

ACUTE PULMONARY EMBOLISM

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Historical perspective

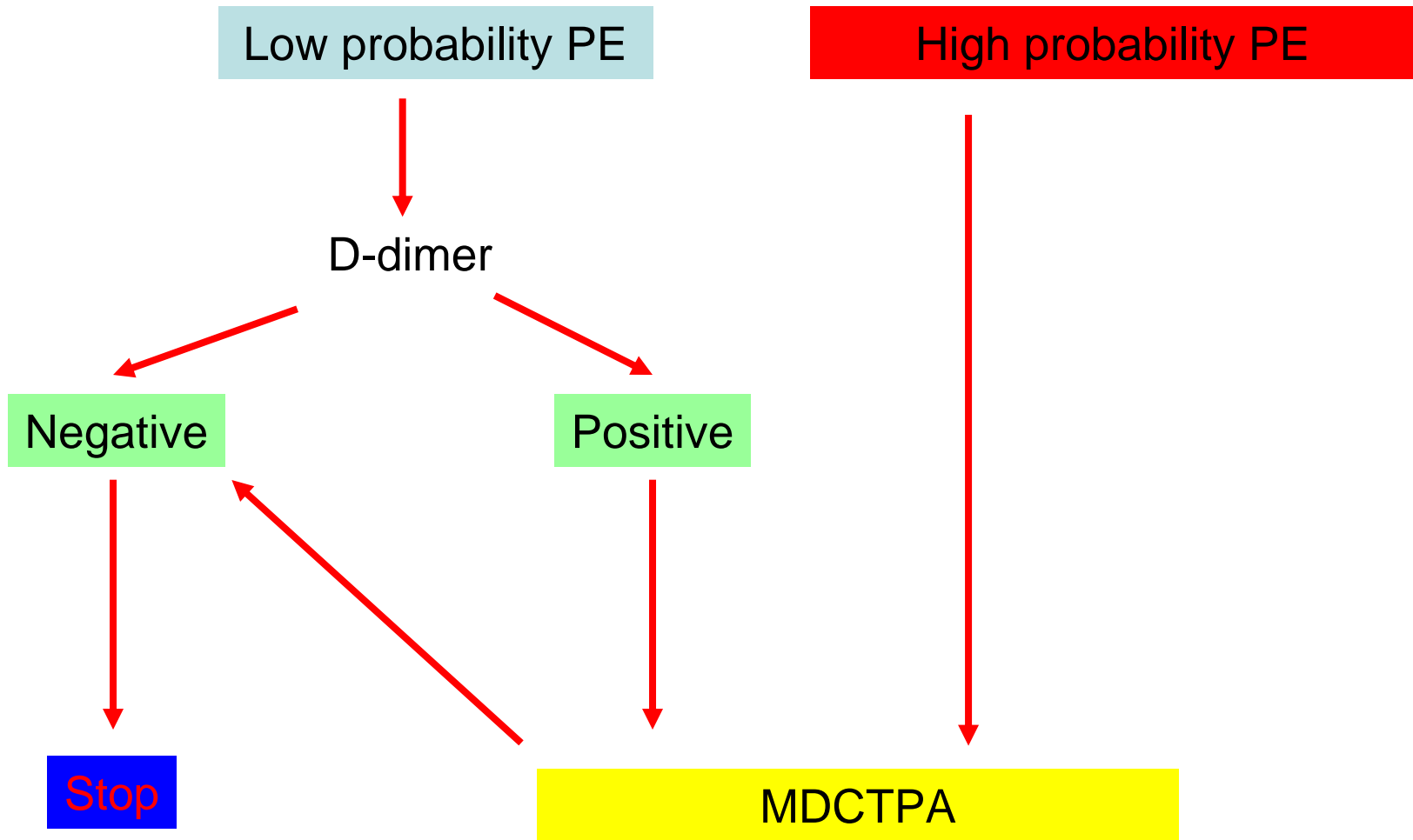
- 1837 First case report of PE
- 1922 Description of signs at chest x-ray
- 1963 Pulmonary angiography
- 1964 Lungscintigraphy
- 1992 Spiral-CT

Incidence of DVT and PE in Sweden

- 150-200/100 000 DVT
 - 20-60/100 000 PE
 - 1000 deaths/year in PE
- The most common cause of death after surgery.
- ~ 10 % of patients with PE die within the first hour.

Findings on Chest X-ray suggesting PE

- Atelectasis and/or infiltrates
- Oligemia (Westermark's sign)
- Prominent central pulmonary artery (Fleischner's sign)
- Lunginfarct (Hampton's hump)
- Elevated diaphragm
- Pleural effusion

