Maladie thrombo-embolique veineuse

Outils d'aide à la décision

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Plan

- **Score** diagnostique
- Outils diagnostique **biologique**
- Outils diagnostique **échographique**
- **Stratification pronostique**

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ESC GUIDELINES

2014 ESC Guidelines on the diagnosis and management of acute pulmonary embolism

The Task Force for the Diagnosis and Management of Acute Pulmonary Embolism of the European Society of Cardiology (ESC)

Endorsed by the European Respiratory Society (ERS)

La clinique, la clinique, la clinique!

Table 3 Clinical characteristics of patients with suspected PE in the emergency department (adapted from Pollack *et al.* (2011)).[82]

Feature	PE confirmed (n = 1880)	PE not confirmed (n = 528)
Dyspnoea	50%	51%
Pleuritic chest pain	39%	28%
Cough	23%	23%
Substernal chest pain	15%	17%
Fever	10%	10%
Haemoptysis	8%	4%
Syncope	6%	6%
Unilateral leg pain	6%	5%
Signs of DVT (unilateral extremity swelling)	24%	18%

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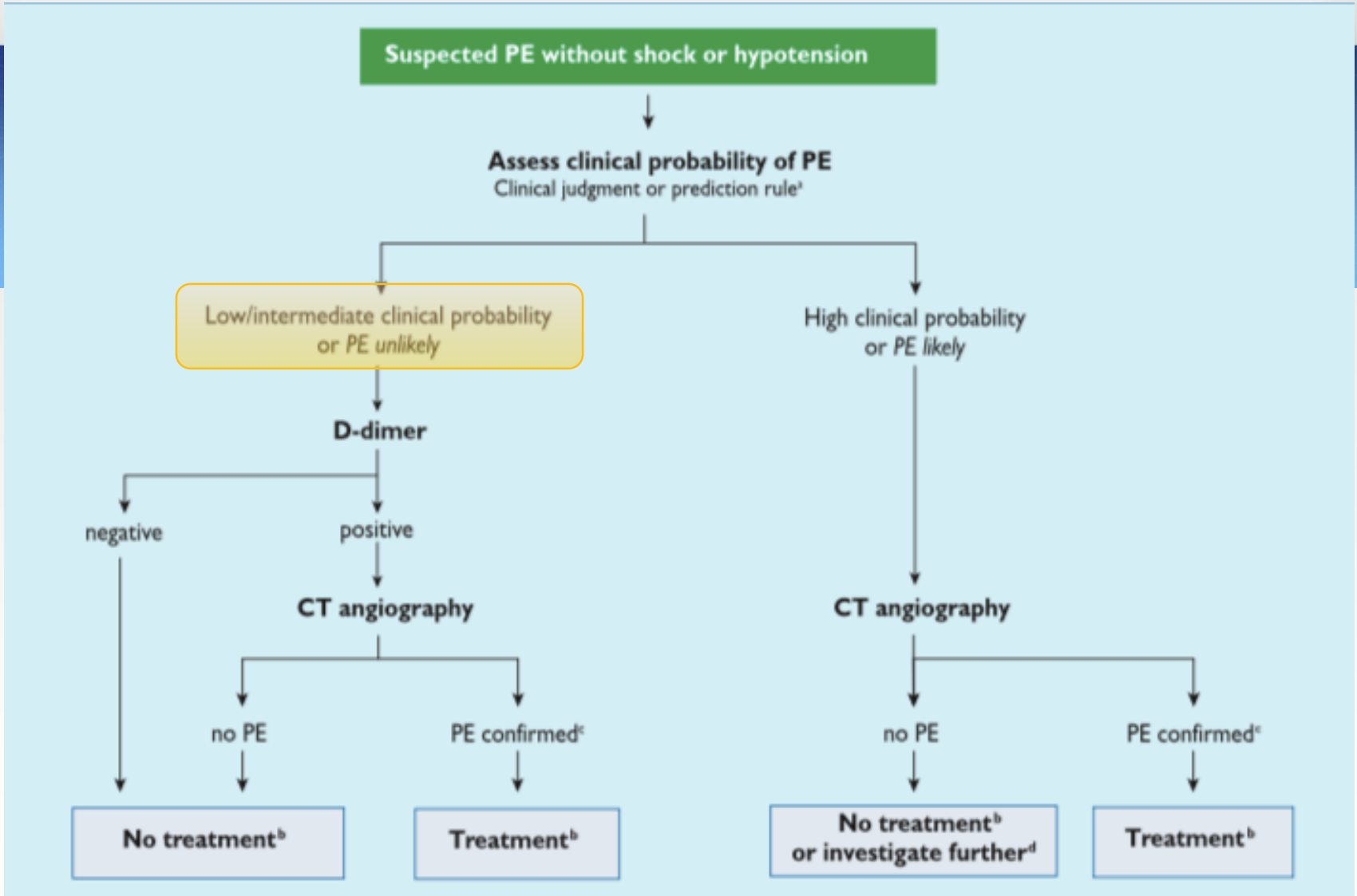
Items	Clinical decision rule points	
Wells rule	**Original version[95]**	**Simplified version[107]**
Previous PE or DVT	1.5	1
Heart rate ≥100 b.p.m.	1.5	1
Surgery or immobilization within the past four weeks	1.5	1
Haemoptysis	1	1
Active cancer	1	1
Clinical signs of DVT	3	1
Alternative diagnosis less likely than PE	3	1
Clinical probability		
Three-level score		
Low	0–1	N/A
Intermediate	2–6	N/A
High	≥7	N/A
Two-level score		
PE unlikely	0–4	0–1
PE likely	≥5	≥2
Revised Geneva score	**Original version[92]**	**Simplified version[108]**
Previous PE or DVT	3	1
Heart rate 75–94 b.p.m. ≥95 b.p.m.	 3 5	 1 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

MTV et biologie

- **D Dimères**: produit dégradation fibrine.

