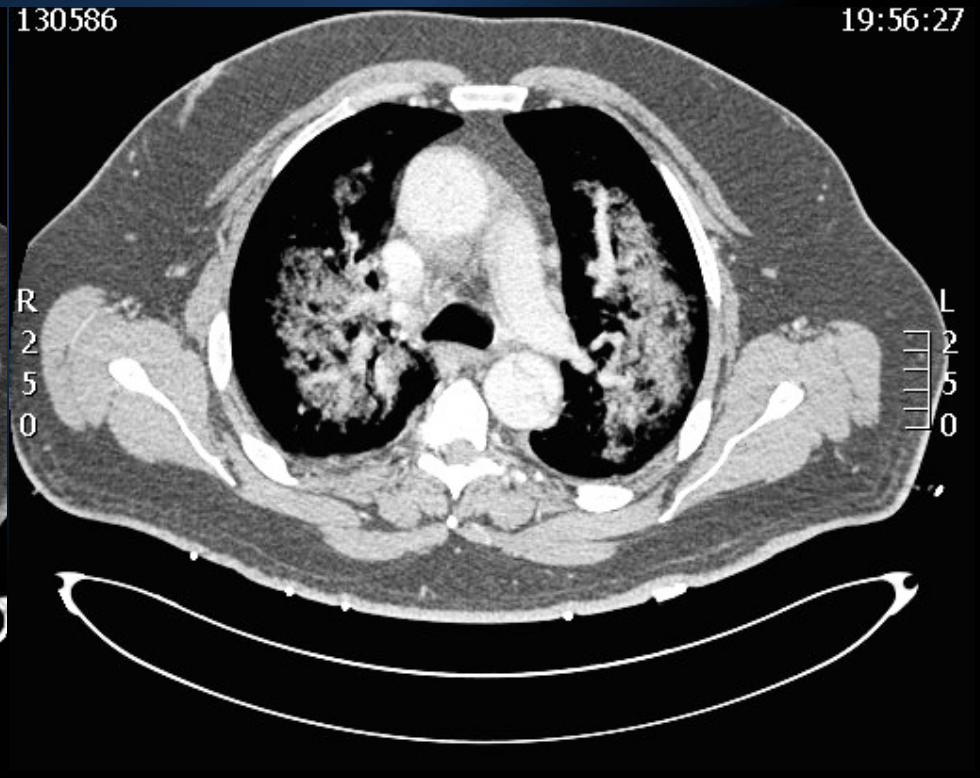
L'ECO2DColorDoppler nell'EPA

Aurelio Caruso
Casa di Cura San Michele
Maddaloni (Caserta)

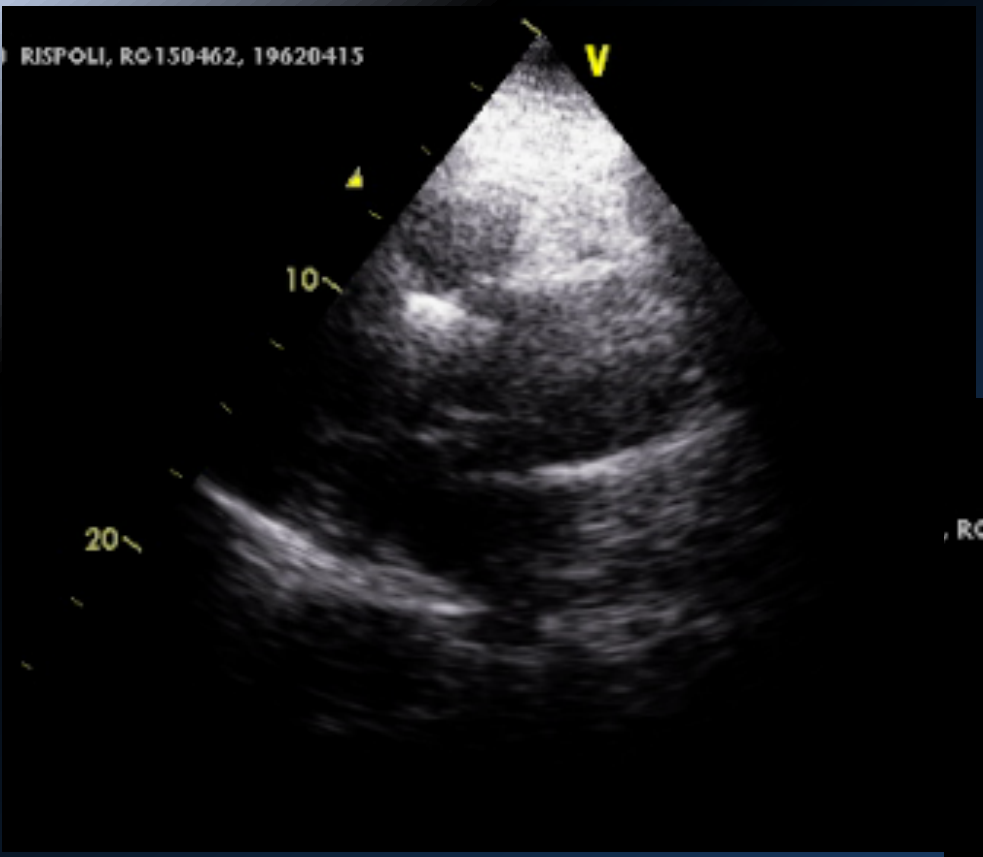
- M.
- 51 anni
- Tosse, dispnea,febbre da 4-5 gg
- Trasferito da altro P.O. con diagnosi di SCA x troponina e mioglobina elevate

