Διαγνωστικά προβλήματα & νεότερες οδηγίες για την πνευμονική εμβολή

Αναστασία Άνθη

Β΄ Κλινική Εντατικής Θεραπείας & Διακλινικό Ιατρείο Πνευμονικής Υπέρτασης Π.Γ.Ν. «ΑΤΤΙΚΟΝ»

New ESC/ERS Guidelines on the diagnosis and management of pulmonary embolism:

- **Many recommendations have been retained or their validity has been reinforced**

- **New data have extended or modified our knowledge**

  in respect of
  the optimal diagnosis, assessment, and treatment of patients with PE

Epidemiology

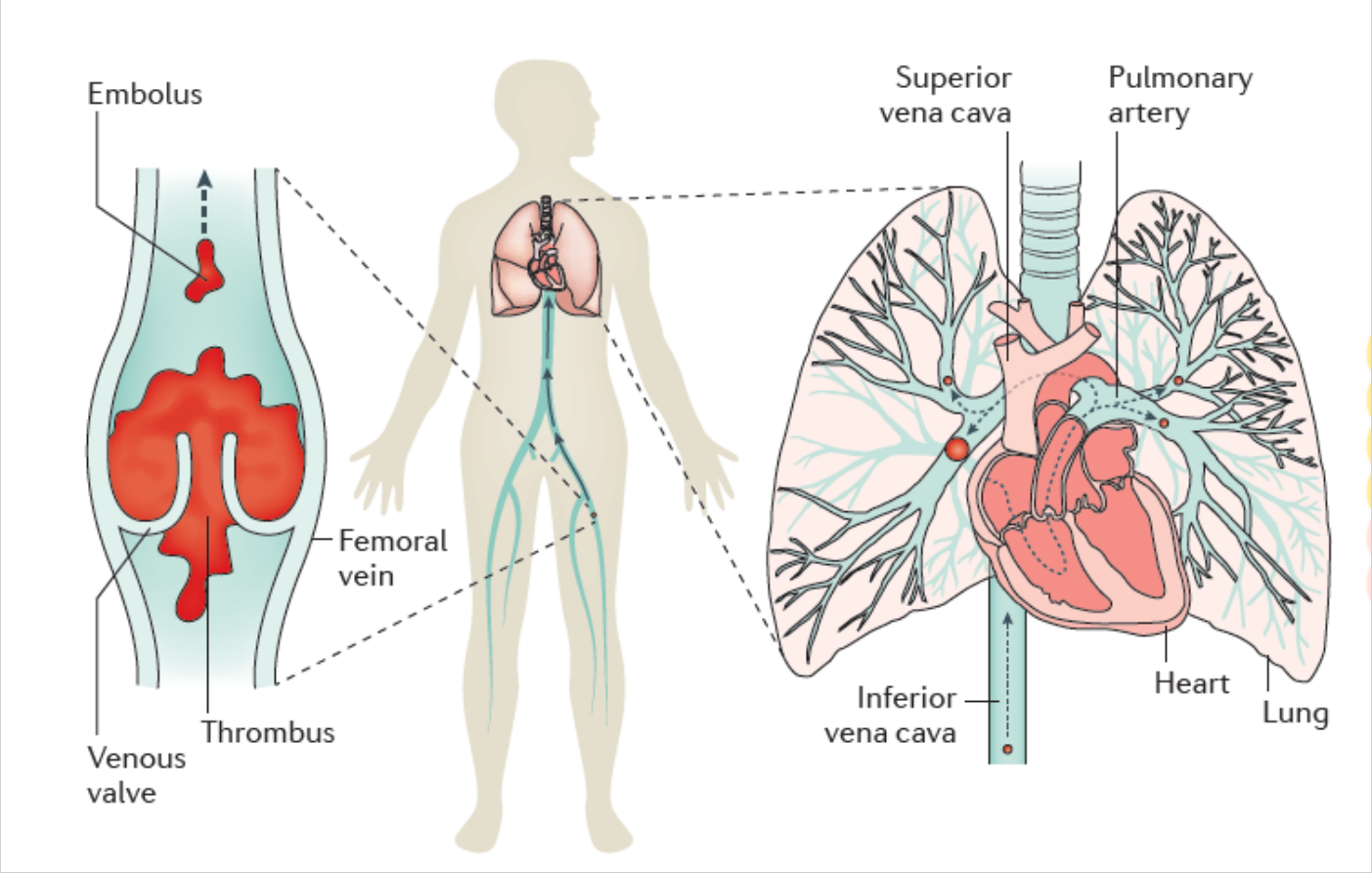
Venous thrombo-embolism (VTE)

includes deep-vein thrombosis (DVT)
& pulmonary embolism (PE)

Epidemiology

Venous thrombo-embolism (VTE)

includes deep-vein thrombosis (DVT) & pulmonary embolism (PE)



Epidemiology

Venous thrombo-embolism (VTE)

includes deep-vein thrombosis (DVT)
& pulmonary embolism (PE)

- is the third most common cause
  of vascular disease–related deaths
  after myocardial infarction and stroke

Epidemiology

Venous thrombo-embolism (VTE)

includes deep-vein thrombosis (DVT)
& pulmonary embolism (PE)

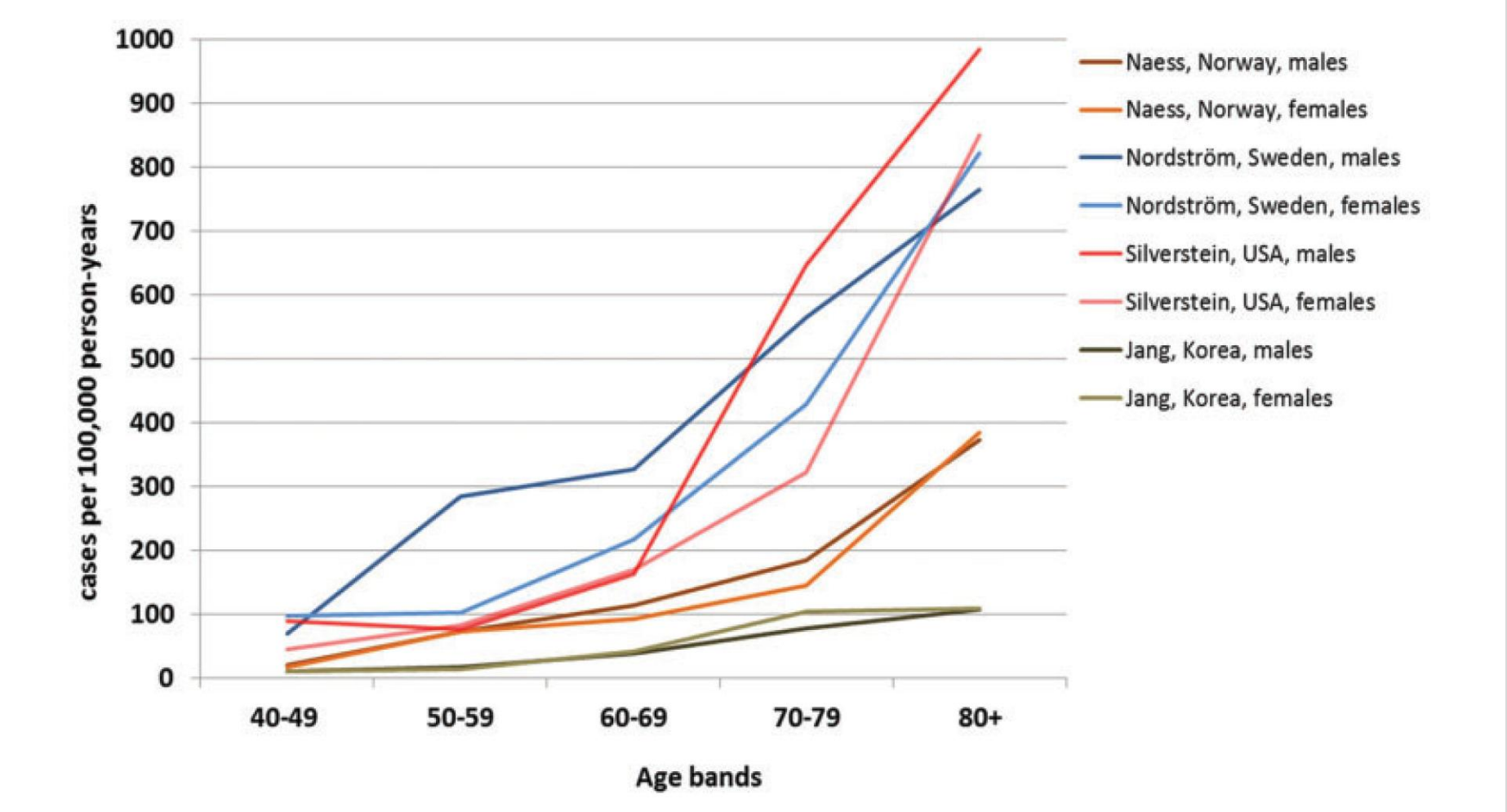
- is the **third** most common cause
  of vascular disease–related deaths
  after myocardial infarction and stroke

