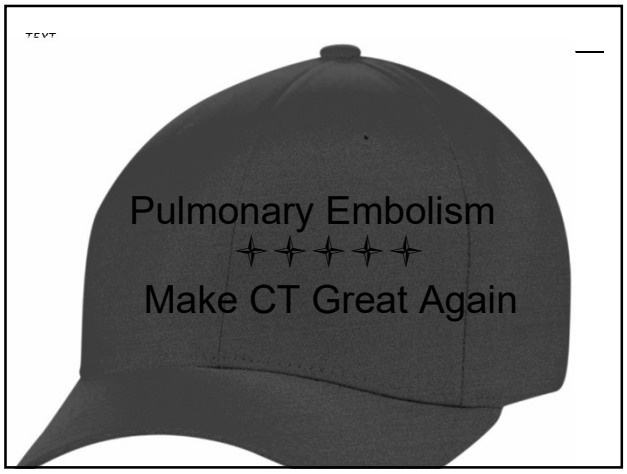


NAY! CTPA IS ALL YOU NEED

TAN SWEE YAW

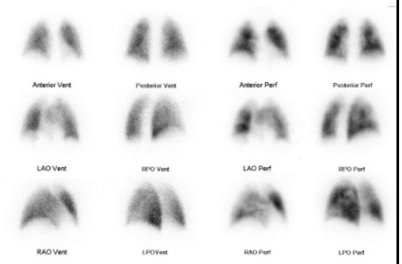
PULMONARY EMBOLUS: WHY CTPA IS THE MODALITY OF CHOICE

PULMONARY EMBOLISM

- 70-200 cases per 100,000 patient years
- Life threatening condition that needs to be identified expediently and accurately

VQ

- PIOPED I study 65% ended up indeedrminate scan
- 40% of the indeterminate scans PE was revealed on PA



PREVIOUS GOLD STANDARD

- Invasive Pulmonary Angiography
- 15 years ago before the advent of multislice CT angiography
- Interventional Radiologists used to think Pulmonary angiography as the reference standard . Survery 5 years ago revealed that up to 45-65% still prefer Invasive pulmonary angiography.
- Pulmonary Angiography now used if any intervention considered - thromblysis or thrombictomy
- Off course they get more sleep so took sometime but the IRs have accepted the CTPA as the gold standard

Remy-Jardin M, Pistolesi M, Goodman LR, Gefter WB, Gottschalk A, Mayo JR, et al. Management of suspected acute pulmonary embolism in the era of CT angiography: a statement from the Fleischner Society. Radiology 2007;245:315-29

HISTORICAL INVESTIGATIONS FOR PULMONARY EMBOLISM

- CTPA is now the gold standard for diagnosing PE (Am J Roentgenology 2017; 208:485)
- Computed tomography (CT) pulmonary angiography (CTPA) is the current standard of care and provides accurate diagnosis with rapid turnaround time

Remy-Jardin M, Pistolesi M, Goodman LR, Gefter WB, Gottschalk A, Mayo JR, et al. Management of suspected acute pulmonary embolism in the era of CT angiography: a statement from the Fleischner Society. Radiology 2007;245:315–29

CLINICAL PREDICTION MODELS

- The clinical risk of PE is stratified based on the Wells score the Geneva score. A three-tier model of classification (0–1, low risk; 2–6, moderate risk; >6, high risk) helps risk stratification in a reliable manner
- A two-tier model (≤4 PE unlikely; >4 PE likely) approach recommends performing a D-dimer test on "PE unlikely" patients and a CT angiography (CTA) for "PE likely" patients

WELLS AND GENEVA PREDICTION SCORE

Appendix Table 1. Wells Prediction Rule for Pretest Probability of PE*

Clinical Characteristic	Score	Simplified Score
Previous PE or DVT	1.5	1
Heart rate >100 beats/min	1.5	1
Recent surgery or immobilization	1.5	1
Clinical signs of DVT	3	1
Alternative diagnosis less likely than PE	3	1
Hemoptysis	1	1
Cancer	1	1
	Pretest probability: 0-1: Low 2-6: Intermediate ≥7: High Dichotomized score: ≤4: PE unlikely (low) >4: PE likely (high)	Pretest probability: ≤1: PE unlikely (low) >1: PE likely (high)

Appendix Table 2. Revised Geneva Score for Predicting Pretest Probability of PE*

Clinical Characteristic	Score	Simplified Score
Age >65 y	1	1
Previous PE or DVT	3	1
Surgery (under general anesthesia) or fracture of the lower limbs in the past month	2	1
Cancer (solid or hematologic; currently active or considered cured for <1 y)	2	1
Unilateral lower-limb pain	3	1
Hemoptysis	2	1
Heart rate		
75-94 beats/min	3	1
≥95 beats/min	5	2
Pain on deep venous palpation of lower limb and unilateral edema	4	1
	Pretest probability: <4: Low 4-10: Intermediate >10: High	Pretest probability: ≤2: Unlikely (low) >2: Likely (high)

DVT = deep venous thrombosis; PE = pulmonary embolism.