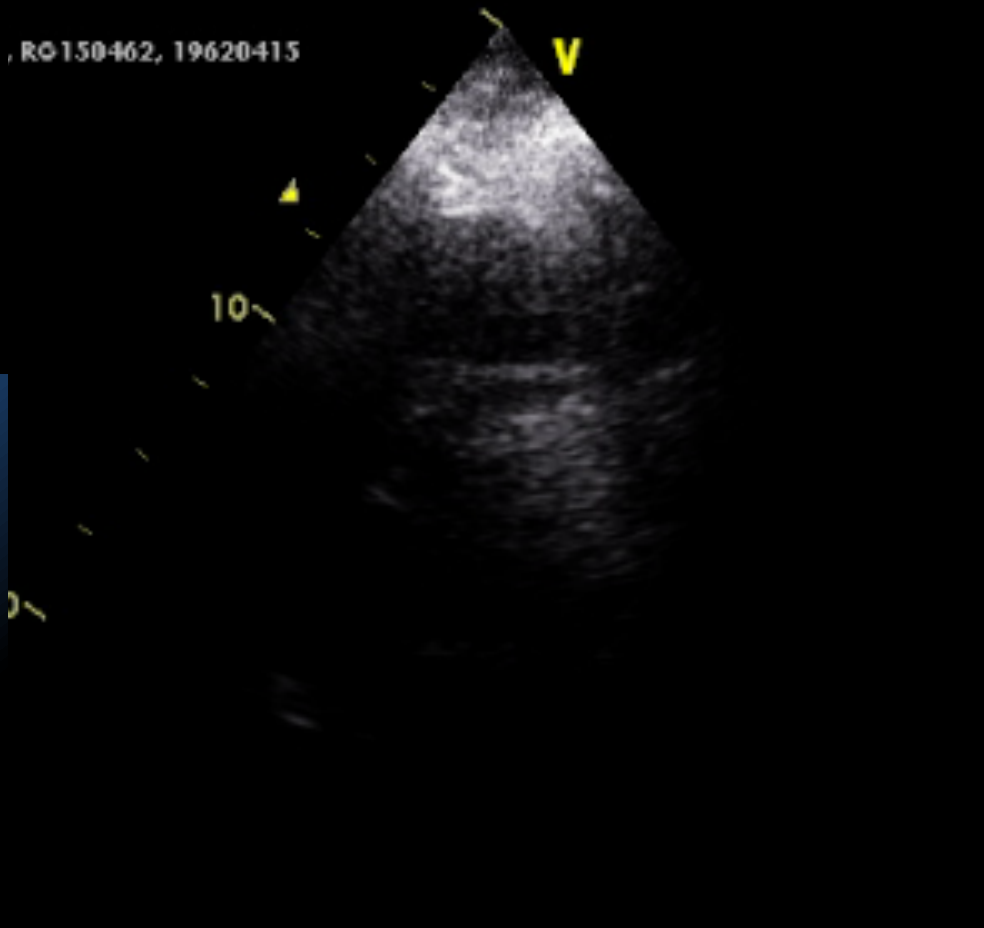
Dispnea intensa all'ingresso

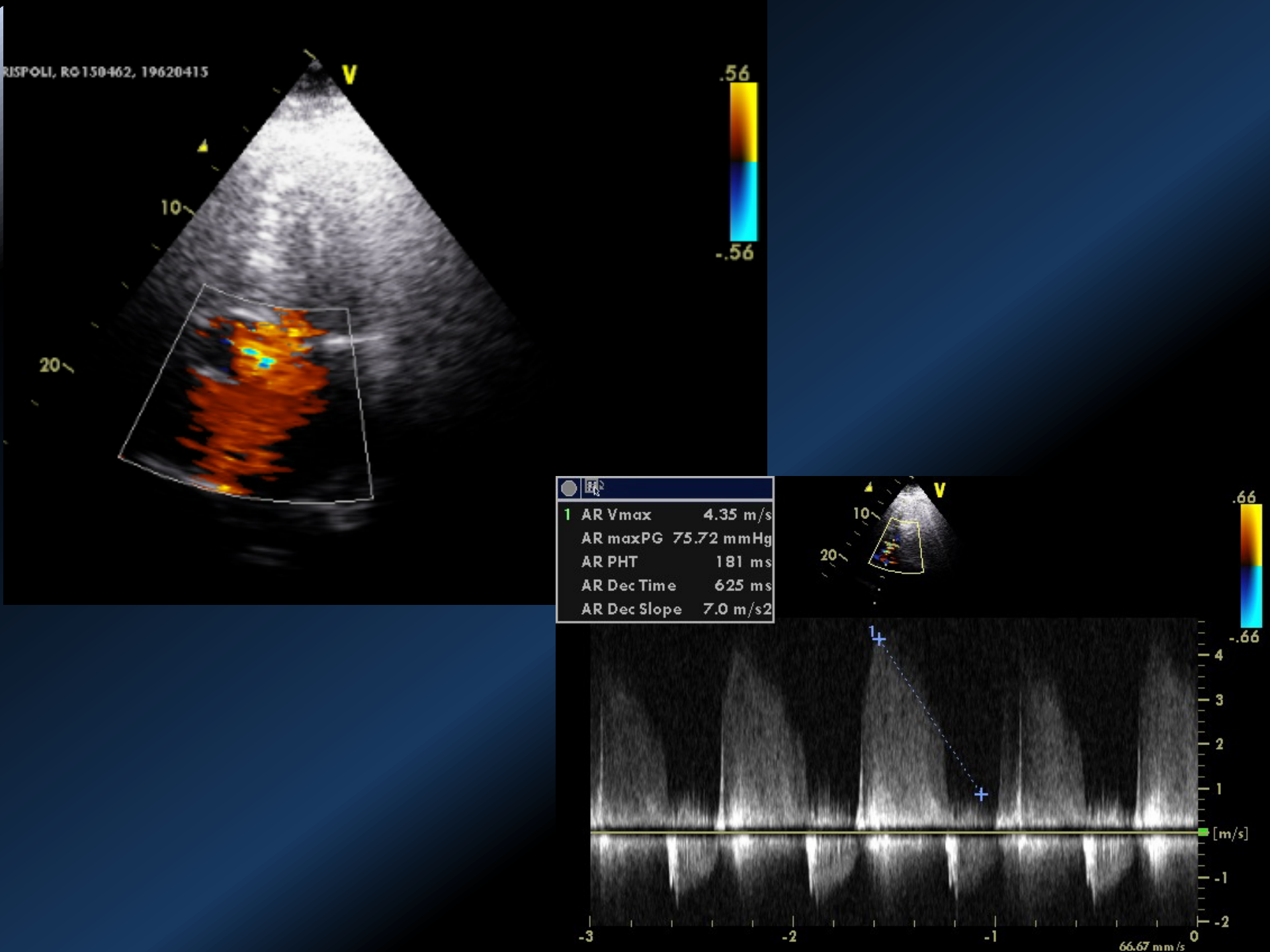


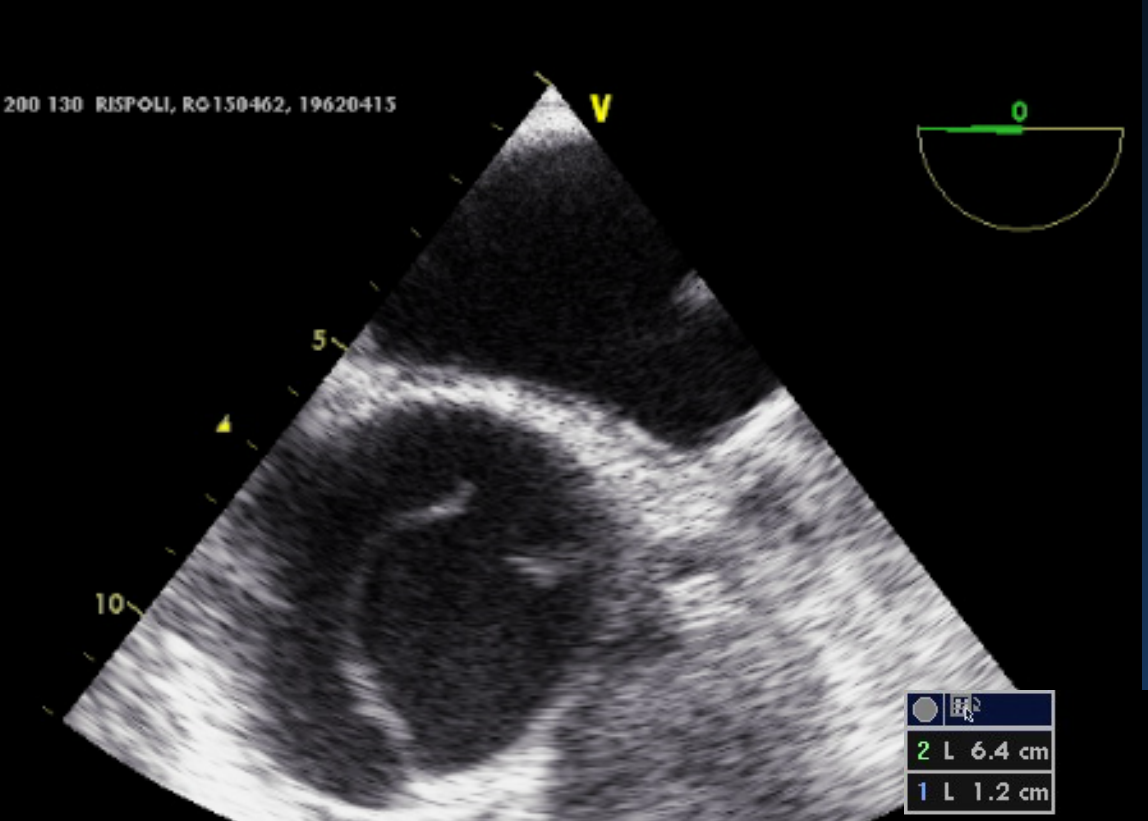
Dilemma decisionale

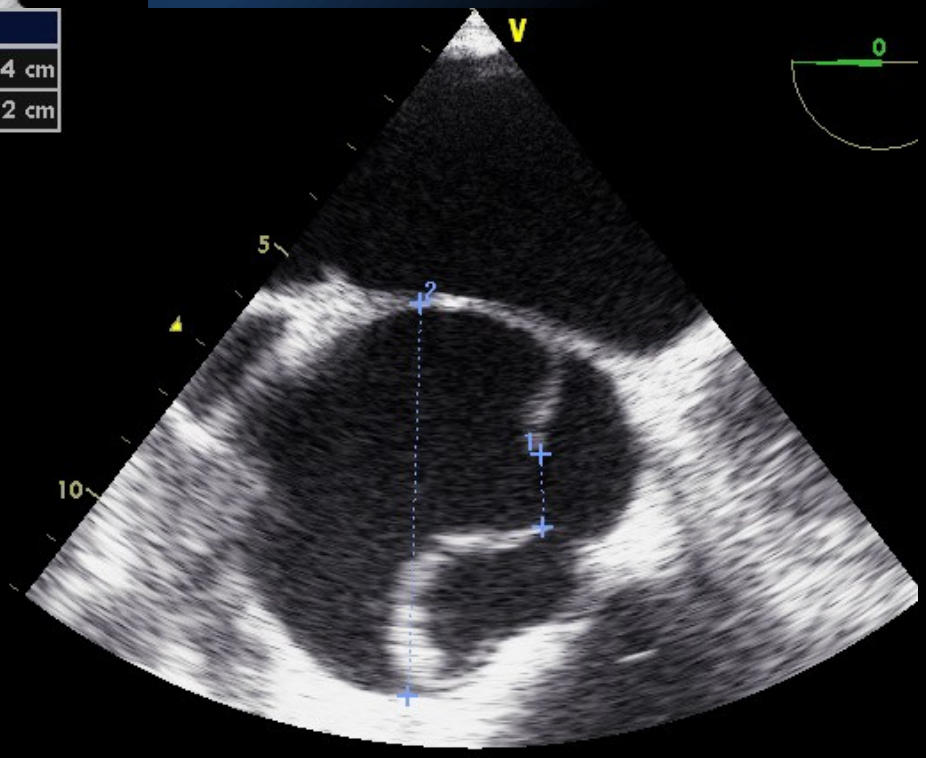
- Dissezione acuta?
- Chirurgia immediata
- Dissezione cronica?
- Chirurgia differita


RISPOLI, RO150462, 19620415
V
10
20


RO150462, 19620415
V
10


RISPOLI, RO150462, 19620415
V
10
20
.56
-.56
1 AR Vmax 4.35 m/s
AR maxPG 75.72 mmHg
AR PHT 181 ms
AR Dec Time 625 ms
AR Dec Slope 7.0 m/s2
V
10
20
.66
-.66
1
4
3
2
1
[m/s]
-1
-2
-3
-2
-1
0
66.67 mm/s


200 130 RISPOLI, RO150462, 19620415
V
0
5
10
2 L 6.4 cm
1 L 1.2 cm


V
0
5
10
2
1

Si ribalta la diagnosi:

- Dissezione acuta
- Insufficienza aortica acuta
- EPA (non polmonite!)
- Chirurgia immediata

Ecocardiogramma e EPA

- E' sempre utile o necessario?
- Quando deve essere eseguito?
- Come conciliare i punti di vista:
  - del cardiologo?
  - dell'urgentista?

ACCF-AHA 2013

Table 10. Recommendations for Noninvasive Cardiac Imaging

Recommendations	COR	LOE
Patients with suspected, acute, or new-onset HF should undergo a chest x-ray	I	C

A 2-dimensional echocardiogram with Doppler should be performed for initial evaluation of HF

Repeat measurement of EF is useful in patients with HF who have had a significant change in clinical status or received treatment that might affect cardiac function or for consideration of device therapy

ESC 2012

Recommendations	Class[a]	Level[b]
Investigations to consider in all patients		
Transthoracic echocardiog and to measure LVEF to m	I	C

Transtoracic echocardiograpy is recommended to evaluate cardiac structure and function, including diastolic function and to measure LVEF to make the diagnosis of HF, assist in planning and monitoring of treatment end to obtain prognostic information.

Table 3. Definitions of HF*r*EF and HF*p*EF

Classification	EF (%)
I. Heart failure with reduced ejection fraction (HF*r*EF)	≤40
II. Heart failure with preserved ejection fraction (HF*p*EF)	≥50
a. HF*p*EF, borderline	41 to 49
b. HF*p*EF, improved	>40

