



GENERAL HISTORY

GENERAL HISTORY

GENERAL DATA

NAME : 賴X禎
AGE : 52-year-old
SEX : Male
NATIVE : Taiwanese
EDUCATION : Junior high school
OCCUPATION : 失業中

GENERAL HISTORY

PRESENT ILLNESS SUMMARY

This 52-year-old male patient had past history of HTN, DM and CVA without regular medical control. Sudden onset of retrosternal chest pain radiation to back was found while he took a walk on the admission afternoon. Cold sweating and near-fainting was also noted. The patient described that no such similar experience was found before. He was sent ER in 亞東hospital because symptoms was still noted after anti-hypertensive medicine was used by himself.

In ER of 亞東hospital, EKG showed V4-V6 T wave inversion. CK-MB: 52 and Troponin-T: 0.079 were also found. Unstable angina was impressed. Because there was no ICU available in 亞東hospital, he was transferred to our hospital for further evaluation and management.

GENERAL HISTORY

PAST and PERSONAL HISTORY

Past medical history:

1. HTN
2. DM
3. CVA
4. Gouty arthritis

Personal history:

1. Alcohol consumption
2. Cigarette smoking
3. No allergy to drug or food

GENERAL HISTORY

PHYSICAL EXAMINATION (on the admission day)

1. Vital sign: BP: 169/82 mmHg
PR: 80/min
RR: 14/min
BT: 37C
2. GCS: E4V5M6
3. Pupil Size: 3.0mm/3.0mm with light reflex symmetrically
4. Chest: symmetric expansion
breathing sound: bilateral coarse, no wheezing,
rhonchi and crackles
5. Heart: RHB without murmur
6. Abdomen: soft and no distension
normoactive bowel sound
7. Extremity: free movable
no pitting edema

GENERAL HISTORY

LABORATORY DATA (on the admission day)

CBC/DC

| | |
|------------|---------|
| WBC | 9370 |
| RBC | 4430000 |
| Hb | 13.3 |
| PLT | 114000 |
| PT | 14.55 |
| PTT | 40.80 |
| Neutrophil | 84.6 |
| Lymphocyte | 9.0 |

BIOCHEMISTRY

| | |
|------------|-------|
| Glucose | 139 |
| BUN | 16 |
| GOT | 61 |
| GPT | 60 |
| CK | 289 |
| CKMB | 13 |
| Troponin T | 0.95 |
| CRP | <0.14 |
| Na | 142.0 |
| K | 4.00 |

GENERAL HISTORY

EKG FINDINGS (on the admission day)

1. NSR with rate: 82/min
2. V4-V6 T wave inversion

CLINICAL INITIAL DIAGNOSIS

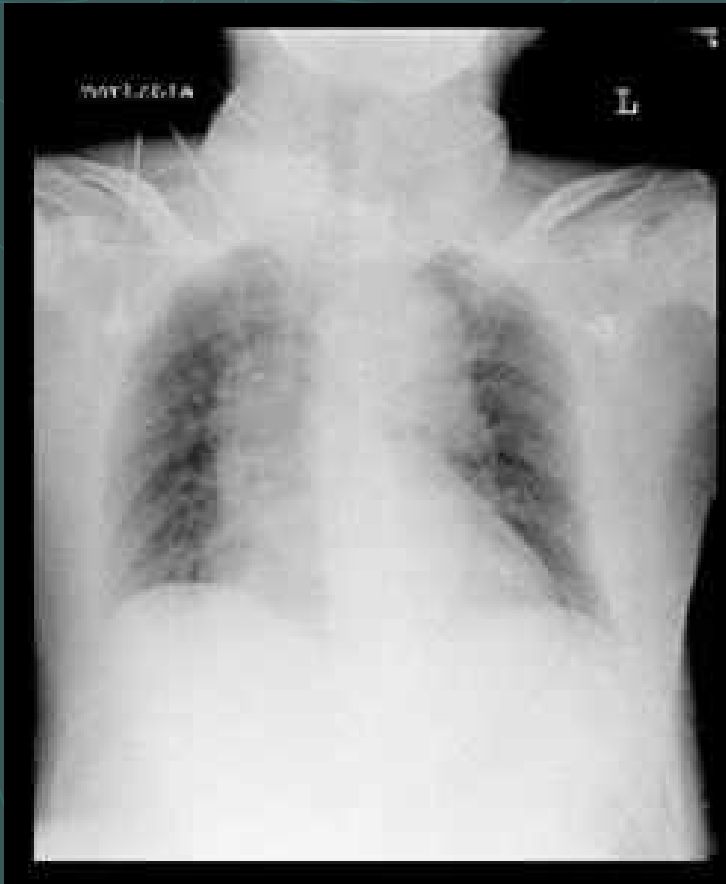
1. Acute coronary syndrome
2. Acute aortic dissection