PIOPED

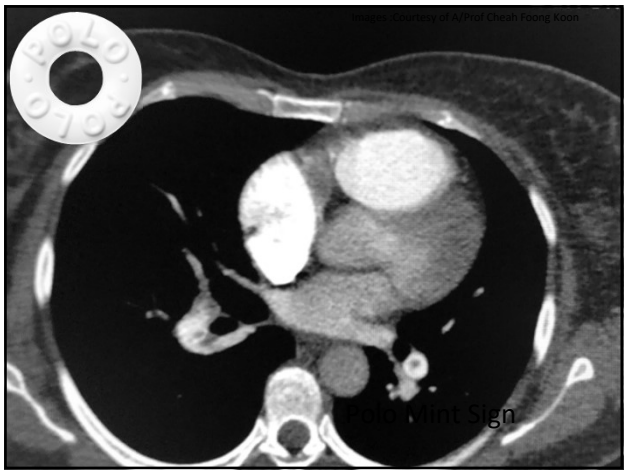
- PIOPED II study demonstrated that computed tomographic pulmonary angiography (CTPA) had high specificity (96%) but only moderate sensitivity (83%) for identifying patients with pulmonary embolism
- When combined with clinical probability, the positive predictive value rose to as high as 96% when there was high or low clinical probability and 92% when there was intermediate clinical probability

SPECIFICITY AND SENSITIVITY

- Highest Specificity 83-100 and Sensitivity 89-96%
- Small sub segmental is now 92%
- The sensitivity of spiral CT scanning in the evaluation of central PE is as high as 100%
- VQ rule out was only 75.9%
- If the test is negative PE is ruled out. Even in a population prevalence of 15% the NPV was 99.1%

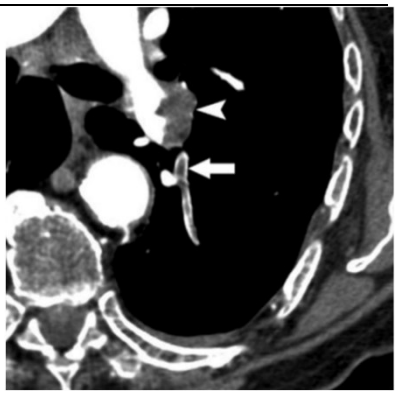
DIRECT VISUALIZATION OF THE CLOT

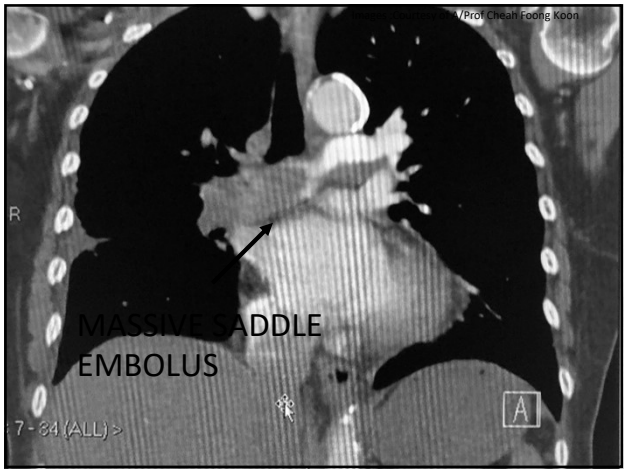
- CT is not probabilistic
- Direct Imaging of the problem
- Direct findings of acute PE in CT include a central filling defect within a vessel surrounded by contrast material yielding a “polo mint” appearance when orthogonal to the long axis of the vessel