EF indicates ejection fraction; HF, heart failure; HF

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a. HF*p*EF, borderline	41 to 49
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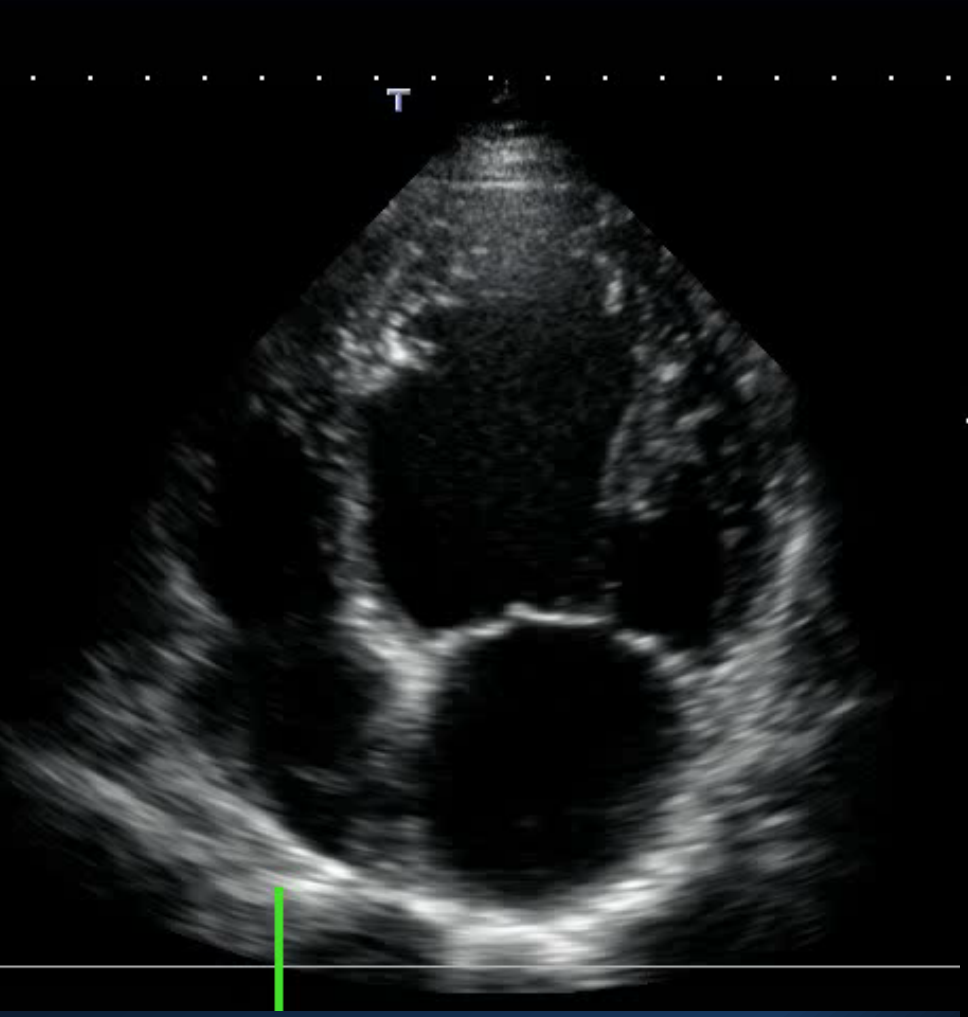