incidence

- **1 - 2 cases / 1000/ year** in the general population

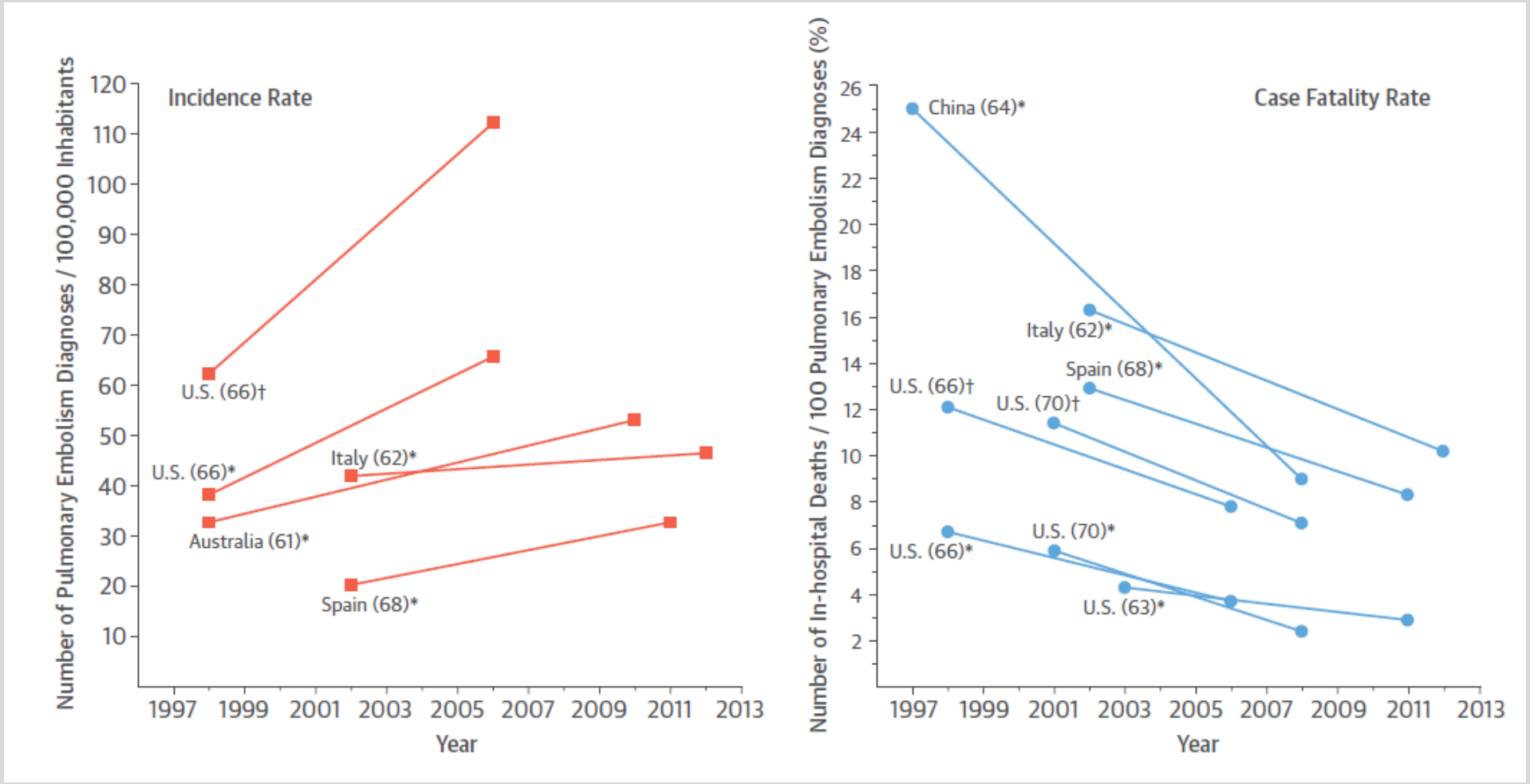
- is steadily **increasing**

Venous thromboembolism incidence according to age group



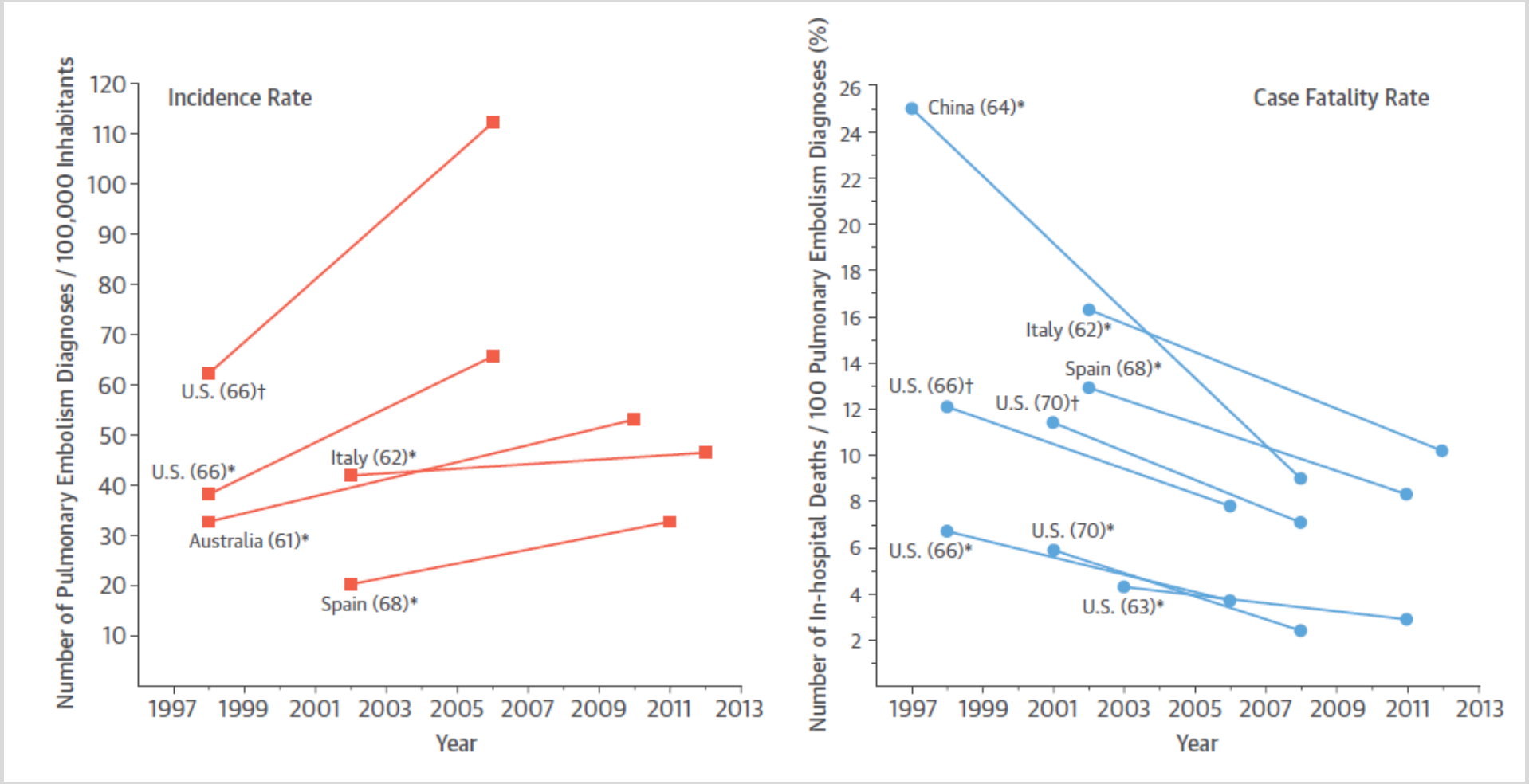
ESC consensus document on diagnosis and management of acute DVT
European Heart Journal (2017)

Global Trends in PE Incidence & Case Fatality Rates



Konstantinides et al. J Am Coll Cardiol 2016;67:976–90

Global Trends in PE Incidence & Case Fatality Rates



diagnosis and treatment of PE have both improved

Konstantinides et al. J Am Coll Cardiol 2016;67:976–90

VTE is considered to be a consequence of the interaction between

patient-related—*usually permanent*—risk factors &

setting-related—*usually temporary*—risk factors.

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

Predisposing factors for VTE

Strong risk factors (OR >10)
Fracture of lower limb
Previous VTE
Spinal cord injury
Hospitalization for heart failure or atrial fibrillation/flutter (within previous 3 months)
Hip or knee replacement
Major trauma
Myocardial infarction (within previous 3 months)

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

Moderate risk factors (OR 2–9)
Arthroscopic knee surgery
Autoimmune diseases
Blood transfusion
Central venous lines
Intravenous catheters and leads
Chemotherapy
Congestive heart failure or respiratory failure
Erythropoiesis-stimulating agents
Hormone replacement therapy (depends on formulation)
In vitro fertilization
Oral contraceptive therapy
Postpartum period
Infection (specifically pneumonia, urinary tract infection, and HIV)
Inflammatory bowel disease
Cancer (highest risk in metastatic disease)
Paralytic stroke
Superficial vein thrombosis
Thrombophilia

Predisposing factors for VTE

Weak risk factors (OR <2)
Bed rest >3 days
Diabetes mellitus
Arterial hypertension
Immobility due to sitting (e.g. prolonged car or air travel)
Increasing age
Laparoscopic surgery (e.g. cholecystectomy)
Obesity
Pregnancy
Varicose veins

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

Symptoms and signs and initial prognostic triage in suspected PE

Cardiovascular s/s
including but not limited to:

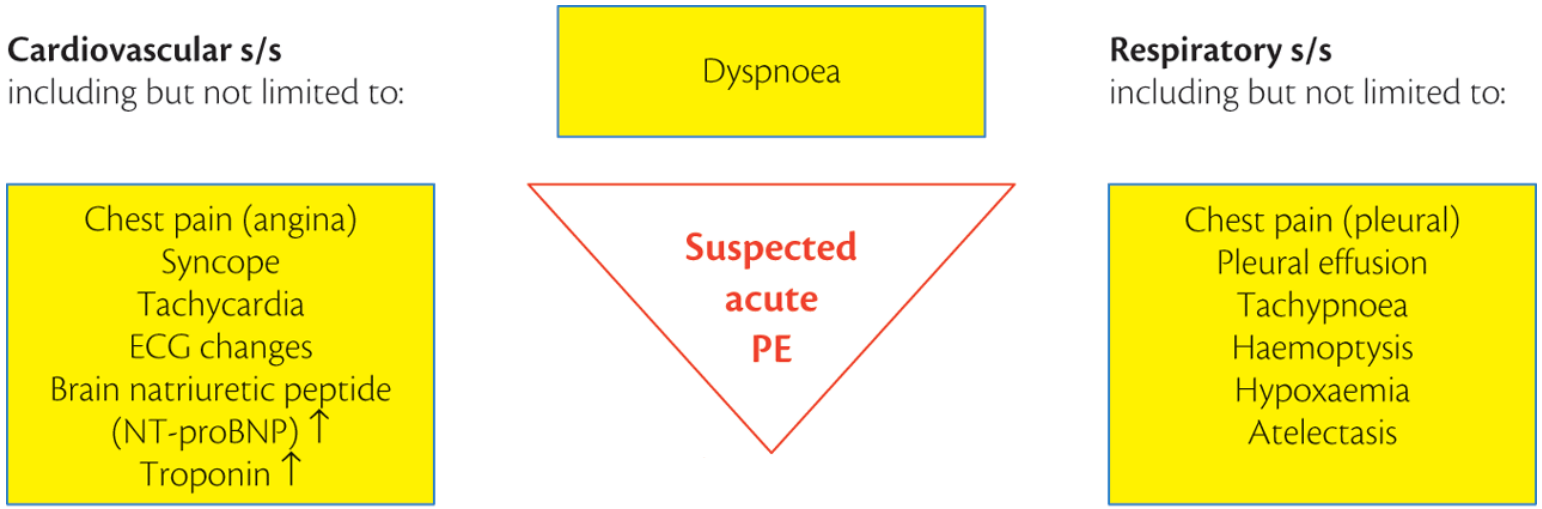
- Chest pain (angina)
- Syncope
- Tachycardia
- ECG changes
- Brain natriuretic peptide (NT-proBNP) ↑
- Troponin ↑

Respiratory s/s
including but not limited to:

- Chest pain (pleural)
- Pleural effusion
- Tachypnoea
- Haemoptysis
- Hypoxaemia
- Atelectasis

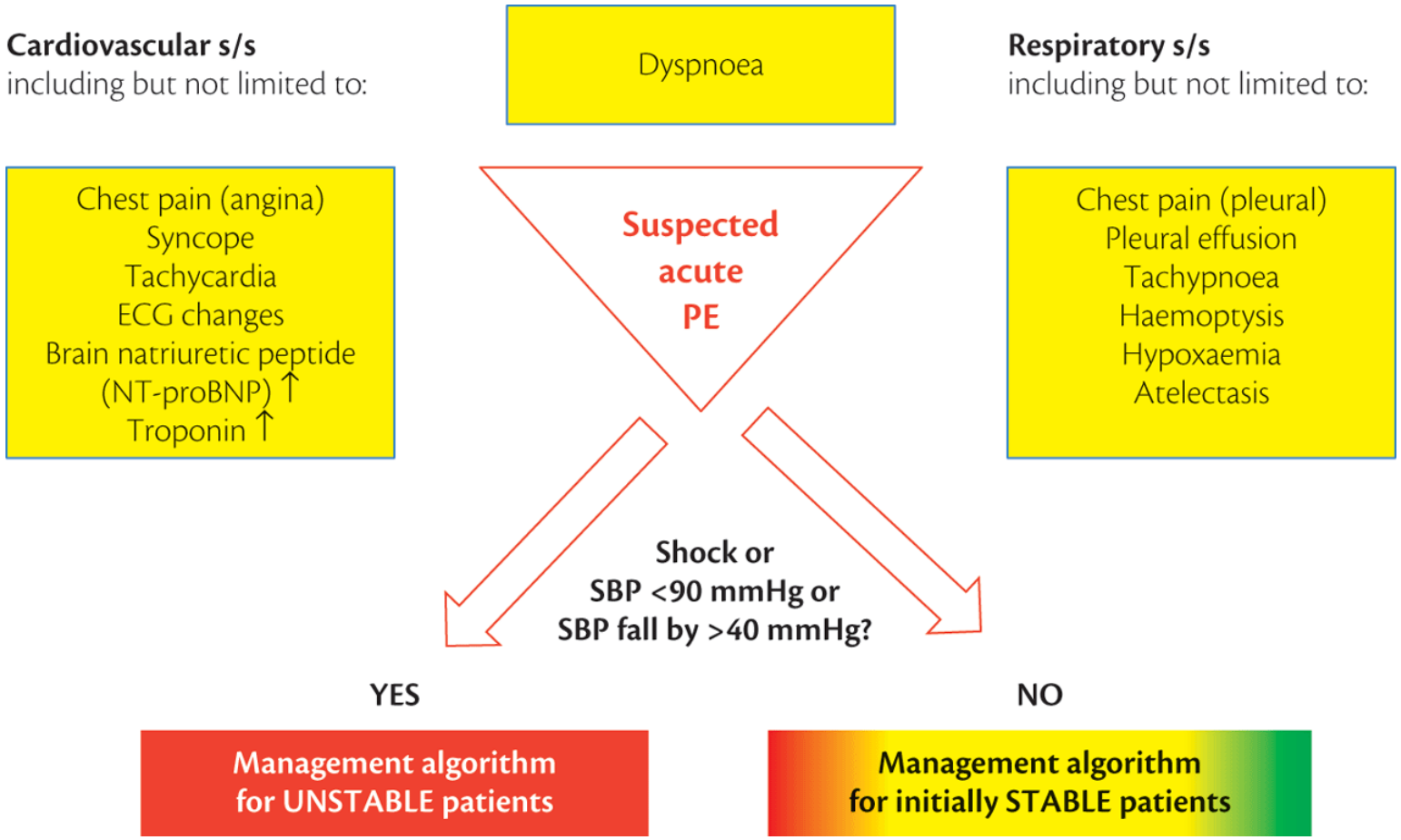
The ESC Textbook of Intensive and Acute Cardiovascular Care (2018)

Symptoms and signs and initial prognostic triage in suspected PE



The ESC Textbook of Intensive and Acute Cardiovascular Care (2018)

Symptoms and signs and initial prognostic triage in suspected PE



The ESC Textbook of Intensive and Acute Cardiovascular Care (2018)

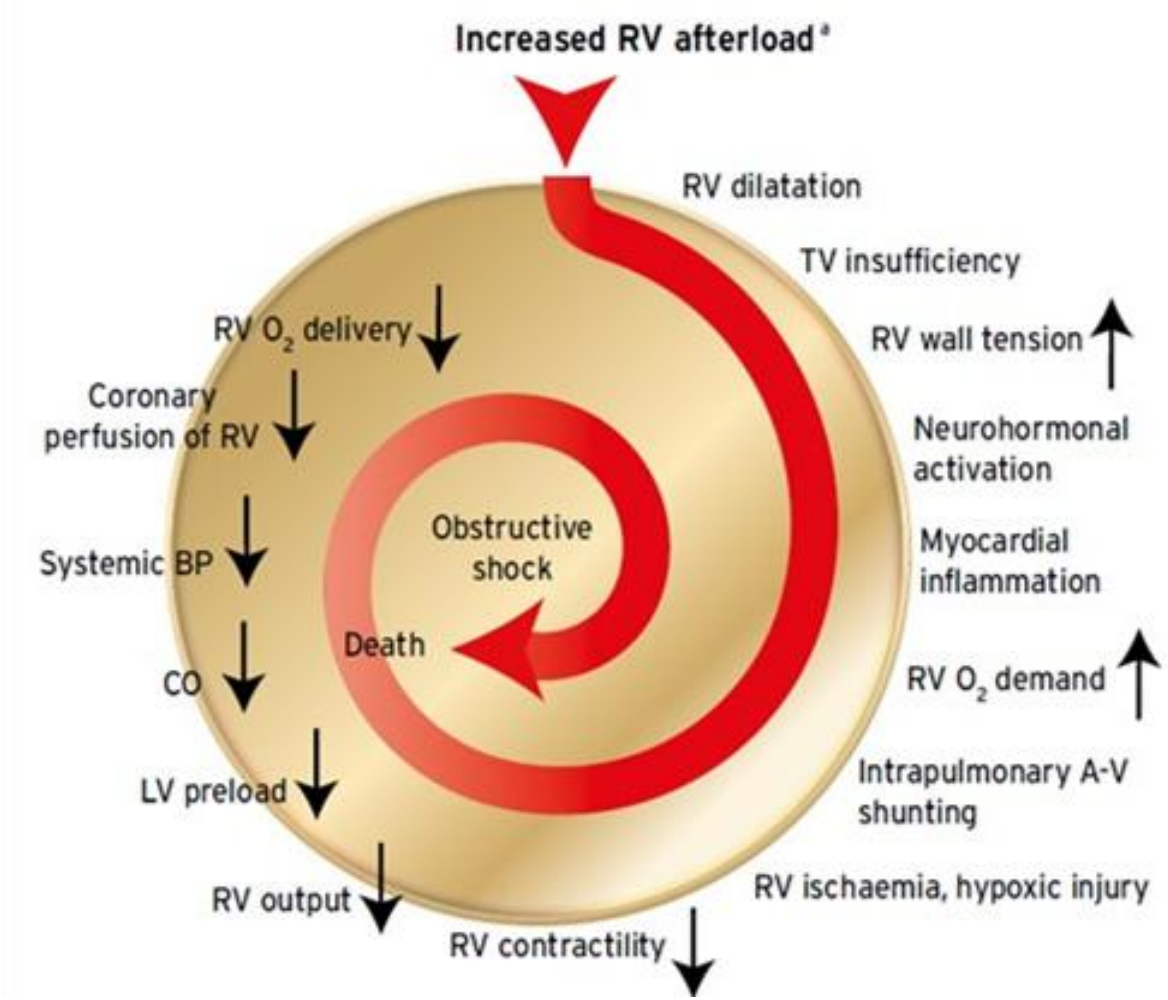
Acute PE interferes with both circulation & gas exchange