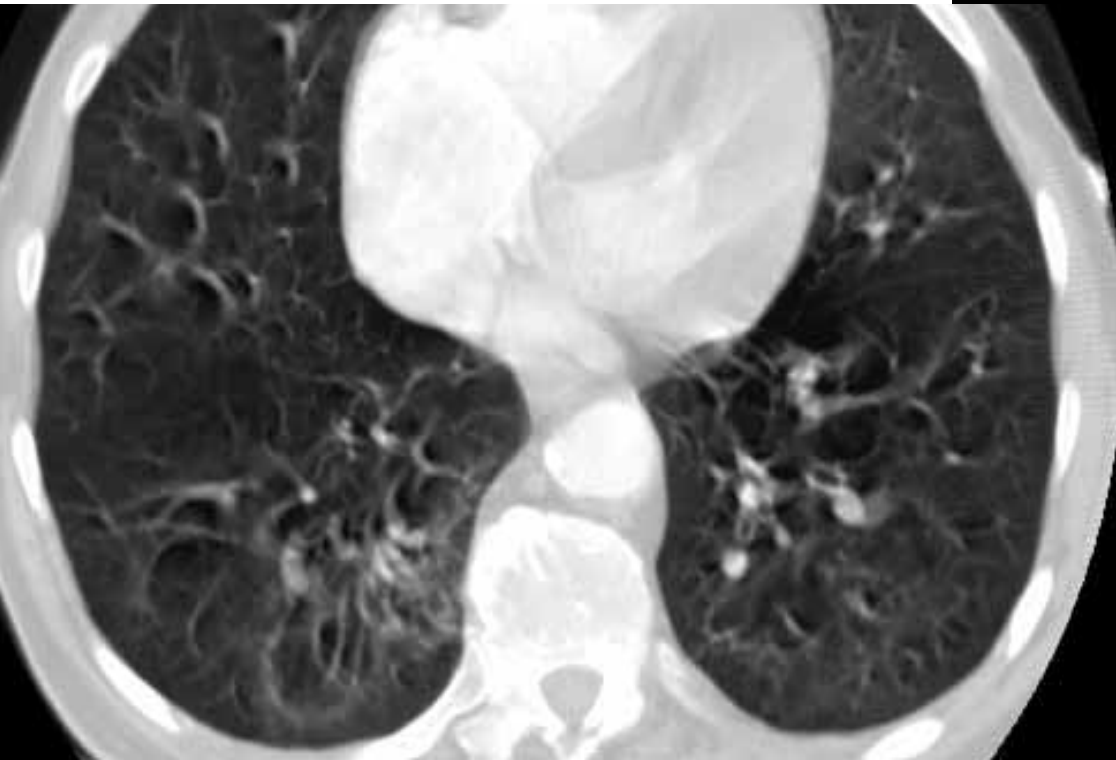


MDCTPA

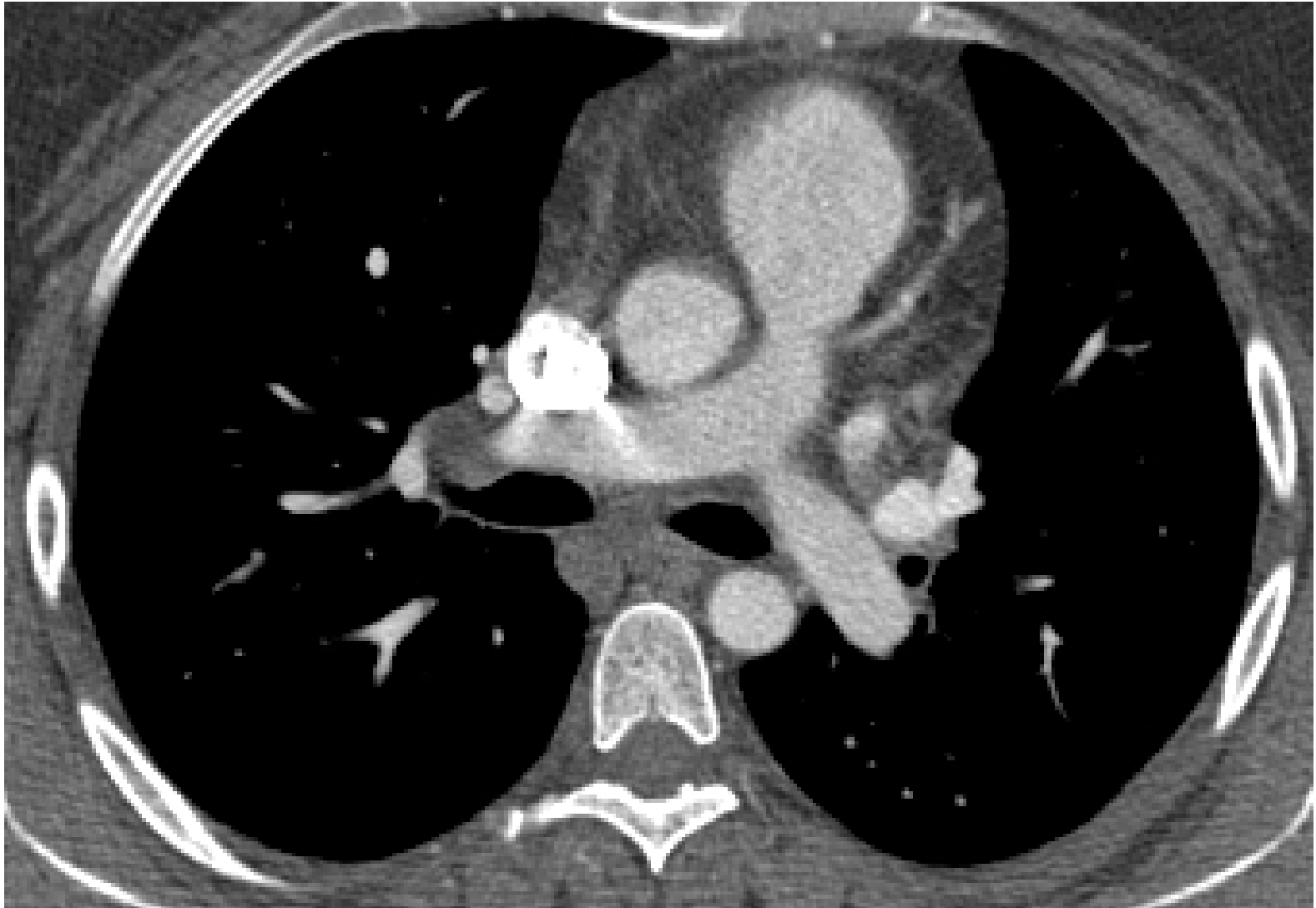
- Sensitivity 90-100%
- Specificity 89-94% for the detection of PE down to the level of subsegmental arteries.