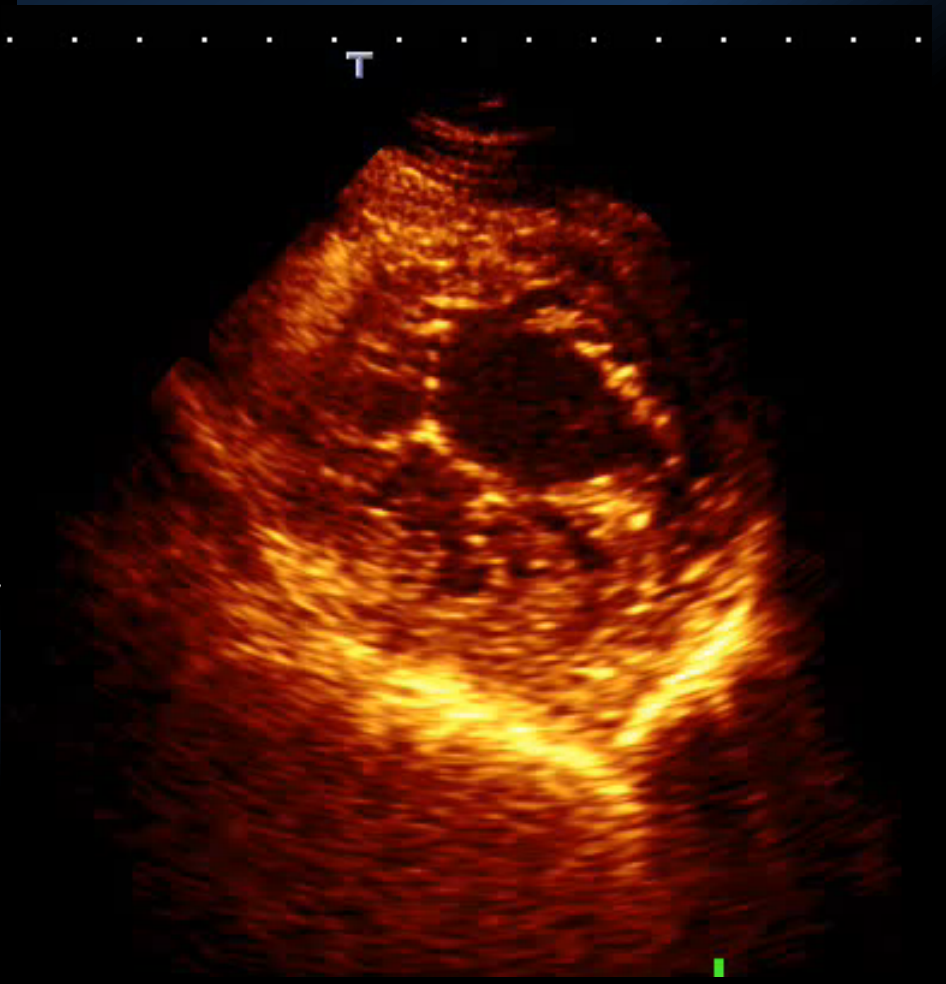
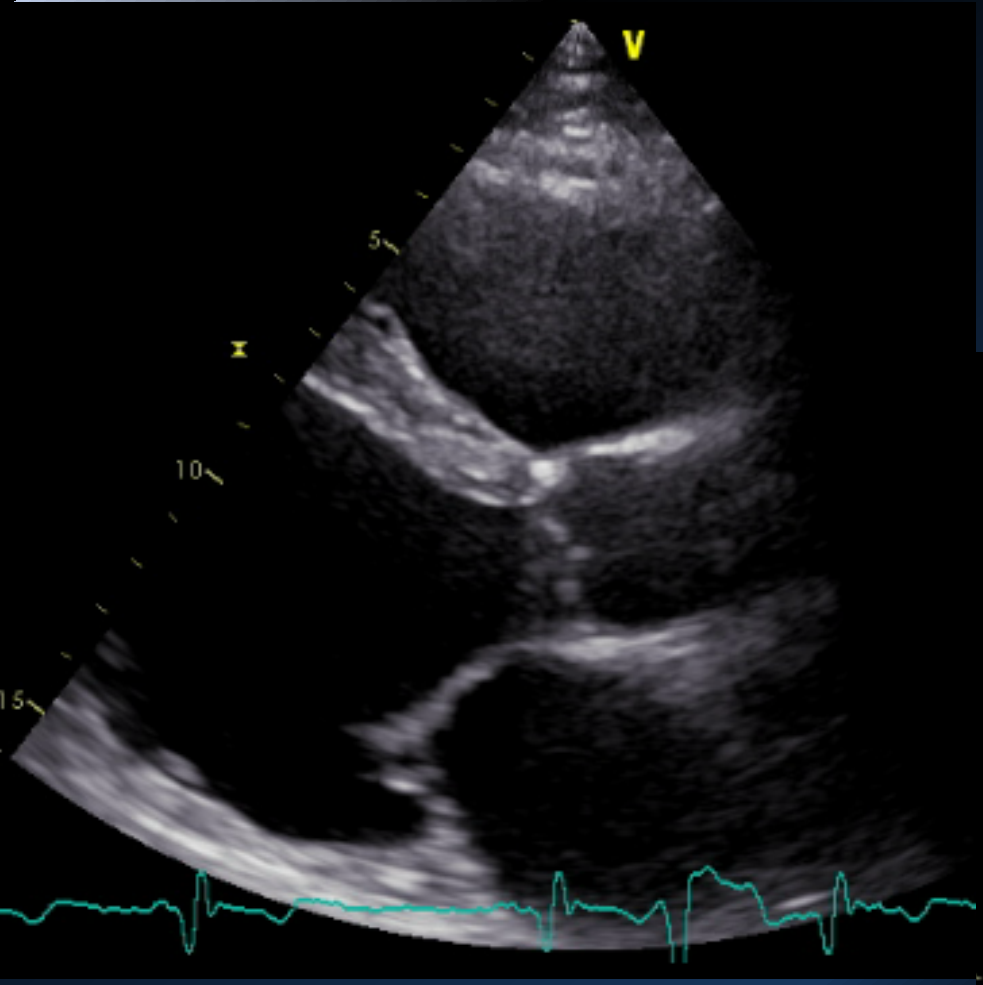
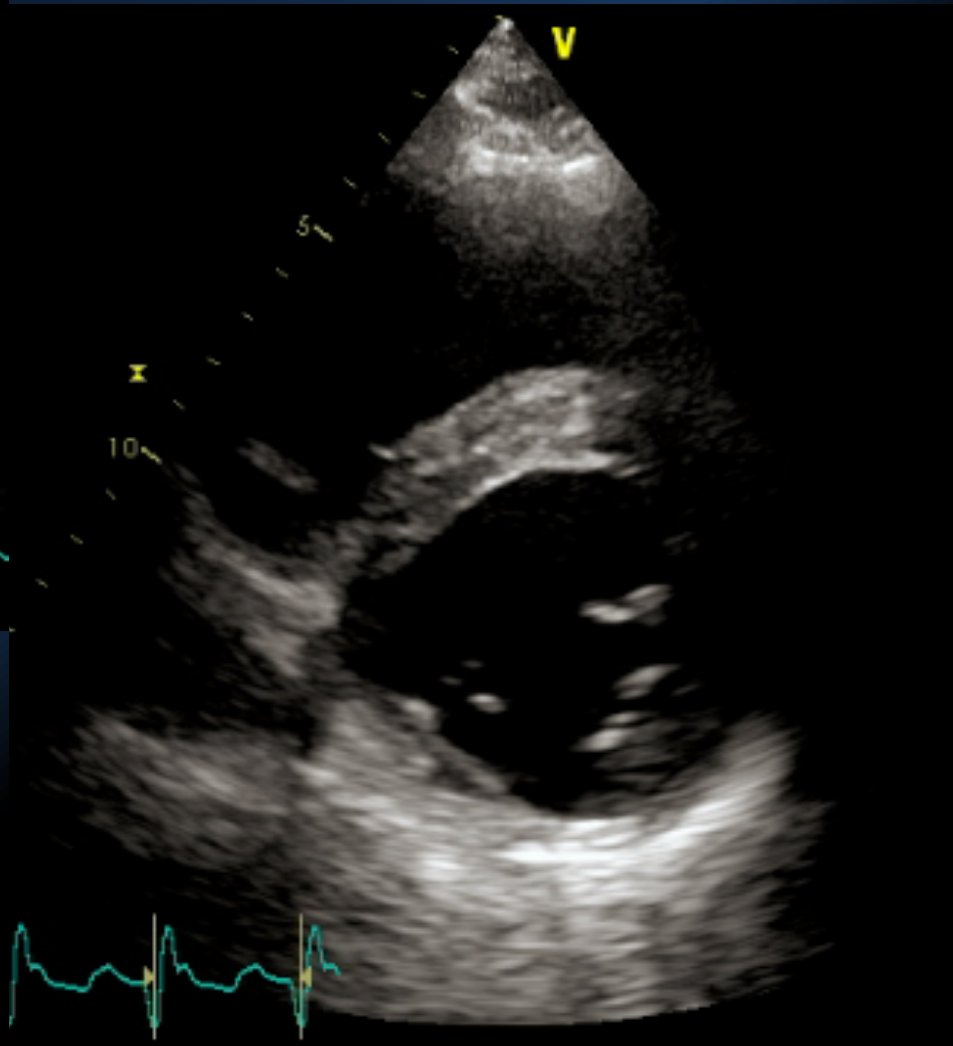
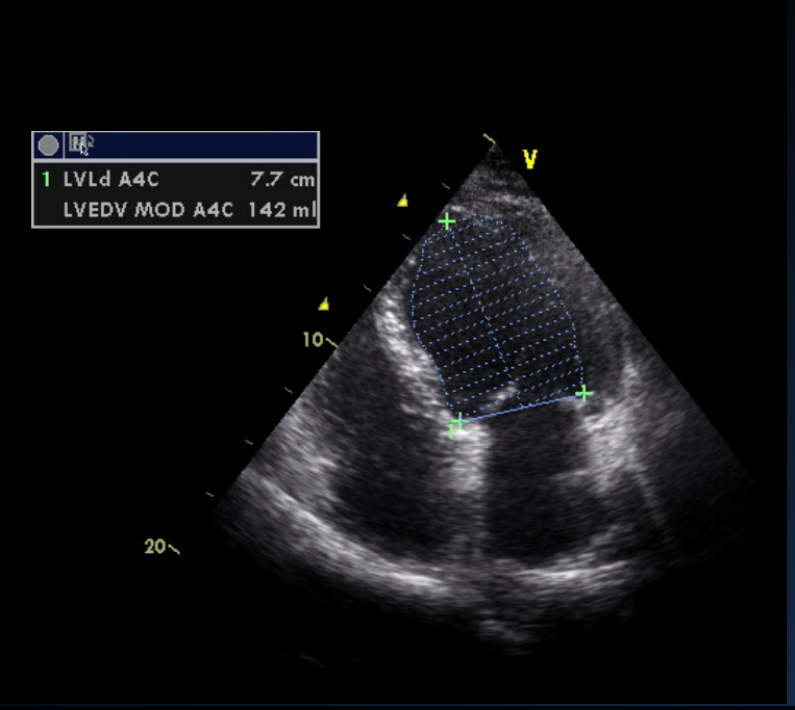
Linee guida ACCF/AHA 2013

