Αντιμετώπιση του αιμοδυναμικά ασταθή ασθενή με Πνευμονική Εμβολή

Κονδύλη Ευμορφία ΜΕΘ ΠΑΓΝΗ
Ιατρική σχολή Πανεπιστημίου Κρήτης

Massive Pulmonary Embolism

Acute PE with sustained hypotention

- SAP < 90 mmHg for at least 15 min
- or requiring inotropes , not due to to a cause other than PE, such as arrhythmia,hypovolemia, sepsis, or left ventricular [LV] dysfunction
- Pulselessness, or persistent profound bradycardia (heart rate 40 bpm with signs or symptoms of shock.

Jaff at all

Definition of Submassive PE

Acute PE without systemic hypotension (SBP > 90 mm Hg)

but with either

RV dysfunction

or Myocardial necrosis'

RV dysfunction means the presence of at least 1 of the following:

1. RV dilation (RV/LV >0.9) or RV systolic dysfunction on echocardiography

1. RV dilation on CT (RV/LV >0.9)

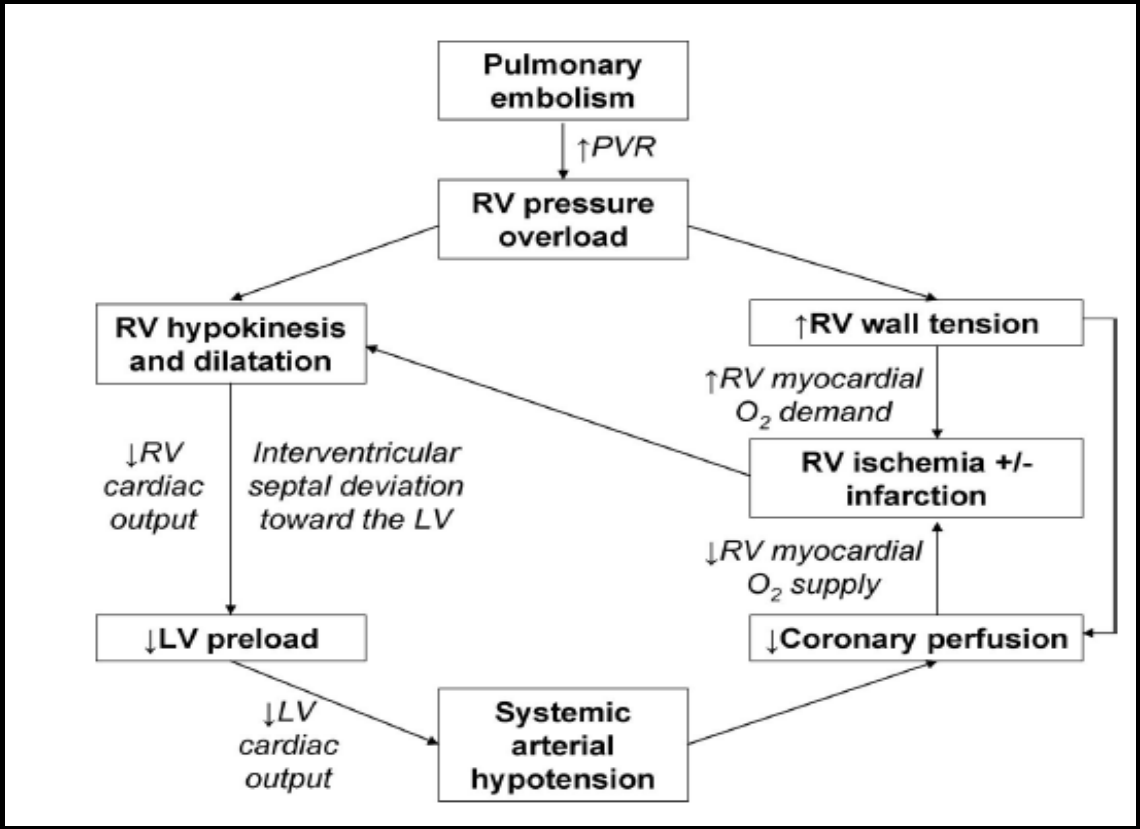
2. Elevation of BNP (90 pg/mL)

3. Elevation of N-terminal pro-BNP (500 pg/mL);
4. or ECG changes

Myocardial necrosis is defined as:

1. Elevation of troponin I (0.4 ng/mL) or
2. Elevation of troponin T (0.1 ng/mL)

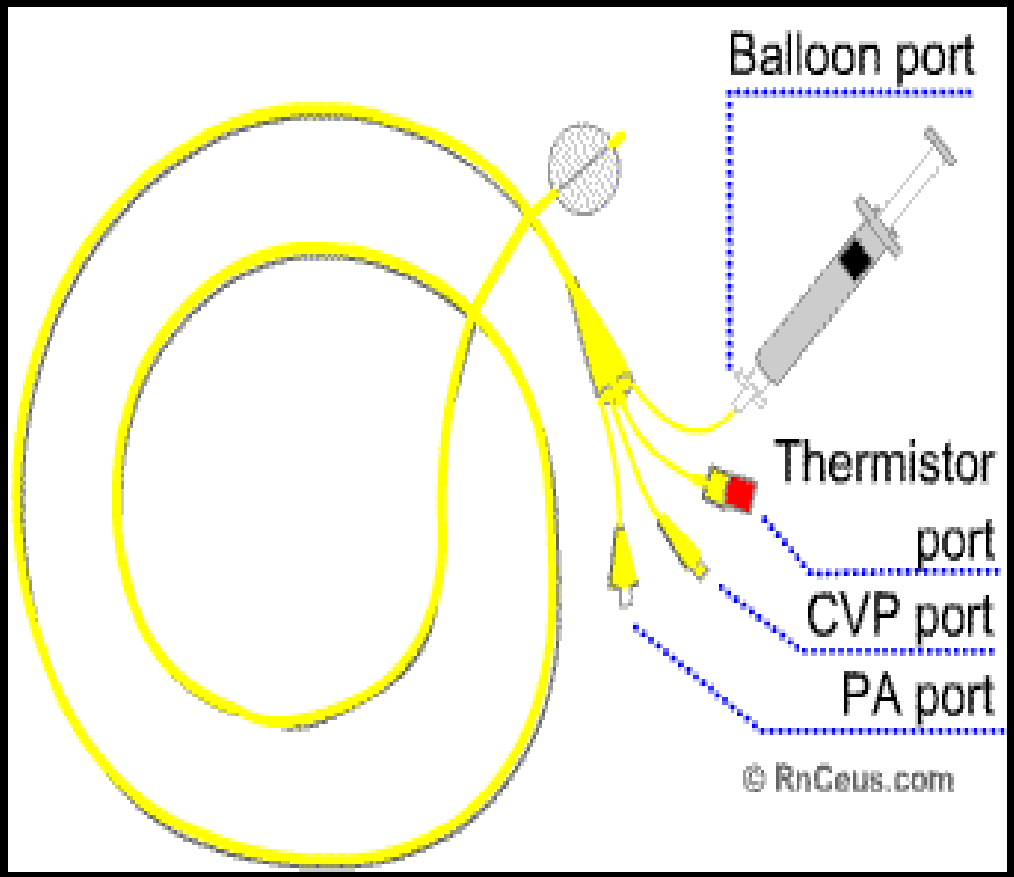
Pathophysiology OF RV dysfunction in massive /submassive PE