"PITFALLS"

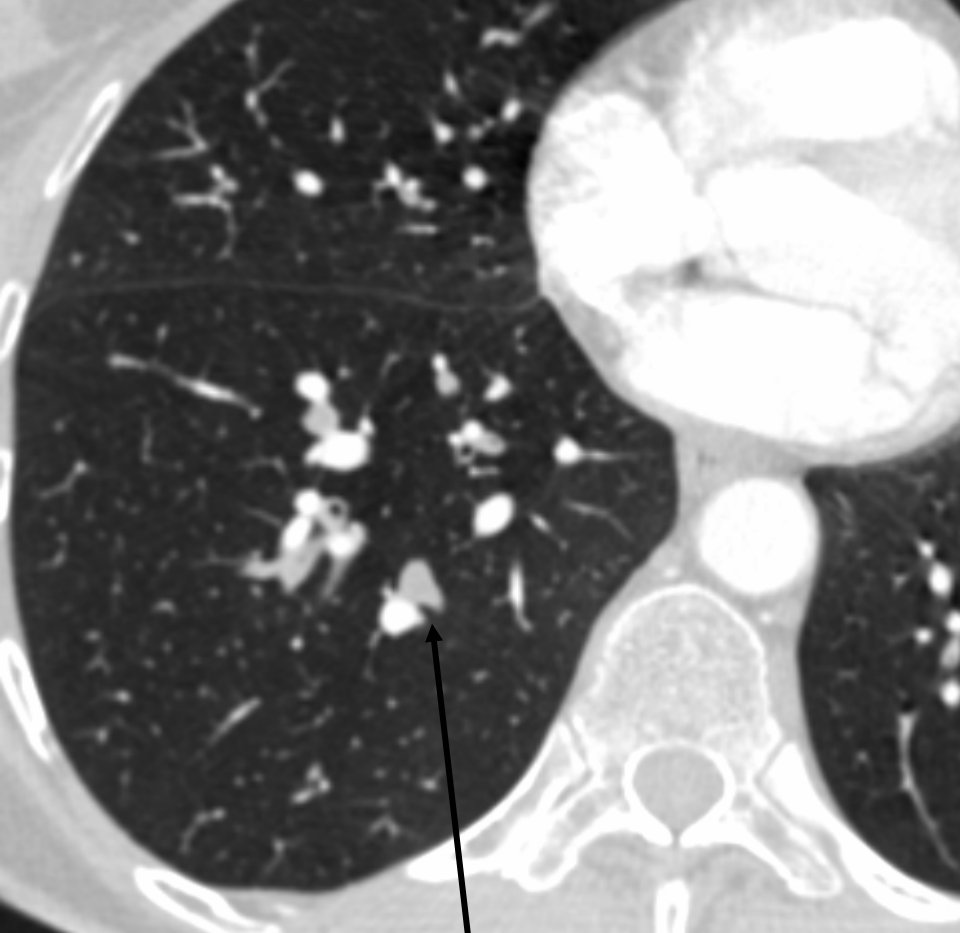
BREATHING ARTEFACTS



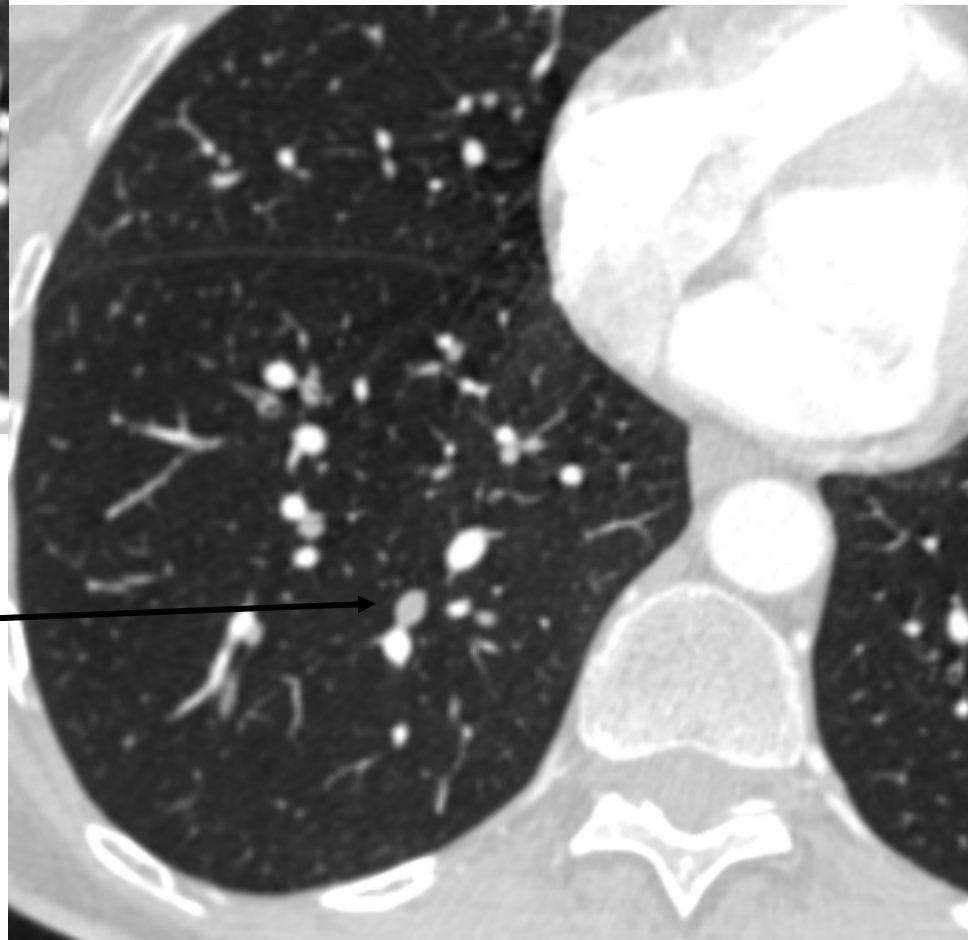
STREAK ARTEFACTS



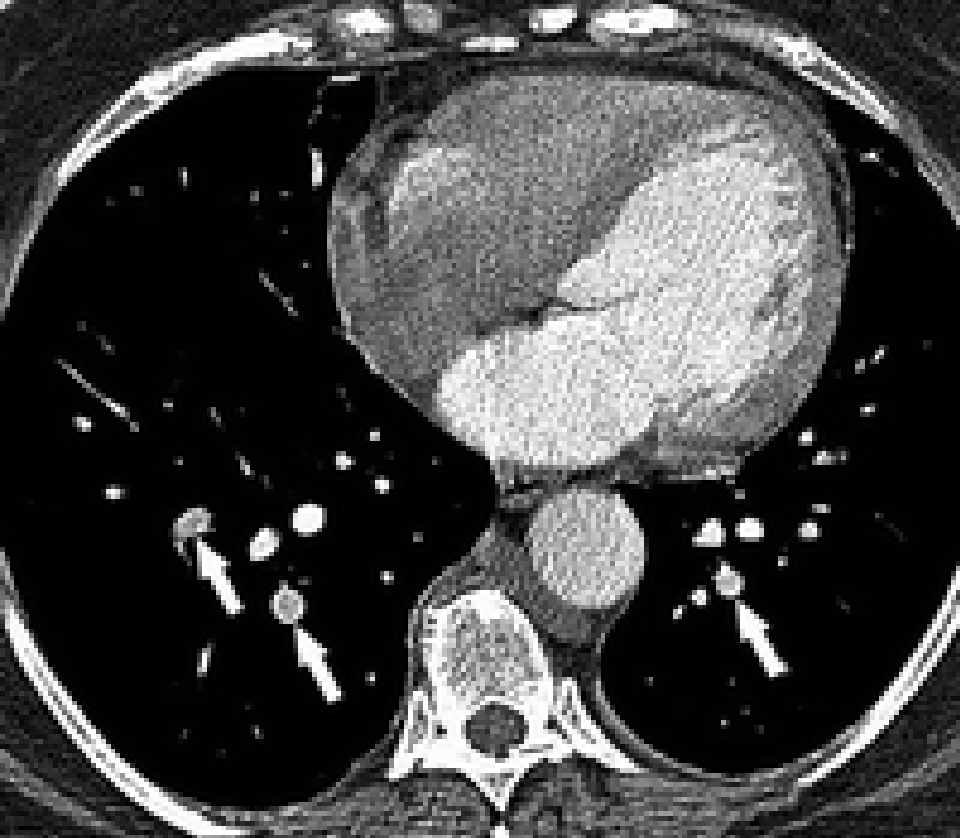




MUCOUS FILLED BRONCHI

