ECHO PATTERN OF ACUTE COR PULMONALE

Antoine Vieillard-Baron, Boulogne, France

1- Unlike the left ventricle, the RV is able to dilate acutely under abnormal conditions.

Its diastolic function is tolerant
A failed RV is dilated

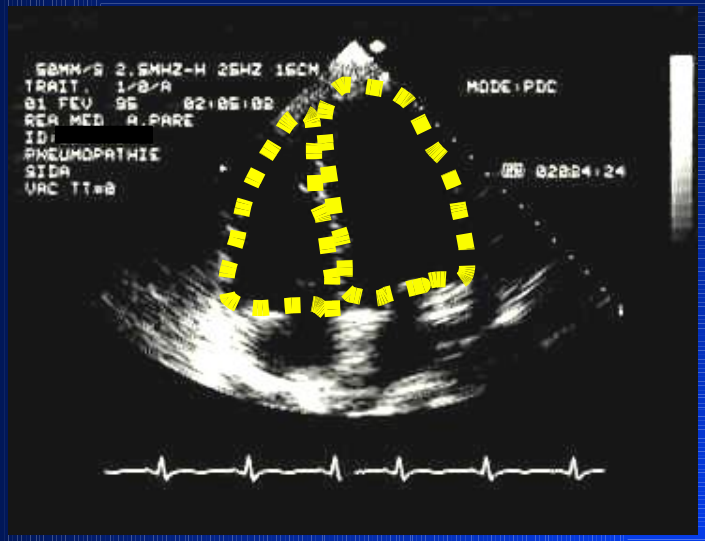
2- Unlike the left ventricle, the RV not easily adapts to an acute increase in its afterload.

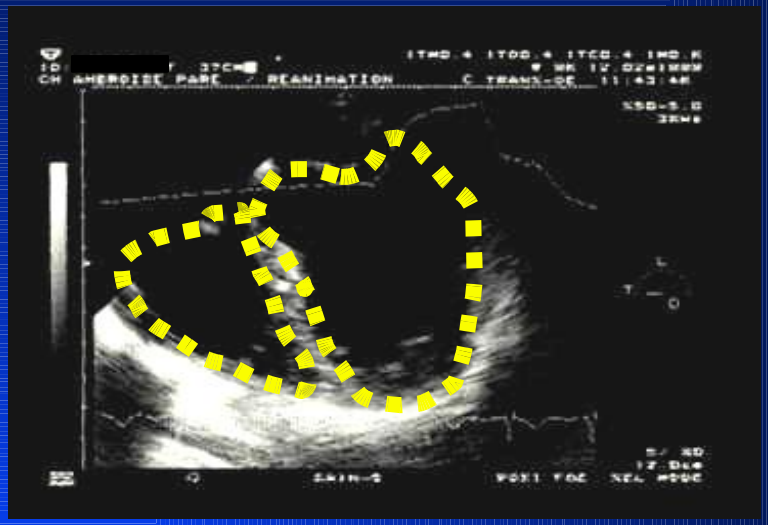
Its systolic function is sensitive
A paradoxical septal motion can be visualized in certain conditions

ACP = Echocardiographic definition
Diastolic overload (dilatation)
+ systolic overload (paradoxical septal motion)