Primary cause of death in severe PE: RV failure due to acute pressure overload

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

Acute PE interferes with both circulation & gas exchange

Primary cause of death in severe PE: RV failure due to acute pressure overload



2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

Definition of haemodynamic instability

(1) Cardiac arrest	(2) Obstructive shock	(3) Persistent hypotension
Need for cardiopulmonary resuscitation	Systolic BP <90 mmHg, or vasopressors required to achieve a BP ≥90 mmHg despite adequate filling status	Systolic BP <90 mmHg, or systolic BP drop ≥40 mmHg, either lasting longer than 15 minutes and not caused by new-onset arrhythmia, hypovolaemia, or sepsis
	And	
	End-organ hypoperfusion (altered mental status; cold, clammy skin; oliguria/anuria; increased serum lactate)	

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

Complications associated with overtesting and overdiagnosis of PE

Complication	Associated Risk
Bleeding	• Major bleeding can occur in up to 12% of treated VTE patients[69,70] • Anticoagulation complications increased from 3.1 to 5.3 per 100,000 from 1998 to 2006 (P<.001)[69] • Bleeding risk may outweigh benefit in some populations, with a 5.3% major bleed rate in isolated subsegmental PE but only a 0.7% risk of recurrent VTE[71]
Cost	• Total charges for PE admission increased from $25,293 to $43,740 from 1998 to 2006[72] • Newer anticoagulants can cost $3000 annually and, although the warfarin drug itself is cheaper, the associated bridge and monitoring increase its cost[69,73,74]
Nephrotoxin exposure	• CTPA contrast nephropathy occurs in 14%–24% of patients, with higher rates in those with critical illness or renal comorbidities[75–77] • There are no protective effects from *N*-acetylcysteine, normal saline, or sodium bicarbonate[76]
Contrast dye allergy	• Although not studied specifically in CTPAs, it is recognized that mild contrast reactions occur in 15% of patients receiving iodinated contrast, moderate in 1%–2%, and severe in 0.2%[77]
Radiation	• Females have a significantly higher CTPA-related lifetime attributable risk of cancer death (vs males, 48.7 vs 42.1 per 100,000 for age group 20–29; P<.0001)[78] • Estimates suggest that 3 out of every 1000 20-year-old women who undergo CTPA will develop cancer[69,79]

Clin Chest Med 39 (2018) 473–482

Complications associated with overtesting and overdiagnosis of PE

Complication	Associated Risk
Bleeding	• Major bleeding can occur in up to 12% of treated VTE patients[69,70] • Anticoagulation complications increased from 3.1 to 5.3 per 100,000 from 1998 to 2006 (P<.001)[69] • Bleeding risk may outweigh benefit in some populations, with a 5.3% major bleed rate in isolated subsegmental PE but only a 0.7% risk of recurrent VTE[71]
Cost	• Total charges for PE admission increased from $25,293 to $43,740 from 1998 to 2006[72] • Newer anticoagulants can cost $3000 annually and, although the warfarin drug itself is cheaper, the associated bridge and monitoring increase its cost[69,73,74]
Nephrotoxin exposure	• CTPA contrast nephropathy occurs in 14%–24% of patients, with higher rates in those with critical illness or renal comorbidities[75–77]
allergy	reactions occur in 1%–2% of patients receiving iodinated contrast, moderate in 1%–2%, and severe in 0.2%[77]
Radiation	• Females have a significantly higher CTPA-related lifetime attributable risk of cancer death (vs males, 48.7 vs 42.1 per 100,000 for age group 20–29; P<.0001)[78] • Estimates suggest that 3 out of every 1000 20-year-old women who undergo CTPA will develop cancer[69,79]

In recent studies <20% (in some studies only 5%) of pts investigated for a suspected PE actually have the disease

Clin Chest Med 39 (2018) 473–482

Generally, the use of clinical decision rules and D-dimer testing

- **standardizes the diagnostic work-up for VTE**
- **reduces the use of invasive tests &**
- **is cost-effective**

The revised Geneva clinical prediction rule for PE

Items	Clinical decision rule points	
	Original version[91]	Simplified version[87]
Previous PE or DVT	3	1
Heart rate		
75–94 b.p.m.	3	1
≥95 b.p.m.	5	2
Surgery or fracture within the past month	2	1
Haemoptysis	2	1
Active cancer	2	1
Unilateral lower-limb pain	3	1
Pain on lower-limb deep venous palpation and unilateral oedema	4	1
Age >65 years	1	1
Clinical probability		
Three-level score		
Low	0–3	0–1
Intermediate	4–10	2–4
High	≥11	≥5
Two-level score		
PE-unlikely	0–5	0–2
PE-likely	≥6	≥3

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

The revised Geneva clinical prediction rule for PE

Items	Clinical decision rule points	
	Original version[91]	Simplified version[87]
Previous PE or DVT	3	1
Heart rate		
75–94 b.p.m.	3	1
≥95 b.p.m.	5	2
Surgery or fracture within the past month	2	1
Haemoptysis	2	1
Active cancer	2	1
Unilateral lower-limb pain	3	1
Pain on lower-limb deep venous palpation and unilateral oedema	4	1
Age >65 years	1	1
Clinical probability		
Three-level score		
Low	0–3	0–1
Intermediate	4–10	2–4
High	≥11	≥5
Two-level score		
PE-unlikely	0–5	0–2
PE-likely	≥6	≥3

PE confirmation

10%

30%

65%

12%

35%

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

Pulmonary embolism rule-out criteria (PERC)

- age <50 years
- pulse rate <100/min
- SpO2 >94%
- no unilateral leg swelling
- no haemoptysis
- no surgery or trauma within 4 weeks
- no prior DVT or PE
- no oral hormone use

Patients meeting PERC criteria (PERC (–)) should not require any further testing

Emerg Med J 2013;30:701–706

Pulmonary embolism rule-out criteria (PERC)

- age <50 years
- pulse rate <100/min
- SpO2 >94%
- no unilateral leg swelling
- no haemoptysis
- no surgery or trauma within 4 weeks
- no prior DVT or PE
- no oral hormone use

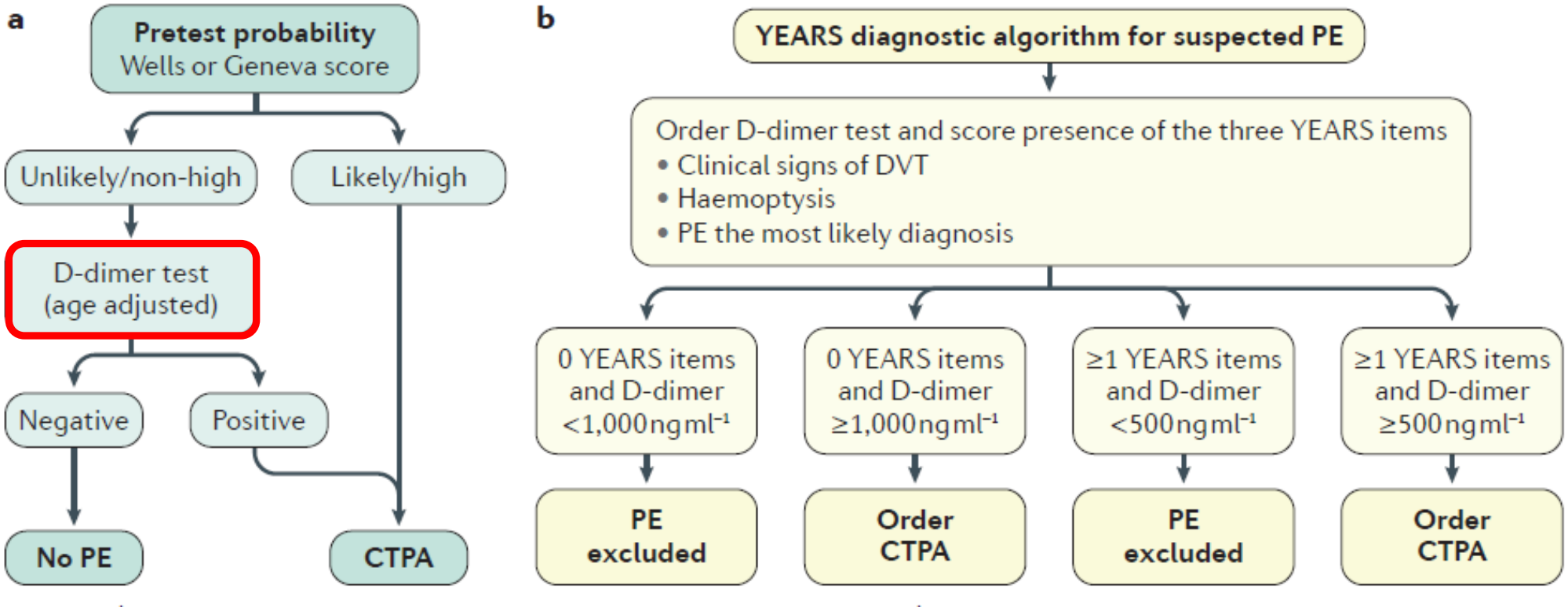
PERC rule should be used only in low-prevalence settings or for pts considered to have a low probability of PE

Emerg Med J 2013;30:701–706

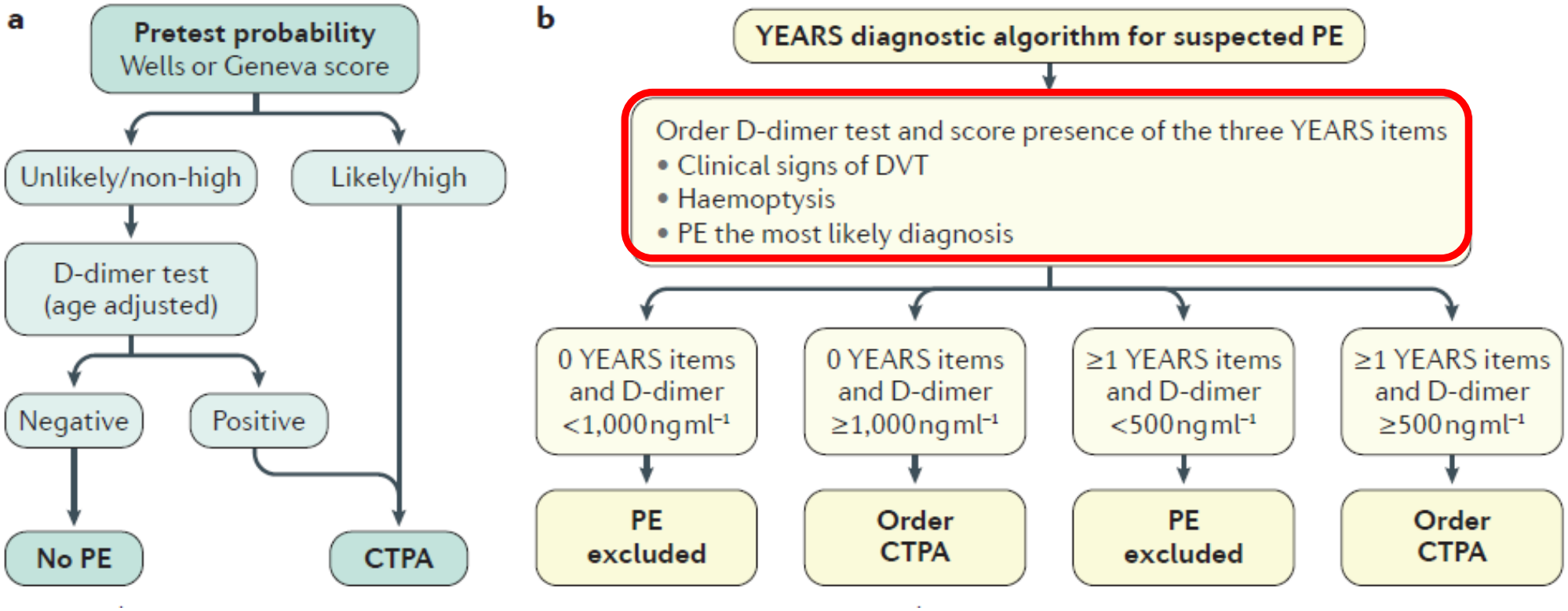
Recommendations for diagnosis

Recommendations	Class	Level
D-dimer		
Plasma D-dimer measurement, preferably using a highly sensitive assay, is recommended in outpatients/emergency department patients with low or intermediate clinical probability, or PE-unlikely, to reduce the need for unnecessary imaging and irradiation.	I	A
As an alternative to the fixed D-dimer cut-off, a negative D-dimer test using an age-adjusted cut-off (age x 10 µg/L, in patients >50 years) should be considered for excluding PE in patients with low or intermediate clinical probability, or PE-unlikely.	IIa	B
As an alternative to the fixed or age-adjusted D-dimer cut-off, D-dimer levels adapted to clinical probability should be considered for excluding PE.	IIa	B
D-dimer measurement is not recommended in patients with high clinical probability, as a normal result does not safely exclude PE, even when using a highly sensitive assay.	III	A