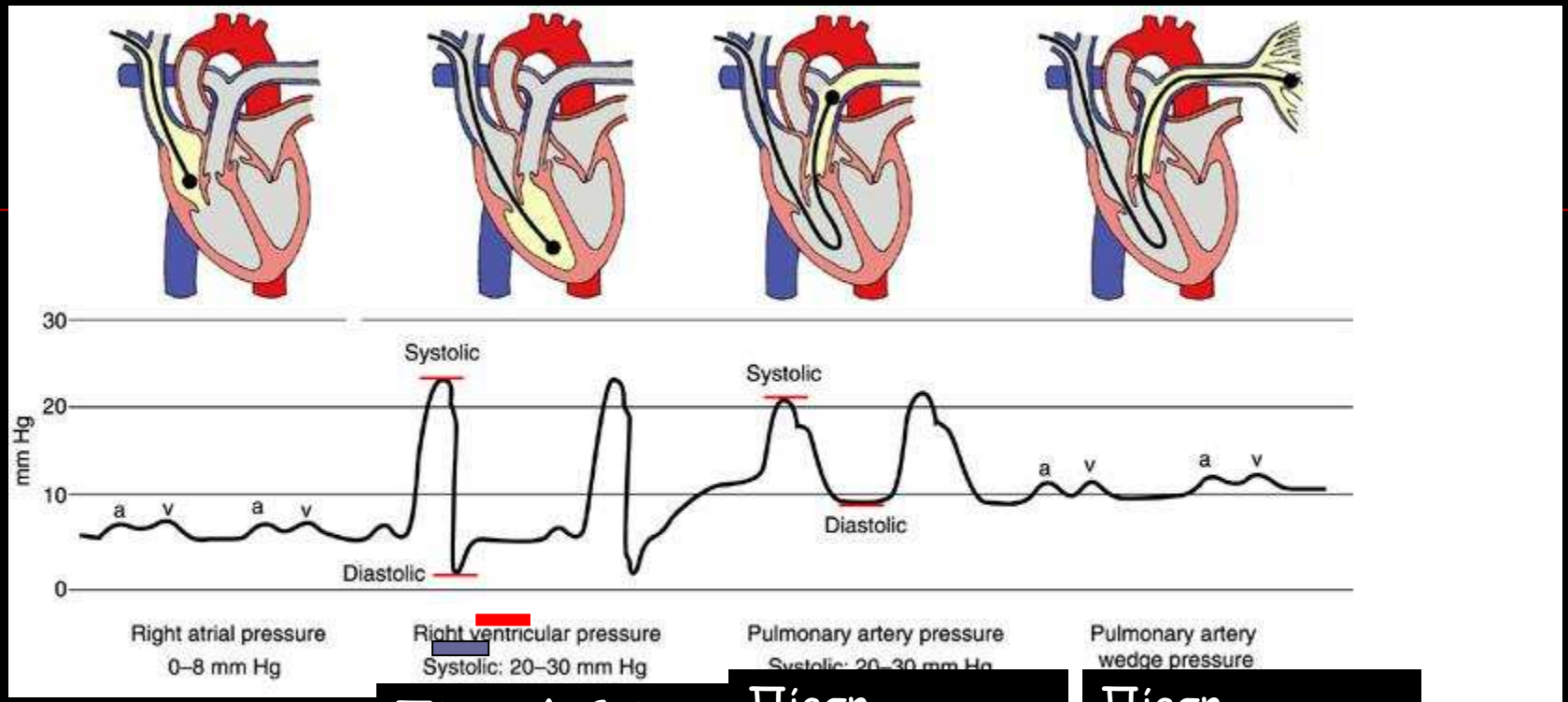


RVD- EVALUATION

- Pulmonary arterial catheterization
- Echocardiography

Pulmonary arterial catheterization





Πίεση

Δεξιού Κόλπου

0-5 mmHg

Πίεση Δεξιά κοιλίας

Συστολική 20-30 mmHg

Διαστολική 0-8 mmHg

Πίεση πνευμονικής αρτηρίας

Συστολική 20-30 mmHg

Διαστολική 8-15 mmHg

Πίεση ενσφήνωσης πνευμονικών τριχοειδών

8-12 mmHg

Hemodynamic parameters

- PVR= mean PAP-Pwedge / CO

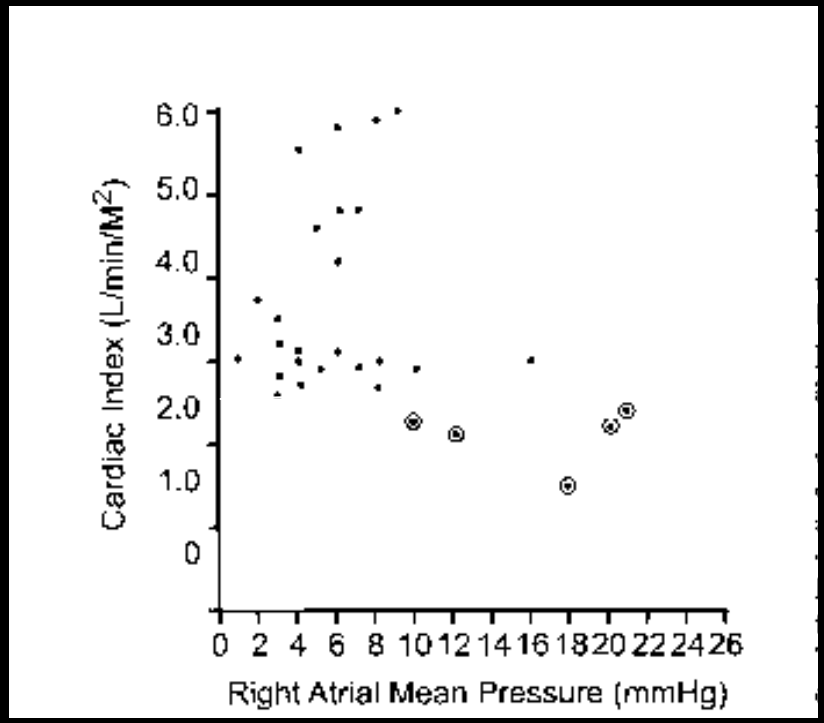
  (Wood units = 1mmHg.min.L-1)

- **Cardiac Output**

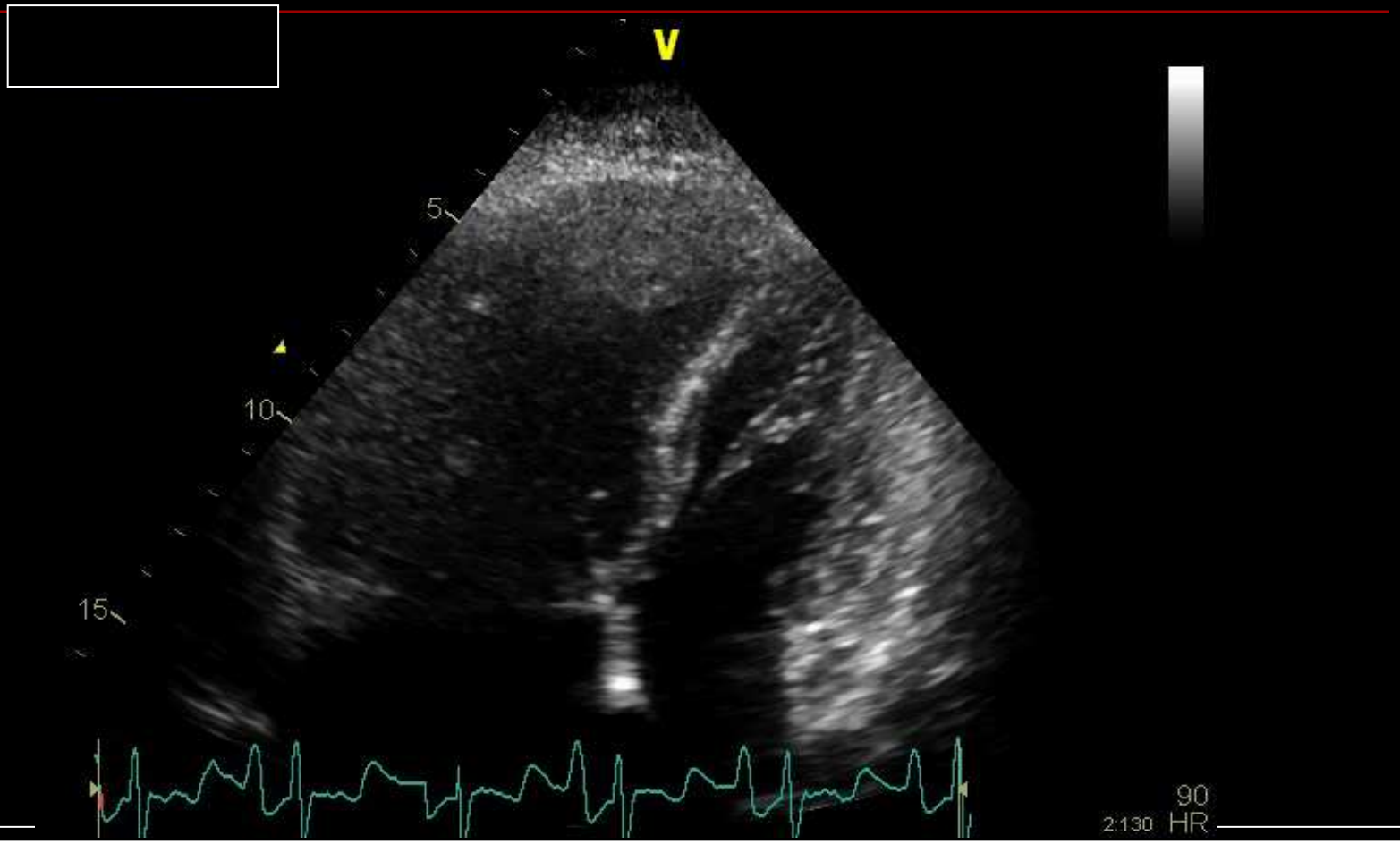
  (Thermodilution Fick Method)