IMAGING FINDINGS

IMAGING FINDINGS

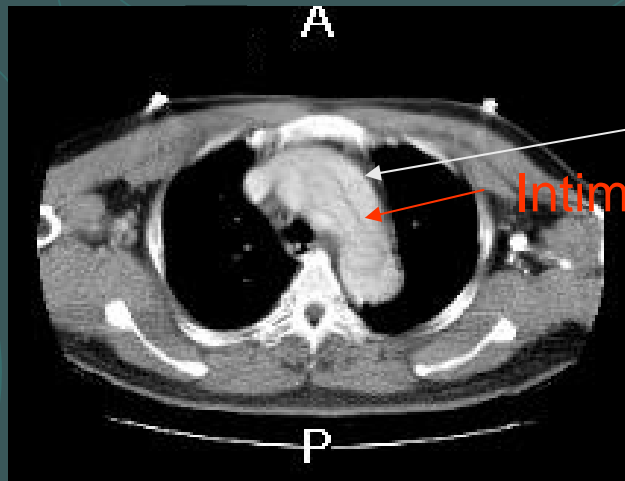
CHEST X-RAY PA VIEW (on the admission day)



1. Obvious widening of mediastinum
2. Trachea deviation to right
3. Obvious cardiomegaly, interstitial pulmonary edema and engorged pulmonary vessel
4. No CP angle blunting

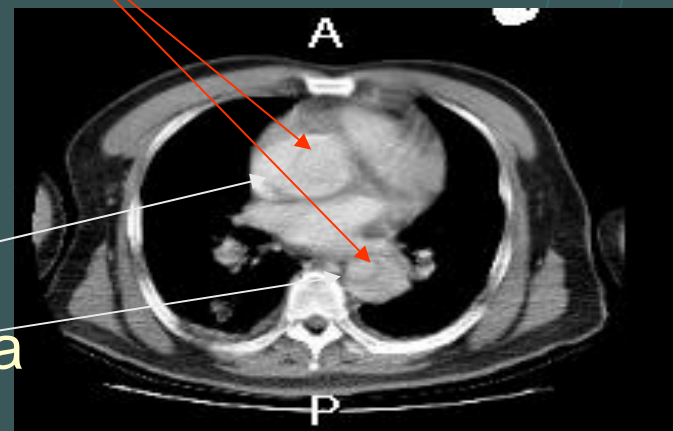
IMAGING FINDINGS

CHEST CT WITH CONTRAST (on the admission day)



Aortic dissection involving
1. aortic arch

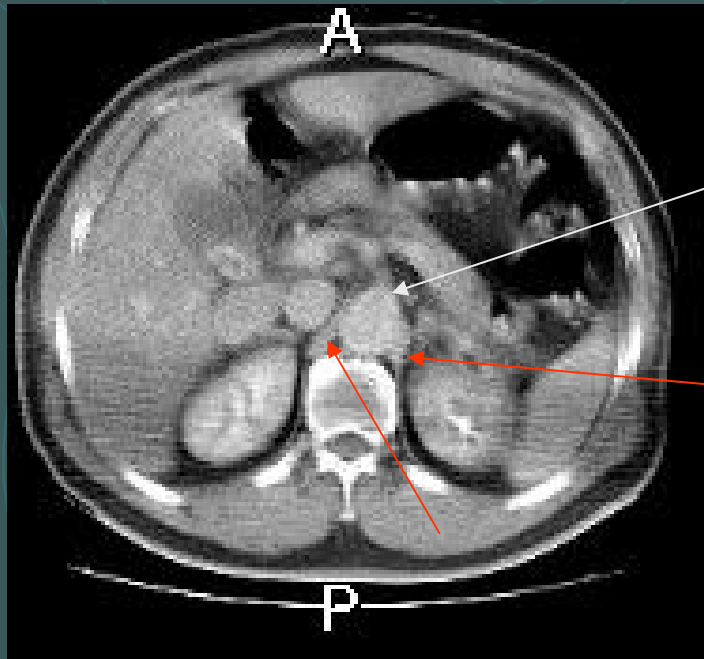
Intima flap



2. ascending aorta
3. descending aorta

IMAGING FINDINGS

ABDOMEN CT WITH CONTRAST (on the admission day)



Aorta dissection is downward extending to the renal artery at least



IMAGING FINDINGS

Conclusions of imaging finding:


Stanford type A (DebakeyType1) aortic dissection involving ascending aorta, aortic arch and descending aorta is considered. Emergency surgical intervention is suggested.