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism



the **YEARS** study: Lancet, 390: 289-297, 2017



*Compared with the conventional algorithm, the YEARS algorithm spares the need for CTPA in an additional **14%** of patients with suspected PE*

the **YEARS** study: Lancet, 390: 289-297, 2017

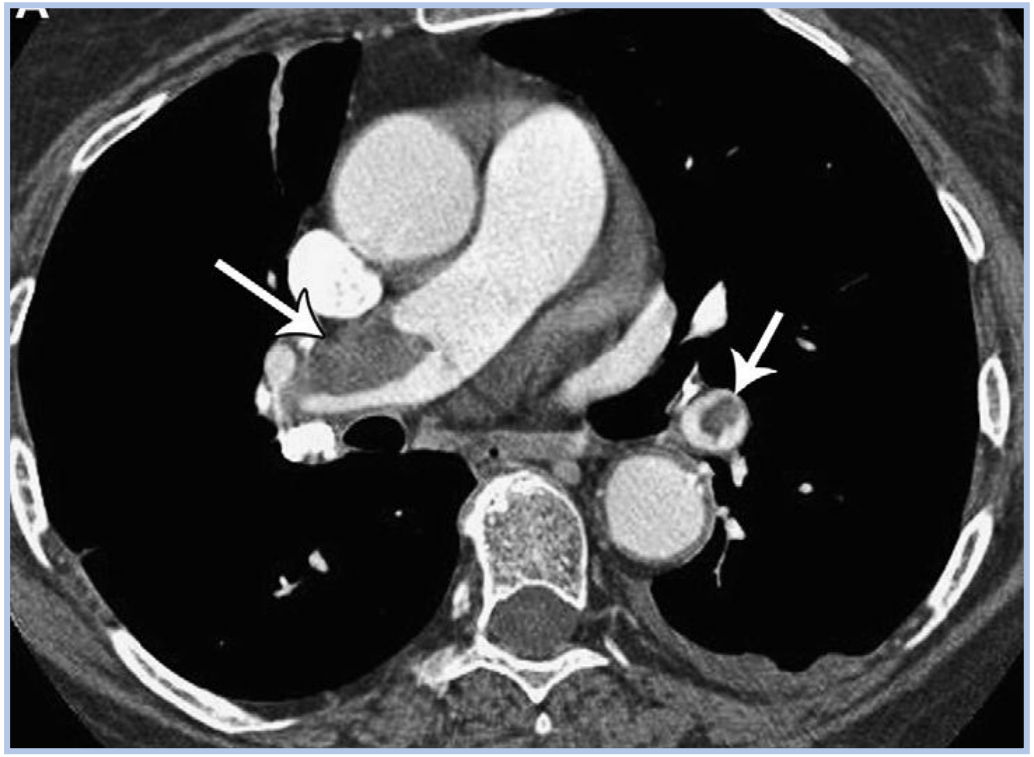
Imaging tests for diagnosis of pulmonary embolism

	Strengths	Weaknesses/limitations	Radiation issues[a]

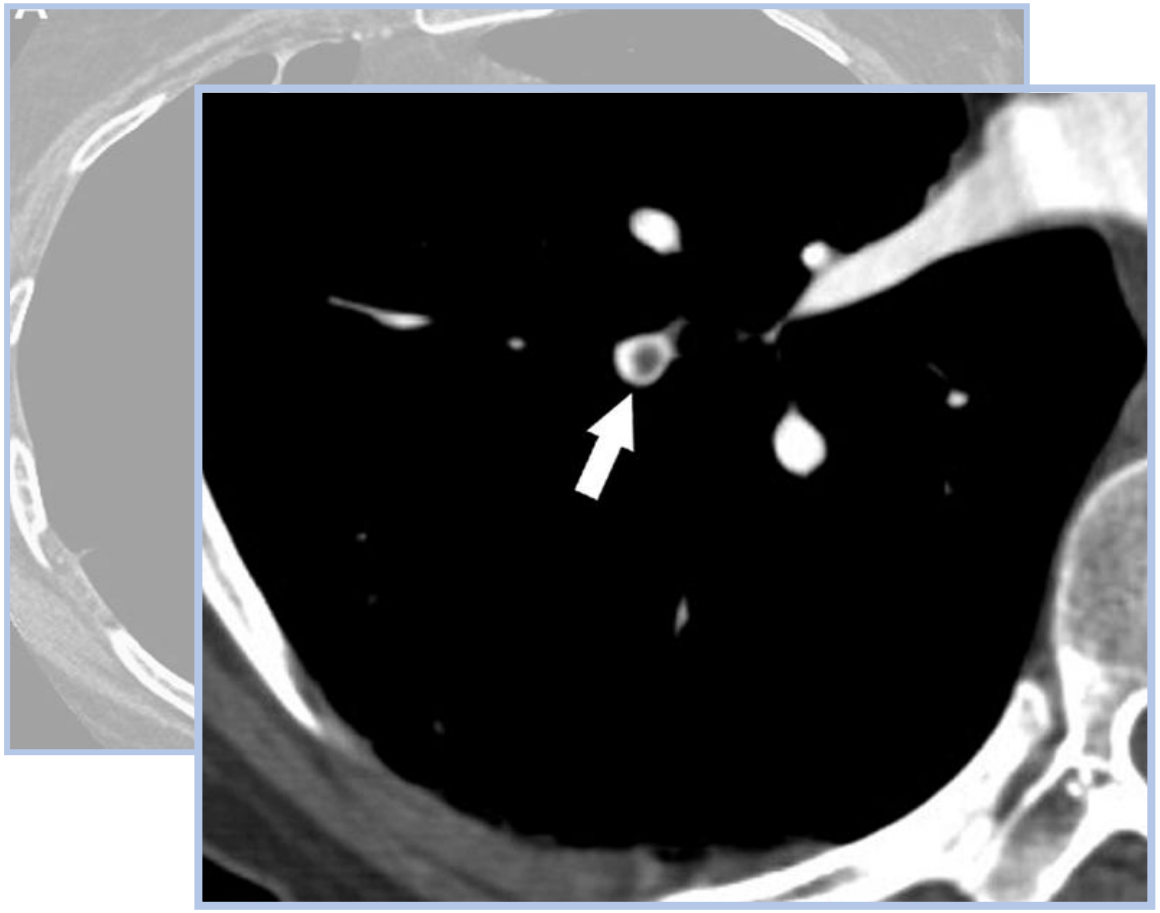
CTPA	• Readily available around the clock in most centres
	• Excellent accuracy
	• Strong validation in prospective management outcome studies
	• Low rate of inconclusive results (3–5%)
	• May provide alternative diagnosis if PE excluded
	• Short acquisition time
		• Radiation exposure
		• Exposure to iodine contrast:
		  ○ limited use in iodine allergy and hyperthyroidism
		  ○ risks in pregnant and breastfeeding women
		  ○ contraindicated in severe renal failure
		• Tendency to overuse because of easy accessibility
		• Clinical relevance of CTPA diagnosis of subsegmental PE unknown
			• Radiation effective dose 3–10 mSv[b]
			• Significant radiation exposure to young female breast tissue