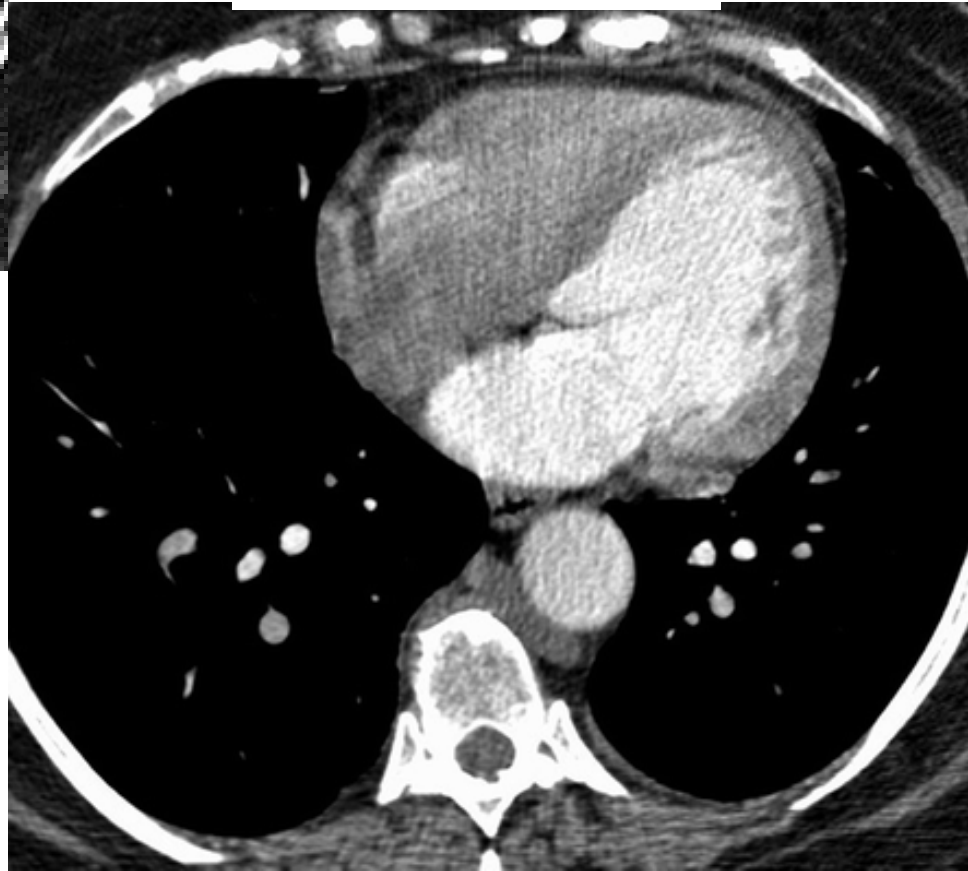


RECONSTRUCTION ALGORITHM

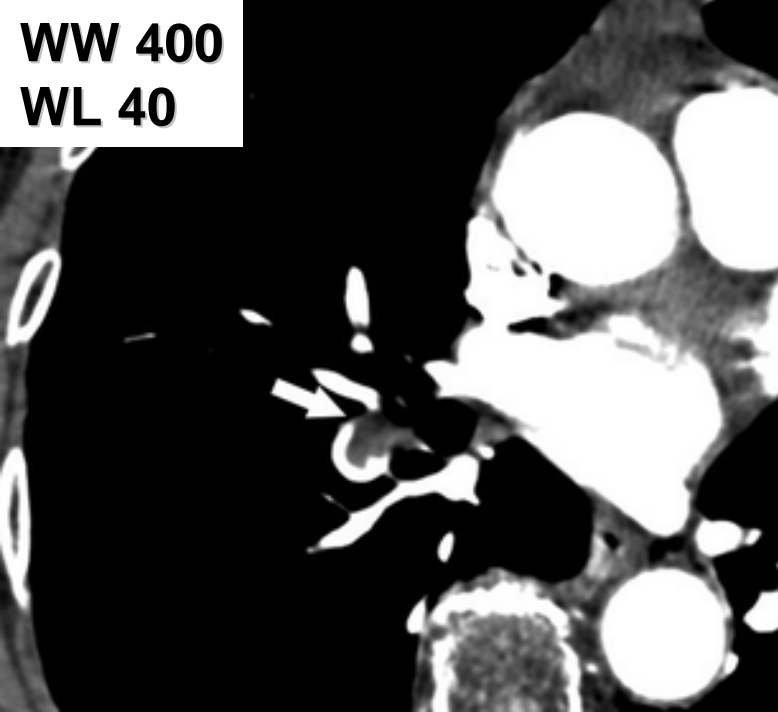


Lung algorithm

Standard algorithm



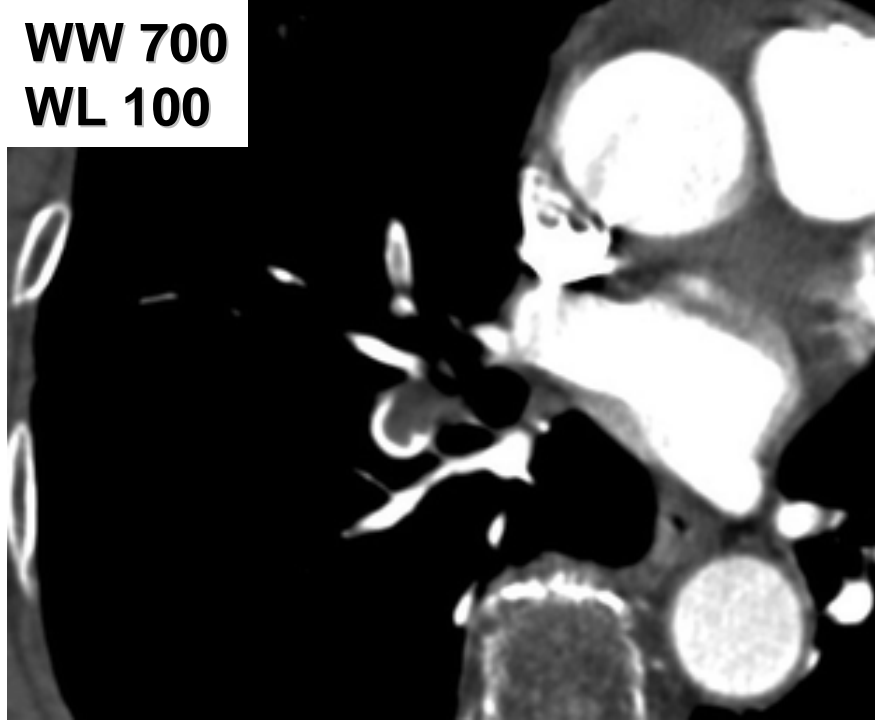
WW 400
WL 40



WW 552
WL 276



WW 700
WL 100