I

RV DIASTOLIC FUNCTION IS TOLERANT





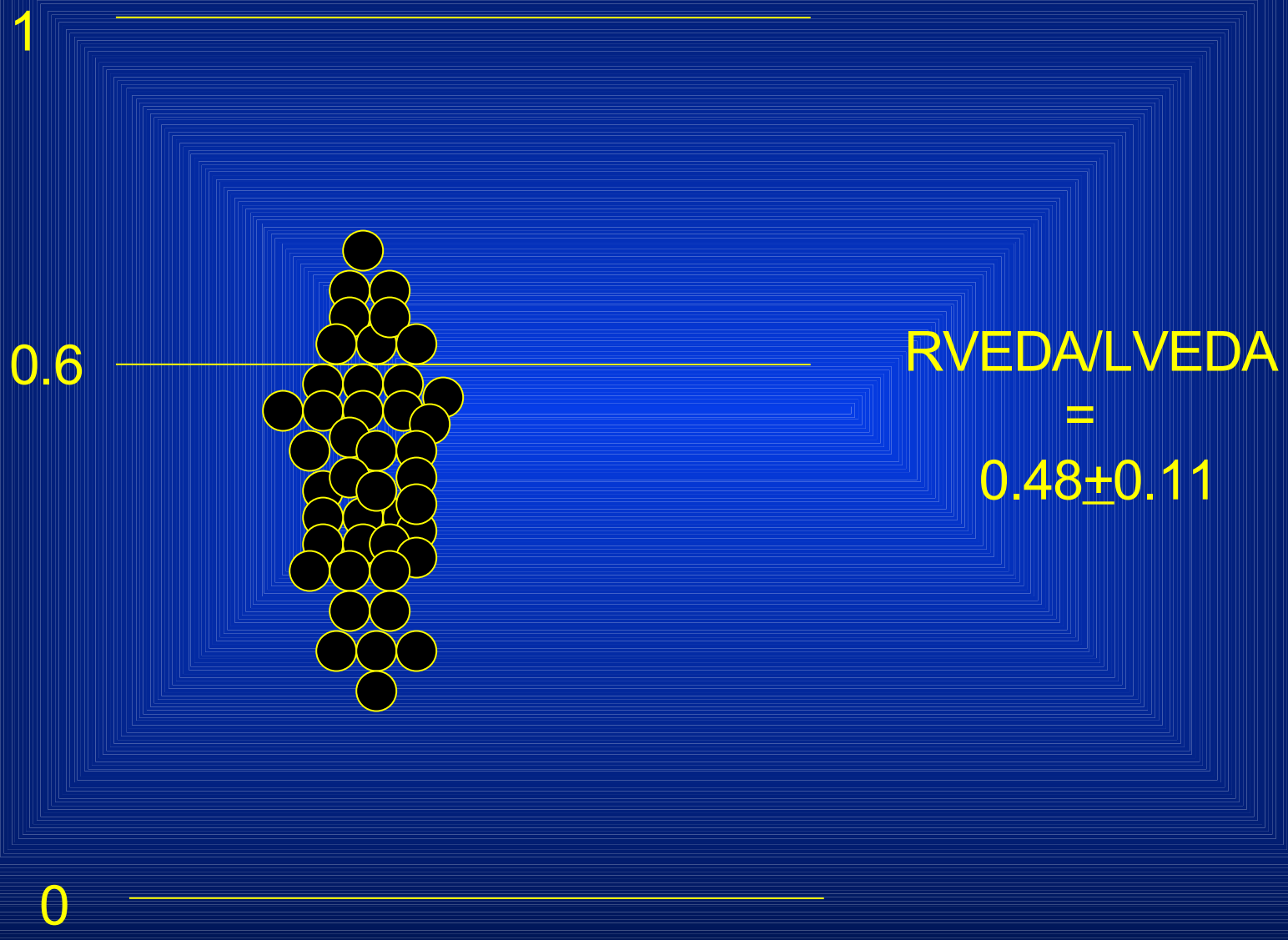
No dilatation: RVEDA/LVEDA < 0.6

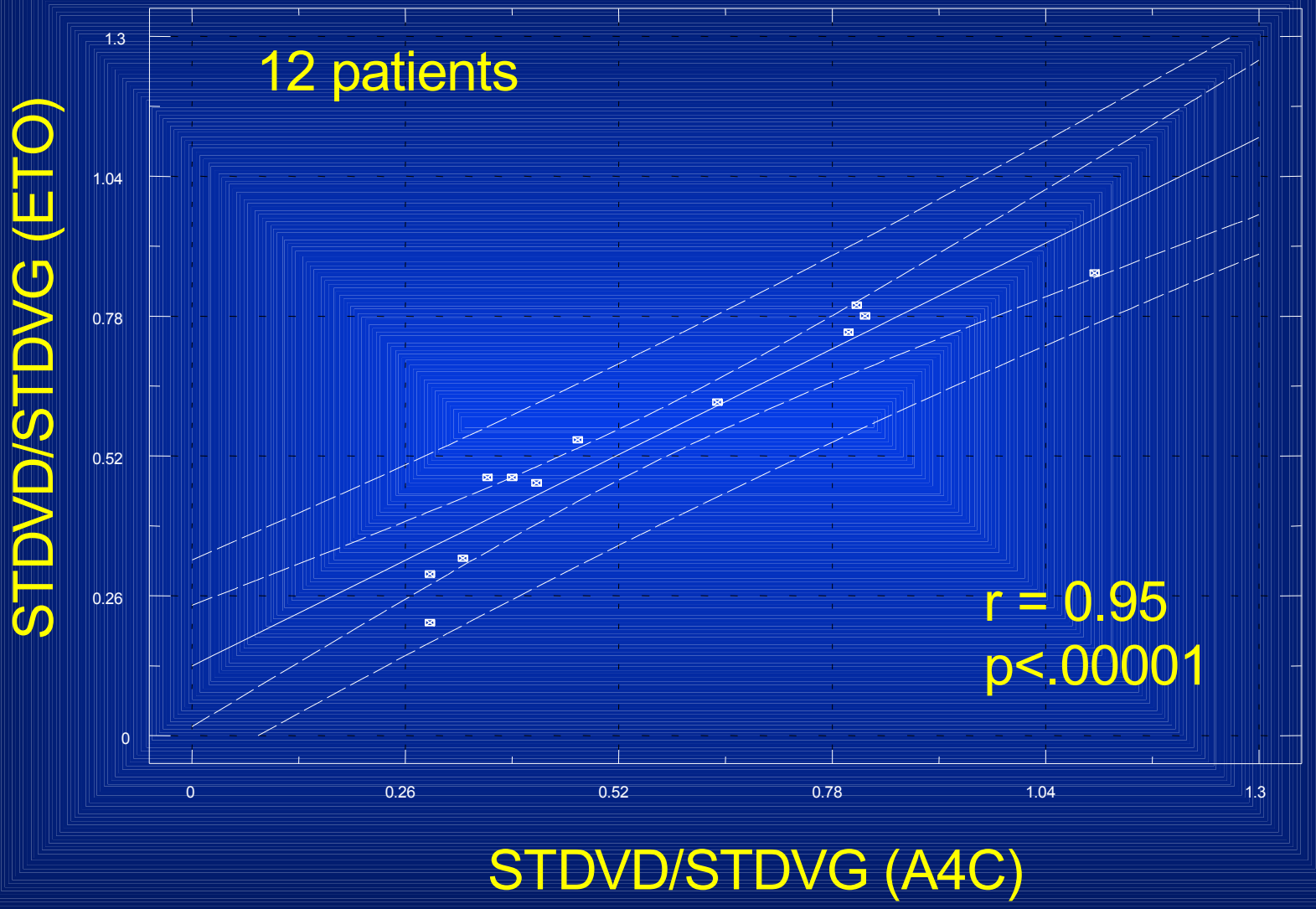
Moderate dilatation: RVEDA/LVEDA 0.6 - 1