2019 ESC /ERS Guidelines for the diagnosis & management of acute PE

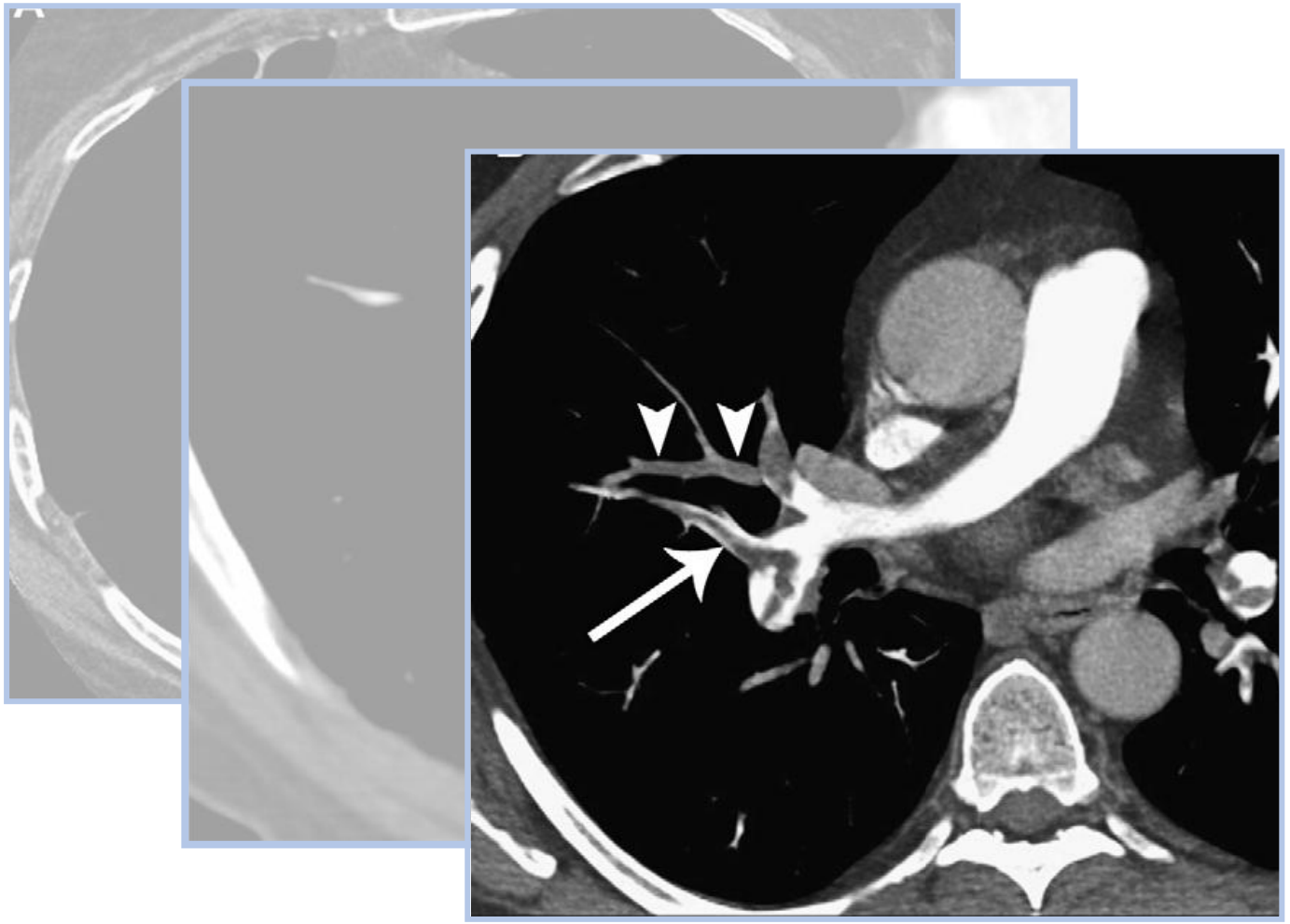
CTPA



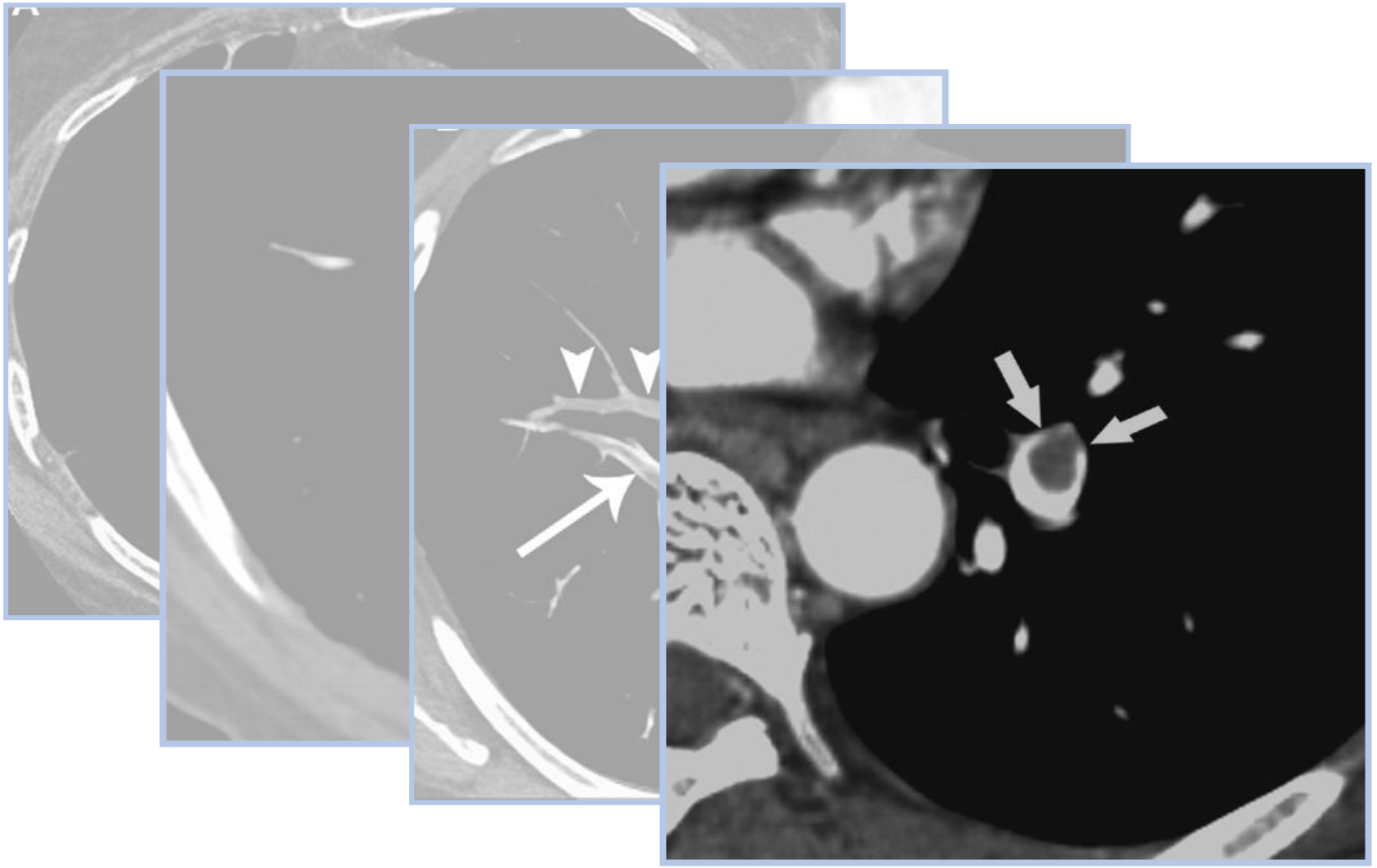
CTPA



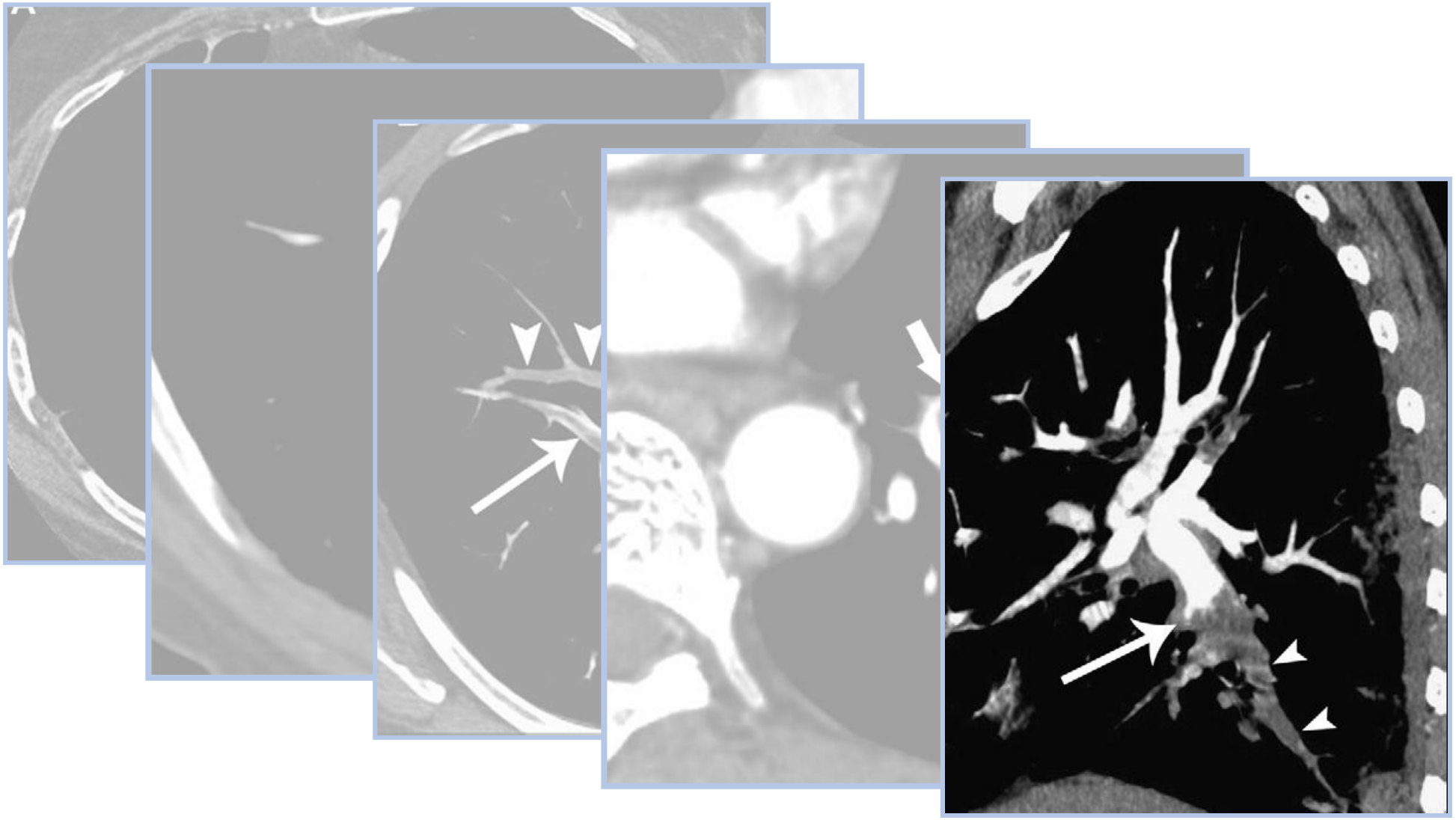
CTPA



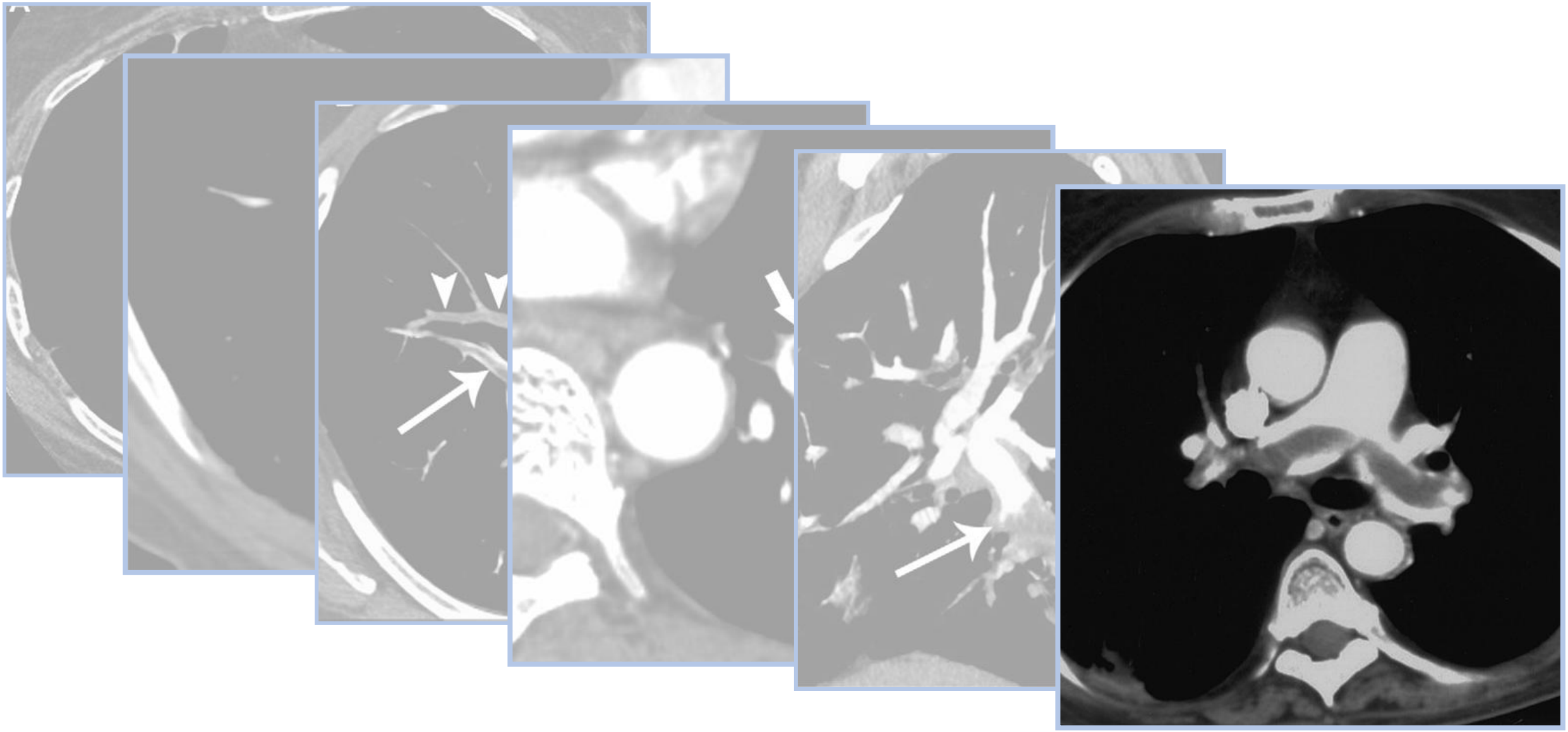
CTPA



CTPA

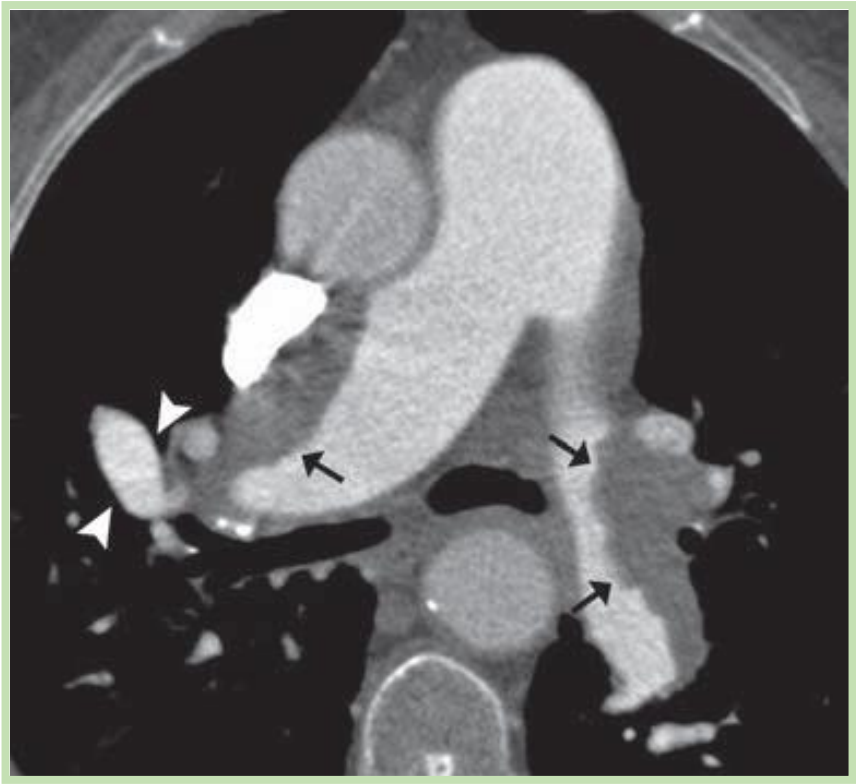


CTPA

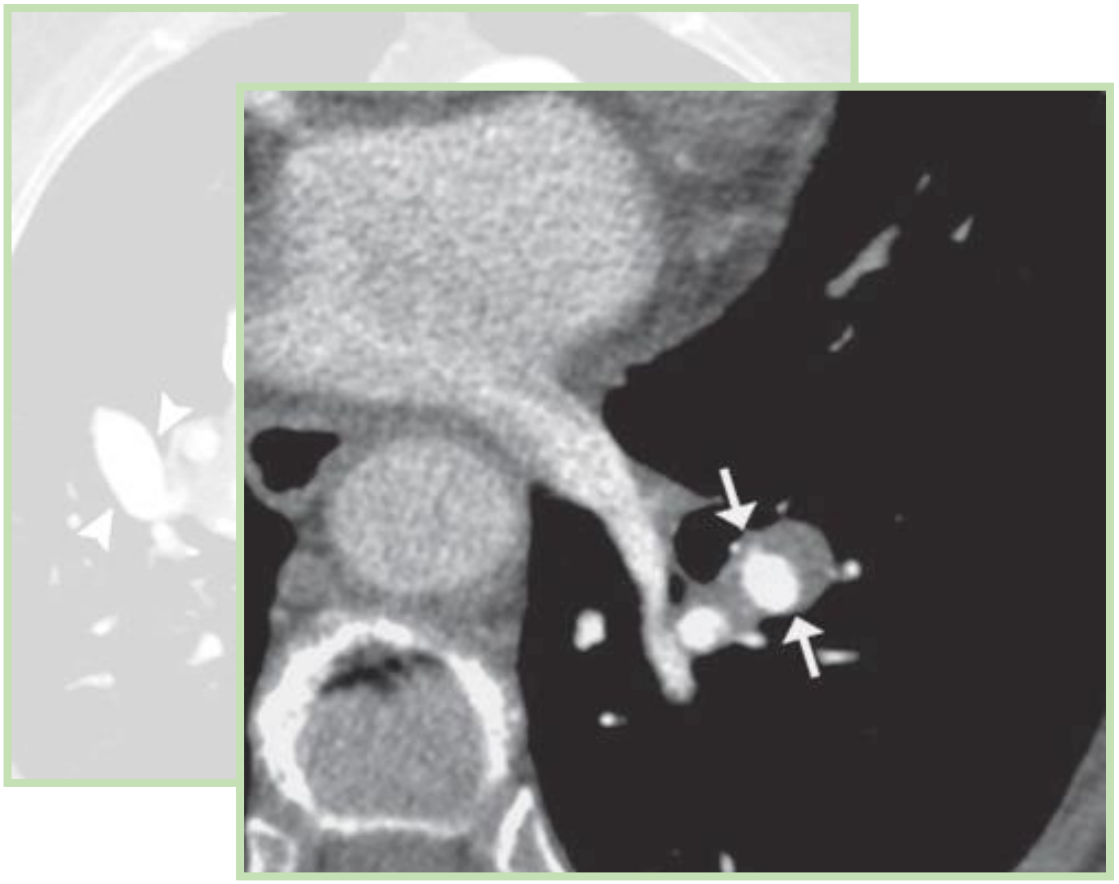


Findings of pre-existing CTEPH on CTPA

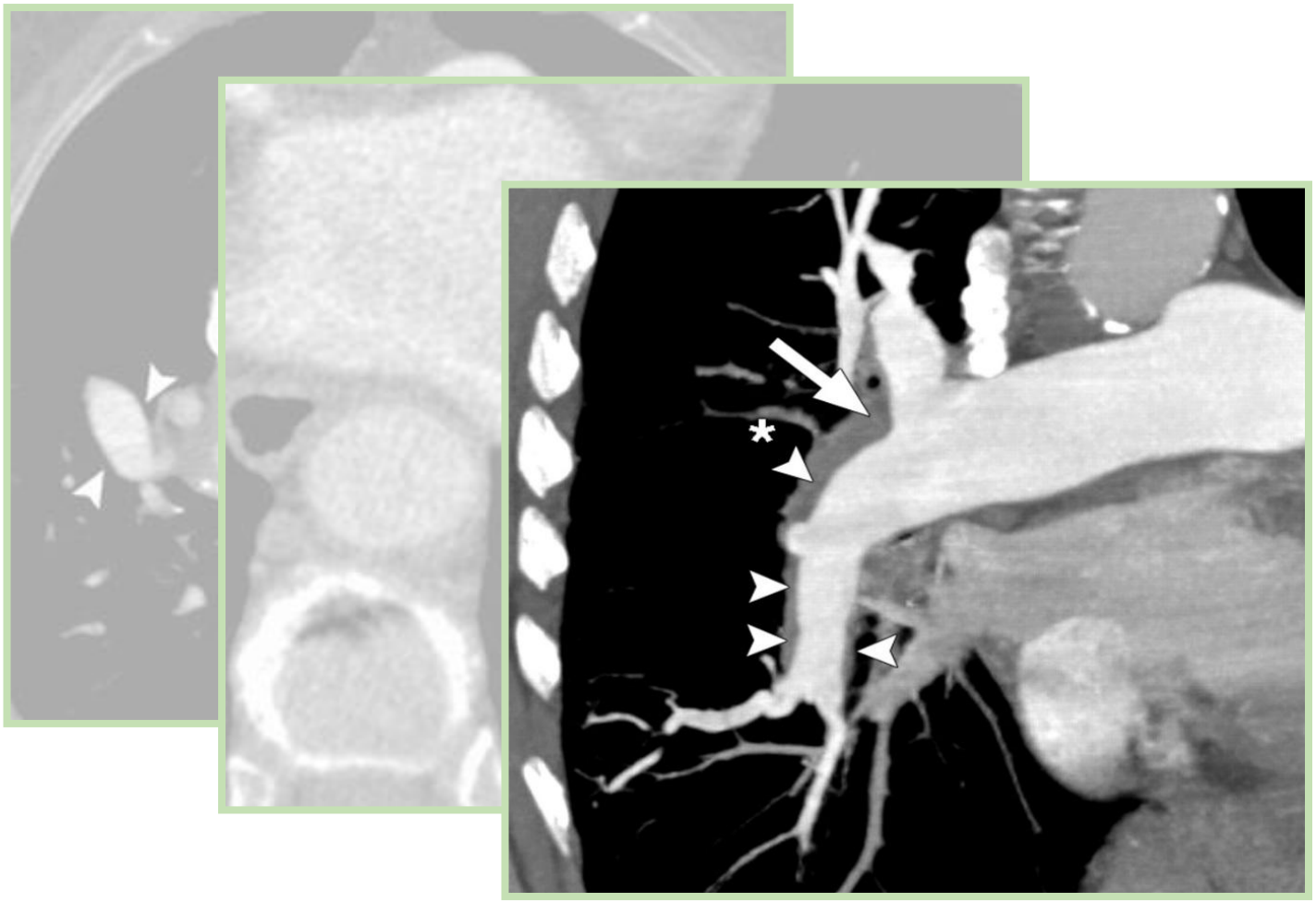
Findings of pre-existing CTEPH on CTPA



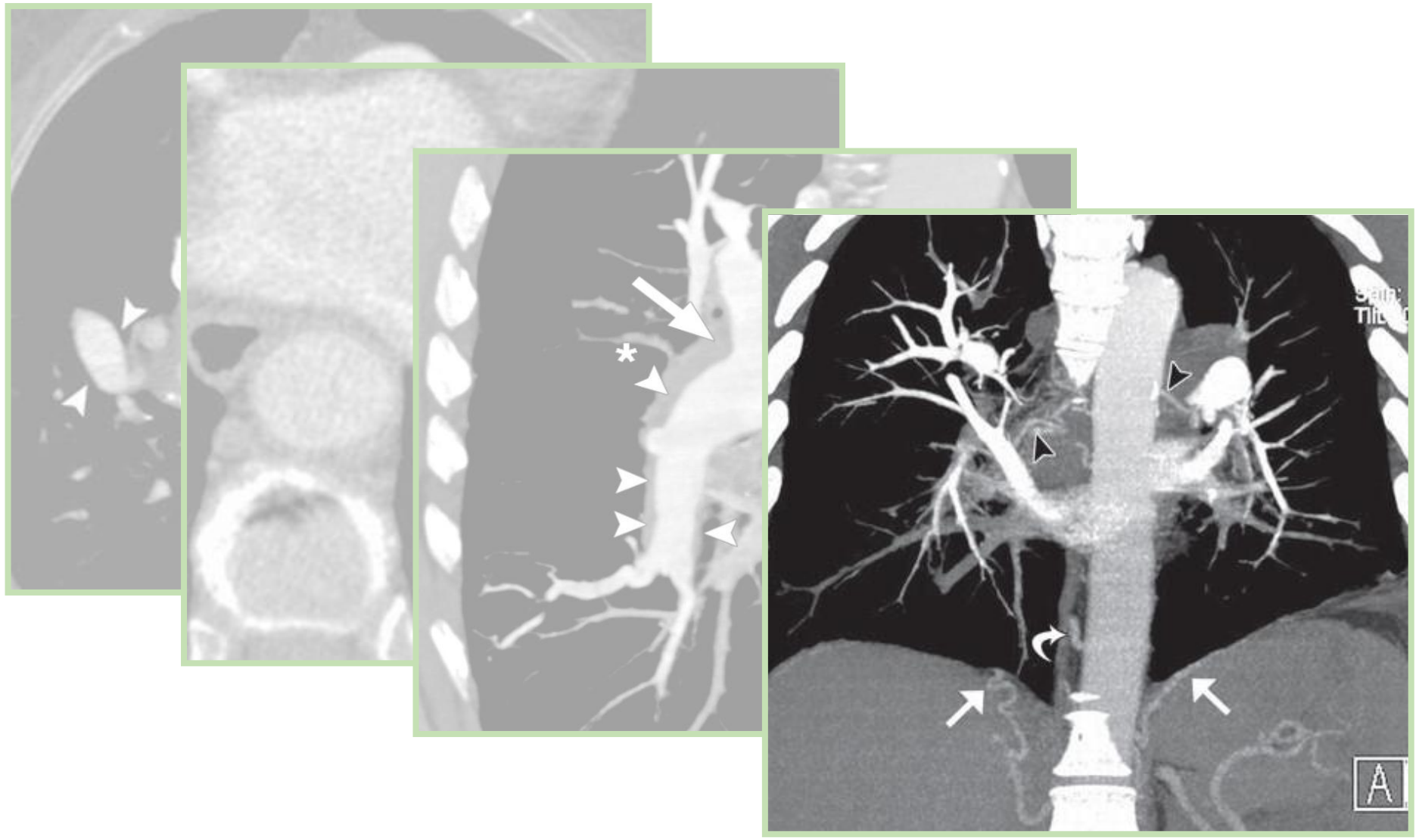
Findings of pre-existing CTEPH on CTPA



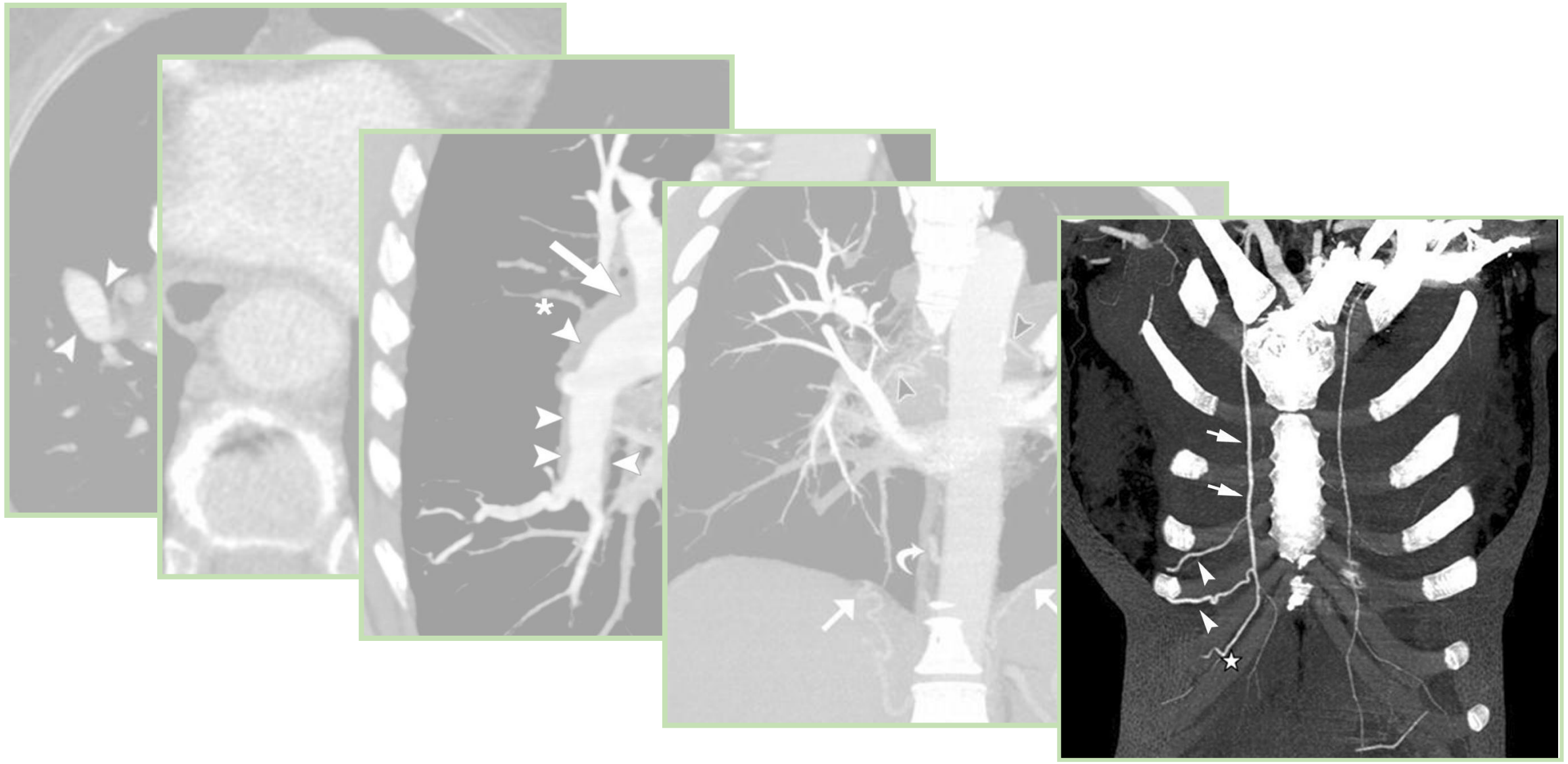
Findings of pre-existing CTEPH on CTPA



Findings of pre-existing CTEPH on CTPA



Findings of pre-existing CTEPH on CTPA



Imaging tests for diagnosis of pulmonary embolism

Planar V/Q scan	• Almost no contraindications • Relatively inexpensive • Strong validation in prospective management outcome studies	• Not readily available in all centres • Interobserver variability in interpretation • Results reported as likelihood ratios • Inconclusive in 50% of cases • Cannot provide alternative diagnosis if PE excluded	• Lower radiation than CTPA, effective dose ~2 mSv[b]
V/Q SPECT	• Almost no contraindications • Lowest rate of non-diagnostic tests (<3%) • High accuracy according to available data • Binary interpretation ('PE' vs. 'no PE')	• Variability of techniques • Variability of diagnostic criteria • Cannot provide alternative diagnosis if PE excluded • No validation in prospective management outcome studies	• Lower radiation than CTPA, effective dose ~2 mSv[b]
Pulmonary angiography	• Historical gold standard	• Invasive procedure • Not readily available in all centres	• Highest radiation, effective dose 10–20 mSv[b]

2019 ESC /ERS Guidelines for the diagnosis & management of acute PE

Recommendations for diagnosis

Recommendations	Class	Level
Lower-limb compression ultrasonography (CUS)		
It is recommended to accept the diagnosis of VTE (and PE) if a CUS shows a proximal DVT in a patient with clinical suspicion of PE.	I	A
If CUS shows only a distal DVT, further testing should be considered to confirm PE.	IIa	A
If a positive proximal CUS is used to confirm PE, assessment of PE severity should be considered to permit risk-adjusted management.	IIa	C

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

Main new recommendations 2019

Diagnosis	