DISCUSSIONS

PART 1 IMAGING D/D of WIDENING MEDIASTINUM

PART 2 REVIEW of AORTIC DISSECTION



IMAGING DIFFERENTIAL DIAGNOSIS of WIDENING MEDIASTINUM



IMAGING D/D of WIDENING MEDIASTINUM

1. Traumatic aortic disruption
2. True or false aortic aneurysm
3. Takayasu's aortitis



IMAGING D/D of WIDENING MEDIASTINUM

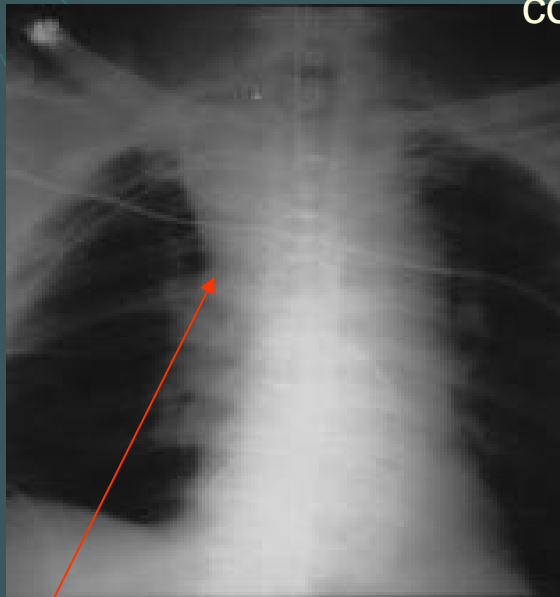
1. Traumatic aortic disruption(1)

1. Most common site: ligamentum arteriosum
2. Vertebral or rib fractures
3. CT with IV contrast may show evidence of direct aortic injury with irregularity or broken continuity of the aortic outline.
4. Increased attenuation of the mediastinum which is consistent with mediastinal hematoma
5. Angiography has been considered a definite investigation of traumatic aorta disruption

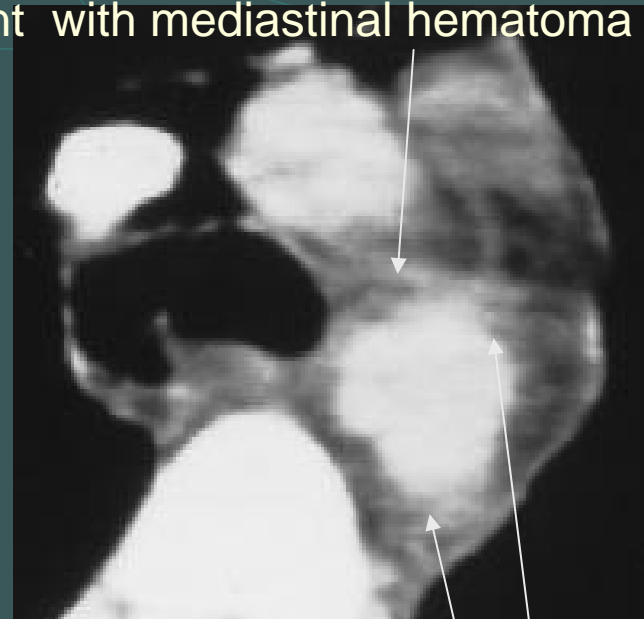
IMAGING D/D of WIDENING MEDIASTINUM

1. Traumatic aortic disruption(2)

increased attenuation of the mediastinum which is consistent with mediastinal hematoma



widening of the mediastinal contour and deformity and blurred margins of the superior mediastinum