- ☑ thrombose aiguë
- ☑ cancer, hémorragie, traumatisme,….


Suspected PE without shock or hypotension
Assess clinical probability of PE
Clinical judgment or prediction rule[a]
Low/intermediate clinical probability or PE unlikely
High clinical probability or PE likely
D-dimer
negative
positive
CT angiography
CT angiography
no PE
PE confirmed[c]
no PE
PE confirmed[c]
No treatment[b]
Treatment[b]
No treatment[b] or investigate further[d]
Treatment[b]

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D-dimer		
Plasma D-dimer measurement 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, preferably using a highly sensitive assay.	I	A
In low clinical probability or PE-unlikely patients, normal D-dimer level using either a highly or moderately sensitive assay excludes PE.	I	A
Further testing may be considered in intermediate probability patients with a negative moderately sensitive assay.	IIb	C
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	B

- VPN Ddimeres n'a été validé que lorsque la **probabilité clinique est faible** (1,2,3)
- Test "modérement sensible", Se < 95% → nécessité de le corréler au jugement clinique
- Valeur prédictive négative faible lorsque la probabilité clinique est élevée

1/Van Belle, JAMA 2006;295(2)
2/Wells, Ann Intern Med 2001;135(2)
3/ Douma RA, Ann Intern Med 2011154(11)

D Dimères et âge

- La spécificité des dimères diminue avec l'âge
- Un cut-off des DD basé sur l'âge a été proposé et testé[1]
- **Âge X 10µg/L au delà de 50 ans**
- Permet d'augmenter la spécificité tout en gardant une Se proche de 95%

1: Penaloza, J Thromb haemost; 2012 10(7)

Diagnostic accuracy of conventional or age adjusted D-dimer cut-off values in older patients with suspected venous thromboembolism: systematic review and meta-analysis

BMJ 2013;346:f2492 doi: 10.1136/bmj.f2492

- Méta-analyse
- 13 études avec au total 12 497 patients présentant une suspicion clinique d'EP/TVP non élevée
- Comparaison des Sp selon un seuil défini à 500 µg/L et un seuil adapté à l'âge

Table 4| **Classification table for 1000 hypothetical patients based on median prevalence of venous thromboembolism (VTE) in each age subgroup* and on pooled estimates of sensitivity and specificity**

Variables	Age (years)														
	≤50			51-60			61-70			71-80			>80		
Conventional cut-off value	VTE+	VTE-	Total	VTE+	VTE-	Total	VTE+	VTE-	Total	VTE+	VTE-	Total	VTE+	VTE-	Total
D-dimer high	120	291	411	134	367	501	154	512	666	212	593	805	151	724	876
D-dimer low	3	586	589	0	499	499	2	332	334	3	192	195	1	124	124
Total	123	877	1000	134	866	1000	156	844	1000	215	785	1000	152	848	1000
Sensitivity/specificity	97.6	66.8	—	100.0	57.6	—	99.0	39.4	—	98.7	24.5	—	99.6	14.6	—
Age adjusted cut-off value	—	—	—	VTE+	VTE-	Total	VTE+	VTE-	Total	VTE+	VTE-	Total	VTE+	VTE-	Total
D-dimer high	—	—	—	133	327	460	152	427	578	209	438	647	147	550	697
D-dimer low	—	—	—	1	539	540	4	417	422	6	347	353	5	298	303
Total	—	—	—	134	866	1000	156	844	1000	215	785	1000	152	848	1000
Sensitivity/specificity	—	—	—	99.4	62.3	—	97.3	49.5	—	97.3	44.2	—	97.0	35.2	—
No of avoided unnecessary imaging examinations	—	—	—	—	40	—	—	85	—	—	155	—	—	175	—
Additional No of cases missed	—	—	—	1	—	—	2	—	—	3	—	—	4	—	—

Outil échographique

- ETT normale n'élimine pas le diagnostic d'embolie pulmonaire
- **Augmentation des PAP si obstruction > 30-50% du lit vasculaire pulmonaire**
- La présence (échographique ou scannographique) de coeur pulmonaire aigu est importante pour le **stratification du pronostique**
- EP → vasoconstriction pulmonaire (thromboxane A2, sérotonine, …) → dilatation VD → diminution contractilité, activation neurohormonale,.. → choc
- Peu adaptation possible **si VD non pré-conditionné → PAPm max à 40mmHg**
- **VD intolérant à la post-charge**