  SvO2

Pulmonary arterial catheterization



Echocardiography

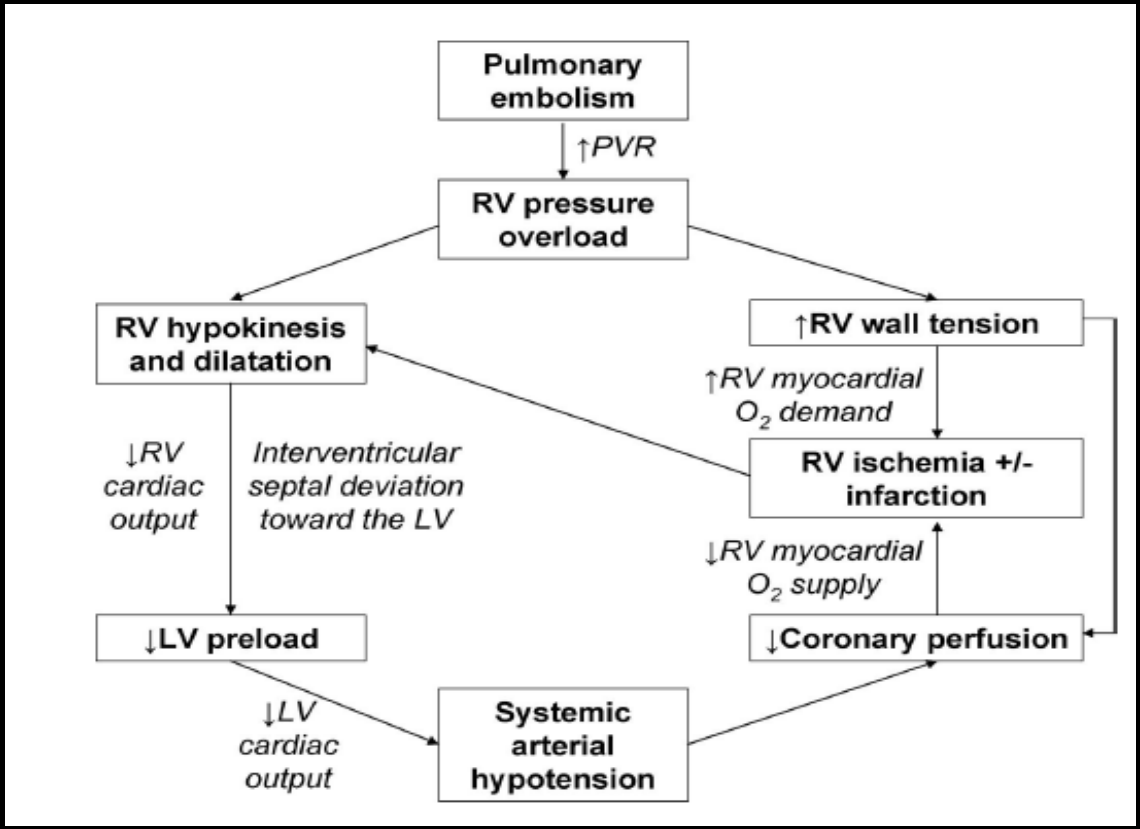


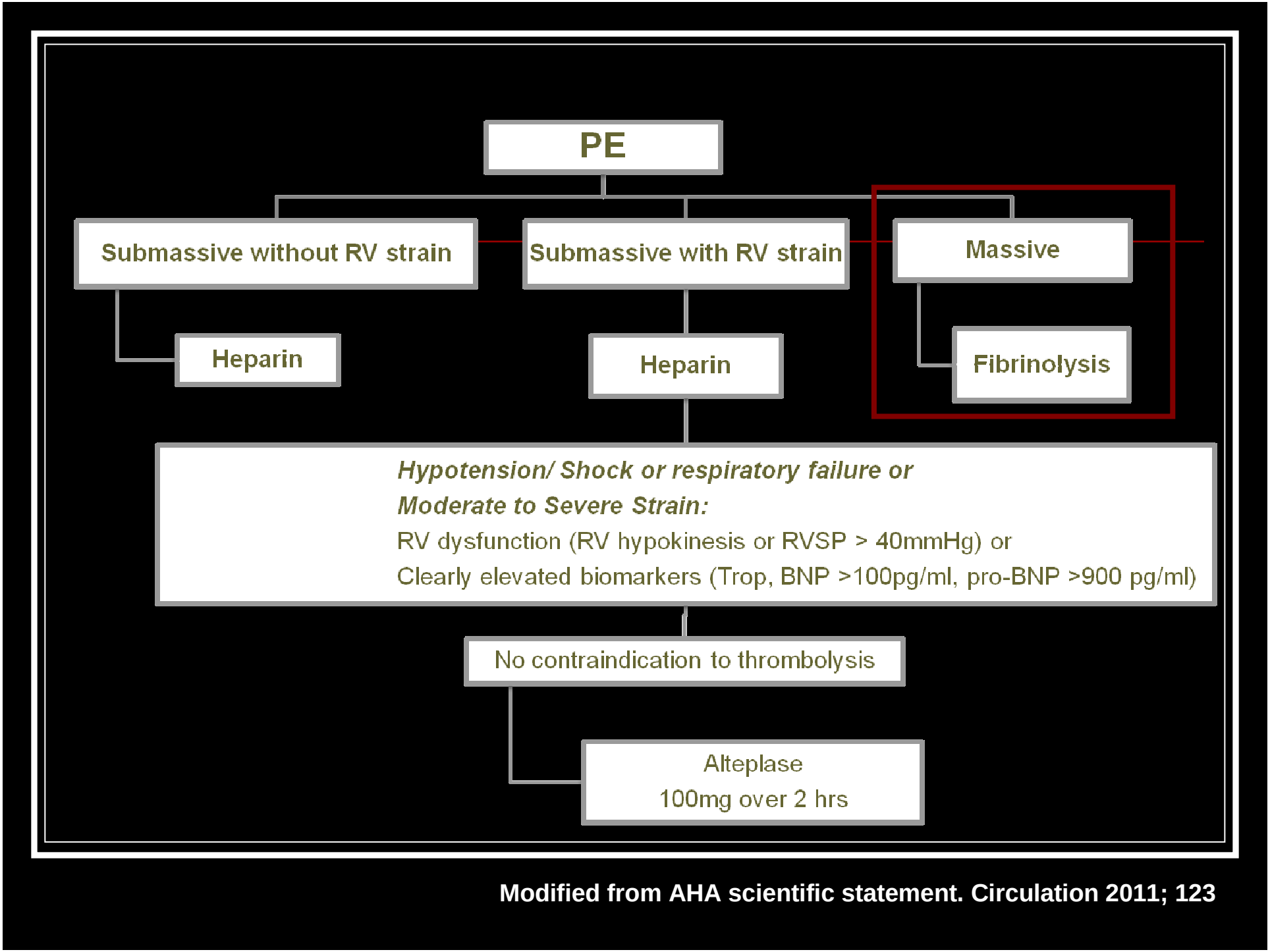
Management of acute RVD