irregularity continuity of the aortic outline



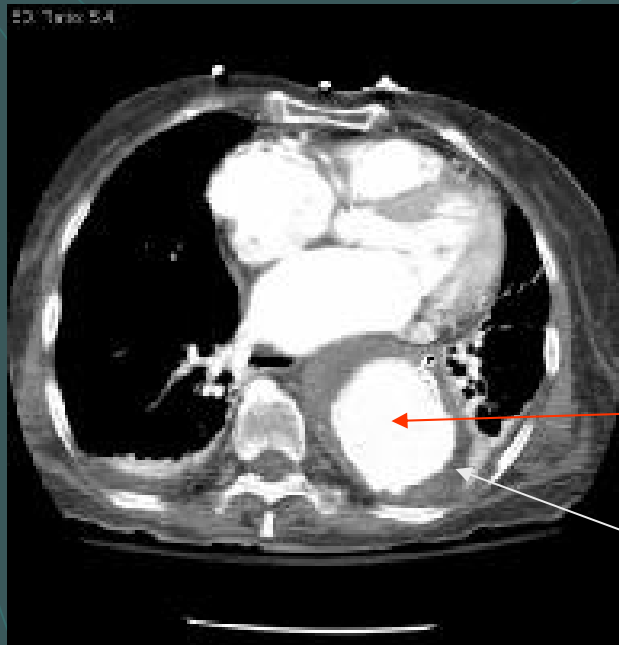
IMAGING D/D of WIDENING MEDIASTINUM

2. Aortic aneurysm (1)

1. Findings suggestive of aneurysm include mediastinal widening, blurring of the aortic knob, and tracheal displacement.
2. Pleural effusion is usually associated with aortic dissection rather than with a stable aneurysm.
3. Intravenous contrast-enhanced CT scanning is the procedure of choice for diagnosis.
4. CT scanning is useful in evaluating aneurysm size, proximal and distal extension, presence or absence of dissection, and in seeking other pathology within the chest.

IMAGING D/D of WIDENING MEDIASTINUM

2. Aortic aneurysm (2)



Descending thoracic aortic aneurysm with mural thrombus at the level of the left atrium, showed on CT scan with contrast

aortic aneurysm

mural thrombus

IMAGING D/D of WIDENING MEDIASTINUM

3. Takayasu's arteritis (1)

1. Angiography is the criterion standard
2. The Ishikawa criteria (1986) have been useful in defining TA.
 - (1) One criterion is age younger than 40 years at diagnosis or at onset of characteristic signs and symptoms of 1-month duration in the patient's history.
 - (2) Two major criteria involve the left and right midsubclavian artery, with the most severe stenosis or occlusion present in the mid portion from a point 1 cm proximal to the left and right, respectively, vertebral artery orifices to that 3 cm distal to the orifice as determined by angiography.
 - (3) The minor criteria consist of annuloaortic ectasia or aortic regurgitation as shown by angiography or echocardiography and pulmonary artery, left mid common carotid, distal brachiocephalic trunk, descending aorta, or abdominal aorta lesions.



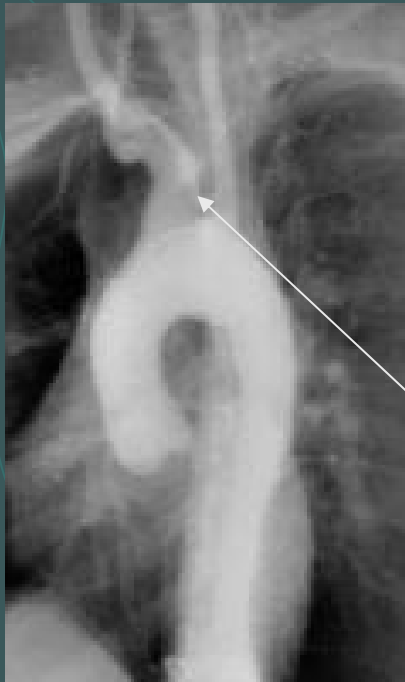
IMAGING D/D of WIDENING MEDIASTINUM

3. Takayasu's arteritis (2)

1. Computed tomography (CT) scanning or ultrasound may be used to assess thickness of the aorta.
2. Magnetic resonance angiography (MRA) can be used to assess the vasculature, but it is not as accurate as angiography.
3. Gallium scanning has been used to assess inflammatory involvement of the vessels.
4. Single-photon emission computed tomography (SPECT) scanning has been used to assess cerebral blood flow and may be useful in patients who undergo bypass surgery.

IMAGING D/D of WIDENING MEDIASTINUM

3. Takayasu's arteritis (3)



narrowing of the proximal descending aorta
and right brachiocephalic artery



REVIEW of AORTIC DISSECTION

AORTIC DISSECTION

Epidemiology

1. **Incidence:** The true incidence of dissection is difficult to estimate. Most estimates are based on autopsy studies. Evidence of dissection is found in 1-3% of all autopsies in United States.
2. **Sex:** Male-to-female ratio is 2:1.
3. **Age:** Approximately 75% of dissections occur in those aged 40-70 years, with a peak in the range of 50-65 years.