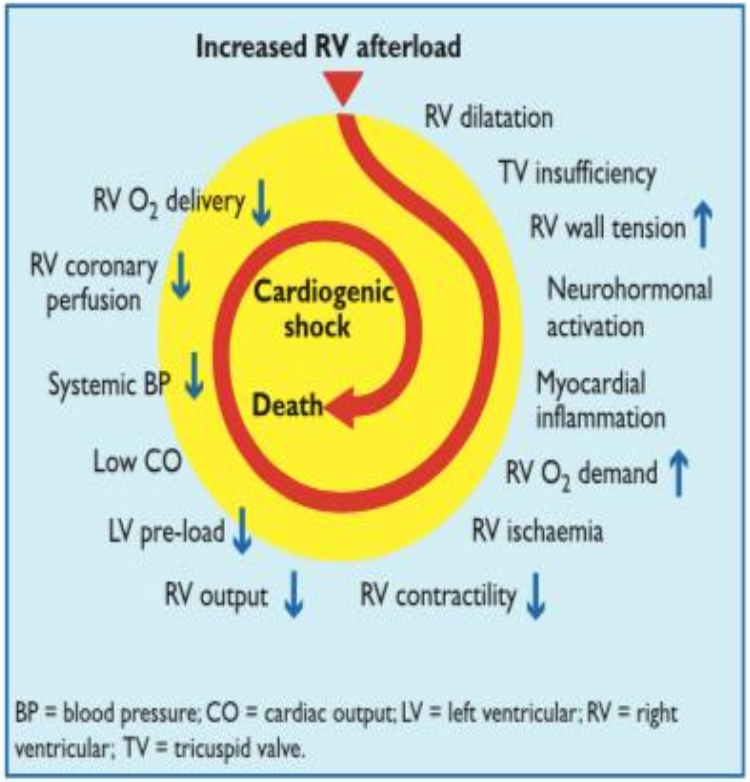
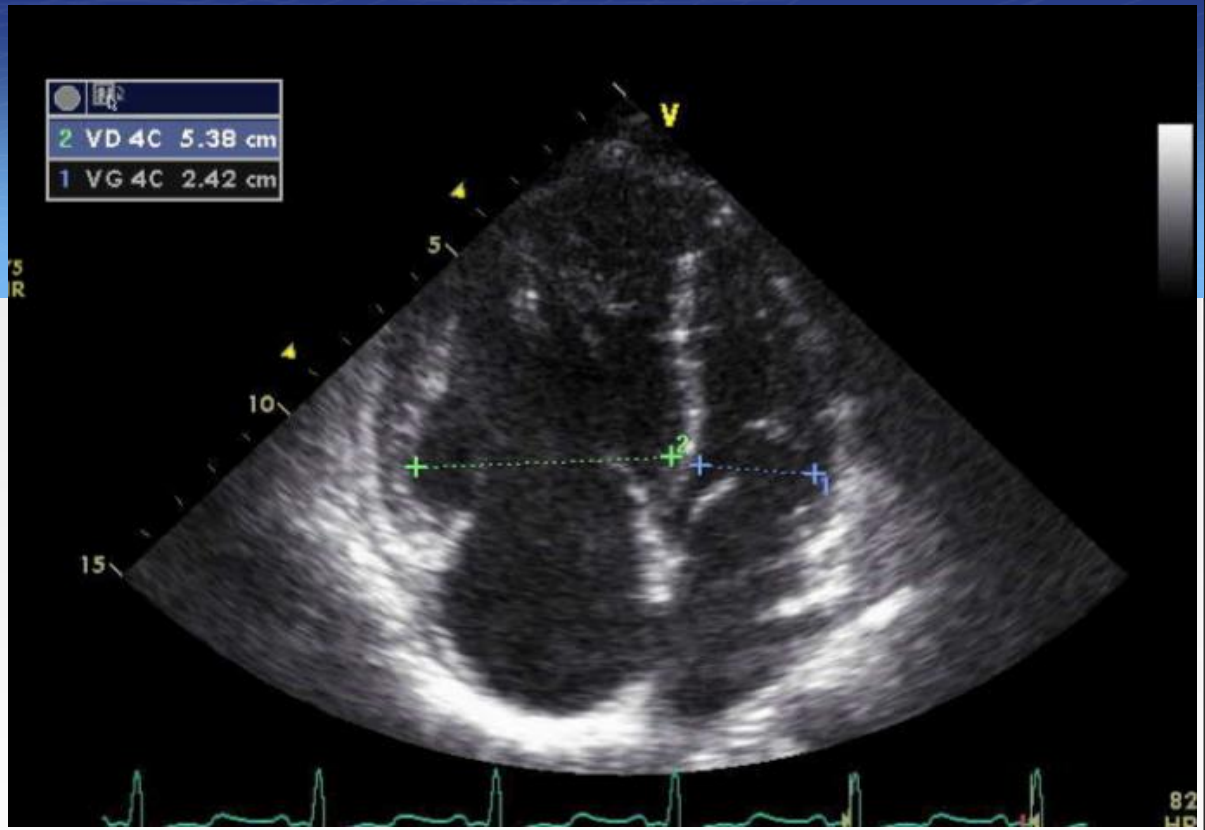