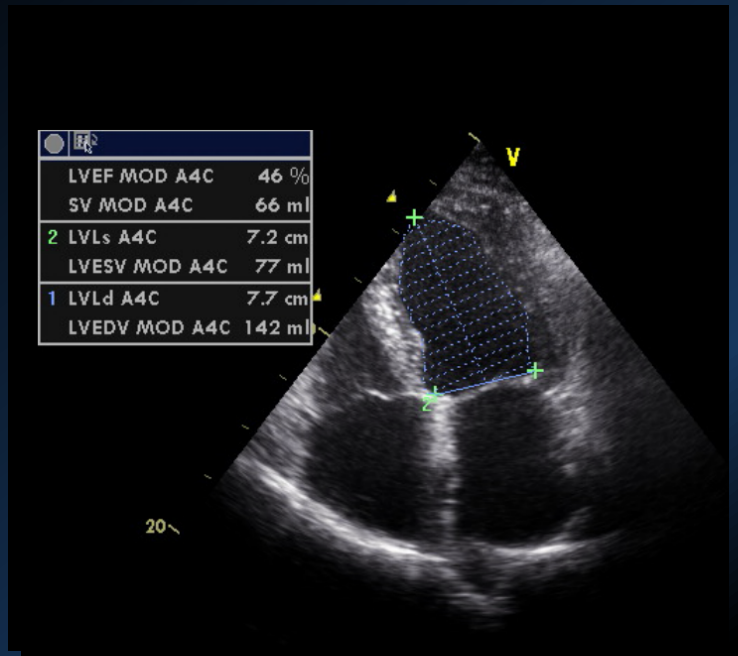


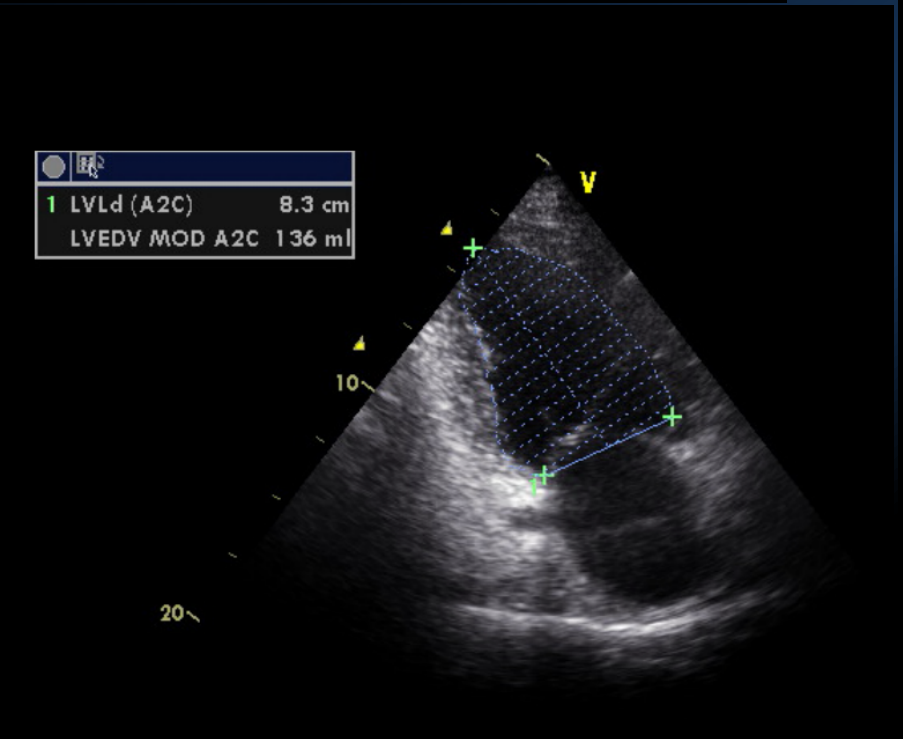


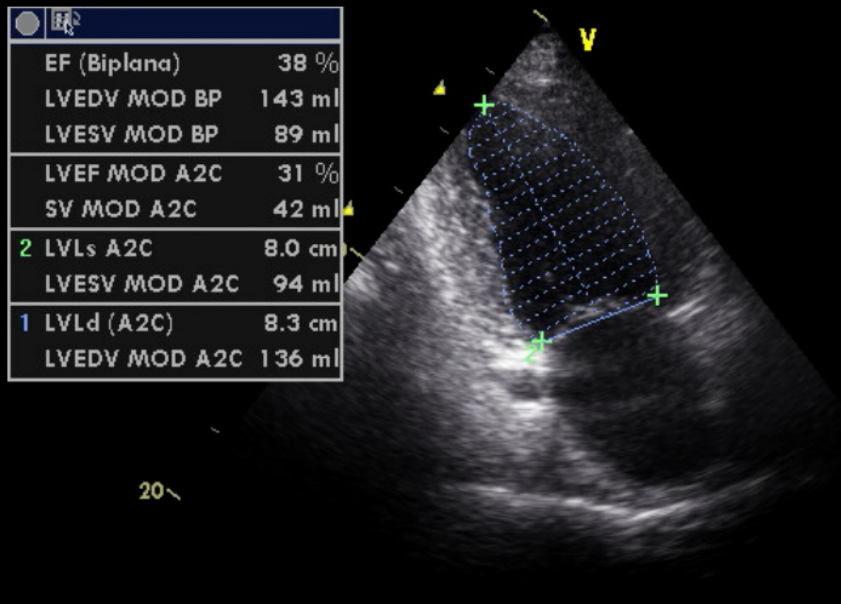

V
5
10
15


V
5
10


1 LVLd A4C 7.7 cm
LVEDV MOD A4C 142 ml
10
20


LVEF MOD A4C 46 %
SV MOD A4C 66 ml
2 LVLs A4C 7.2 cm
LVESV MOD A4C 77 ml
1 LVLd A4C 7.7 cm
LVEDV MOD A4C 142 ml
20


1 LVLd (A2C) 8.3 cm
LVEDV MOD A2C 136 ml
10
20


EF (Biplana) 38 %
LVEDV MOD BP 143 ml
LVESV MOD BP 89 ml
LVEF MOD A2C 31 %
SV MOD A2C 42 ml
2 LVLs A2C 8.0 cm
LVESV MOD A2C 94 ml
1 LVLd (A2C) 8.3 cm
LVEDV MOD A2C 136 ml
20

GUIDELINES AND STANDARDS

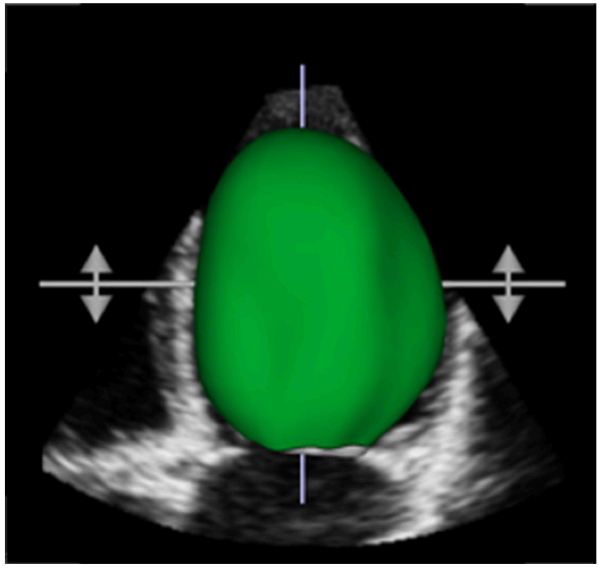
Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging

(J Am Soc Echocardiogr 2015;28:1-39.)

The most commonly used method for 2D echocardiographic volume calculations is the biplane method of disks summation (modified Simpson's rule), which is the recommended 2D echocardiographic method by consensus of this committee (Table 1)

Recommendation. LV size should be routinely assessed on 2DE by calculating volumes using the biplane method of disks summation technique.

3D data sets



ADVANTAGES

- No geometrical assumption
- Unaffected by foreshortening
- More accurate and reproducible compared to other imaging modalities

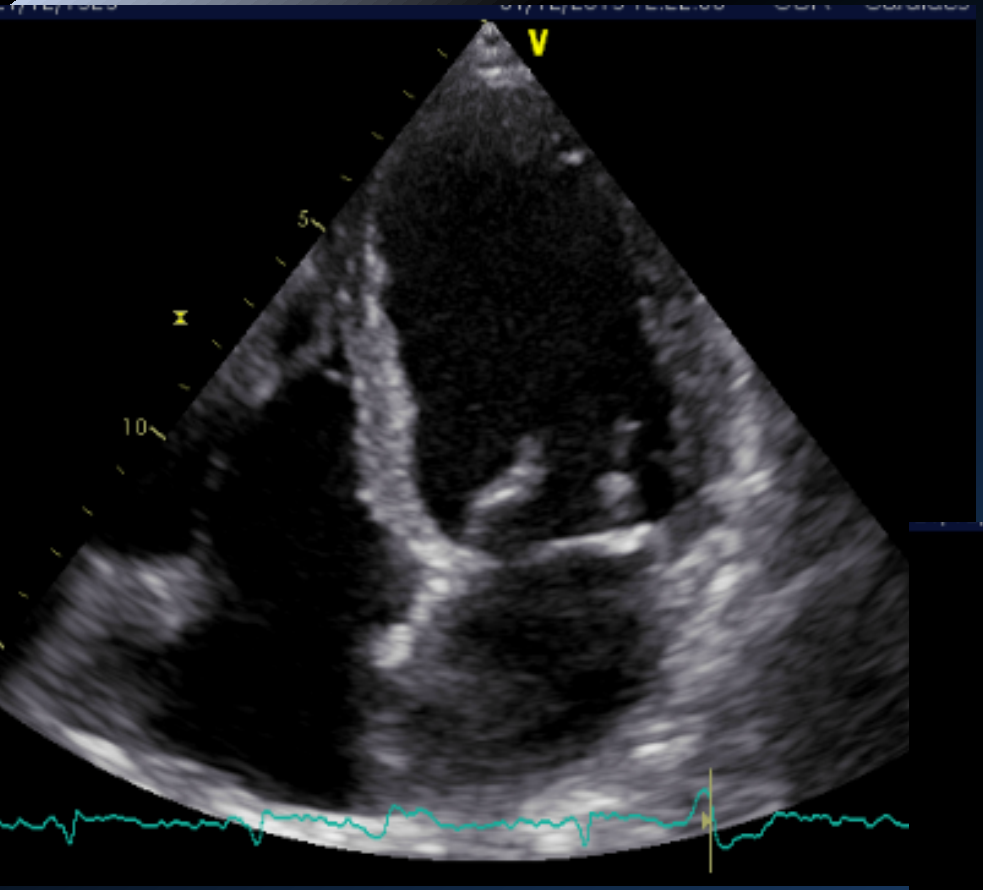
LIMITATIONS

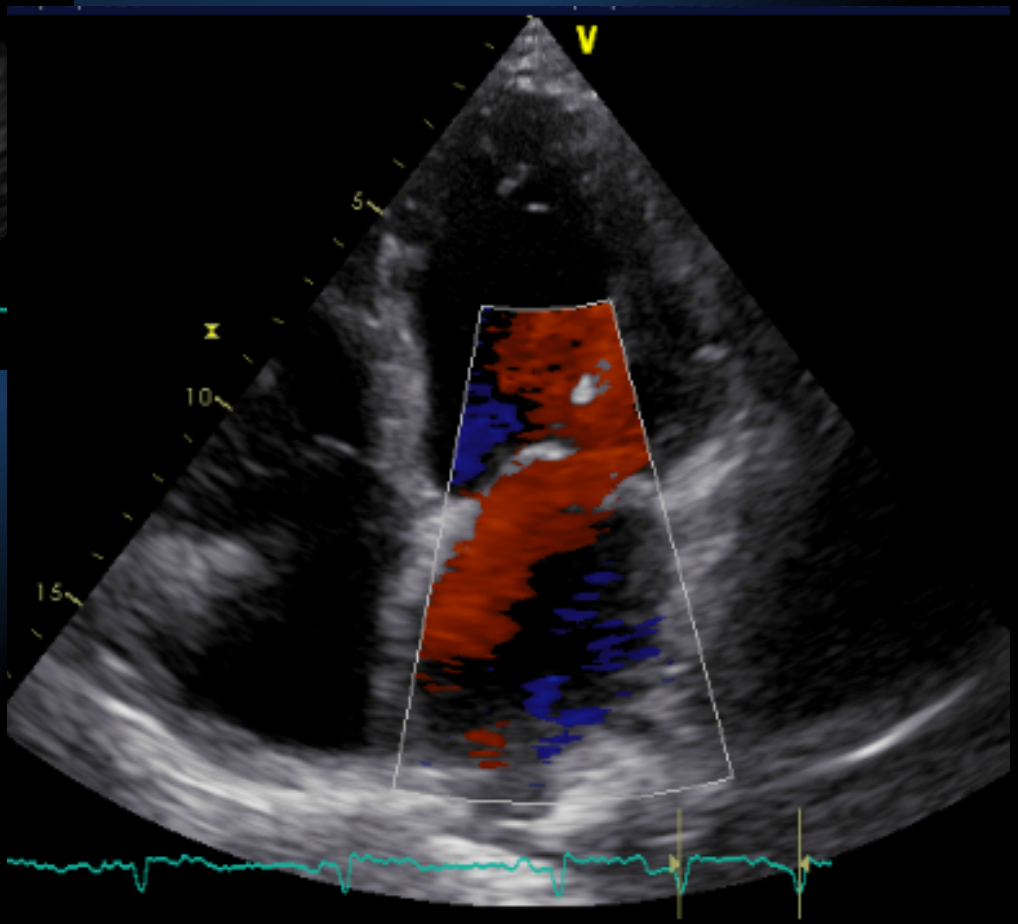
- Lower temporal resolution
- Less published data on normal values
- Image quality dependent