Major dilatation: RVEDA/LVEDA > 1

Jardin Chest 1997

Healthy volunteers (n=44)



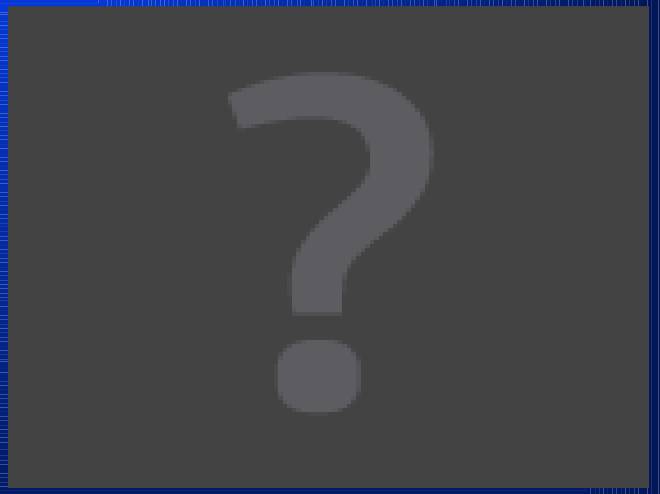

12 patients
STDVD/STDVG (ETO)
1.3
1.04
0.78
0.52
0.26
0
0
0.26
0.52
0.78
1.04
1.3
r = 0.95
p<.00001
STDVD/STDVG (A4C)