The main goal

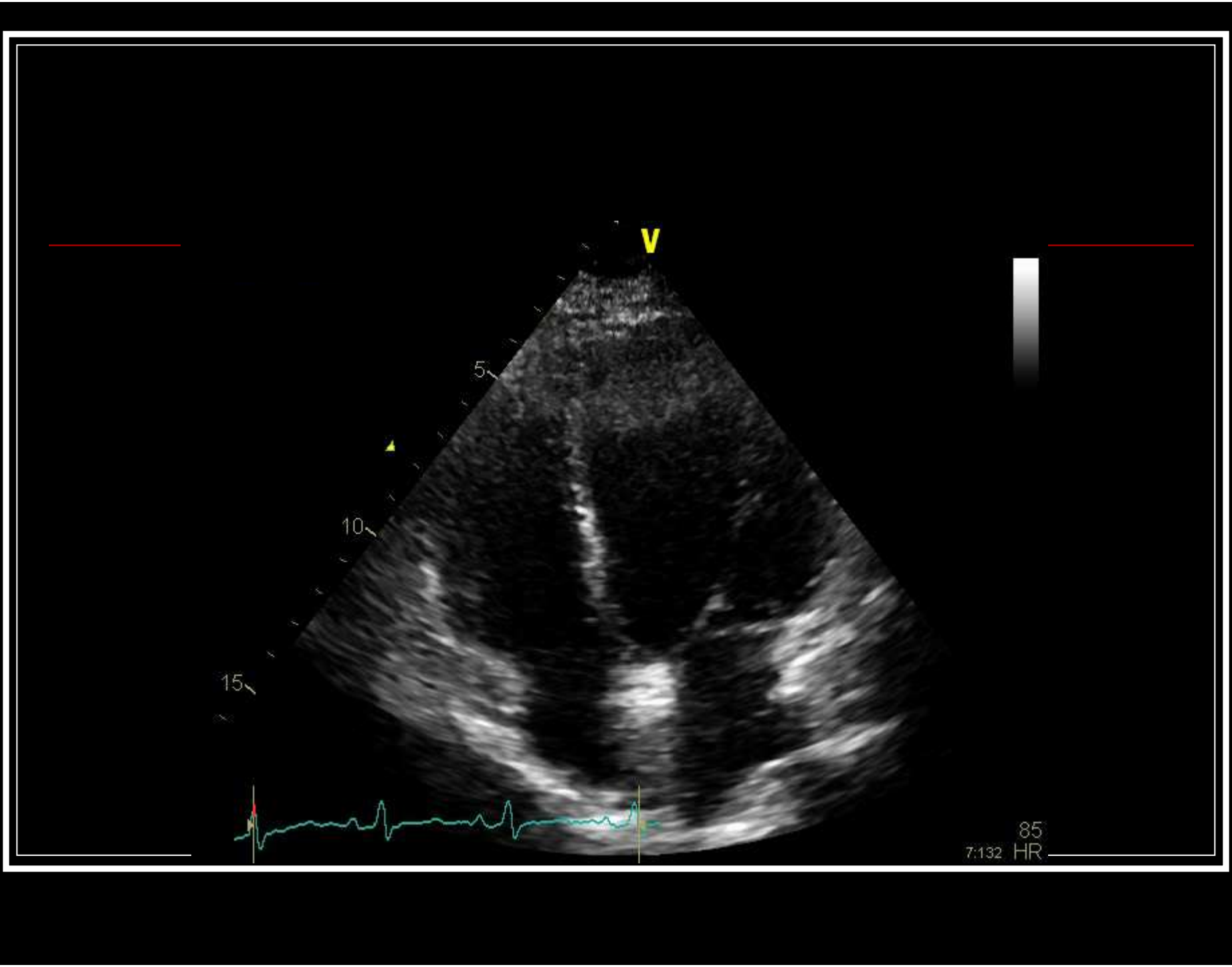
Breaking the vicious cycle of reduced CO by restoring adequate oxygen delivery to the myocardium and reducing RV overload