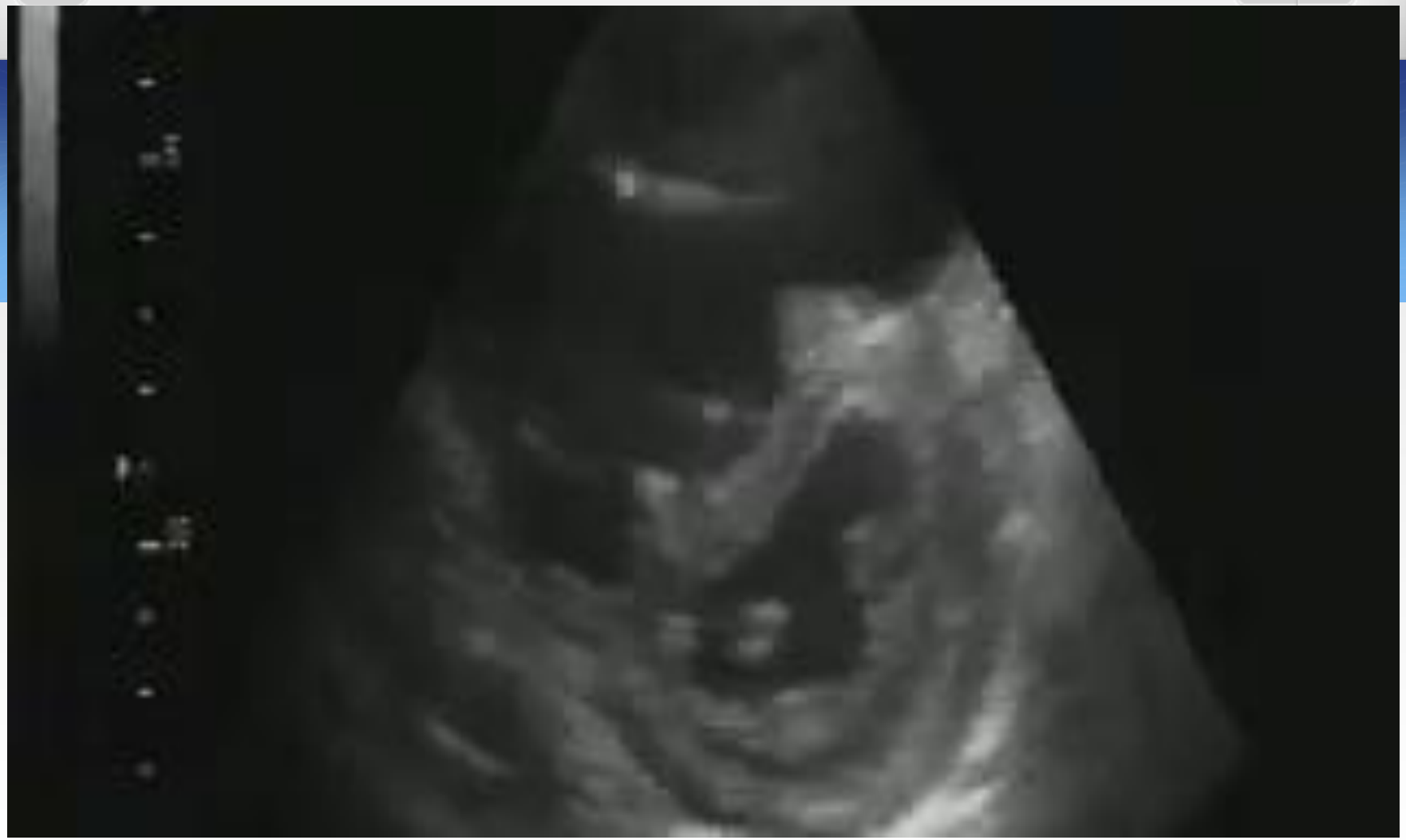
Figure 1 Key factors contributing to haemodynamic collapse in acute pulmonary embolism