Polo Mint Sign

RAILWAY TRACK SIGN

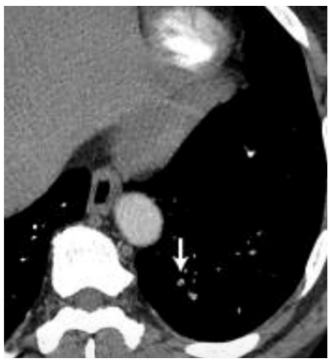




MASSIVE SADDLE EMBOLUS

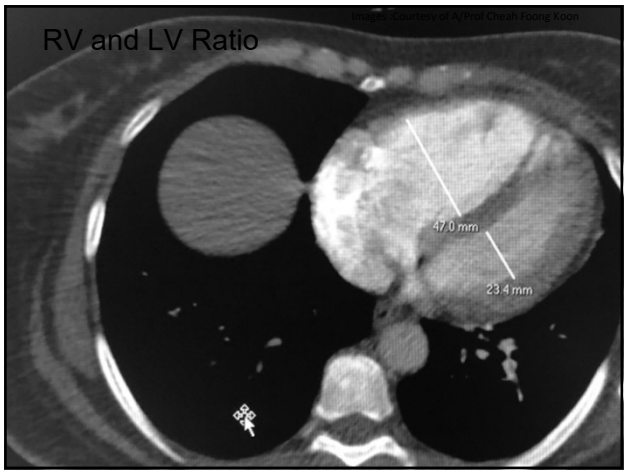
SUB SEGMENTAL PE

- CTPA can detect very small sub-segmental pulmonary emboli which can be sub millimeter



SEVERITY OF THE PE

- CT provides several parameters for estimating the severity of PE and risk-stratification
- Right heart strain,
- Clot burden and lung perfusion.
- Right ventricle (RV)/left ventricular (LV) ratio (>1 in axial plane, >0.9 in 4-chamber reconstruction),
- Flattening of interventricular septum and reflux of contrast material into the IVC and hepatic veins. RV/LV ratio >1.1
- 3D RV/LV volume ratio >1.2 was predictive of 30-day outcome



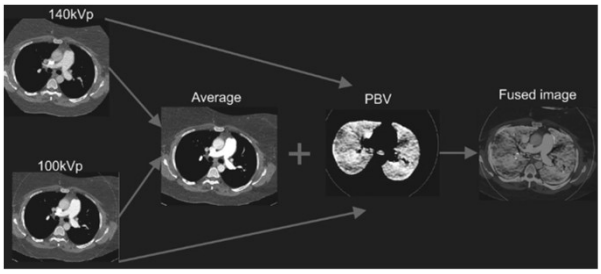
DUAL ENERGY CT

- DECT uses two energy levels to create data sets from two distinct X-ray spectra,
- used to distinguish materials
- Higher molecular weight materials show a greater difference in X-ray attenuation when exposed to low and high energy levels as compared to lower molecular weight materials
- (dual-source, rapid kVp switching, dual-spin, split-beam) and others at the detector level (dual-layer, photon counting CT)

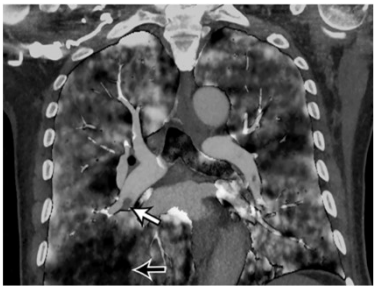
ANATOMY AND FUNCTION

- Data sets derived from DECT can be used to generate iodine maps
- visualization of the distribution of iodine within the lung after intravenous contrast material administration
- perfusion maps can be generated to overlay traditional CT images

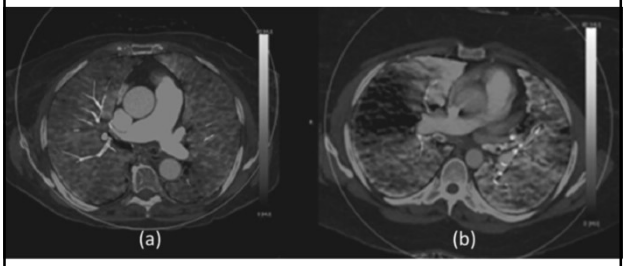
DECT - ANATOMICAL AND IODINE PERFUSION MAPS



WEDGE INFARCT ON DUAL ENERGY IODINE PERFUSION MAP



DECT



WEDGE INFARCTS

- Wedge-shaped perfusion defects are seen in acute PE, which has been shown to correlate well with pulmonary perfusion on scintigraphy
- Enhance detection of peripheral clots
- Allows you to assess severity as it correlates well with RV dysfunction

Thieme SF, Becker CR, Hacker M, et al. Dual energy CT for the assessment of lung perfusion--correlation to scintigraphy. Eur J Radiol 2008;68:369-74.