AORTIC DISSECTION

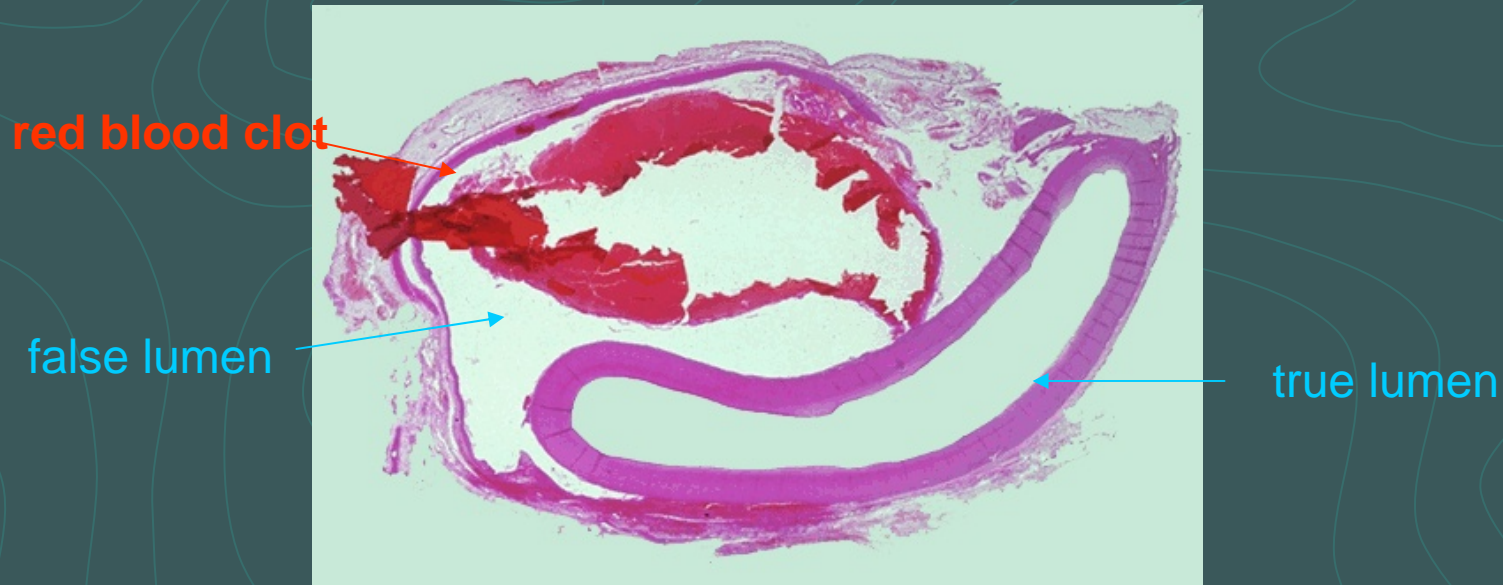
Pathophysiology (1)

1. The essential feature of aortic dissection is a tear in the intimal layer, followed by formation and propagation of a subintimal hematoma.
2. The dissecting hematoma commonly occupies about half and occasionally the entire circumference of the aorta. This produces a false lumen or double-barreled aorta, which can reduce blood flow to the major arteries arising from the aorta.



AORTIC DISSECTION

Pathophysiology (2)



This microscopic cross section of the aorta demonstrates a red blood clot that is compressing the aortic lumen. This occurred as a result of aortic dissection in which there was a tear in the intima followed by dissection of blood at high pressure out through the muscular wall to the adventitia.

AORTIC DISSECTION

Pathophysiology (3)

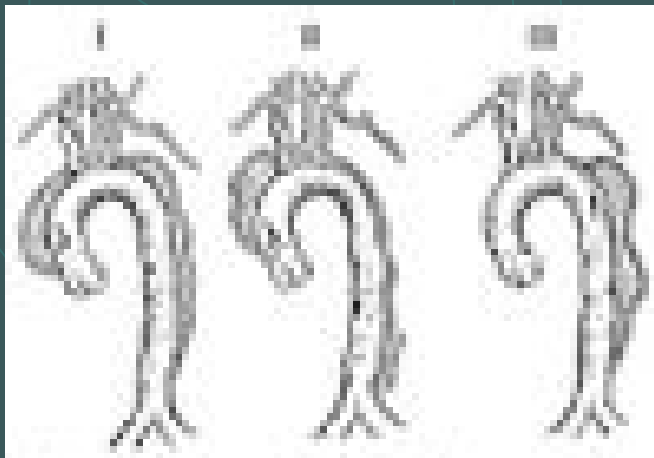
1. Aortic dissection often occurs along the right lateral wall of ascending aorta and descending thoracic aorta just below the ligamentum arteriosum.
2. The dissection usually propagates distally down the descending aorta and into its major branches, but it also may propagate proximally.
3. Dissections of the thoracic aorta have been classified anatomically by 2 different methods, DeBakey and Stanford.