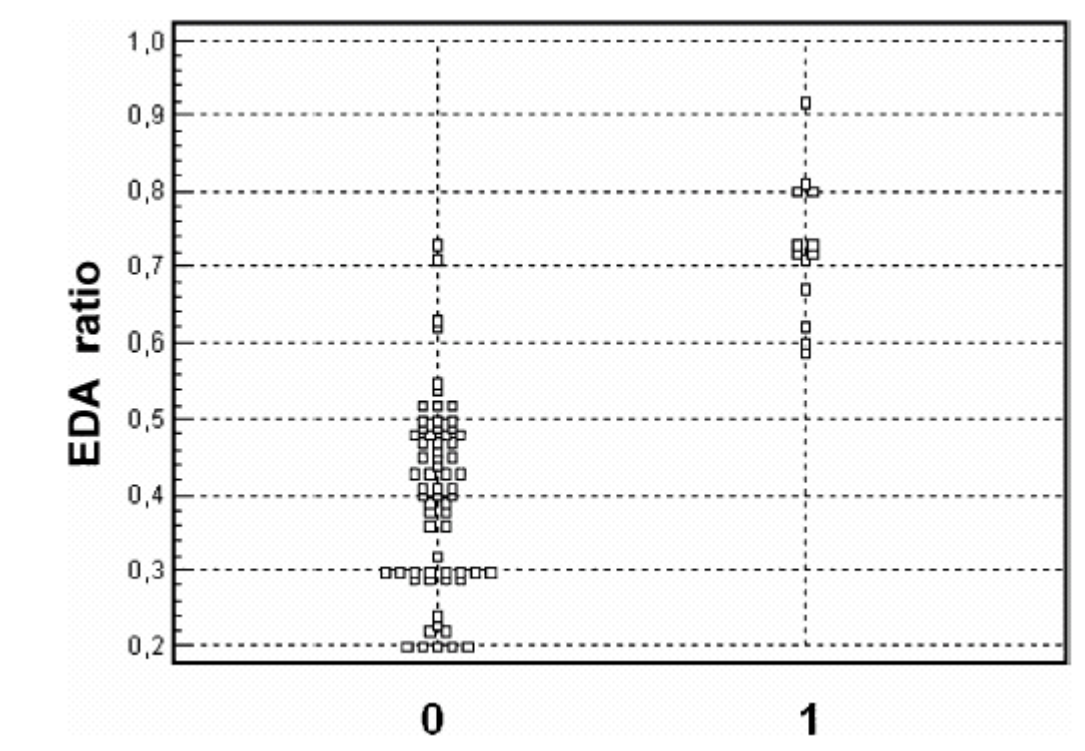
Normal RV function

Massive PE
D1

Normal RV function

ARDS related to varicellous pneumonia

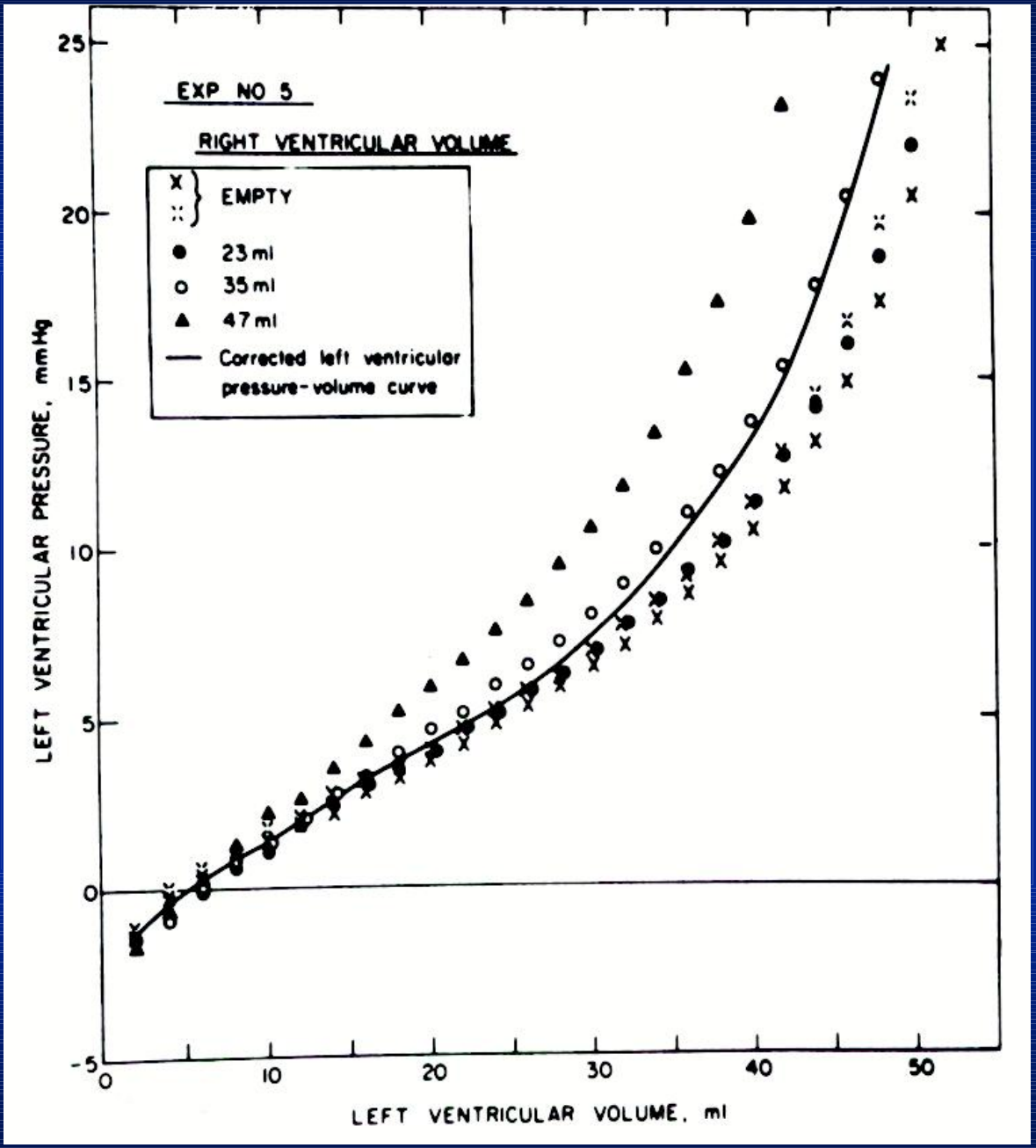




Vieillard-Baron ICM 2006

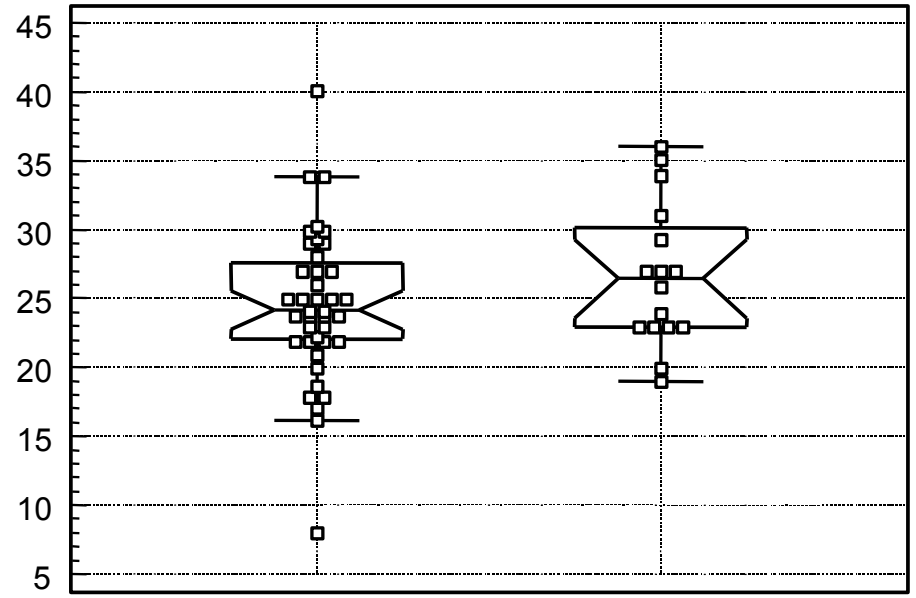
THE LV CONSEQUENCES OF AN ACUTE RV DILATATION

- Because of the pericardium, the sum of cardiac cavities keep constant in acute conditions.