The British Journal of Radiology, 85 (2012), 613–622

Acute and subacute dual energy CT findings of pulmonary embolism in rabbits: correlation with histopathology

[1,2]X CHAI, MS, [1]L-J ZHANG, MD, [3]B M YEH, MD, [1]Y-E ZHAO, MS, [1]X-B HU, MS and [1]G-M LU, MD

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Objective: The purpose of this study was to describe quantitative dual energy CT (DECT) findings and their accuracy in the detection of acute and subacute pulmonary embolism (PE) in rabbits.
Methods: Pulmonary emboli were created in 24 rabbits by gelatin sponge femoral vein injection. Conventional CT pulmonary angiography (CTPA) and DECT were obtained at either 2 h, 1 day, 3 days or 7 days after embolisation (n=6 rabbits for each time point). The location and number of PEs in the different stages were recorded at CTPA and iodine maps from DECT on a per-lobe basis. With histopathology as the reference standard, sensitivity and specificity of CTPA and DECT were calculated. CT and iodine map overlay values of the embolic and non-embolic areas were measured for each scan.
Results: With histopathology as the reference standard, the overall sensitivity and specificity of CTPA were 98% and 100% and those of iodine maps were 100% and 95%, respectively. Conventional CT and iodine map values of the embolised and non-embolised areas were significantly different between 2 h and 1 day (p<0.001), but not between 3 days and 7 days (p>0.05). A statistical difference was found for overlay values measured in the embolic and non-embolic regions for four groups.
Conclusion: Iodine maps derived from DECT show alterations in lung perfusion for acute and subacute PE in an experimental rabbit model and show comparable sensitivity for PE detection and conventional CTPA.

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TEXT

AVAILABILITY

- CT widely available. CTPA can be performed even on your old 4 slice CT scanners
- Primarily, it is readily available , minimally invasive, and fast with scan duration in modern scanners of less than one second

ECONOMIC UTILITY

- Highest diagnostic accuracy
- Lowest proportion of non-diagnostic scans
- Incorporation of CTPA has also been found to be a cost-effective solution in the workup of patients with PE when combined with clinical criteria

GUIDELINES

Guidelines Summary

Guidelines for the diagnosis and management of pulmonary embolism (PE) have been issued by the following organizations:

- American Academy of Family Physicians (AAFP)/American College of Physicians (ACP) [4]
- American College of Physicians (ACP) [107]
- American College of Emergency Physicians (ACEP) [108]
- American College of Radiology (ACR) [69]
- American College of Chest Physicians [5, 109]
- American Heart Association (AHA) [102]
- American College of Obstetricians and Gynecologists (ACOG) [110]

ACR GUIDELINES

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9		☢
CTA chest with IV contrast	9	This procedure should be optimized for pulmonary circulation.	☢☢☢
CT chest with IV contrast	9	This procedure should be optimized for pulmonary circulation. This procedure may be an alternative to CTA, but both should not be performed.	☢☢☢
Tc-99m V/Q scan lung	7	This procedure may be an alternative to CTA, but both should not be performed.	☢☢☢
US duplex Doppler lower extremity	7	This procedure may be an initial study prior to CTA.	O
MRA chest without and with IV contrast	6		O
CTA chest with IV contrast with CT venography lower extremities	5		☢☢☢
Arteriography pulmonary with right heart catheterization	3		☢☢☢☢
US echocardiography transthoracic resting	3		O
CT chest without IV contrast	2		☢☢☢
CT chest without and with IV contrast	2		☢☢☢
MRA chest without IV contrast	2	This procedure has limited sensitivity and may be indicated for rare situations or certain contraindications for a specific patient.	O
US echocardiography transesophageal	2		O

ACR FOR PREGNANT WOMEN AND SUSPECTED PE

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9		☢
US duplex Doppler lower extremity	8	This procedure may be an initial examination prior to CTA, which may prevent the need for ionizing radiation in the appropriate clinical setting.	O
CTA chest with IV contrast	7	This procedure should be optimized for pulmonary circulation.	☢☢☢
CT chest with IV contrast	7	This procedure should be optimized for pulmonary circulation. This procedure may be an alternative to CTA, but both should not be performed.	☢☢☢
Tc-99m V/Q scan lung	7	This procedure may be an alternative to CTA, but both should not be performed. Ventilation should be done only if necessary.	☢☢☢
Arteriography pulmonary with right heart catheterization	4	This procedure is rarely indicated. It is used for clarification or catheter-directed intervention.	☢☢☢☢
CTA chest with IV contrast with CT venography lower extremities	3		☢☢☢
MRA chest without and with IV contrast	3	This procedure may be used as a problem solver or if intervention is planned. There is concern for fetal exposure to contrast.	O
MRA chest without IV contrast	3		O
CT chest without IV contrast	2		☢☢☢
CT chest without and with IV contrast	2		☢☢☢
US echocardiography transesophageal	2		O
US echocardiography transthoracic resting	2		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