D-dimer test using an age-adjusted cut-off, or adapted to clinical probability, should be considered as an alternative to the fixed cut-off level.	IIa
If a positive proximal CUS is used to confirm PE, risk assessment should be considered to guide management.	IIa
V/Q SPECT may be considered for PE diagnosis.	IIb

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

Main new recommendations 2019

Diagnosis	
D-dimer test using an age-adjusted cut-off, or adapted to clinical probability, should be considered as an alternative to the fixed cut-off level.	IIa
If a positive proximal CUS is used to confirm PE, risk assessment should be considered to guide management.	IIa
V/Q SPECT may be considered for PE diagnosis.	IIb
Risk assessment	
Assessing the RV by imaging or laboratory biomarkers should be considered even in the presence of a low PESI or a sPESI of 0.	IIa
Validated scores combining clinical, imaging and laboratory prognostic factors may be considered to further stratify PE severity.	IIb

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

Original and simplified Pulmonary Embolism Severity Index

Parameter	Original version	Simplified version
Age	Age in years	1point (if age >80 years)
Male sex	+10 points	–
Cancer	+30 points	1point
Chronic heart failure	+10 points	1point
Chronic pulmonary disease	+10 points	
Pulse rate ≥110b.p.m.	+20 points	1point
Systolic BP <100 mmHg	+30 points	1point
Respiratory rate >30 breaths per min	+20 points	–
Temperature <36 °C	+20 points	–
Altered mental status	+60 points	–
Arterial oxyhaemoglobin saturation <90%	+20 points	1point

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

Original and simplified Pulmonary Embolism Severity Index

Parameter	Original version	Simplified version
Age	Age in years	1point (if age >80 years)
Male sex	+10 points	–
Cancer	+30 points	1point
Chronic heart failure	+10 points	1point
Chronic pulmonary disease		
Pulse rate ≥110b.p.m.		
Systolic BP <100mmHg		
Respiratory rate >30breaths per min		
Temperature <36 °C		
Altered mental status		
Arterial oxyhaemoglobin saturation <90%		

Risk strata	
Class I: ≤65 points very low 30-day mortality risk (0–1.6%) **Class II: 66–85 points** low mortality risk (1.7–3.5%)	**0 points** = 30-day mortality risk 1.0% (95% CI 0.0–2.1%)
Class III: 86–105 points moderate mortality risk (3.2–7.1%) **Class IV: 106–125 points** high mortality risk (4.0–11.4%) **Class V: >125 points** very high mortality risk (10.0–24.5%)	**≥1point(s)** = 30-day mortality risk 10.9% (95% CI 8.5–13.2%)