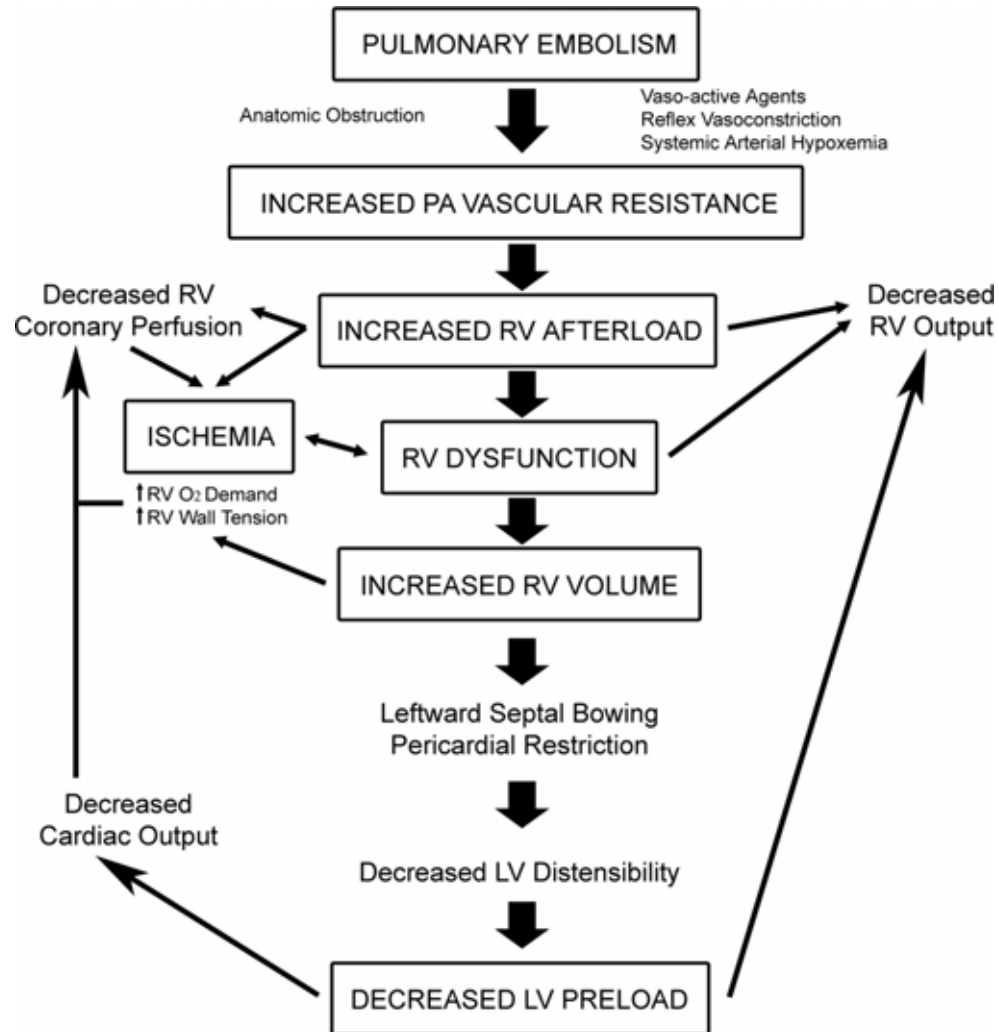


MDCTPA

- Direct visualization of emboli.
- Both parenchymal and mediastinal structures can be evaluated.
- Offers differential diagnosis in 2/3 of cases with a negative scan.