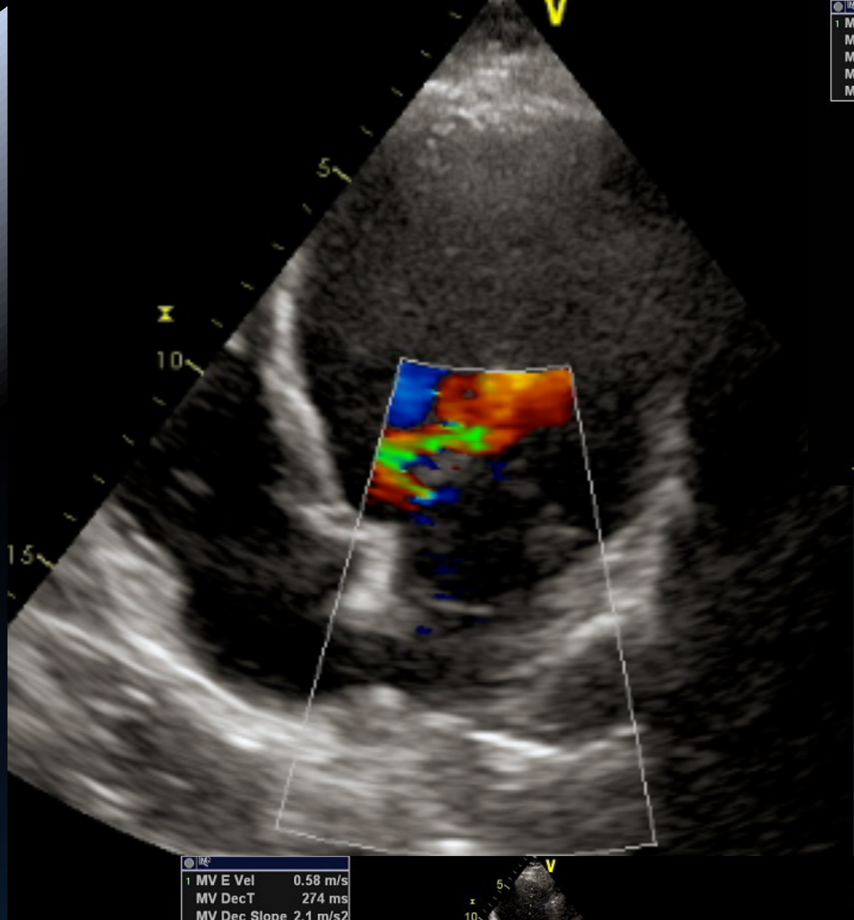
Lang et al. JASE 2015;28:1-39

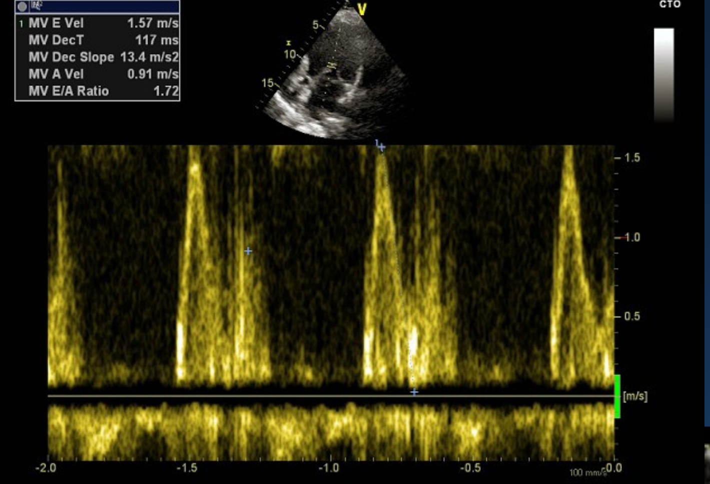
Supplemental Table 3 Normal ranges and severity partition cutoff values for 2DE-derived LV size, function and mass

	Male				Female			
	Normal range	Mildly abnormal	Moderately abnormal	Severely abnormal	Normal range	Mildly abnormal	Moderately abnormal	Severely abnormal
LV dimension								
LV diastolic diameter (cm)	4.2–5.8	5.9–6.3	6.4–6.8	>6.8	3.8–5.2	5.3–5.6	5.7–6.1	>6.1
LV diastolic diameter/BSA (cm/m^2)	2.2–3.0	3.1–3.3	3.4–3.6	>3.6	2.3–3.1	3.2–3.4	3.5–3.7	>3.7
LV systolic diameter (cm)	2.5–4.0	4.1–4.3	4.4–4.5	>4.5	2.2–3.5	3.6–3.8	3.9–4.1	>4.1
LV systolic diameter/BSA (cm/m^2)	1.3–2.1	2.2–2.3	2.4–2.5	>2.5	1.3–2.1	2.2–2.3	2.4–2.6	>2.6
LV volume								
LV diastolic volume (mL)	62–150	151–174	175–200	>200	46–106	107–120	121–130	>130
LV diastolic volume/BSA (mL/m^2)	34–74	75–89	90–100	>100	29–61	62–70	71–80	>80
LV systolic volume (mL)	21–61	62–73	74–85	>85	14–42	43–55	56–67	>67
LV systolic volume/BSA (mL/m^2)	11–31	32–38	39–45	>45	8–24	25–32	33–40	>40
LV function								
LV EF (%)	52–72	41–51	30–40	<30	54–74	41–53	30–40	<30
LV mass by linear method								
Septal wall thickness (cm)	0.6–1.0	1.1–1.3	1.4–1.6	>1.6	0.6–0.9	1.0–1.2	1.3–1.5	>1.5
Posterior wall thickness (cm)	0.6–1.0	1.1–1.3	1.4–1.6	>1.6	0.6–0.9	1.0–1.2	1.3–1.5	>1.5
LV mass (g)	88–224	225–258	259–292	>292	67–162	163–186	187–210	>210
LV mass/BSA (g/m^2)	49–115	116–131	132–148	>148	43–95	96–108	109–121	>121
LV mass by 2D method								
LV mass (g)	96–200	201–227	228–254	>254	66–150	151–171	172–193	>193
LV mass/BSA (g/m^2)	50–102	103–116	117–130	>130	44–88	89–100	101–112	>112