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

Original and simplified Pulmonary Embolism Severity Index

Parameter	Original version	Simplified version
Age	Age in years	1point (if age >80 years)
Male sex	+10 points	–
Cancer	+30 points	1point
Chronic heart failure	+10 points	1point
Systolic BP <100 mmHg	+30 points	1point
Respiratory rate >30 breaths per min	+20 points	–
Temperature <36 °C	+20 points	–
Altered mental status	+60 points	–
Arterial oxyhaemoglobin saturation <90%	+20 points	1point

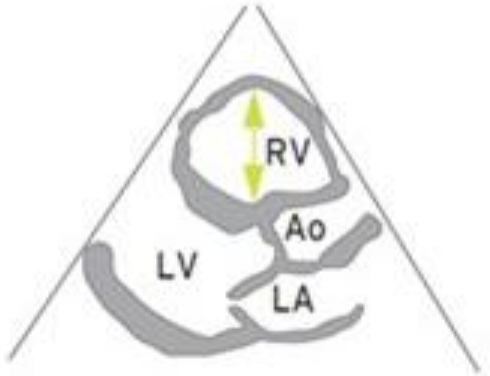
The principal strength of the PESI lies in the reliable identification of pts at low risk for 30-day mortality (PESI classes I and II)

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

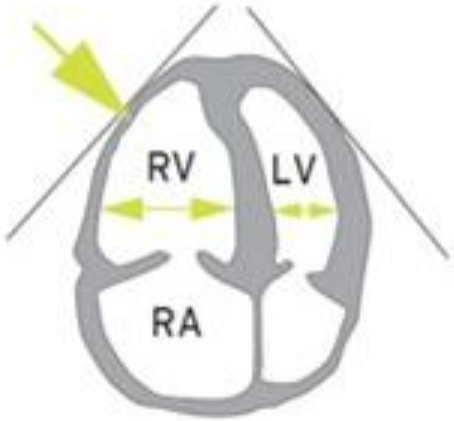
- the diagnosis of PE is based on identifying clots in the pulmonary arteries

- the short-term prognosis of PE is mainly determined by RV function

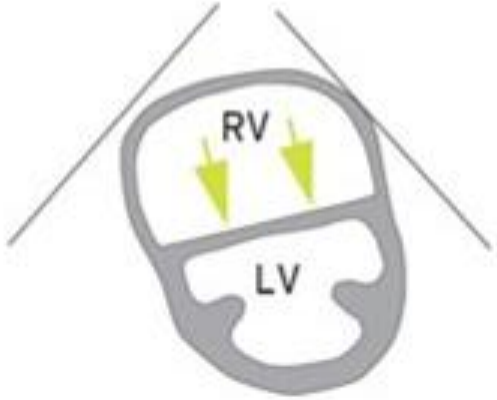
TEE parameters for RV pressure overload



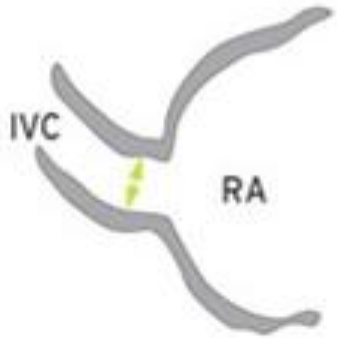
A. Enlarged right ventricle, parasternal long axis view



B. Dilated RV with basal RV/LV ratio >1.0, and McConnell sign (arrow), four chamber view



C. Flattened interventricular septum (arrows) parasternal short axis view



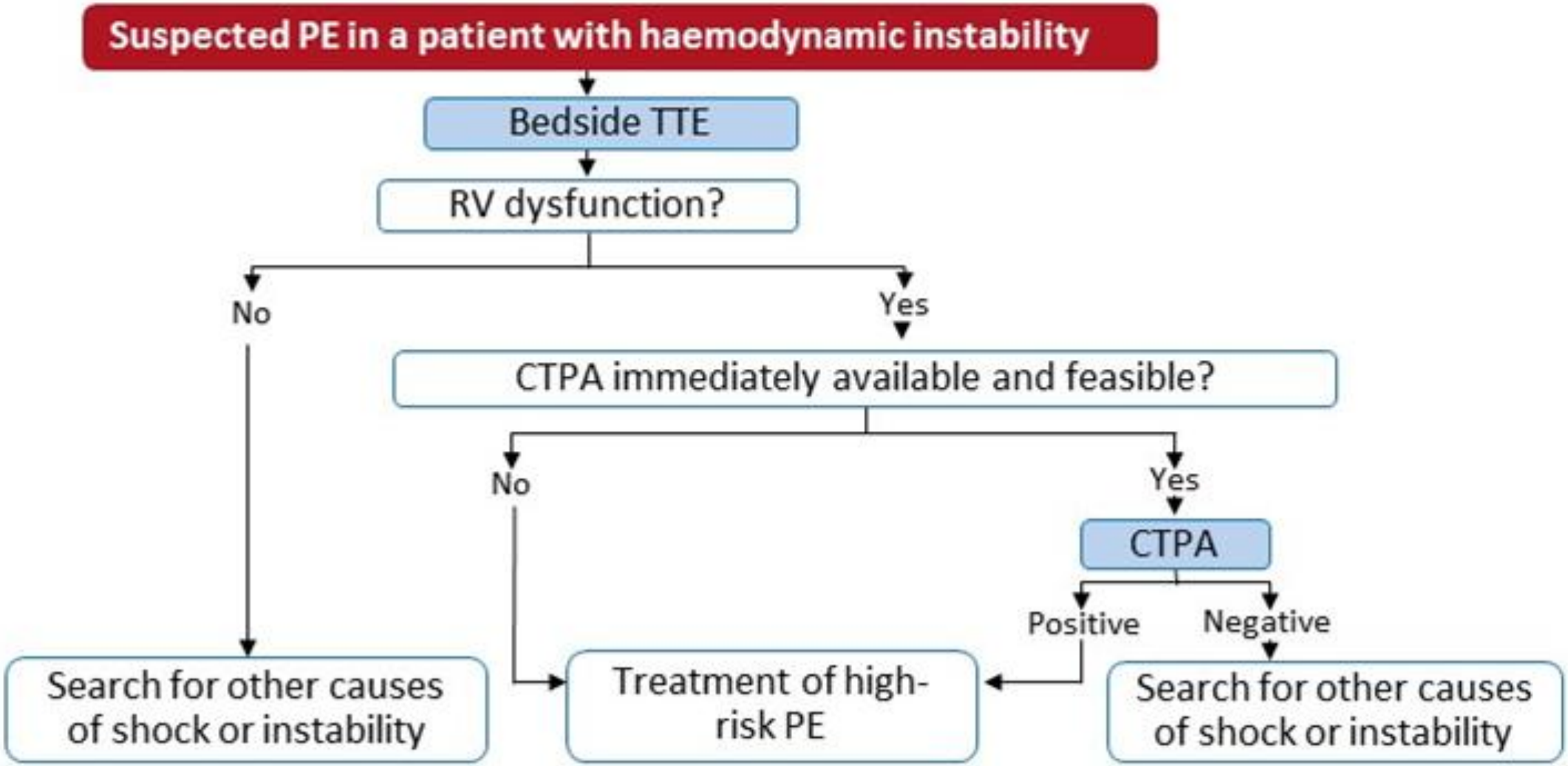
D. Distended inferior vena cava with diminished inspiratory collapsibility, subcostal view

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

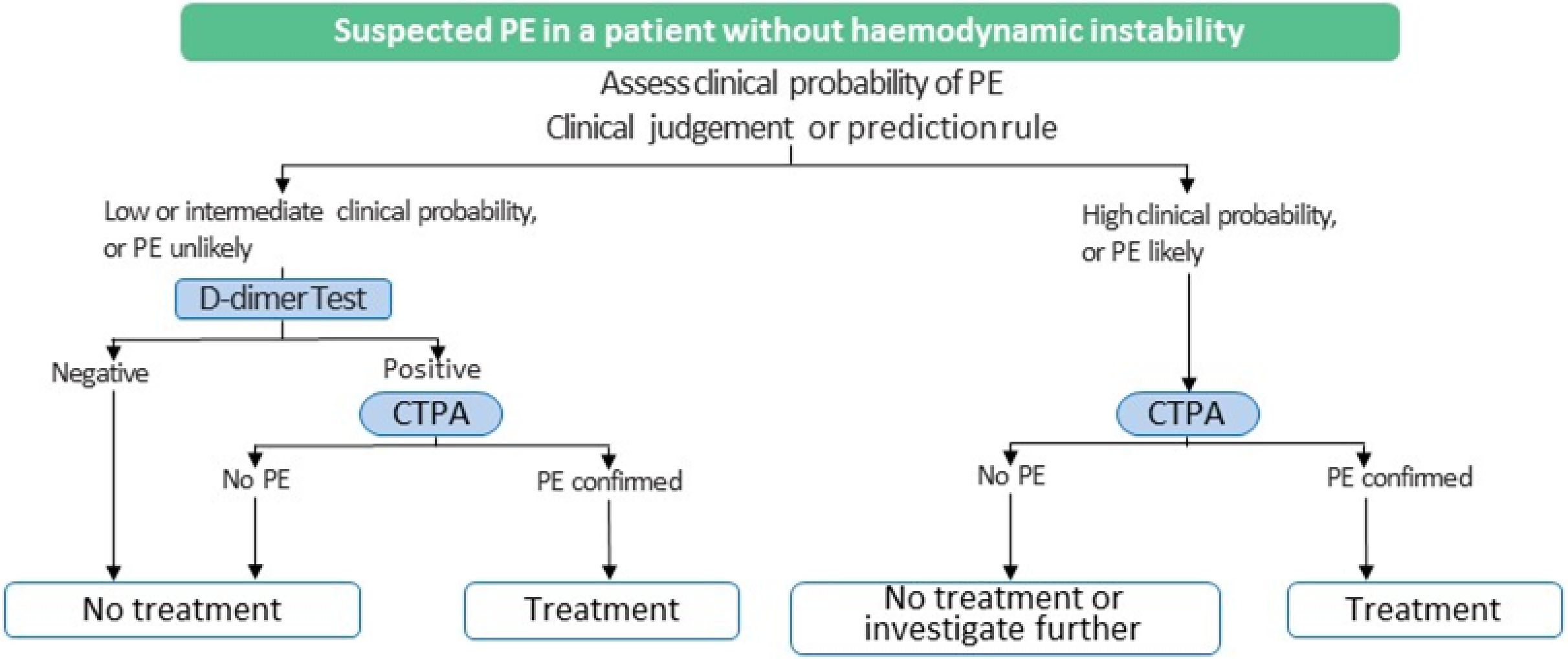
Classification of PE based on early mortality risk

Early mortality risk		Indicators of risk			
		Haemo-dynamic instability	Clinical parameters of PE severity/ comorbidity: PESI III–V or sPESI ≥1	RV dysfunction on TTE or CTPA	Elevated cardiac troponin levels
High		+	(+)	+	(+)
Interme-diate	Intermediate–high	-	+	+	+
	Intermediate–low	-	+	One (or none) positive	
Low		-	-	-	Assessment optional; if assessed, negative

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism



2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism



2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

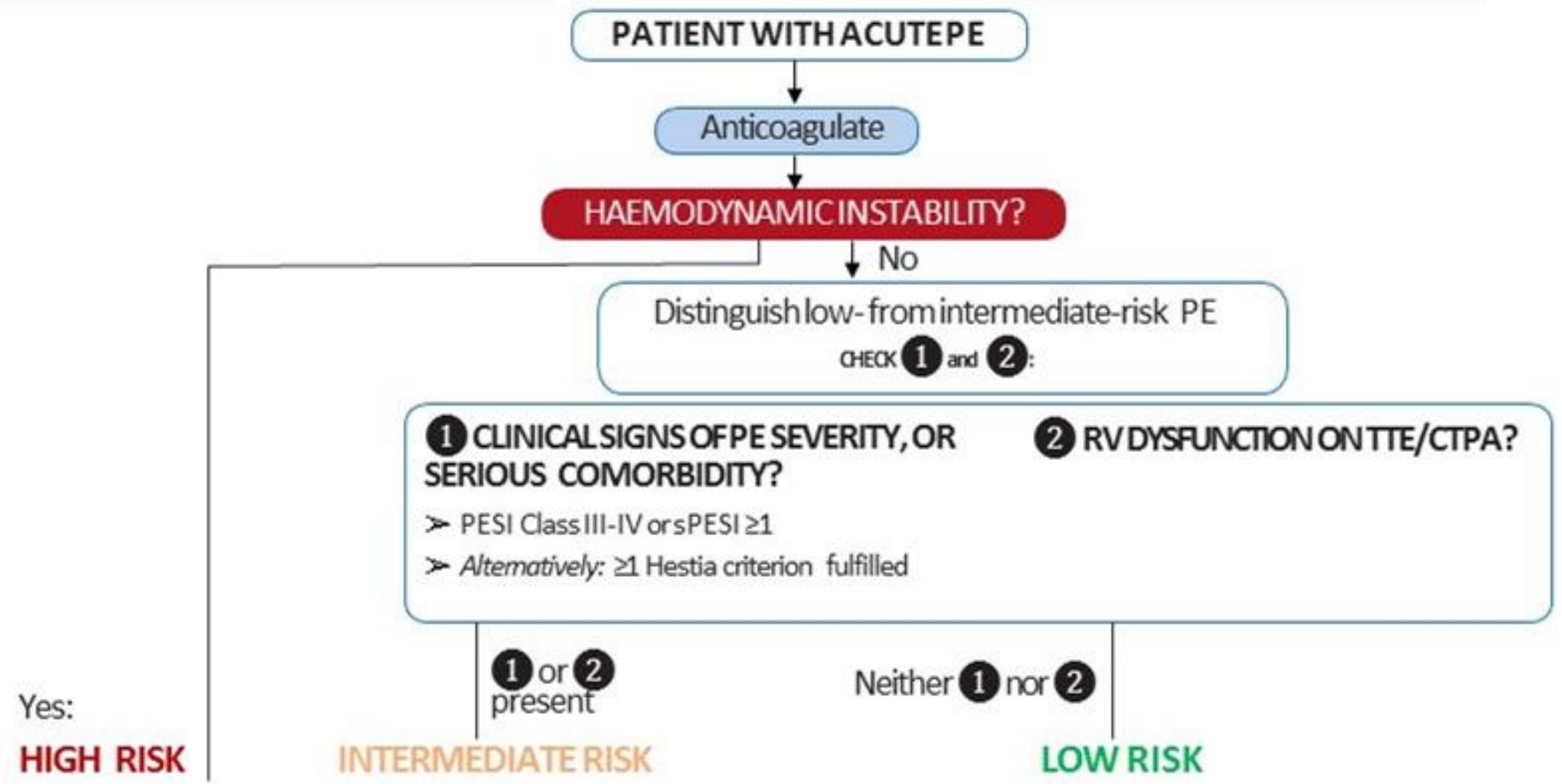
HESTIA clinical decision rule

If at least one of the following questions is answered with *yes*, the patient cannot be treated at home:

- Hemodynamically unstable?*
- Thrombolysis or embolectomy necessary?
- High risk for bleeding?†
- Oxygen supply to maintain oxygen saturation >90%?
- Pulmonary embolism diagnosed during anticoagulant treatment?
- Severe pain needing intravenous pain medication >24 h?
- Medical or social reason for treatment in the hospital >24 h?
- Creatinine clearance < 30 ml/min?‡
- Severe liver impairment?§
- Pregnant?
- Documented history of heparin-induced thrombocytopenia?