AORTIC DISSECTION

Classification(1)

DeBakey:

- I ascending aorta --> arch +/- descending aorta (30%)
- II ascending aorta only (20%)
- III descending aorta --> thoracic aorta (50%)



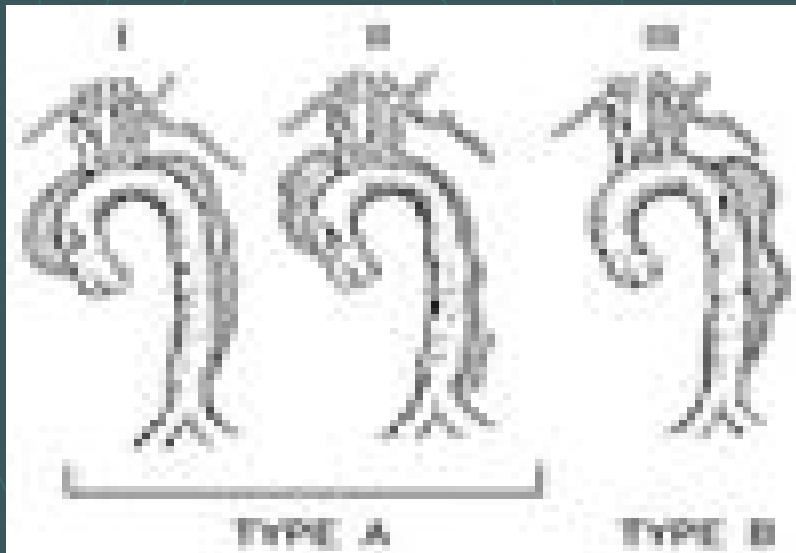
AORTIC DISSECTION

Classification(2)

Stanford:

A involvement of ASCENDING aorta (regardless of origin)

B aortic arch + distal aorta



AORTIC DISSECTION

Predisposing factors

1. HTN (most common)
2. Atherosclerosis
3. Connective tissue disorder (Marfan, Ehlers-Danlos)
4. Takayasu (giant cell) arteritis
5. Pregnancy (normal women during 3rd trimester)
6. Congenital bicuspid aortic valve
7. Aortic coarctation
8. Skeletal abnormalities (scoliosis, pectus)
9. Mycotic aneurysm
10. Aortic laceration

AORTIC DISSECTION

Clinical manifestations

1. Sudden onset of sharp, tearing, intractable chest pain, may radiate to back, esp. interscapular region
2. Previously hypertensive, now possible shock
(Signs of peripheral organ blood flow hypoperfusion, including decreased urine output, ischemia bowel, ischemia pain of lower extremities, etc.)
3. Asymmetric peripheral pulse
5. Diastolic murmur or bruit of aortic regurgitation
6. Pulmonary edema
7. Signs result from compression of adjacent tissues

AORTIC DISSECTION

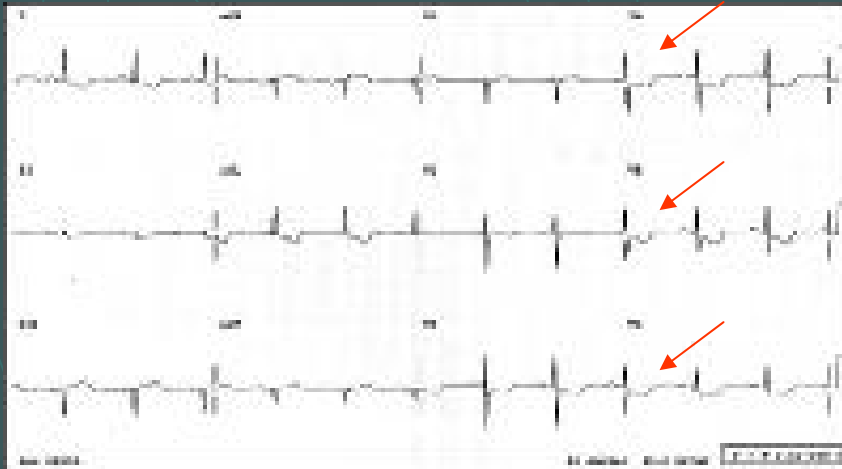
Laboratory data(1)

1. Decreases in the hemoglobin and hematocrit are ominous findings suggesting the dissection either is leaking or has ruptured.
2. BUN and creatinine are elevated if the dissection involves the renal arteries.
3. Hematuria, oliguria, and even anuria (<50 mL/d) may occur if the dissection involves the renal arteries.
4. CKMB and Troponin T may be elevated in acute thoracic aorta dissection

AORTIC DISSECTION

Laboratory data(2)

1. In acute thoracic dissection, ECG can mimic the changes seen in acute cardiac ischemia. In the presence of chest pain, these signs can make distinguishing dissection from AMI very difficult. Keep this in mind when administering thrombolytics to patients with chest pain.