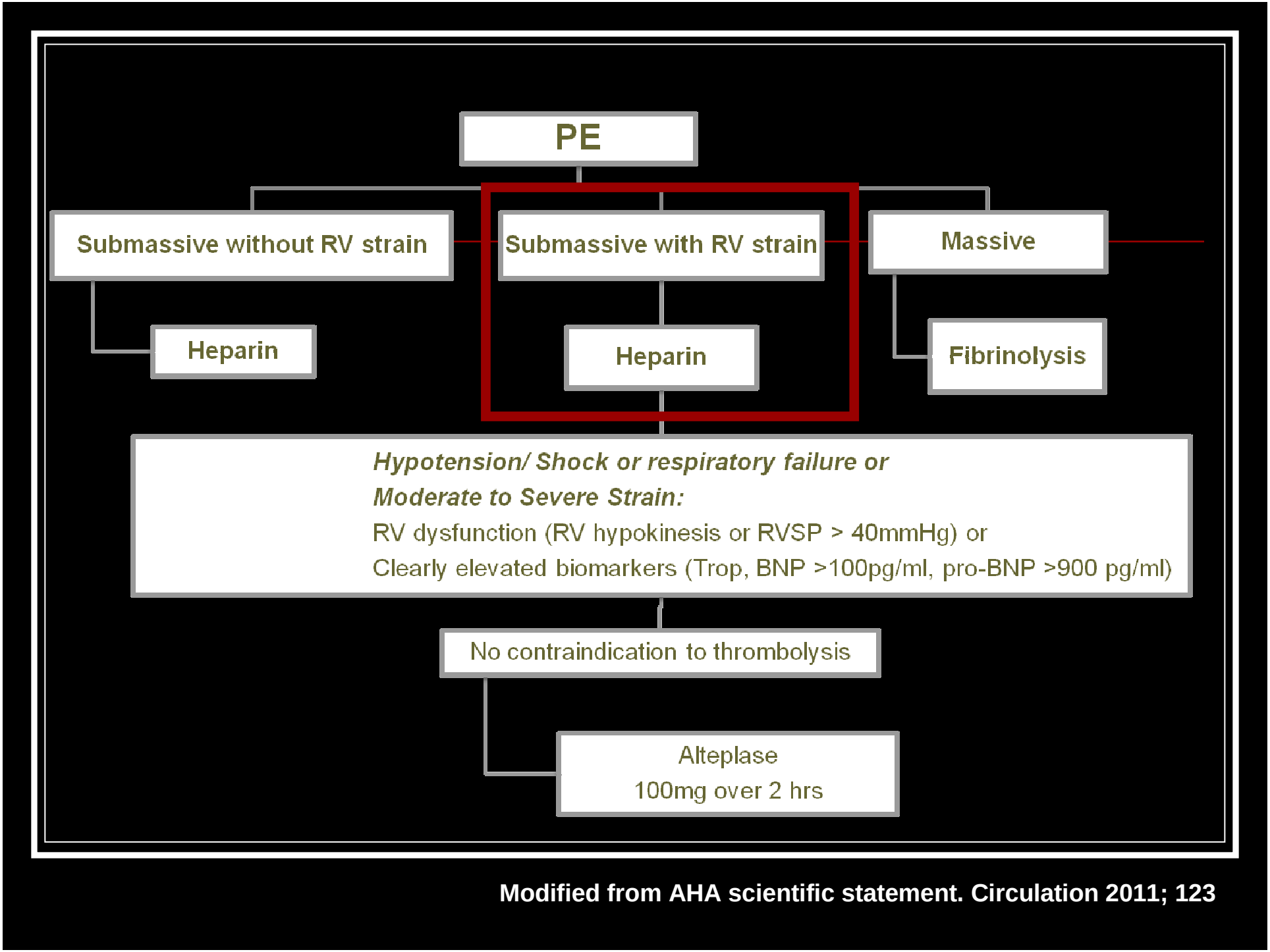
Pathophysiology OF RV dysfunction in massive /submassive PE