Assessment of severity and prognosis in patients with PE on MDCTPA

PATHOPHYSIOLOGIC CYCLE OF MAJOR PE



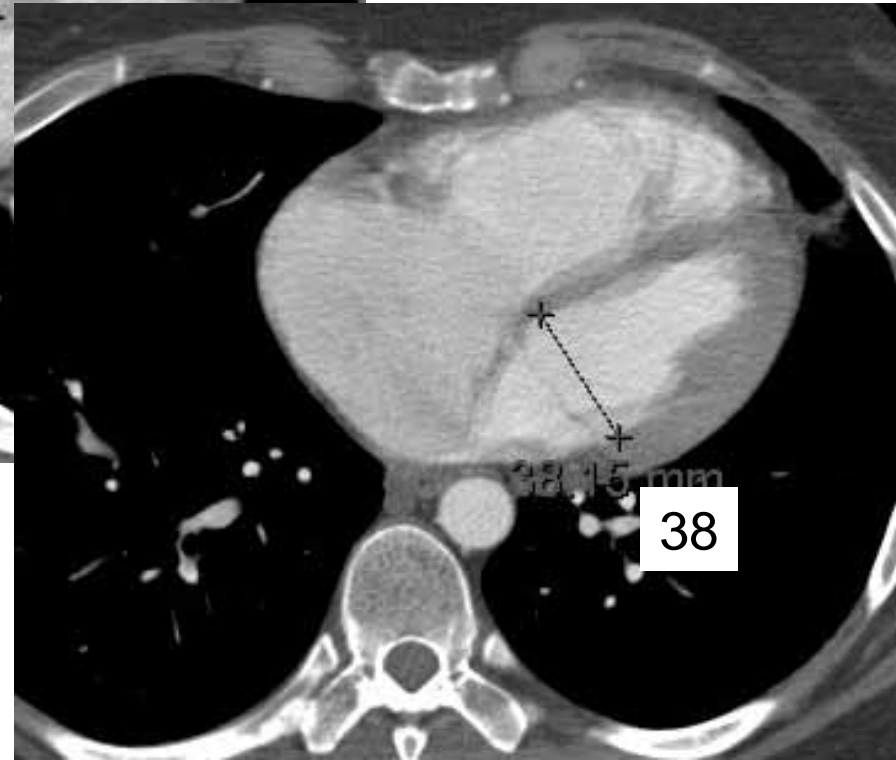
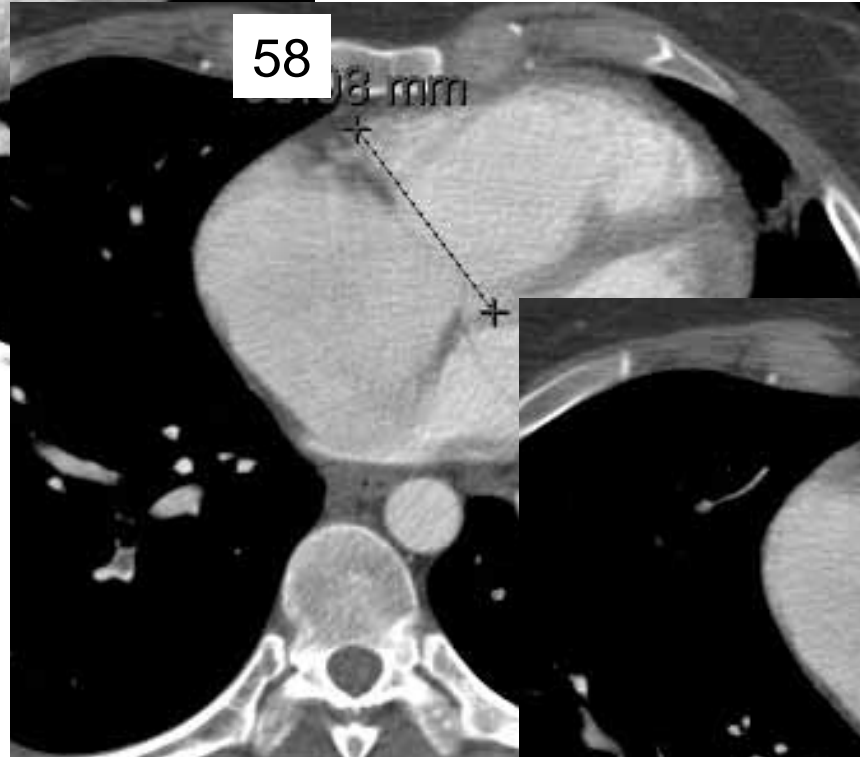
Right ventricular (RV) failure