STT depression and
T wave inversion
(red arrow)

AORTIC DISSECTION

Imaging findings(1)

Chest X-ray

1. Mediastinum widening
2. Displacement of intima calcification
3. Displacement of endotrachea tube and NG tube
4. Left pleural effusion (signs of dissecting rupture)



mediastinum widening



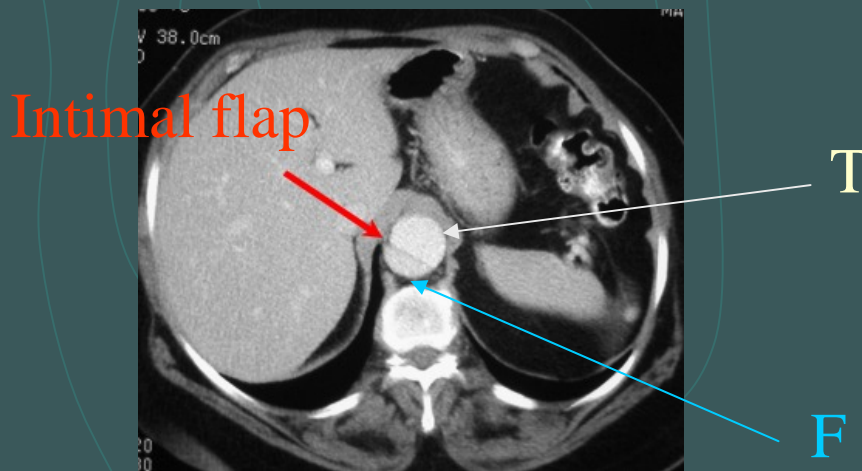
left pleural effusion

AORTIC DISSECTION

Imaging findings(2)

CT scan

1. Intimal flap
2. Displacement of intimal calcification
3. Differential contrast enhancement of true v.s. false lumen



AORTIC DISSECTION

Imaging findings(3)

MRI

1. Intimal flap
2. Slow flow and clot in false lumen



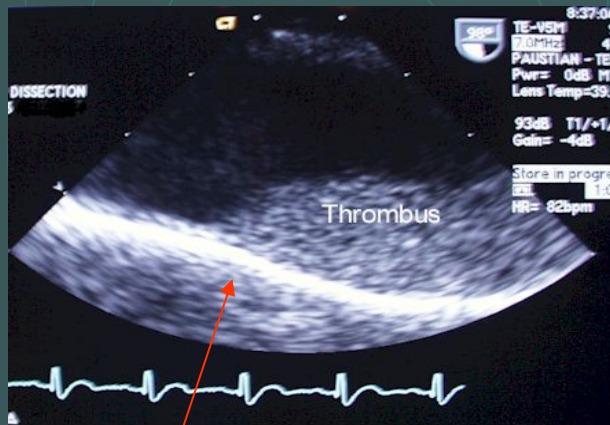
Partition of a three-dimensional contrast-enhanced MRA shows intimal flap (arrows ↙) in the distal aortic arch and descending aorta.

AORTIC DISSECTION

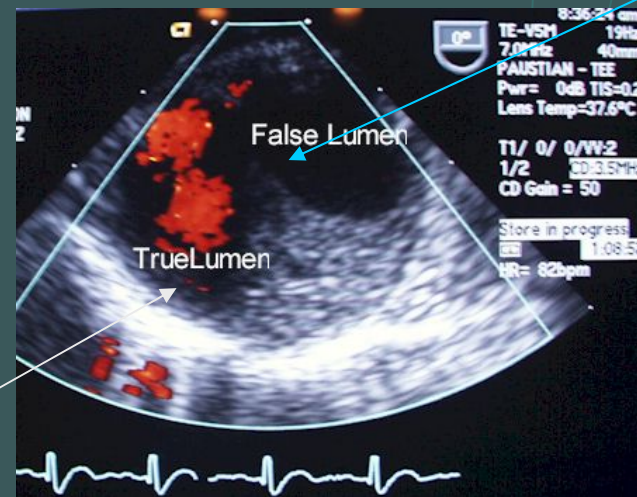
Imaging findings(4)