Modified from AHA scientific statement. Circulation 2011; 123


V
5
10
15
85
7:132 HR



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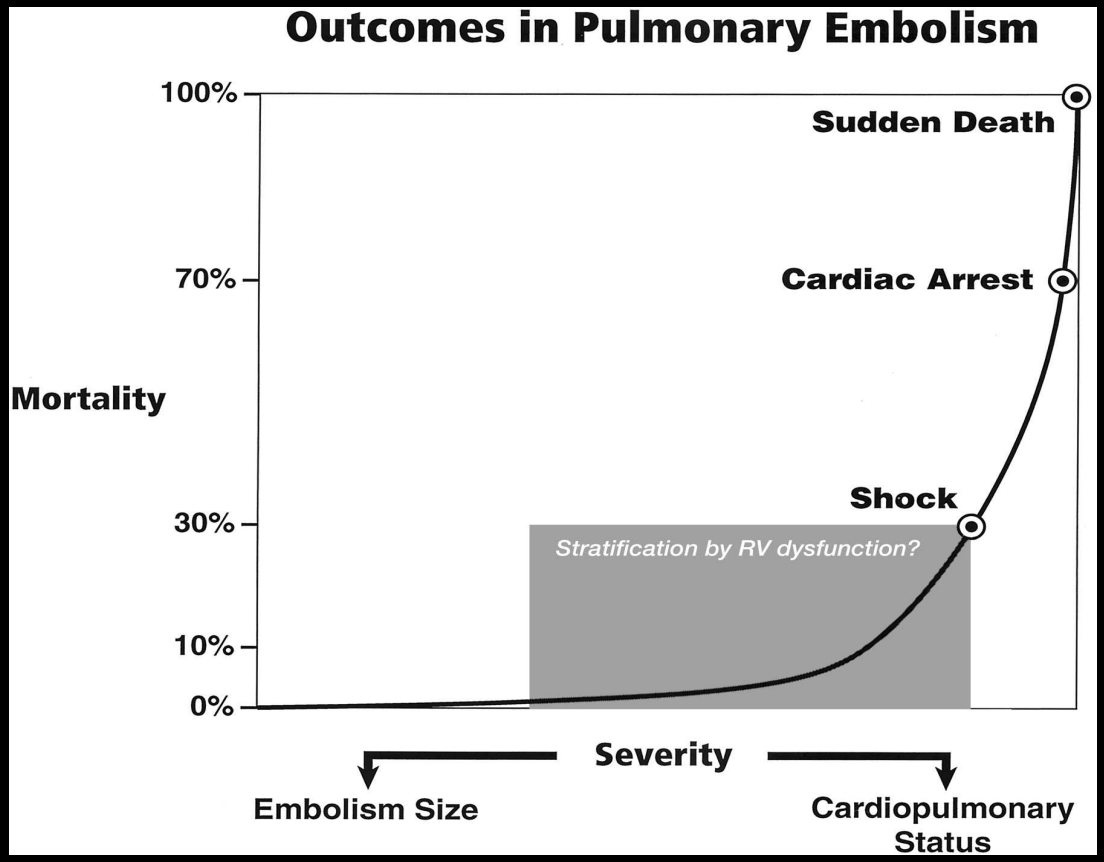
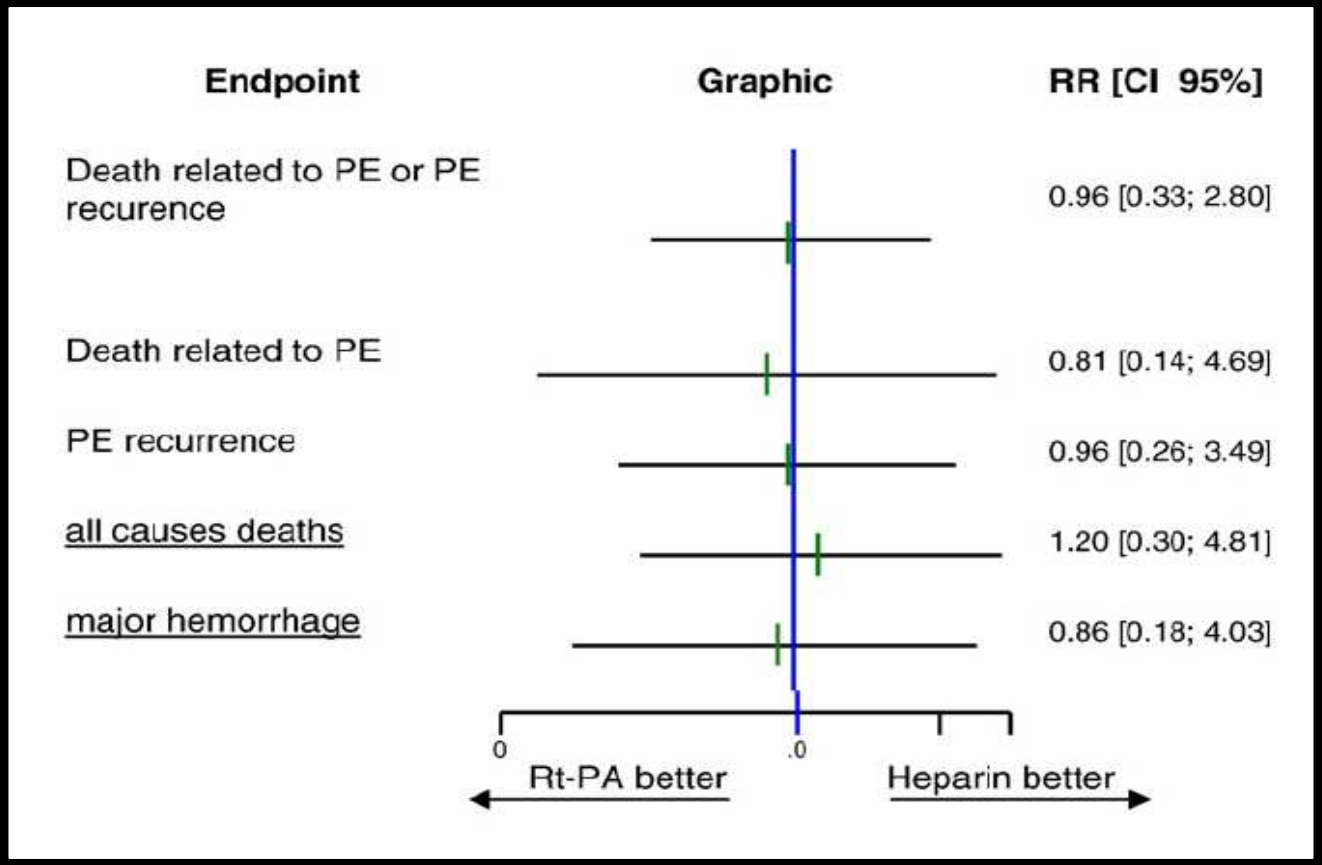
Anticoagulation - Thrombolysis