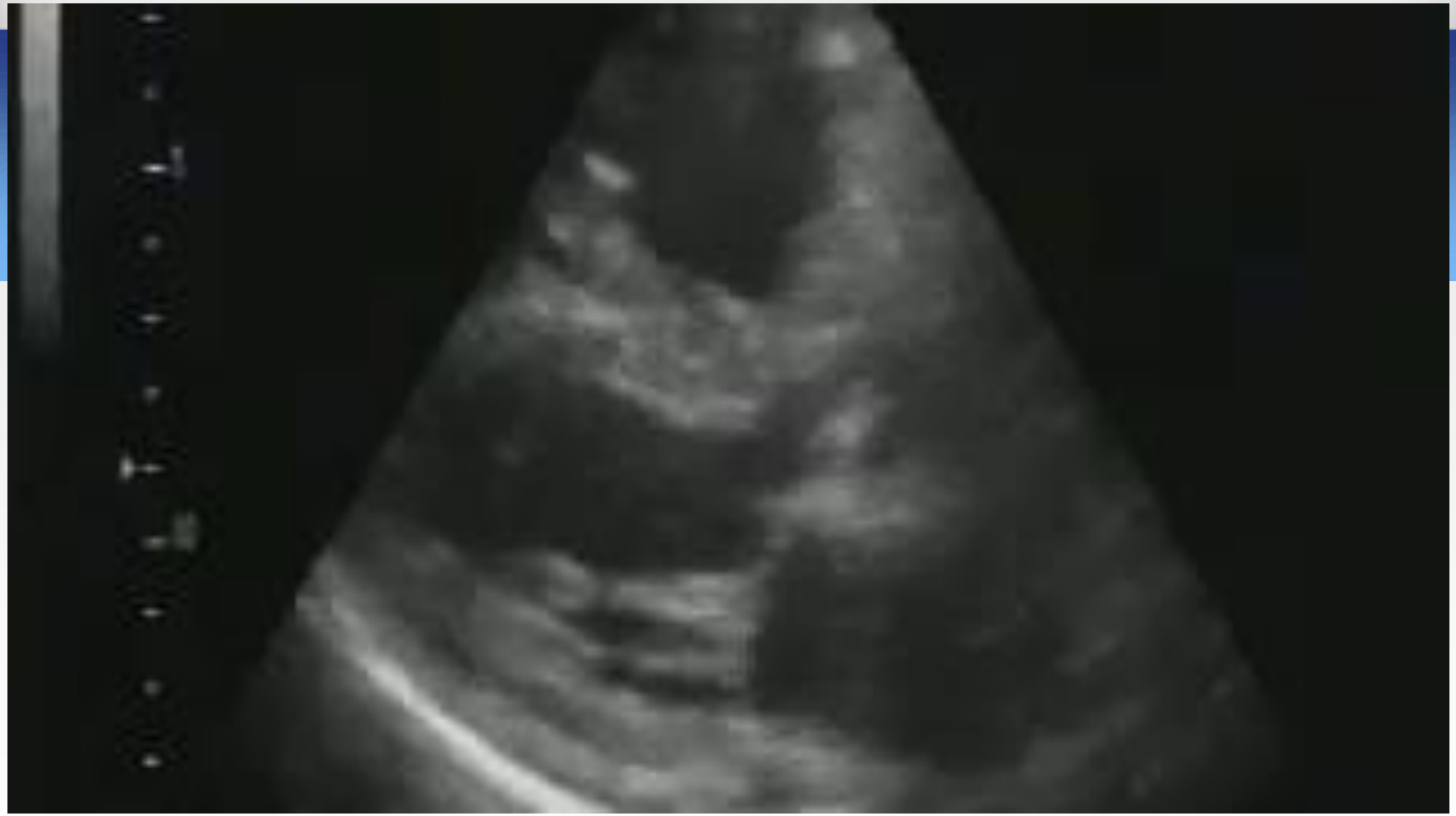
Dilatation VD

- Rapport VD/VG > 0,6

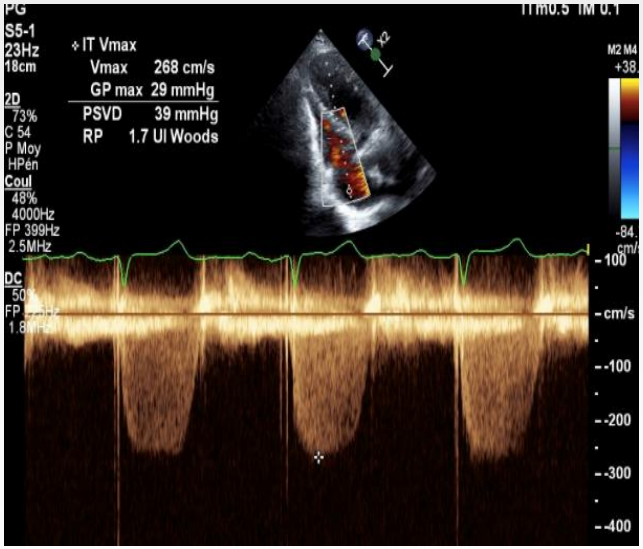


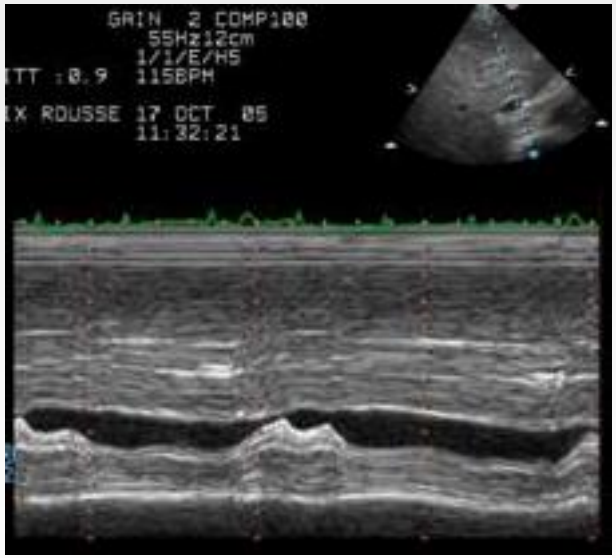
	Reference range	Mildly abnormal	Moderately abnormal	Severely abnormal
Basal RV diameter (RVD1), cm	2.0-2.8	2.9-3.3	3.4-3.8	≥3.9
Mid-RV diameter (RVD2), cm	2.7-3.3	3.4-3.7	3.8-4.1	≥4.2
Base–to-apex (RVD3). cm	7.1-7.9	8.0-8.5	8.6-9.1	≥9.2





Hypertension Artérielle Pulmonaire systolique





Calcul Vmax sur le flux d'IT
→ gradient OD/VD (CW)

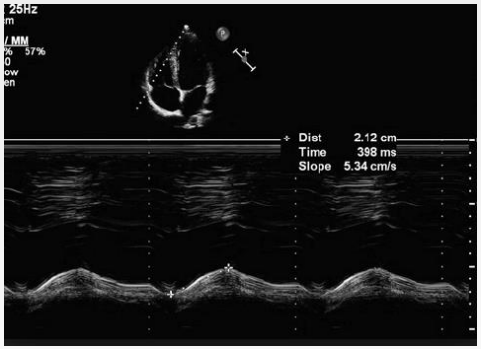
Estimation de la POD selon taille et variation respiratoire VCI

En aigue: **PAPs max à 60mmHg**, sinon chronique

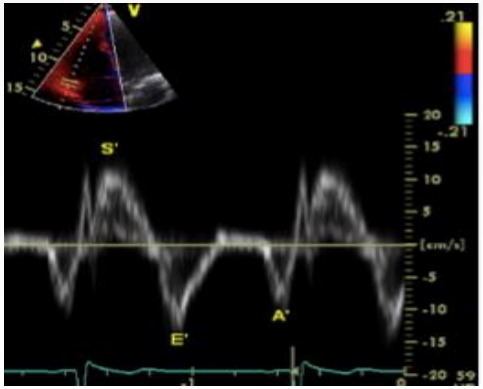
VCI	Variations respiratoires	Estimation de la POD
Petite < 15 mm	Vidange complète en inspiration	5 mmHg
Normale 15 – 25 mm	Vidange > 50 %	10 mmHg
Normale 15 – 25 mm	Vidange < 50 %	15 mmHg
Dilatée > 25 mm	Vidange < 50 %	20 mmHg
VCI et VSH dilatées (> 10 mm)	Pas de variation	> 20 mmHg

VCI : veine cave inférieure, VSH : veine sus hépatique, POD : pression auriculaire droite.