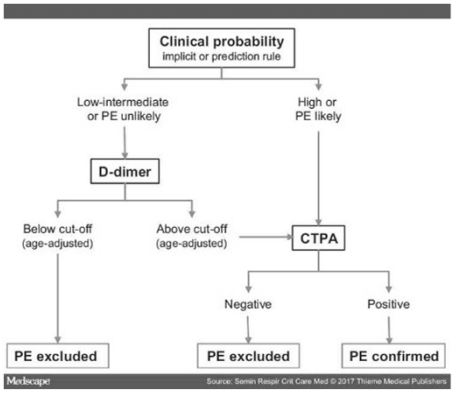
AMERICAN COLLEGE OF PHYSICIANS

ACP
American College of Physicians
Leading Internal Medicine, Improving Lives

SUMMARY OF THE AMERICAN COLLEGE OF PHYSICIANS BEST PRACTICE ADVICE FOR THE EVALUATION OF PATIENTS WITH SUSPECTED ACUTE PULMONARY EMBOLISM

Disease/Condition	Pulmonary embolism
Target Audience	Internists, family physicians, emergency physicians, other clinicians
Target Patient Population	Adults with suspected acute pulmonary embolism, both inpatient and outpatient
Diagnostic Tests	Sensitive D-dimer assays (ELISA, quantitative rapid ELISA, and advanced turbidimetric D-dimer determinations) Pulmonary imaging studies (CTPA, V/Q scintigraphy, or pulmonary angiography) Lower-extremity venous ultrasonography
Evidence on Diagnostic Tests for PE	CT angiography has a sensitivity and specificity for PE of 95% to 100% in patients with low or intermediate pretest probability and a sensitivity of 85% to 95% in patients with high pretest probability The sensitivity of V/Q scan for PE is 93% to 98%, and specificity is 20% to 65% Pulmonary angiography is an invasive test that should only be reserved in patients where the diagnosis is still uncertain after CT angiography or V/Q scan Age-adjusted (age × 10 ng/mL) D-dimer cutoffs can be used to exclude PE in non-high clinical probability patients who are >50 years of age, with a sensitivity of >97% and higher specificities than the conventional cutoff of 500 ng/mL
Evidence That Expanding Testing to Patients Without These Indications Does Not Improve	Well-validated decision rules have found that the risk for PE in patients who do not meet their criteria for additional testing is very low Despite a significant increase in diagnoses of PE, mortality has remained unchanged, suggesting that we are overdiagnosing PEs that are not clinically significant
Harms of Imaging	Radiation exposure Contrast-induced nephropathy and contrast allergy Cost Overdiagnosis and resultant overtreatment with anticoagulants Detection and further work-up of incidental findings
Approaches to Overcome Barriers to Evidence-Based Practice	Patient expectations or preferences for imaging: use evidence to aid education Practice-pattern variation: use individual or group-wide feedback on appropriateness, use, and yield Integrated computerized decision support Incentives and benchmarking using national quality measures
Best Practice Advice	*Best Practice Advice 1: Clinicians should use validated clinical prediction rules to estimate pretest probability in patients in whom acute PE is being considered.* *Best Practice Advice 2: Clinicians should not obtain D-dimer measurements or imaging studies in patients with a low pretest probability of PE and who meet all Pulmonary Embolism Rule-Out Criteria.* *Best Practice Advice 3: Clinicians should obtain a high-sensitivity D-dimer measurement as the initial diagnostic test in patients who have an intermediate pretest probability of PE or in patients with low pretest probability of PE who do not meet all Pulmonary Embolism Rule-Out Criteria. Clinicians should not use imaging studies as the initial test in patients who have a low or intermediate pretest probability of PE.* *Best Practice Advice 4: Clinicians should use age-adjusted D-dimer thresholds (age × 10 ng/mL rather than a generic 500 ng/mL) in patients older than 50 years to determine whether imaging is warranted.* *Best Practice Advice 5: Clinicians should not obtain any imaging studies in patients with a D-dimer level below the age-adjusted cutoff.* *Best Practice Advice 6: Clinicians should obtain imaging with CTPA in patients with high pretest probability of PE. Clinicians should reserve V/Q scans for patients who have a contraindication to CTPA or if CTPA is not available. Clinicians should not obtain a D-dimer measurement in patients with a high pretest probability of PE.*
Talking Points for Clinicians When Discussing PE Evaluation With Patients	Routine imaging has risks The Pulmonary Embolism Rule-Out Criteria exclude PE in patients with low pretest probability D-Dimer testing excludes PE in patients at low pretest probability who do not meet the Pulmonary Embolism Rule-Out Criteria or patients at intermediate pretest probability Alternative diagnostic strategies exist for patients who cannot have CT

