Pulmonary Thromboembolism

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Our Patient GK

40 yo F with sudden decrease in O2 sat 4 hours after surgery

HR 168
BP 124/65
pH 7.2
PaCO2 66
PaO2 136 (100% O2)
HCO3 27
Differential Diagnosis

Pulmonary embolism
Pneumothorax
Pneumonia
Airway obstruction
Increased abdominal pressure
A little bit about PE

Thrombi usually from veins in the lower extremities
Estimated 300,000 cases per year
Mortality: untreated = 30%; treated < 10%
Clinical findings
dyspnea, (pleuritic) chest pain, tachypnea, R-sided HF,
decreased pO2 and pCO2, EKG changes
Risk factors
immobilization, recent surgery, stroke, hx of thromboembolic disease, malignancy
The Imaging Menu

CXR

- Lower extremity venous ultrasound
- Radionuclide Ventilation: Perfusion lung scan
- Contrast enhanced chest CT
- Chest MRI
- Pulmonary Angiography
CXR with suspected PE

Main utility: exclusion of other diagnoses
May be normal (24%)
Abnormalities usually nonspecific
Common findings:
  - cardiac enlargement
  - pleural effusion
  - pulmonary artery enlargement
  - elevated hemidiaphragm
  - atelectasis
  - parenchymal pulmonary infiltrates

2 Classic Signs……
Classic Sings on CXR: Westermark and Hampton

From Sokolove PE, Offerman SR, "Pulmonary Embolism", NEJM, 2001
V/Q scan: When it works

Normal
PE very unlikely
(~2%)


High probability
PE likely
(specificity = 0.97)

From Sokolove PE, Offerman, SR, “Pulmonary Embolism”, *NEJM*, 2001
The indeterminate VQ scan

Matched defects = indeterminate

PIOPED study:

Only 40% of patients with PE have high probability scan

Algorithms to improve sensitivity incorporate clinical suspicion and venous U/S

From Thompson BT, Hales CA, UTDOL 9.3, 2001
Normal Chest CT with contrast

- Aorta
- Right pulm artery
- Pulmonary Trunk
- Left pulm artery
Spiral CT

Benefits
- fast
- specific
- identify other causes of PE symptoms

Poor sensitivity?
- subsegmental emboli
- R middle lobe and lingula

Still improving

Angiography

Why it’s done
Diagnostic gold standard
Therapeutic

Why it’s not done first
Expensive
Requires expertise
Invasive
Our Patient GK: CXR
Our Patient GK: CT with contrast

Left pulm artery
Our Patient GK: Angiography

Filling defect
Our Patient GK: Outcome

Greenfield filter
Summary: PE

Clinically, must look to find it
CXR mainly for exclusion of other diagnoses
VQ scan interpretation can be complicated
CT specific but may not be sensitive
Angiography not risk-free; gold standard for diagnosis + therapeutic
References


Sokolove PE, Offerman, SR. Pulmonary Embolism. *NEJM* 2001; 345 (18): 1311.

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