Dysfonction systolique VD



- **TAPSE**
- Mode TM anneau tricuspidien
- Pathologique < 17mm



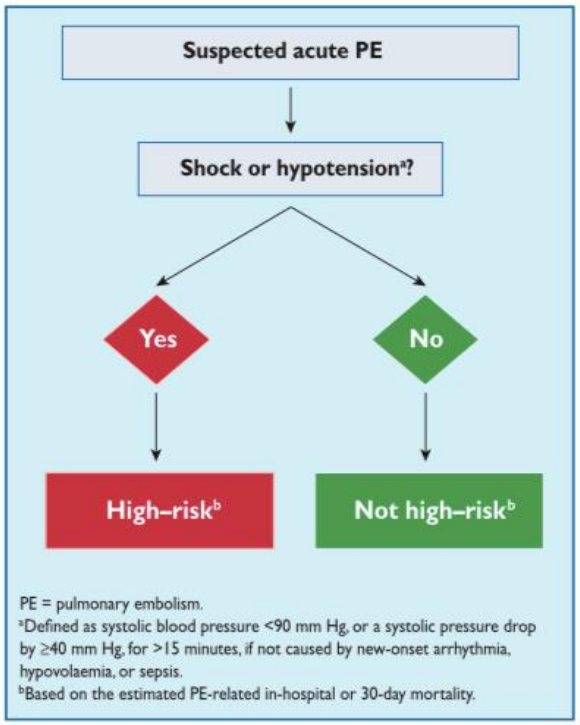
- **Sdti** (vitesse contraction systolique paroi VD)
- Bien mesurer le 2ième clic, doppler tissulaire
- Pathologique < 9,5cm/s

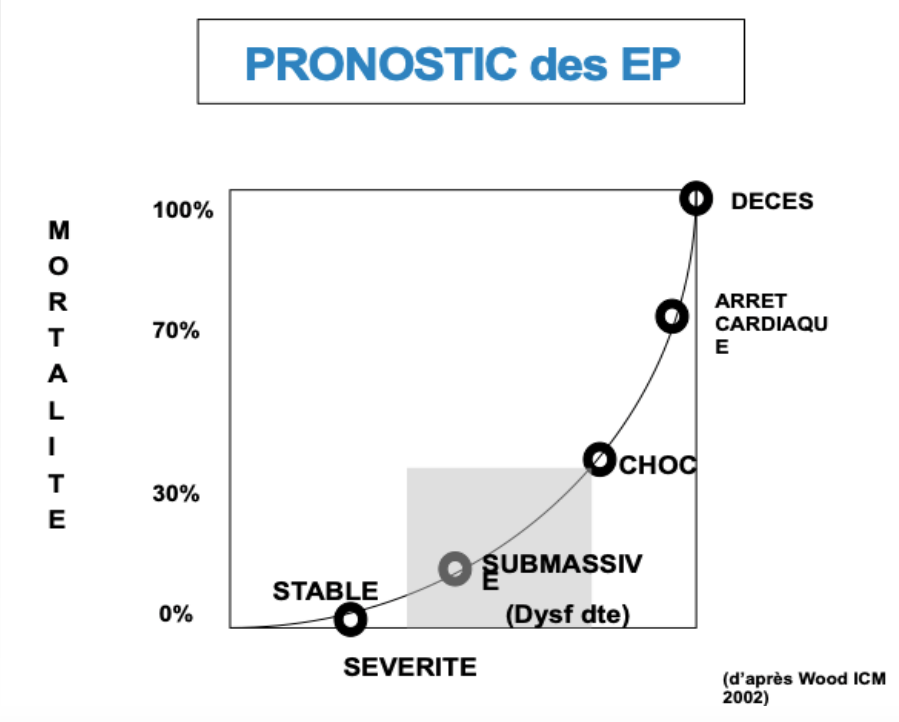
Stratification prognostique

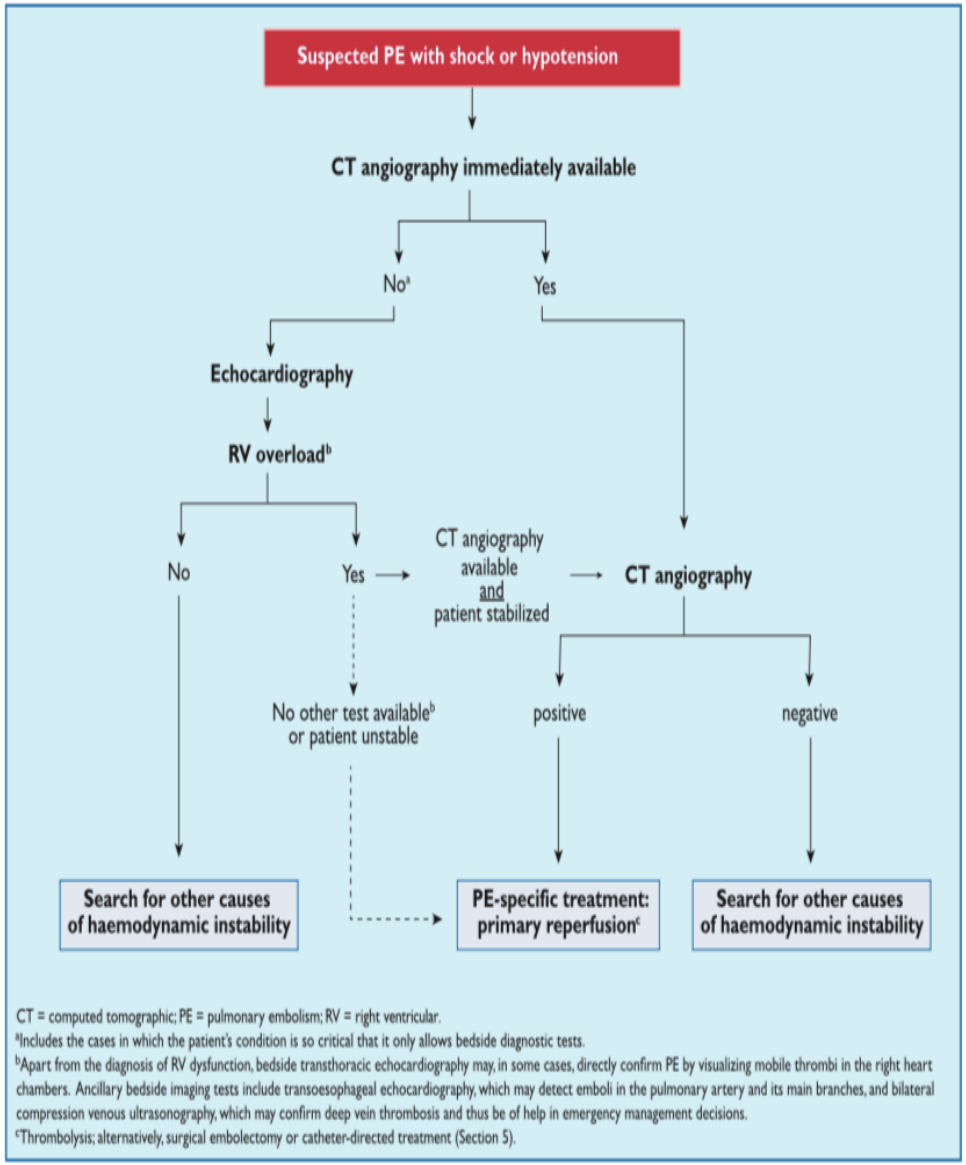
Table 4 **Principal markers useful for risk stratification in acute pulmonary embolism**