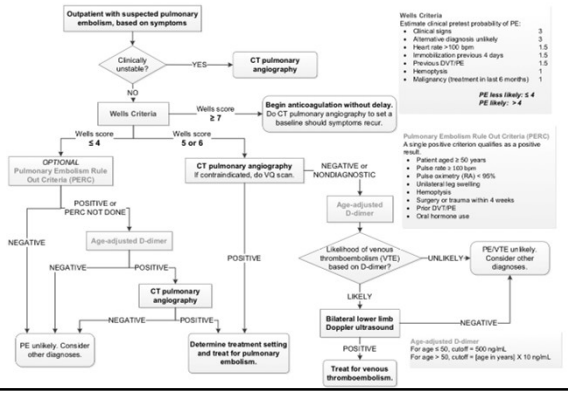
CONTEMPORARY GUIDELINES OF PE



Diagnostic criterion	Clinical probability of PE				
	Low	Intermediate	High	PE unlikely	PE likely
Exclusion of PE					
D-dimer					
Negative result, highly sensitive assay	+	+	-	+	-
Negative result, moderately sensitive assay	+	±	-	+	-
Chest CT angiography					
Normal multidetector CT alone	+	+	±	+	±
V/Q scan					
Normal perfusion lung scan	+	+	+	+	+
Non-diagnostic lung scan[a] and negative proximal CUS	+	±	-	+	-
Confirmation of PE					
Chest CT angiogram showing at least segmental PE	+	+	+	+	+
High probability V/Q scan	+	+	+	+	+
CUS showing proximal DVT	+	+	+	+	+

PE Evaluation and Diagnosis: Non-pregnant Adults Without Cancer

This algorithm is based on ICSI 2013.



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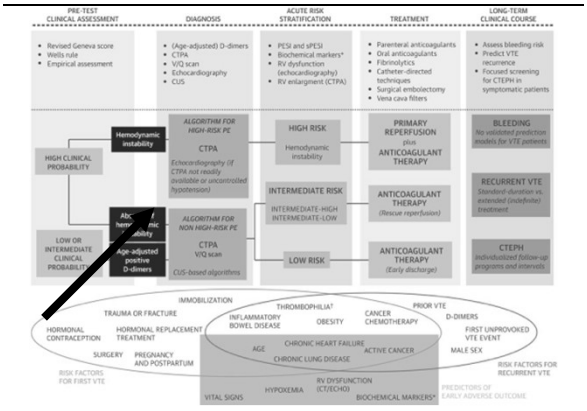
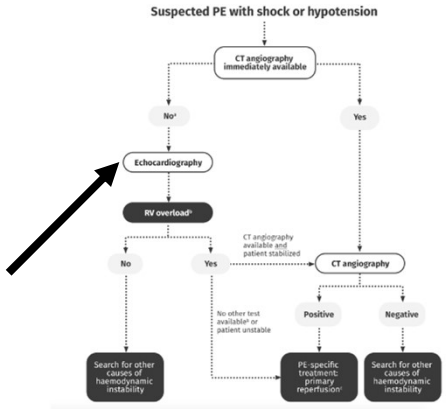


ACCEPTED DECISION TREE BTS



ESC GUIDELINES QUOTE

Acute PE may lead to RV pressure overload and dysfunction, which can be detected by echocardiography. Given the peculiar geometry of the RV, there is no individual echocardiographic parameter that provides fast and reliable information on RV size or function.
This is why echocardiographic criteria for the diagnosis of PE have differed between studies. Because of the reported negative predictive value of 40–50%, a negative result cannot exclude PE.

On the other hand, signs of RV overload or dysfunction may also be found in the absence of acute PE and be due to concomitant cardiac or respiratory disease.

ESC GUIDELINES QUOTE

Echocardiographic examination is not recommended as part of the diagnostic work-up in haemodynamically stable, normotensive patients with suspected (not high-risk) PE.

This is in contrast to suspected high-risk PE, in which the absence of echocardiographic signs of RV overload or dysfunction practically excludes PE as the cause of haemodynamic instability. In the latter case, echocardiography may be of further help in the differential diagnosis of the cause of shock, by detecting pericardial tamponade, acute valvular dysfunction, severe global or regional LV dysfunction, aortic dissection, or hypovolaemia.

Conversely, in a haemodynamically compromised patient with suspected PE, unequivocal signs of RV pressure overload and dysfunction justify emergency reperfusion treatment for PE if immediate CT angiography is not feasible.

