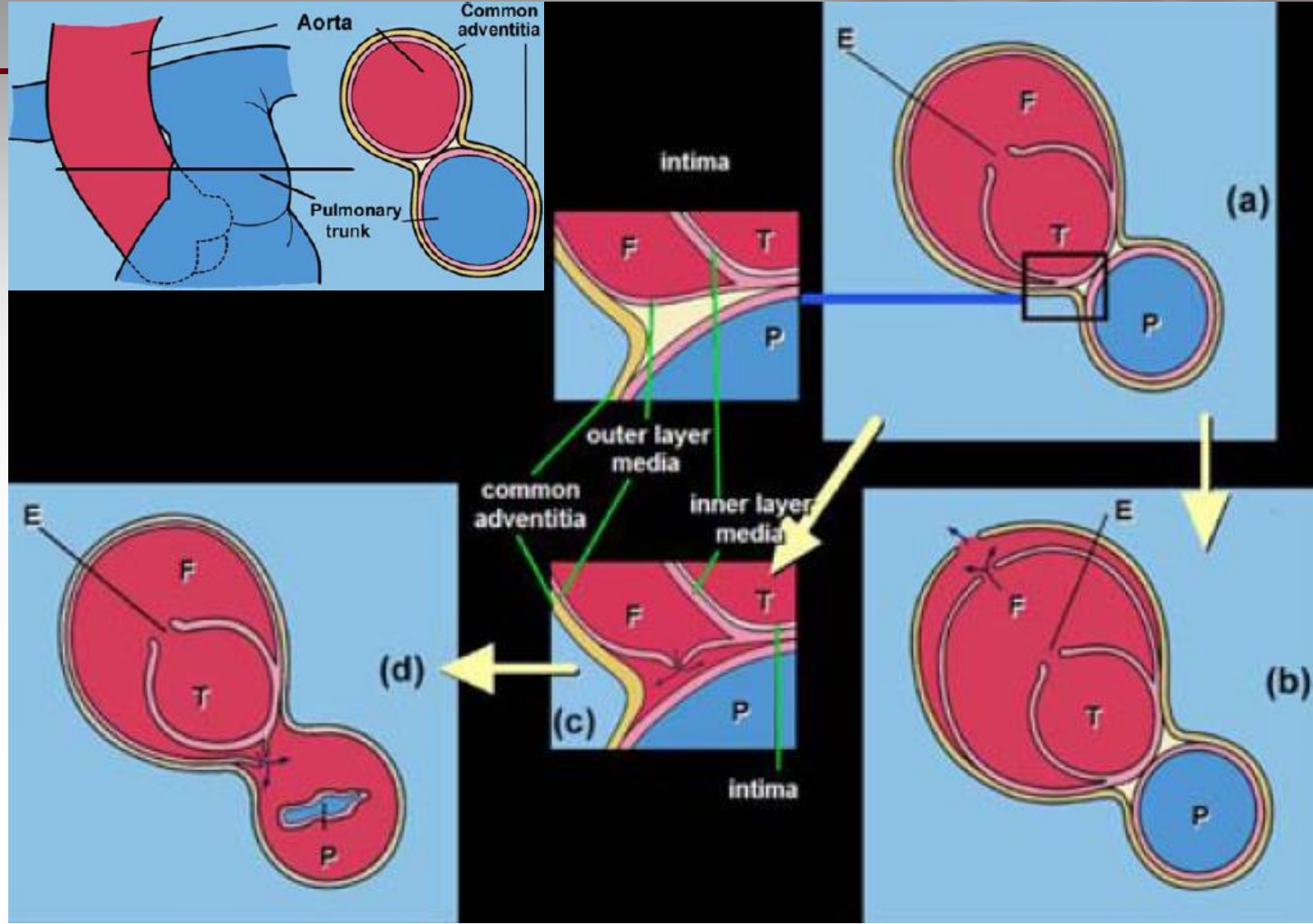
Static or Dynamic obstruction











Mediastinal or pleural hemorrhage



CT for AAS: Confirmatory imaging

- Confirmation of clinical suspicion
- Classification of dissection
- Localization of tears
- Assessment of extent of dissection
- Assessment indicators of urgency
 - Pericardial hemorrhage/tamponade
 - Acute aortic regurgitation
 - Proximal coronary obstruction
 - Mediastinal or pleural hemorrhage

감사합니다.