Clinical markers	Shock
	Hypotension[a]
Markers of RV dysfunction	RV dilatation, hypokinesis or pressure overload on echocardiography
	RV dilatation on spiral computed tomography
	BNP or NT-proBNP elevation
	Elevated right heart pressure at RHC
Markers of myocardial injury	Cardiac troponin T or I positive[b]

Stratification pronostique







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).

Pulmonary Embolism Severity Index

Parameter	Original version[214]	Simplified version[218]
Age	Age in years	1 point (if age >80 years)
Male sex	+10 points	–
Cancer	+30 points	1 point
Chronic heart failure	+10 points	1 point
Chronic pulmonary disease	+10 points	
Pulse rate ≥110 b.p.m.	+20 points	1 point
Systolic blood pressure <100 mm Hg	+30 points	1 point
Respiratory rate >30 breaths per minute	+20 points	–
Temperature <36 °C	+20 points	–
Altered mental status	+60 points	–
Arterial oxyhaemoglobin saturation <90%	+20 points	1 point
	Risk strata[a]	
	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%) **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**	**0 points**= 30-day mortality risk 1.0% (95% CI 0.0%–2.1%) **≥1 point(s)**= 30-day mortality risk 10.9% (95% CI 8.5%–13.2%)

Prognostique selon Fonction VD/biomarqueurs

AHA Scientific Statement

Management of Massive and Submassive Pulmonary Embolism, Iliofemoral Deep Vein Thrombosis, and Chronic Thromboembolic Pulmonary Hypertension

A Scientific Statement From the American Heart Association

Circulation
JOURNAL OF THE AMERICAN HEART ASSOCIATION
American Heart Association
Learn and Live