OTHER DIAGNOSIS

- The field-of-view of CTPA is not limited to solely the pulmonary arteries other aetiologies may be imaged
- musculoskeletal injuries,
- pericardial abnormalities,
- pneumonia,
- vascular pathologies,
- coronary artery disease

SUMMARY

- CTPA allows direct visualise of the PE
- Highest NPV with best sensitivity ,specificity
- Even higher with Dual Energy CT- anatomy and function
- Economic and widely available
- All guidelines favour CTPA

REBUTLE

3 SITUATIONS WHERE YOU NOT WANT TO DO CT

- The unstable patient
- The pregnant lady
- Contraindications for CT

MCONNELL'S SIGN

- right atrial and ventricular dilation,
- moderate tricuspid regurgitation,
- severe right ventricular dysfunction,
- regional wall motion abnormality of the basal and mid right ventricular free wall with apical hyper contractility

MCONNELL EAT YOUR HEART OUT

- McConnell's sign, not that specific ?
  - Acute increase in pulmonary vascular resistance
  - Chronic pulmonary hypertension
  - PE = MOST COMMON ETIOLOGY
- Echo findings in acute pulmonary embolism :
  - ≠ Dx ; ≠ Rule out
  - Need to be confirmed (CTA, V/Q) unless HD instability
- McConnell's sign utility :
  - Good clinical context
  - Severely compromised and HD unstable patients

NO CHANGE IN OUTCOME

Computed tomography (CT) has become the predominant imaging modality used for the diagnosis of PE. Although the use of CT for the evaluation of patients with suspected PE is increasing in the inpatient, outpatient, and ED settings (9–14), no evidence indicates that this increased use has led to improved patient outcomes. In fact, evidence suggests that many of the PEs diagnosed with increasing use of CT may be less severe (15–17). As a result, although the incidence of PE has risen significantly with the use of CT, there has been minimal or no associated change in mortality (9, 10). This questionable benefit of increased testing, in combination with the significant expense of PE evaluations and the unintended costs of follow-up imaging needed for incidental findings discovered on these potentially inappropriate CTs (5, 18), has led some to conclude that current practice patterns for the evaluation of PE are not cost-effective (5, 19–21).

PREGNANT WOMEN

Ann Intern Med. 2018 Oct 23. doi: 10.7326/M18-1670. [Epub ahead of print]

Diagnosis of Pulmonary Embolism During Pregnancy: A Multicenter Prospective Management Outcome Study.

Righini M[1], Robert-Ebadi H[1], Elias A[2], Sanchez O[3], Le Moigne E[4], Schmidt J[5], Le Gall C[6], Cornuz J[7], Aujesky D[8], Roy PM[9], Chauleur C[10], Rutschmann OT[11], Poletti PA[1], Le Gal G[12]; CT-PE-Pregnancy Group.

Author information

Abstract

BACKGROUND: Data on the optimal diagnostic management of pregnant women with suspected pulmonary embolism (PE) are limited, and guidelines provide inconsistent recommendations on use of diagnostic tests.

OBJECTIVE: To prospectively validate a diagnostic strategy in pregnant women with suspected PE.

DESIGN: Multicenter, multinational, prospective diagnostic management outcome study involving pretest clinical probability assessment, high-sensitivity D-dimer testing, bilateral lower limb compression ultrasonography (CUS), and computed tomography pulmonary angiography (CTPA). (ClinicalTrials.gov: NCT00740454).

SETTING: 11 centers in France and Switzerland between August 2008 and July 2016.

PATIENTS: Pregnant women with clinically suspected PE in emergency departments.

INTERVENTION: Pulmonary embolism was excluded in patients with a low or intermediate pretest clinical probability and a negative D-dimer result. All others underwent lower limb CUS and, if results were negative, CTPA. A ventilation-perfusion (V/Q) scan was done if CTPA results were inconclusive. Pulmonary embolism was excluded if results of the diagnostic work-up were negative, and untreated pregnant women had clinical follow-up at 3 months.

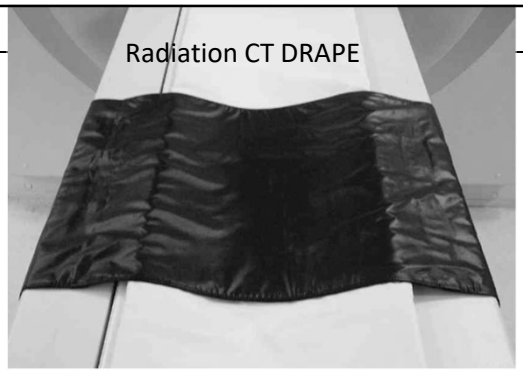
MEASUREMENTS: The primary outcome was the rate of adjudicated venous thromboembolic events during the 3-month follow-up.