- Any RV dilatation leads to a LV restriction which impairs its filling. This induces a pattern of relaxation impairment of the LV.

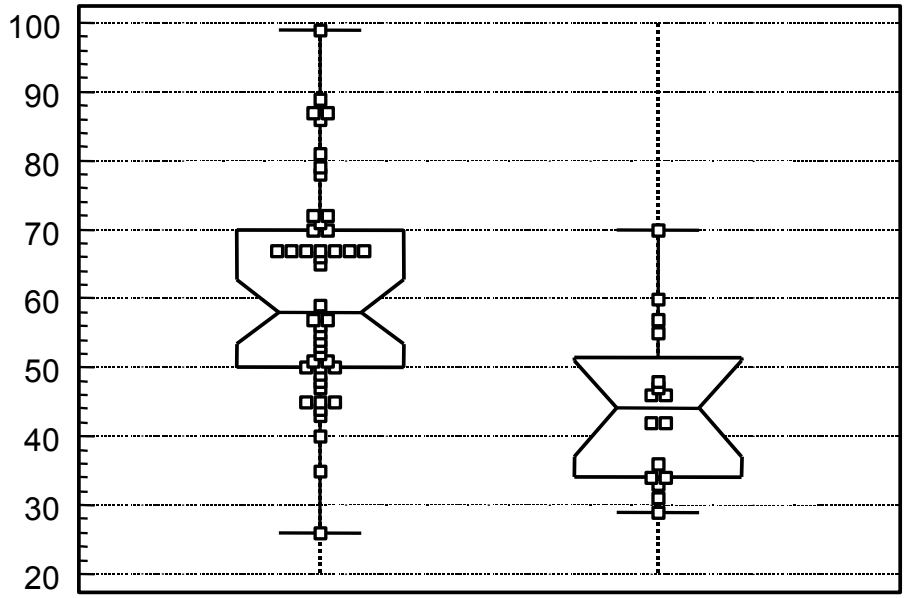


Taylor AJP 1967

EDA RV+LV
(cm^2)



LVEDV
(cm^3)



Vieillard-Baron CCM 2001

TEE study at D3

75 SDRA (1996-2001)

	Gr I (56 patients) no ACP (75 %)	Gr II (19 patients) ACP (25 %)	
LVEDV	60 ± 16	50 ± 15*	(cm^3/m^2)
E/A mit	1.3 ± 0.4	0.8 ± 0.2*	
SI	32± 9	25 ± 9*	(cm^3/m^2)
HR	96 ± 19	112 ± 16*	(bt/mn)