- Increased risk of sudden death
- DILATED RV AND NORMAL OR SMALL LV.

RV/LV SHORT AXES RATIO. RV/LV DIAMETER RATIO > 1 .

RV/LV DIAMETER RATIO SUPERIOR TO 1.5 INDICATES A SEVERE EPISODE OF PE.

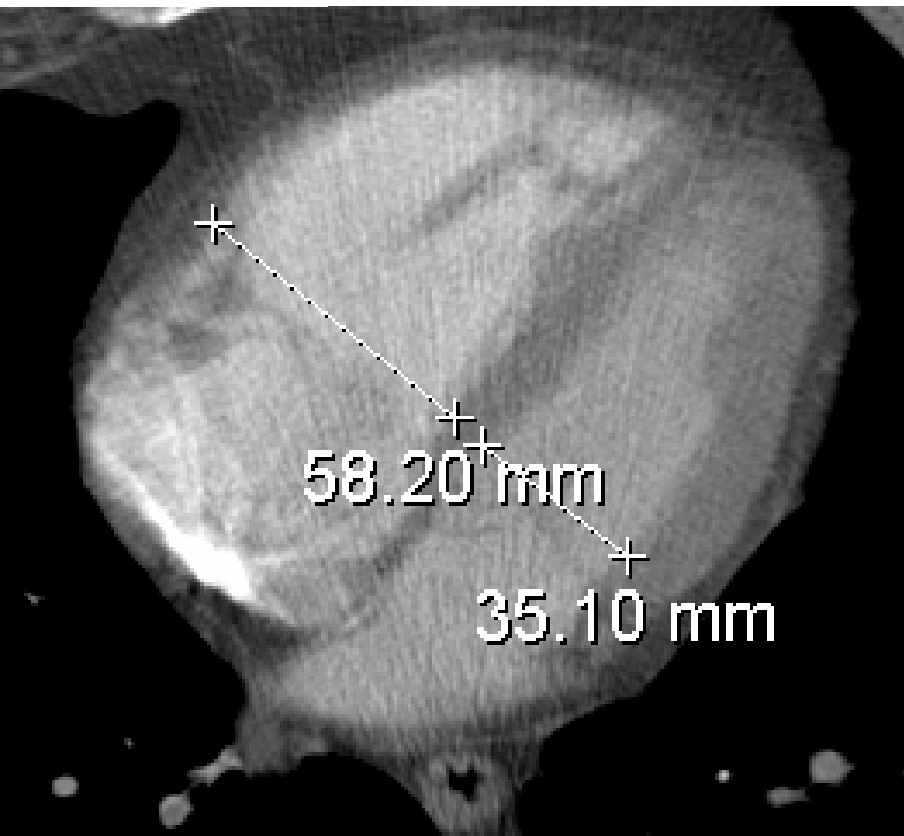
Measurement of the short axes of the RV and LV on axial CT pulmonary angiogram