Results for pts with RV dysfunction: 2 studies, 357 pts

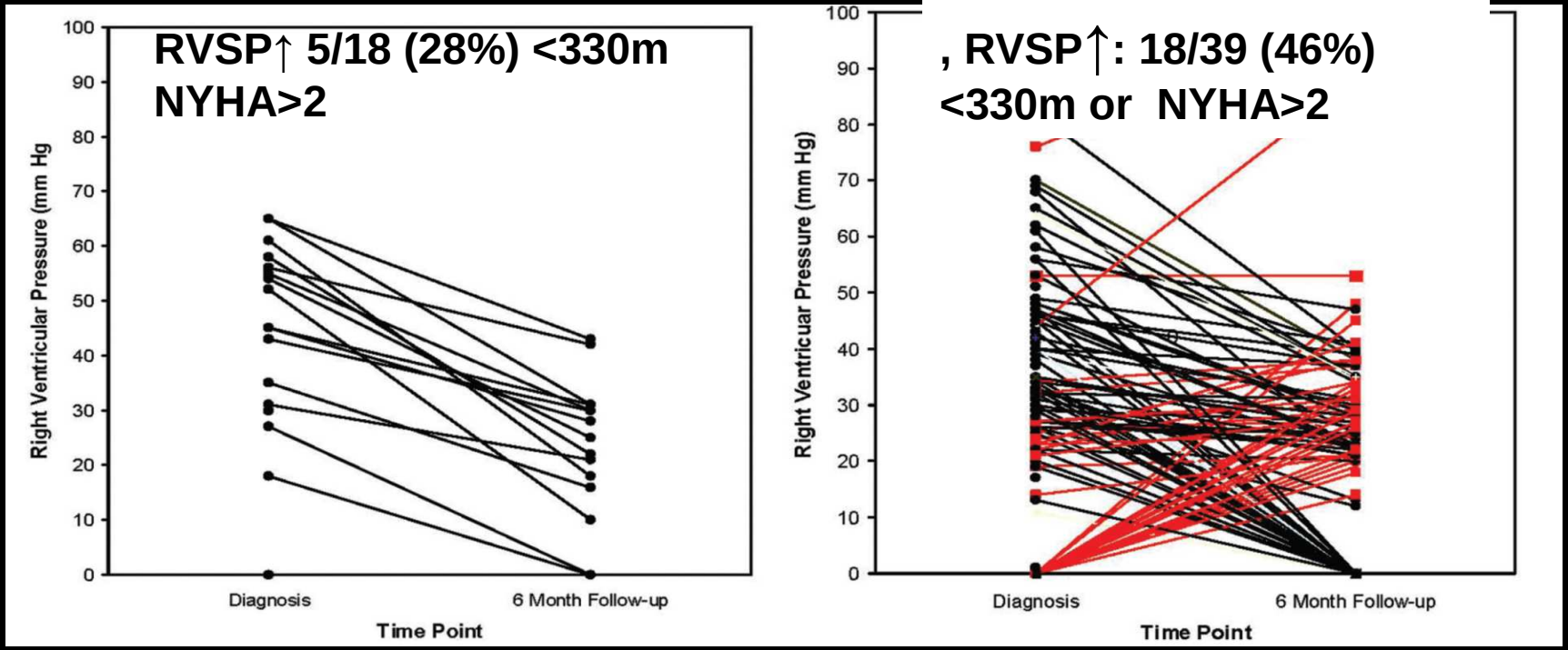


Thromb Res 2009; 124:672-77.

RVSP at baseline and 6 months later

Group with heparin + alteplase

Group with heparin and placebo



Kline et al. Chest 2009; 136:1202-1210

Volume management

- Volume overloading may further

  Dilate RV

  Increase Triscuspid regurgitation

  A sharp increase in left or to right filling pressures may indicate when **further loading is detrimental**

Positive Inotropic agents

- Dobutamine – Phosphodiestarase inhibitors

  Increase contractility but may Increase oxygen consumption of the myocardium

- Levosimental

Vasopressors

TABLE 1. Effect of Volume and Norepinephrine on Right Ventricula

	CO ($l \cdot min^{-1}$)	SV (ml)	RVEDP (mmHg)	RVSP (mmHg)	PAP (mmHg)	PVR ($mmHg \cdot l^{-1} \cdot min$)
Baseline (cond. A)	2.8 ± 1.6	17.4 ± 4.4	0.17 ± .4	19.4 ± 2.4	11.0 ± 2.3	1.9 ± 1
Volume (cond. B)	3.4 ± 0.6	23.5 ± 6.5*	1.3 ± .93	21.2 ± 1.6	12.3 ± 1.8	1.2 ± .1
Baseline (cond. C)	3.0 ± 1.5	18.7 ± 8.3	0.42 ± 2.5	18.7 ± 8.3	13.8 ± 4.4	1.7 ± 2.3
PVR (cond. D)	1.4 ± 0.2†	9.1 ± 1.3†	9.4 ± 4.8†	71.3 ± 6.8†	55.4 ± 5.8†	37.0 ± 5.9†
Volume (cond. E)	0.94 ± .4	6.3 ± 2.3†	11.9 ± 4.7†	52.1 ± 18.7†	42.3 ± 16.0†	36.7 ± 5.9
Norepinephrine (cond. F)	1.9 ± .2*	11.2 ± 2.1†	4.7 ± 4.3†	81.8 ± 15.5†	60.2 ± 7.1†	29.7 ± 4.1

Ghignone et Anesthesiology 1984

Conclusions

- Massive PE :Heparine +Fibrinolysis
- Submassive PE : Heparine , Consider Fibrinolysis in High Risk Patients
- Avoid Volume overload
- Vasopressors