Vieillard-Baron CCM 2001

P/F 80
Crs 25 mL/cmH_2O

P/F 40
Crs 20 mL/cmH_2O
NE 0.6 µg/kg/min

P/F 35
Crs 11 mL/cmH_2O
NE 1.5 µg/kg/min

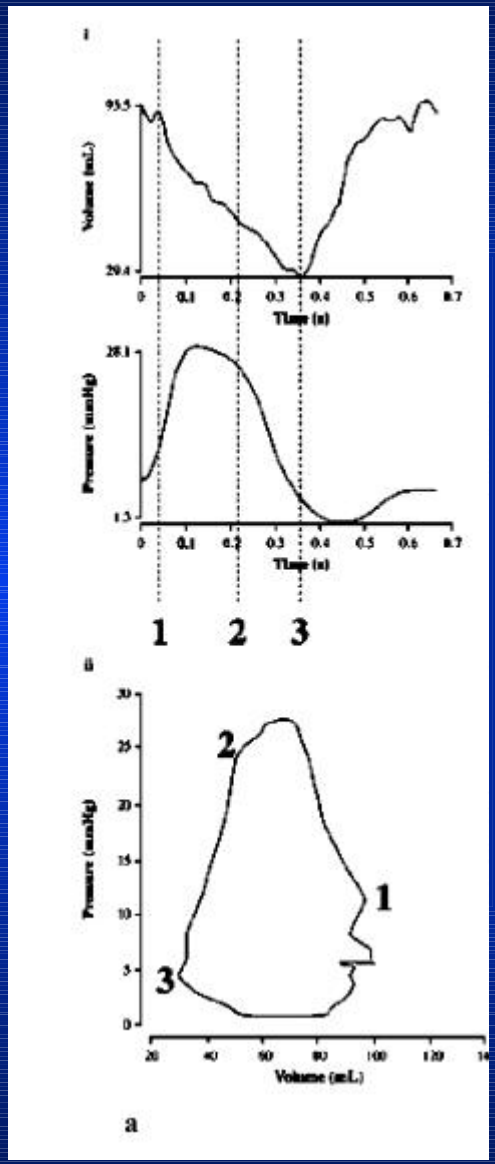
II

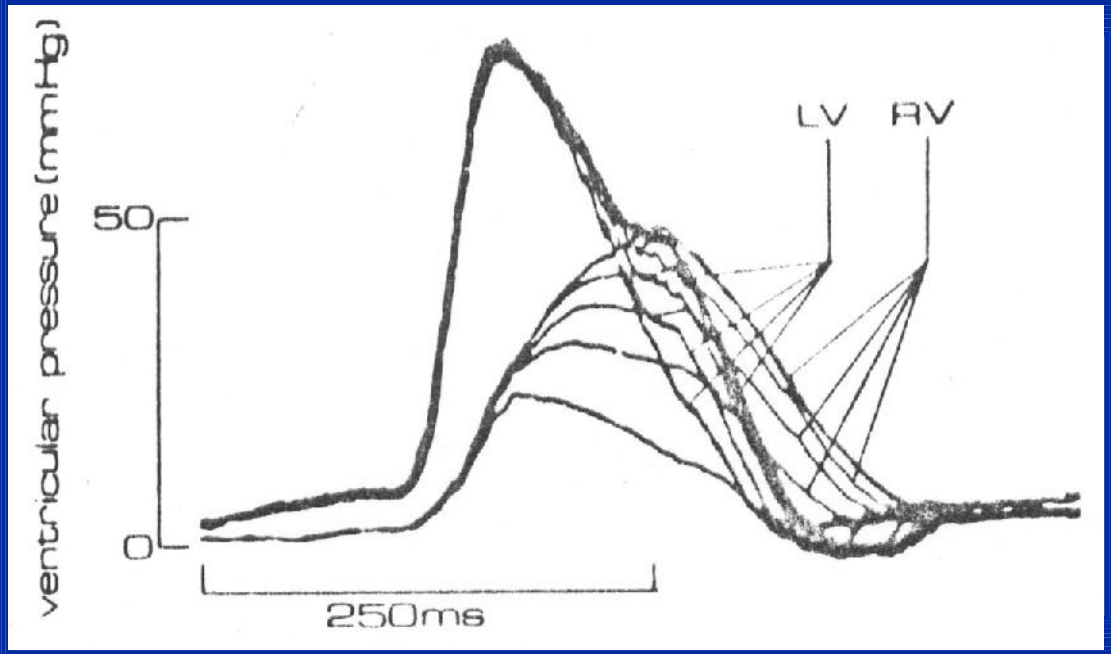
RV SYSTOLIC FUNCTION IS SENSITIVE

1: Opening of the pulmonic valve

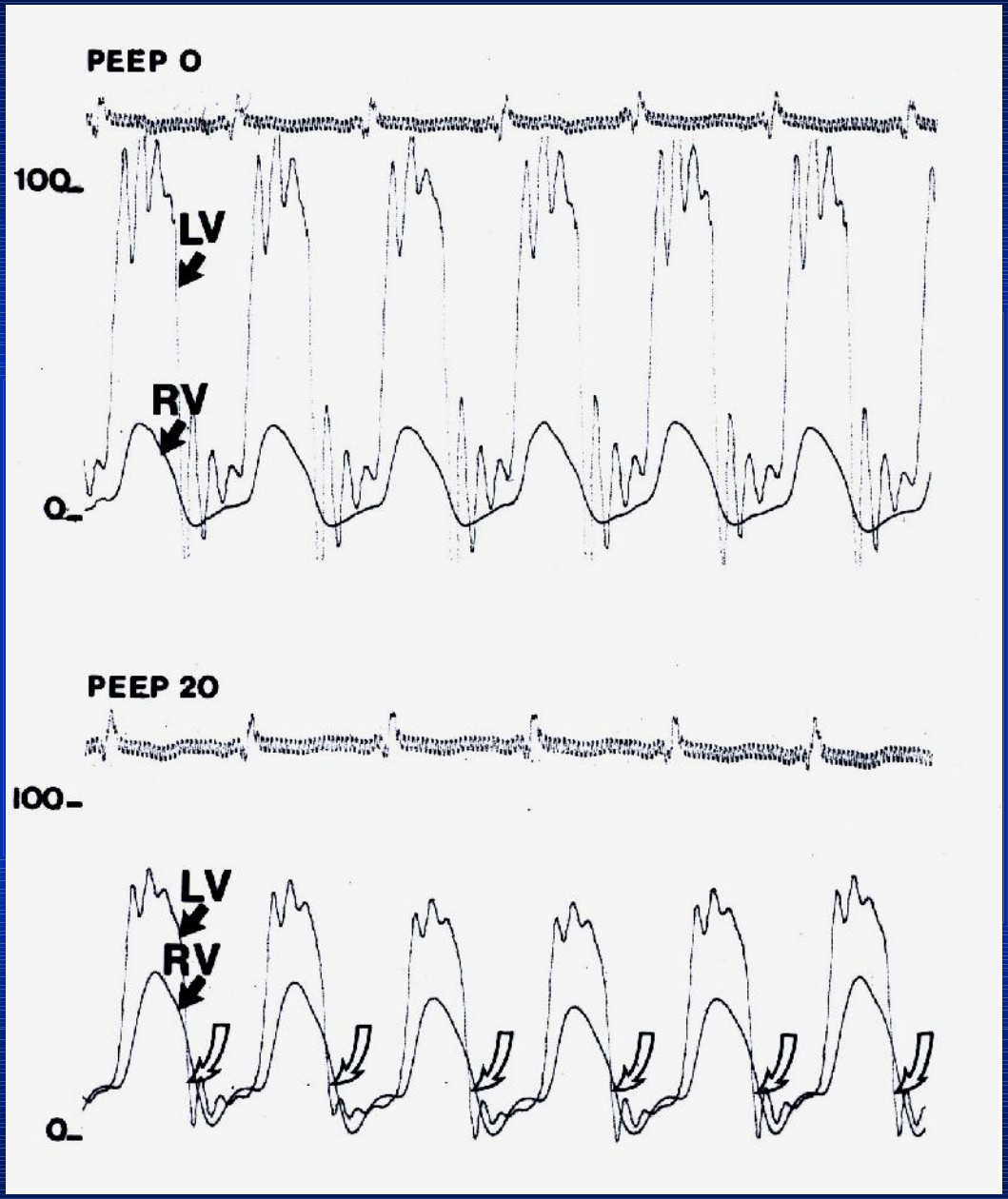
2: Beginning of relaxation

3: Closing of pulmonic valve





Elzinga 1990



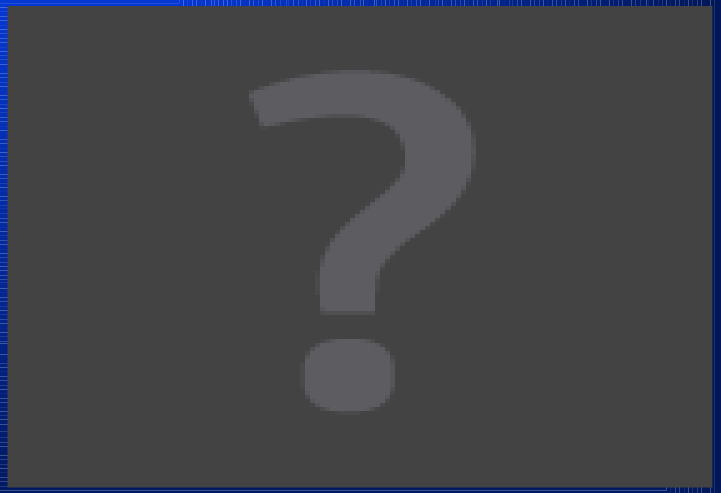