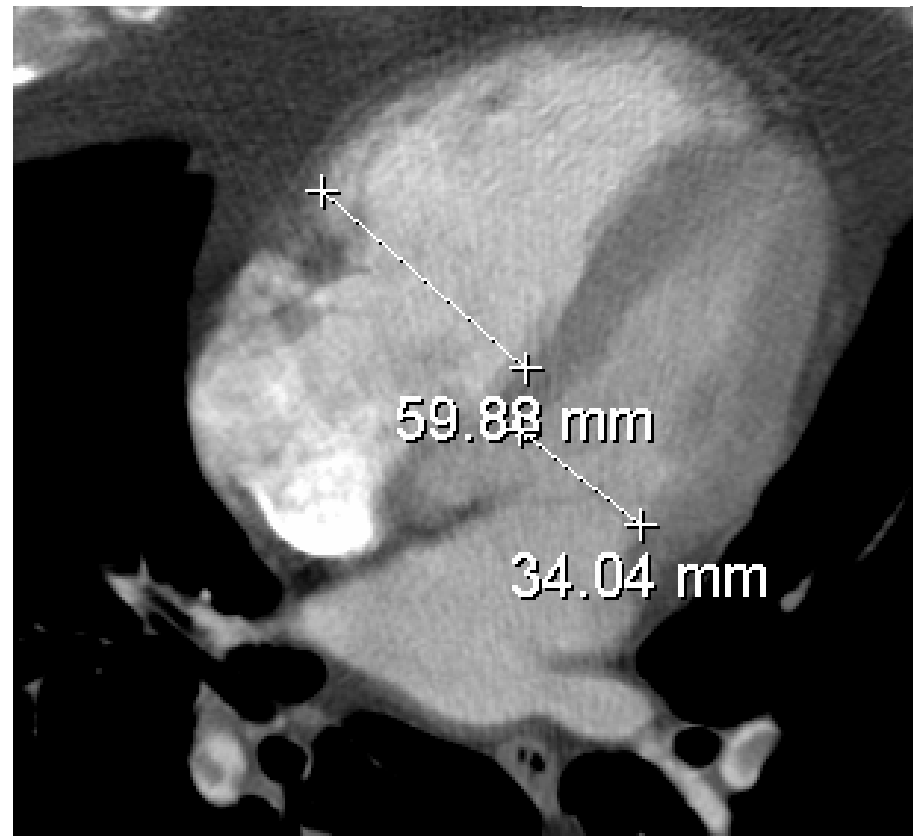
$$RV/LV=58/38=1.5$$

REFORMATED FOUR-CHAMBER VIEW

RV/LV=1.65



RV/LV=1.74



An RV/LV diameter ratio greater than 0.9 was associated with a higher mortality rate compared to an RV/LV diameter ratio less than or equal to 0.9 calculated on a four-chamber view in 431 patients with PE.

Right ventricular (RV) failure

- Increased risk of sudden death
- Dilated RV and normal or small LV.
RV/LV short axes ratio. RV/LV diameter ratio > 1 .
RV/LV diameter ratio superior to 1.5 indicates a severe episode of PE
- LEFTWARD SEPTAL BOWING.

Leftward septal bowing.



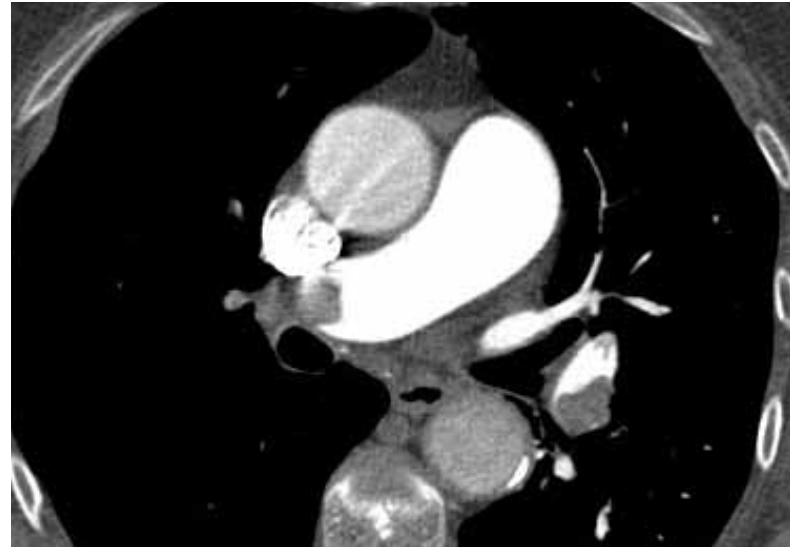
Paradoxical embolism

- Atrial septal defect
- Patent foramen ovale (25%)
- Atrial septal aneurysm (70% have PFO)

Paradoxical embolism?



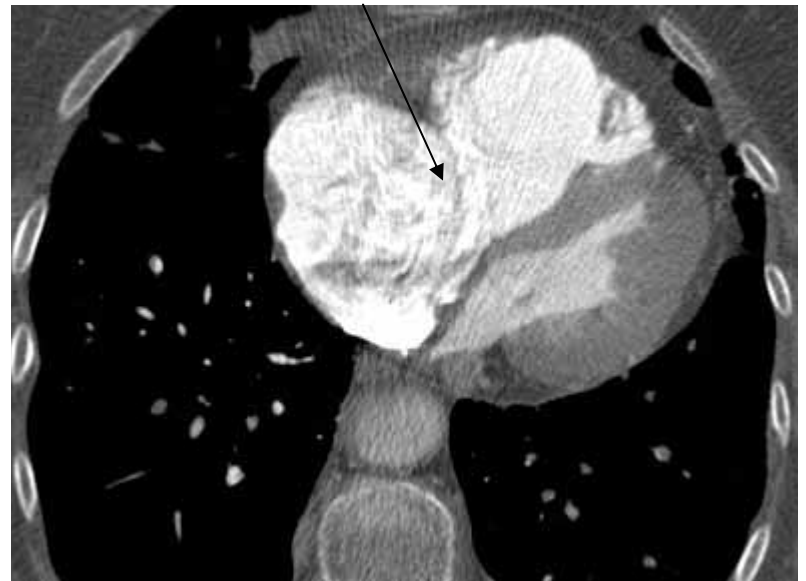
Massive PE



Atrial septal aneurysm.



RV failure



CT- findings of Chronic pulmonary embolism

Vascular pulmonary artery signs :

Complete and partial obstruction, eccentric thrombus, calcified thrombus, bands, webs, poststenotic dilatation

Signs related to pulmonary hypertension:

Enlargement of main pulmonary arteries, atherosclerotic calcification, tortuous vessels, right ventricular enlargement, hypertrophy

Signs of systemic collateral supply:

Enlargement of bronchial and nonbronchial systemic arteries

Parenchymal signs:

Scars, a mosaic perfusion pattern, focal ground-glass opacities and bronchial anomalies.

Diagram shows the various possible results of disturbed resolution of a thrombus: vascular stenosis, retraction with total obstruction, retraction with partial obstruction, recanalization, or residual fibrous cords (web or bands)

