CT Protocol for Pulmonary Embolism Assessment

Based on:
Imaging and Biomarkers: The Assessment of Pulmonary Embolism Risk and Early Mortality. Alexandru Gratian Naum 1,2, Irina Jari 3,4,*, Liliana Moisii 3,4, Andra Mara Ursu 4 and Paloma Moisii 5,6,* Medicina 2024, 60, 1489.

Presenter:
陳佩珊

Main objective

- The prognostic value of **PAOI** (pulmonary artery obstruction index) for risk assessment in PE
- The predictive accuracy of **D-dimer**, **c-TnT**

- PAOI ：肺動脈阻塞指數
- D-dimer ：是血栓中纖維蛋白溶解的產物，<500 μg/L 為正常
- C-TnT：心肌旋轉蛋白T， >14 ng/L 為心肌損傷

Study CT Method Overview

- Equipment： Philips Incisive 64-slice CT
- Purpose：Evaluate PE using CTPA
- Additional：Calculate PAOI and assess RVD (Right Ventricular Dysfunction)

■ RVD ：右心室功能障礙

Scan Direction and Setup

- Direction: Cranio-caudal (head-to-foot)
- Benefits:
  - Less artifact from SVC contrast
  - Better lower lobe clarity
  - Improves basal PE detection

Triple-Phase CTPA Protocol

- Non-contrast:
  - Baseline findings (e.g., calcifications, bleeding)
- Arterial phase
  - Triggered 7s after 180 HU in pulmonary artery
- Venous phase
  - 20s post-arterial phase
    → Enhances clarity & confirms perfusion defects

Estimated Contrast Protocol

- Flow: ≥ 4 mL/s
- Volume: 70–100 mL
- Saline flush: 20–30 ml
- Bolus tracking ROI: Main pulmonary artery

Why Use a Venous Phase?

- Enhances diagnostic confidence
- Helps evaluate IVC reflux
- Reduces false-negatives from motion or low cardiac output
- Trade-off: Increased radiation

Quantitative CT Parameters

- RV/LV ratio > 1 → RVD
- PAT/Ao > 1 → Pulmonary HTN
- Septal deviation → RV pressure
- IVC reflux → Right strain
- PAOI = (n × d) / 40 × 100%

PAOI Cutoff and Clinical Role

- PAOI ≥ 32.5% → Massive PE
- Correlates with:
  - D-dimer, c-TnT
  - RVD on CTPA
  - Higher short-term mortality
- AUC = 0.993 (Excellent risk predictor)

Tips for Radiologic Technologists

✓ Confirm correct bolus timing
✓ Recommend dual-phase scan in complex cases
✓ Estimate PAOI, RV/LV, PAT/Ao if applicable
✓ Communicate critical findings quickly

Summary

✓ Optimized protocol: bolus tracking, dual-phase, PAOI quantification
✓ PAOI = a bridge from imaging to prognosis
✓ Radiographers are crucial for PE diagnosis and triage