Jardin N Engl J Med 1981

Normal RV function

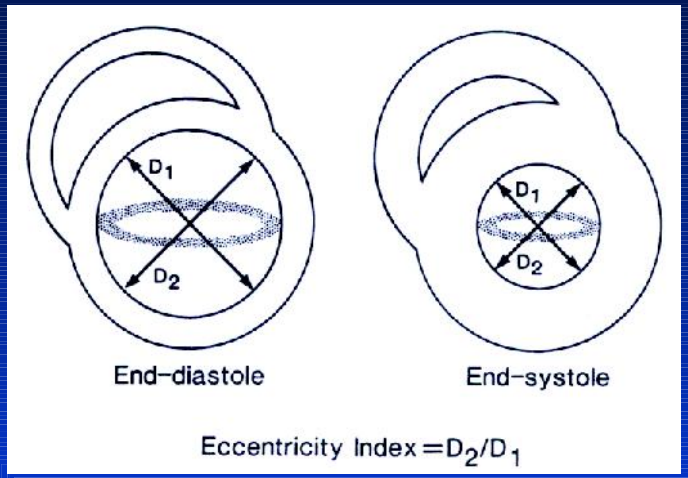
Massive PE
D1

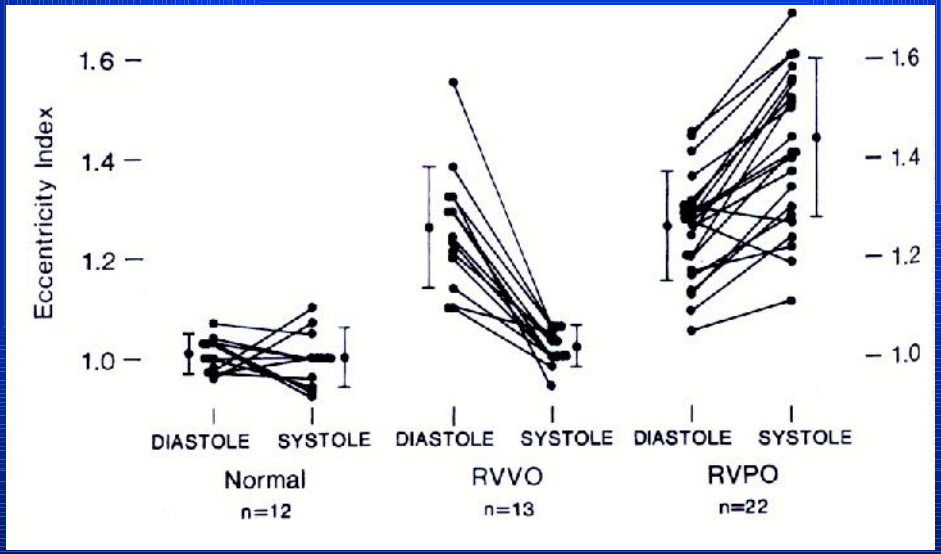
Normal RV function

ARDS related to varicellous pneumonia



Vieillard-Baron AJRCCM 2002





Ryan JACC 1985

INCIDENCE OF ACP IN ICU

Acute cor pulmonale in acute respiratory distress syndrome submitted to protective ventilation: Incidence, clinical implications, and prognosis