RESULTS: 441 women were assessed for eligibility, and 395 were included in the study. Among these, PE was diagnosed in 28 (7.1%) (proximal deep venous thrombosis found on ultrasound [n = 7], positive CTPA result [n = 19], and high-probability V/Q scan [n = 2]) and excluded in 367 (clinical probability and negative D-dimer result [n = 46], negative CTPA result [n = 290], normal or low-probability V/Q scan [n = 17], and other reason [n = 14]). Twenty-two women received extended anticoagulation during follow-up, mainly for previous venous thromboembolic disease. The rate of symptomatic venous thromboembolic events was 0.0% (95% CI, 0.0% to 1.0%) among untreated women after exclusion of PE on the basis of negative results on the diagnostic work-up.

LIMITATION: There were several protocol deviations, reflecting the difficulty of performing studies in pregnant women with suspected PE.

CONCLUSION: A diagnostic strategy based on assessment of clinical probability, D-dimer measurement, CUS, and CTPA can safely rule out PE in pregnant women.

Radiation CT DRAPE



The entire chest is covered in the scan including the subcutaneous tissue, except for pregnant patients where the lung bases can be excluded to minimize radiation dose.

CONTRAST NEPHROPATHY

CTPA is performed with intravenous contrast material, which is associated with contrast-induced-nephropathy (CIN) and may not be suitable for patients with a low glomerular filtration rate (GFR) although the risk is probably overestimated in many clinical scenarios .

Adverse events, including anaphylactoid reactions, related to intravenous iodinated contrast for modern low-osmolar and iso-osmolar contrast materials are low, ranging from 0.2% to 0.7% with fatal reactions occurring in 1 out of 170,000 injections.

PERC CRITERIA

Table 1. Pulmonary Embolism Rule-Out Criteria for Predicting Probability of Pulmonary Embolism in Patients With Low Pretest Probability*

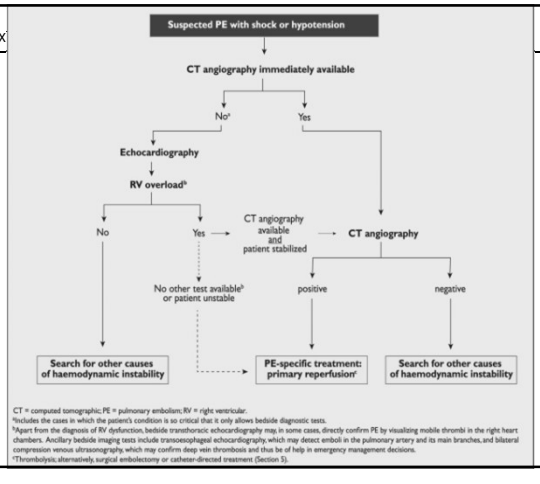
Clinical Characteristic	Meets Criterion	Does Not Meet Criterion
Age <50 y	0	1
Initial heart rate <100 beats/min	0	1
Initial oxygen saturation >94% on room air	0	1
No unilateral leg swelling	0	1
No hemoptysis	0	1
No surgery or trauma within 4 wk	0	1
No history of venous thromboembolism	0	1
No estrogen use	0	1

Pretest probability with score of 0 is <1%

NPV OF A NEGATIVE D-DIMER

Study	D-dimer assay	Patients n	PE prevalence %	PE excluded by D-dimer and clinical probability† n (%)	Three-month thromboembolic risk % (95% CI)
Carrier, 2009 (meta-analysis)[17]	Vidas Exclusion	5612	22	2246 (40)	0.1 (0.0–0.4)
Kearon, 2006, PEPIS, 2009[18,19]	Simplified	2056	12	797 (39)	0.0 (0.0–0.5)
Leclerc, 2003, van Belle, 2006[20,21]	Tinaquant	3588	31	1123 (32)	0.4 (0.0–1.0)

TEX



CT = computed tomographic; PE = pulmonary embolism; RV = right ventricular.
[a]Includes the cases in which the patient's condition is so critical that it only allows bedside diagnostic tests.
[b]Apart from the diagnosis of RV dysfunction, bedside transthoracic echocardiography may, in some cases, directly confirm PE by visualizing mobile thrombi in the right heart chambers. Ancillary bedside imaging tests include transoesophageal echocardiography, which may detect emboli in the pulmonary artery and its main branches, and bilateral compression venous ultrasonography, which may confirm deep vein thrombosis and thus be of help in emergency management decisions.
[c]Thrombolysis; alternatively, surgical embolectomy or catheter-directed treatment (Section 5).