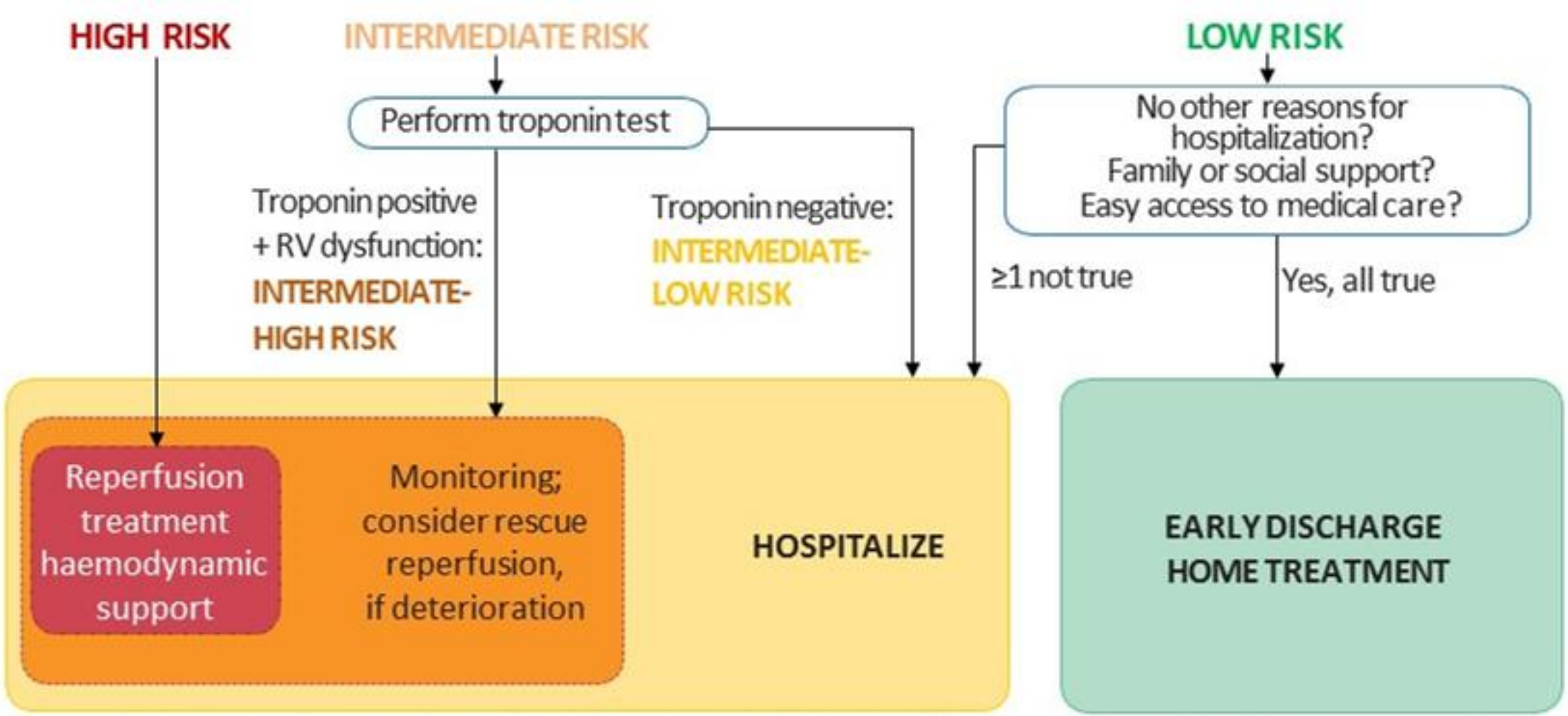
Am. J. Respir. Crit. Care Med. 194, 998–1006 (2016)

Risk –adjusted management of pts with acute pulmonary embolism



2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

Risk –adjusted management of pts with acute pulmonary embolism



2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

Three key steps are vital in the management of PE:

1. rapid, simple and accessible diagnosis

2. accurate triaging of PE (Risk Stratification) - appropriate treatment

3. optimal duration of treatment (assessment of recurrent VTE &/or anticoagulation associated bleeding)

The mainstay of treatment for VTE is anticoagulation

Treatment consists of three phases:

- **an acute phase comprising the first 5–10 days after presentation of PE**
- **an intermediate phase between 10 days & 3 months after presentation**
- **an extended long-term phase beyond this period**

Thrombolytic regimens, doses, and contraindications

Molecule	Regimen	Contraindications to fibrinolysis
rtPA	100 mg over 2 h	**Absolute**
	0.6 mg/kg over 15 min (maximum dose 50 mg)[a]	History of haemorrhagic stroke or stroke of unknown origin
Streptokinase	250 000 IU as a loading dose over 30 min, followed by 100 000 IU/h over 12–24 h	Ischaemic stroke in previous 6 months
	Accelerated regimen: 1.5 million IU over 2 h	Central nervous system neoplasm
Urokinase	4400 IU/kg as a loading dose over 10 min, followed by 4400 IU/kg/h over 12–24 h	Major trauma, surgery, or head injury in previous 3 weeks
	Accelerated regimen: 3 million IU over 2 h	Bleeding diathesis
		Active bleeding
		Relative
		Transient ischaemic attack in previous 6 months
		Oral anticoagulation
		Pregnancy or first post-partum week
		Non-compressible puncture sites
		Traumatic resuscitation
		Refractory hypertension (systolic BP >180 mmHg)
		Advanced liver disease
		Infective endocarditis
		Active peptic ulcer

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

Changes in recommendations 2014 -19

Recommendations	2014	2019
Rescue thrombolytic therapy is recommended for patients who deteriorate haemodynamically.	IIa	I
Surgical embolectomy or catheter-directed treatment should be considered as alternatives to rescue thrombolytic therapy for patients who deteriorate haemodynamically.	IIb	IIa
D-dimer measurement and clinical prediction rules should be considered to rule out PE during pregnancy or the post-partum period.	IIb	IIa
Further evaluation may be considered for asymp-tomatic PE survivors at increased risk for CTEPH.	III	IIb

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

Duration of anticoagulant treatment

beyond the initial 3-month treatment

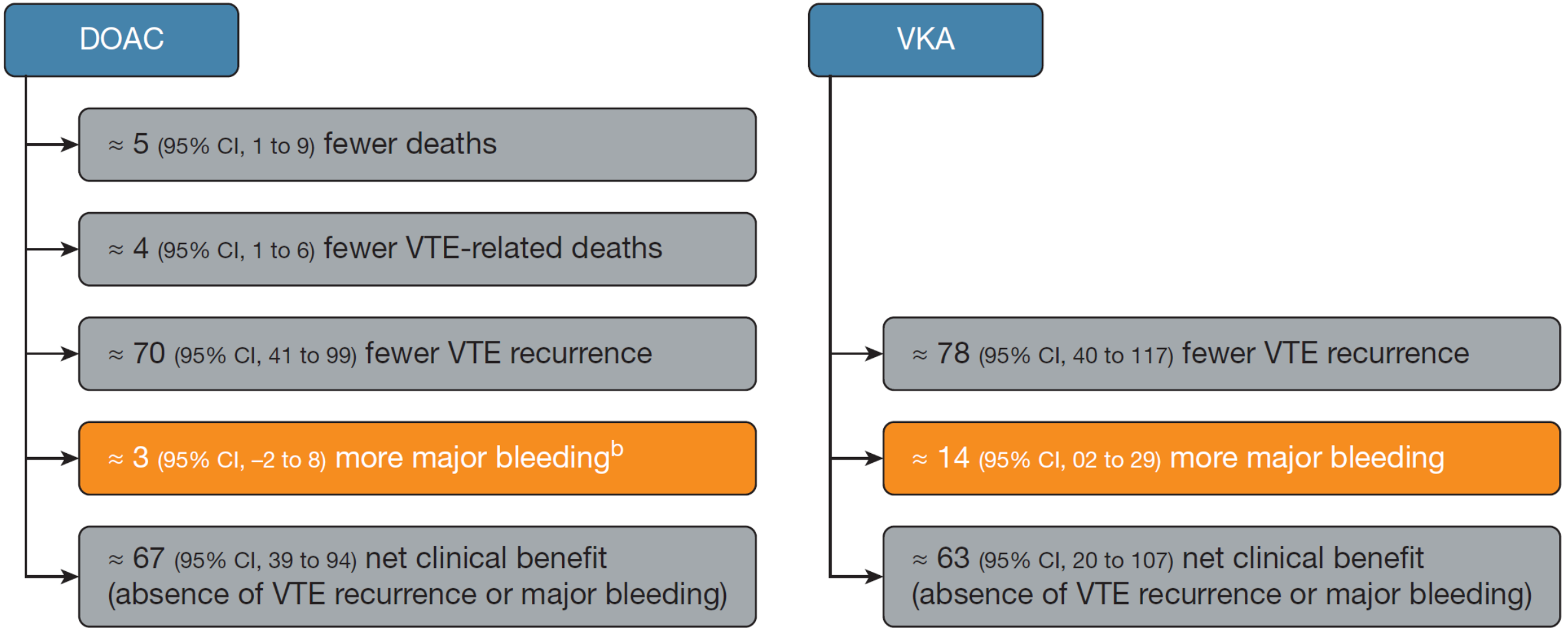
- **the risk of recurrent VTE**

versus

- **the risk of major bleeding**

should be assessed

Extended Anticoagulation for VTE



CHEST 2019; 155(6):1199-1216

Main new recommendations 2019

Treatment in the acute phase	
When oral anticoagulation is initiated in a patient with PE who is eligible for a NOAC (apixaban, dabigatran, edoxaban, or rivaroxaban), a NOAC is the recommended form of anticoagulant treatment.	I
Set-up of multidisciplinary teams for management of high-risk and selected cases of intermediate-risk PE should be considered, depending on the resources and expertise available in each hospital.	IIa
ECMO may be considered, in combination with surgical embolectomy or catheter-directed treatment, in refractory circulatory collapse or cardiac arrest.	IIb

2019 ESC /ERS Guidelines for the diagnosis & management of acute pulmonary embolism

Main new recommendations 2019

Chronic treatment and prevention of recurrence	
Indefinite treatment with a VKA is recommended for patients with antiphospholipid antibody syndrome.	I
Extended anticoagulation should be considered for patients with no identifiable risk factor for the index PE event.	IIa
Extended anticoagulation should be considered for patients with a persistent risk factor other than anti-phospholipid antibody syndrome.	IIa
Extended anticoagulation should be considered for patients with a minor transient/reversible risk factor for the index PE event.	IIa
A reduced dose of apixaban or rivaroxaban should be considered after the first 6 months.	IIa

2019 ESC /ERS Guidelines for the diagnosis & management of acute PE

- **Anticoagulants reduce the risk of recurrent VTE by 80% - 90%**
  at the cost of a 1% - 3% annual risk of major bleeding

- ***The continuation is justified when the annual risk of recurrence***
  is higher than 3% - 5%

- **Anticoagulants reduce the risk of recurrent VTE by 80% - 90%**
  at the cost of a 1% - 3% annual risk of major bleeding

- ***The continuation is justified when the annual risk of recurrence***
  is higher than 3% - 5%

- **After withdrawal of anticoagulant treatment**
  the risk of recurrence - if anticoagulants are stopped after 6 or 12 months -
  is similar to that after 3 months

- **Anticoagulants are discontinued when**
  the risk of anticoagulation-related bleeding
  outweighs
  the risk of recurrent VTE

‘What to do’ and ‘what not to do’ messages from the Guidelines

Diagnosis
In suspected high-risk PE, perform bedside echocardiography or emergency CTPA (depending on availability and clinical circumstances) for diagnosis.
In suspected high-risk PE, initiate intravenous anticoagulation with UFH without delay, including a weight-adjusted bolus injection.
In suspected PE without haemodynamic instability, use validated diagnostic criteria.
In suspected PE without haemodynamic instability, initiate anticoagulation in case of high or intermediate clinical probability, while diagnostic workup is in progress.
Base the diagnostic strategy on clinical probability, using either clinical judgement or a validated prediction rule.
Measure D-dimers in plasma, preferably with a highly sensitive assay, in outpatients/emergency department patients with low or intermediate clinical probability, or who are PE-unlikely.
Reject the diagnosis of PE (without further testing) if CTPA is normal in a patient with low or intermediate clinical probability, or if the patient is PE-unlikely.
Reject the diagnosis of PE (without further testing) if the perfusion lung scan is normal.
Accept the diagnosis of PE if CTPA shows a segmental or more proximal filling defect in a patient with intermediate or high clinical probability.
Accept the diagnosis of VTE if CUS shows a proximal DVT in a patient with clinical suspicion of PE.
Do not measure D-dimers in patients with high clinical probability, as a normal result does not safely exclude PE.
Do not perform CT venography as an adjunct to CTPA.
Do not perform MRA to rule out PE.

ESC Pocket Guidelines App

Anytime - Anywhere

- All ESC Pocket Guidelines
- Over 145 interactive tools
  - Algorithms
  - Calculators
  - Charts & Scores
- Summary Cards & Essential Messages
- Online & Offline

Learn more in the Guidelines area