Circulation 2011.
123:1788-1830

Seuils

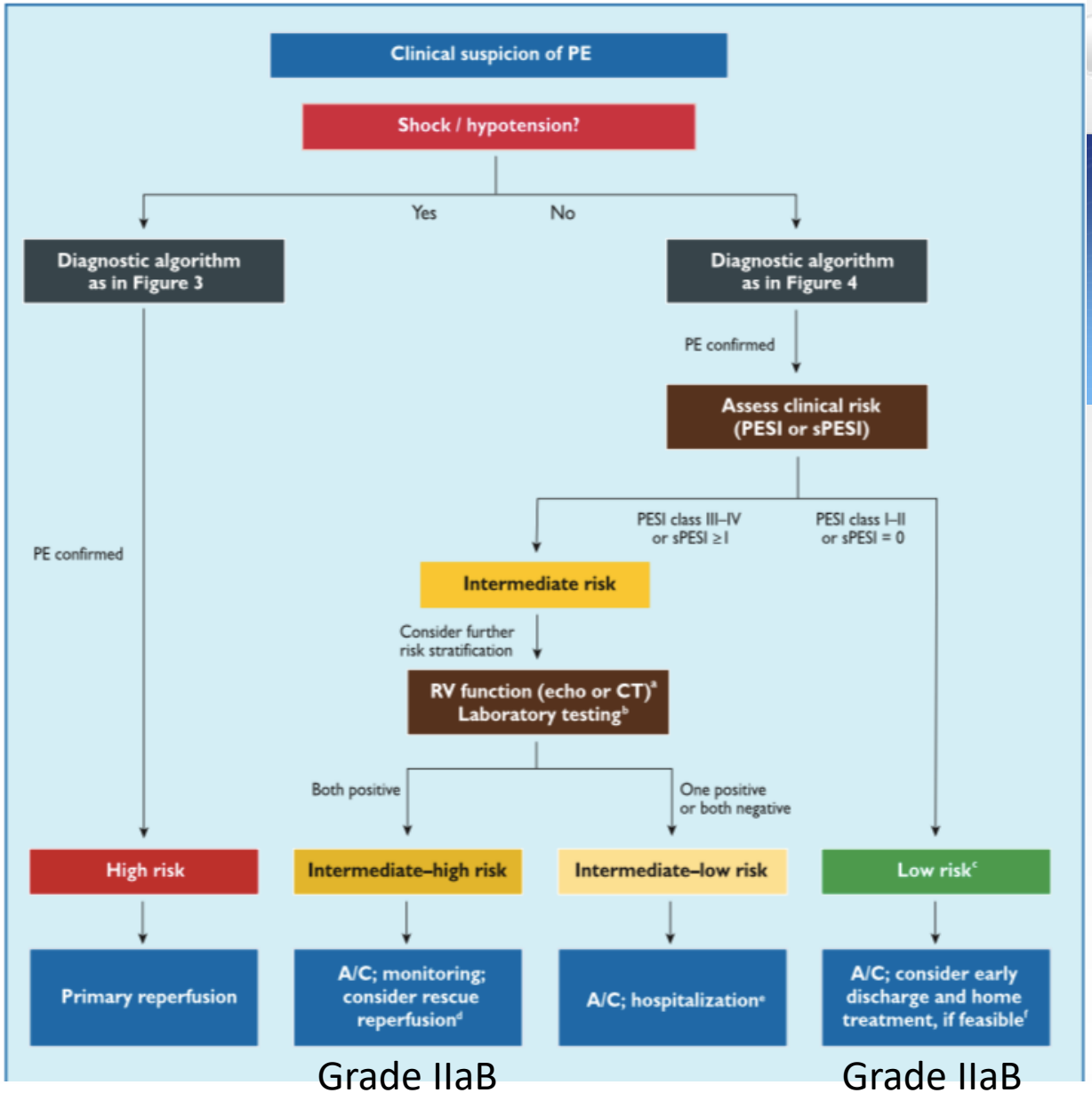
- RV dysfunction means the presence of at least 1 of the following:
  - RV dilation (apical 4-chamber RV diameter divided by LV diameter >0.9) or RV systolic dysfunction on echocardiography
  - RV dilation (4-chamber RV diameter divided by LV diameter >0.9) on CT
  - Elevation of BNP (>90 pg/mL)
  - Elevation of N-terminal pro-BNP (>500 pg/mL); or

- Myocardial necrosis is defined as either of the following:
  - Elevation of troponin I (>0.4 ng/mL) or
  - Elevation of troponin T (>0.1 ng/mL)

Test or biomarker	Cut-off value	Sensitivity, % (95% CI)	Specificity, % (95% CI)	NPV, % (95% CI)	PPV, % (95% CI)	OR or HR (95% CI)	No. patients	Study design (reference)	Remarks
Echocardiography	Various criteria of RV dysfunction	74 (61–84)	54 (51–56)	98 (96–99)	8 (6–10)	2.4 (1.3–4.3)	1249	Meta-analysis[226]	RV dysfunction on echocardiography or CT was one of the inclusion criteria in two randomized trials investigating thrombolysis in normotensive patients with PE.[252, 253]
CT angiography	RV/LV ≥1.0	46 (27–66)	59 (54–64)	93 (89–96)	8 (5–14)	1.5 (0.7–3.4)	383	Meta-analysis[226]	
	RV/LV ≥0.9	84 (65–94)	35 (30–39)	97 (94–99)	7 (5–10)	2.8 (0.9–8.2)	457	Prospective cohort[228]	
BNP	75–100 pg/mL	85 (64–95)	56 (50–62)	98 (94–99)	14 (9–21)	6.5 (2.0–21)	261	Meta-analysis[232]	The optimal cut-off value for PE has not been defined.
NT-proBNP	600 pg/mL	86 (69–95)	50 (46–54)	99 (97–100)	7 (5–19)	6.3 (2.2–18.3)	688	Prospective cohort[234e]	NT-proBNP <500 pg/mL was one of the inclusion criteria in a single-armed management trial investigating home treatment of PE.[237]
Troponin I	Different assays/ cut-off values[c]	NR	NR	NR	NR	4.0 (2.2–7.2)	1303	Meta-analysis[239]	A positive cardiac troponin test was one of the inclusion criteria in a randomized trial investigating thrombolysis in normotensive patients with PE.[253]
Troponin T	Different assays/cut-off values[c]	NR	NR	NR	NR	8.0 (3.8–16.7)	682	Meta-analysis[239]	
	14 pg/mL[d]	87 (71–95)	42 (38–47)	98 (95–99)	9 (6–12)	5.0 (1.7–14.4)	526	Prospective cohort[76e]	
H-FABP	6 ng/mL	89 (52–99)	82 (74–89)	99 (94–99)	28 (13–47)	36.6 (4.3–304)	126	Prospective cohort[244e]	

Early mortality risk		Risk parameters and scores			
		Shock or hypotension	PESI class III-V or sPESI ≥1[a]	Signs of RV dysfunction on an imaging test[b]	Cardiac laboratory biomarkers[c]
High		+	(+)[d]	+	(+)[d]
Intermediate	Intermediate–high	–	+	Both positive	
	Intermediate–low	–	+	Either one (or none) positive[e]	
Low		–	–	Assessment optional; if assessed, both negative[e]	

Si score sPESI = 0 mais CPA ou biomarqueurs positifs → risque intermédiaire bas



Grade IIaB

Grade IIaB

Take home message

- Ddimères à corréler avec l'âge des patients
- Stratification diagnostique (Wells/Genève modifié/algorithme ESC)
- Stratification pronostique (PESI / CPA / Biomarqueurs)
- Quid du RAD si PESIs et pas de dysfonction VD?

Merci