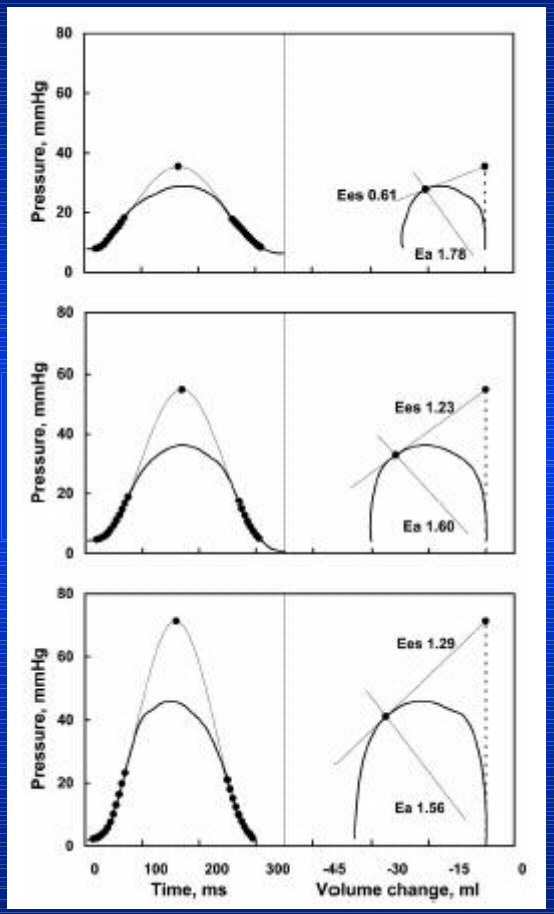
CCM 2001

- **75 ARDS submitted to a protective ventilation**
  - **TEE at D3**
  - **Incidence of ACP: 25%**

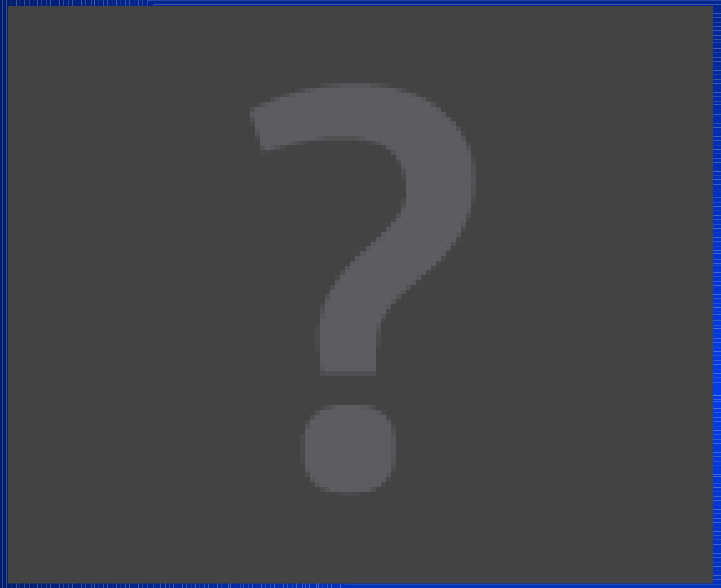
Acute cor pulmonale in massive pulmonary embolism: incidence, echocardiographic pattern, clinical implications and recovery rate

ICM 2001

- **161 massive PE**
  - **TTE at D1**
  - **Incidence of ACP: 61%**



Kerbaul Chest 2004



D1

2 hours later…..