Transesophageal echocardiogram

1. Freely movable flap within the lumen of the vessel
2. Differential Doppler detection of true v.s. false lumen



Freely movable flap
within the aorta



T

F

AORTIC DISSECTION

Imaging findings(5)

Angiography

1. Intimal flap
2. True and false lumen (may be failure if the false channel is thrombosed)
3. Aortic regurgitation
4. Coronary artery

Oblique arteriogram of the thoracic aorta demonstrates the double-barrel aorta sign of aortic dissection. Both the true and false lumina are opacified



T

F

AORTIC DISSECTION

Selection of imaging diagnosis

1. Chest X-ray is used as routine screening
2. Contrast-enhanced CT can image arch and descending aorta
3. MRI if available is usually best for imaging ascending aorta
4. Transesophageal ultrasound, if available, especially for root and ascending aorta
5. Angiography is more invasive and has been replaced by many other imaging such CT, MRI

AORTIC DISSECTION

Treatment

1. Medical treatment should be initiated as soon as the diagnosis is considered. The patient should be admitted to an ICU for monitoring hemodynamics and urine output.
2. Unless hypotension is present, therapy should be aimed at reducing cardiac contractility and systemic arterial pressure. B-blockers accompanied by sodium nitroprusside is suggested.
3. Surgical intervention is indicated for type A and complicated Type B aortic dissection.

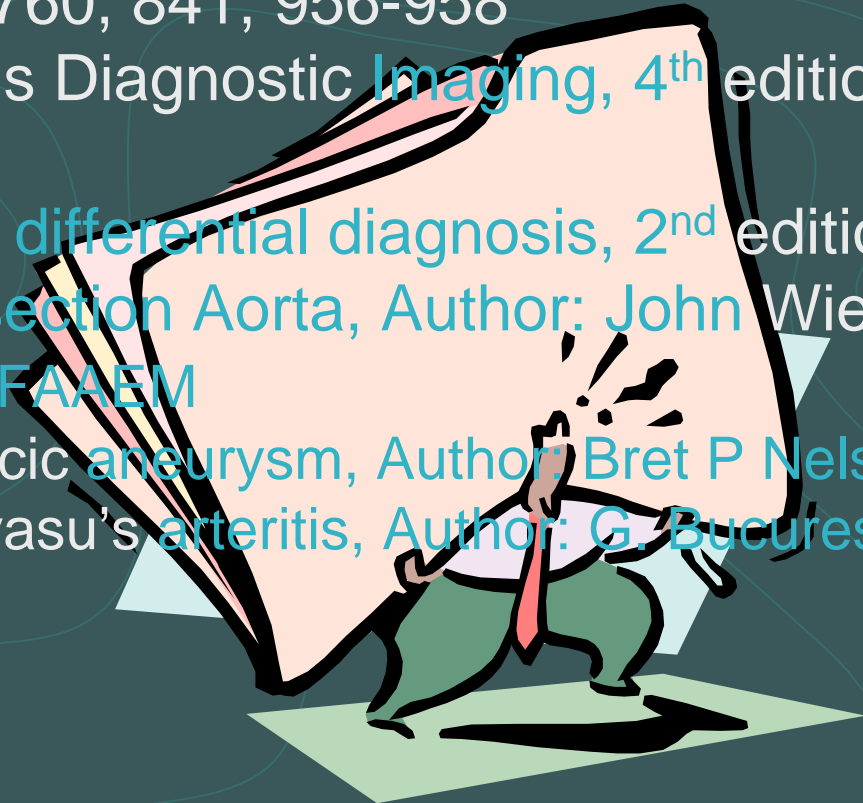
AORTIC DISSECTION

Prognosis

When left untreated, about 33% of patients die within the first 24 hours, and 50% die within 48 hours. The 2-week mortality rate approaches 75% in patients with undiagnosed ascending aortic dissection.

REFERENCES

1. Harrison's Principle of internal medicine, 15th edition page 1430-1434
2. Crainger and Allison's Diagnostic Radiology, 4th edition, page 74, 92-93, 760, 841, 956-958
3. Peter Armstrong's Diagnostic Imaging, 4th edition, page 122-123
4. Aids to radiology differential diagnosis, 2nd edition
5. E-medicine, Dissection Aorta, Author: John Wiesenfarth, MD, MS, FACEP, FAAEM
6. E-medicine, Thoracic aneurysm, Author: Bret P Nelson, MD
7. E-medicine, Takayasu's arteritis, Author: G. Bucurescue, MD



THANKS FOR YOUR ATTENTION