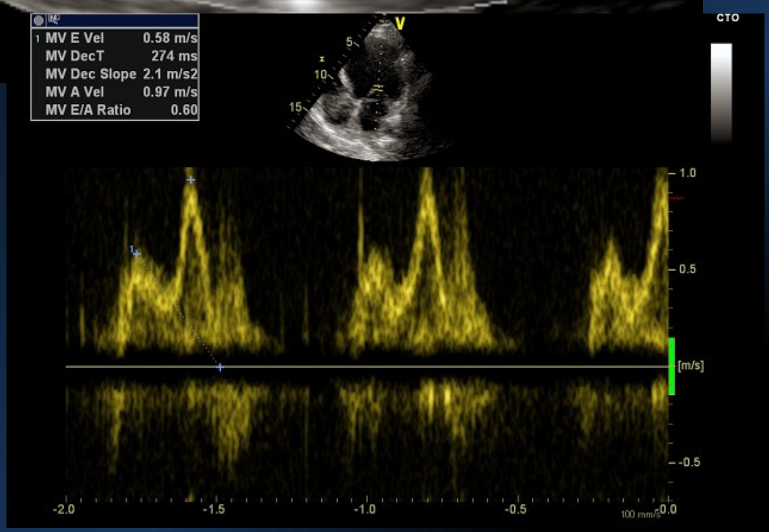

V
5
10

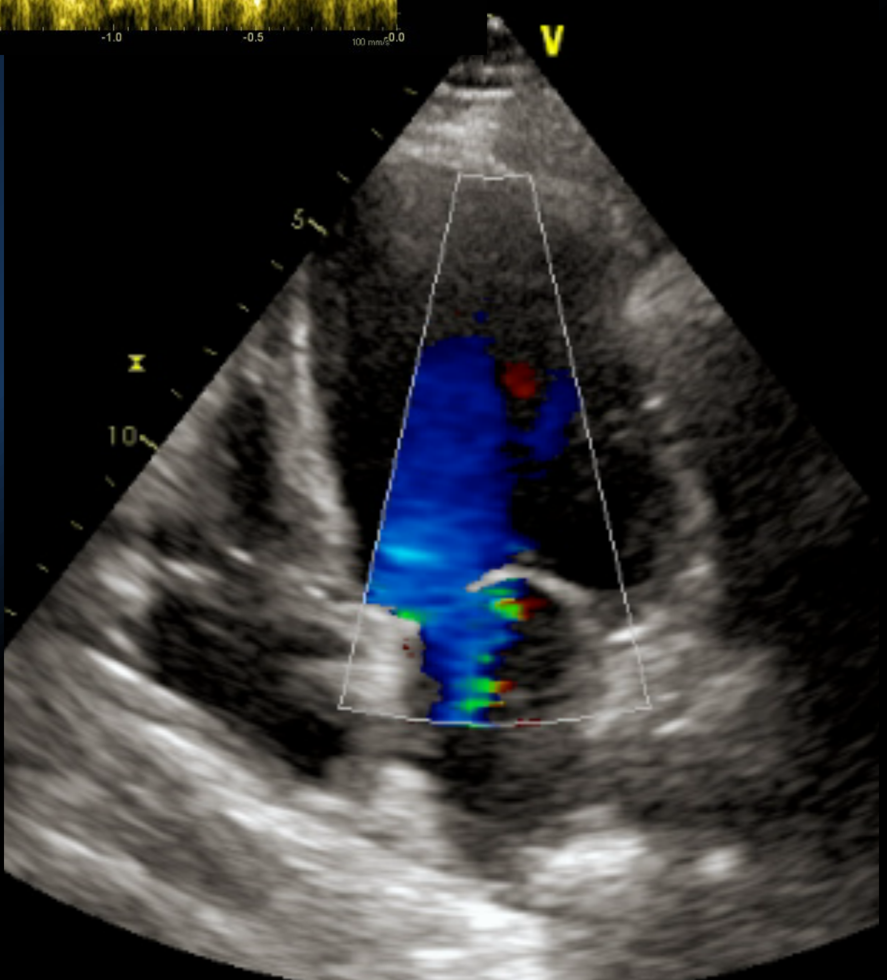

V
5
10
15





VARIABILITA'





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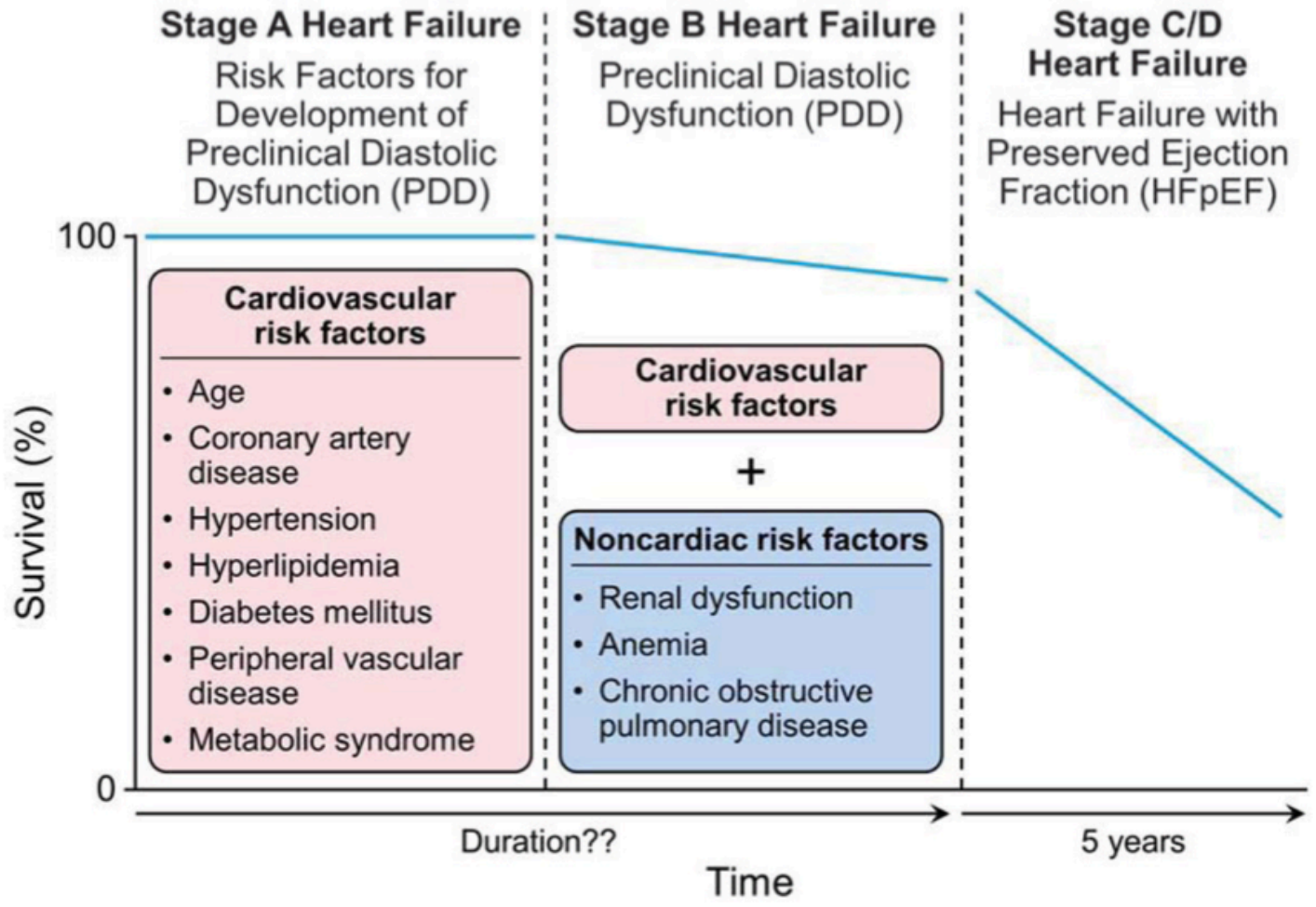
Linee guida ACCF/AHA 2013



Wan et al. JACC 2014;63:407-14

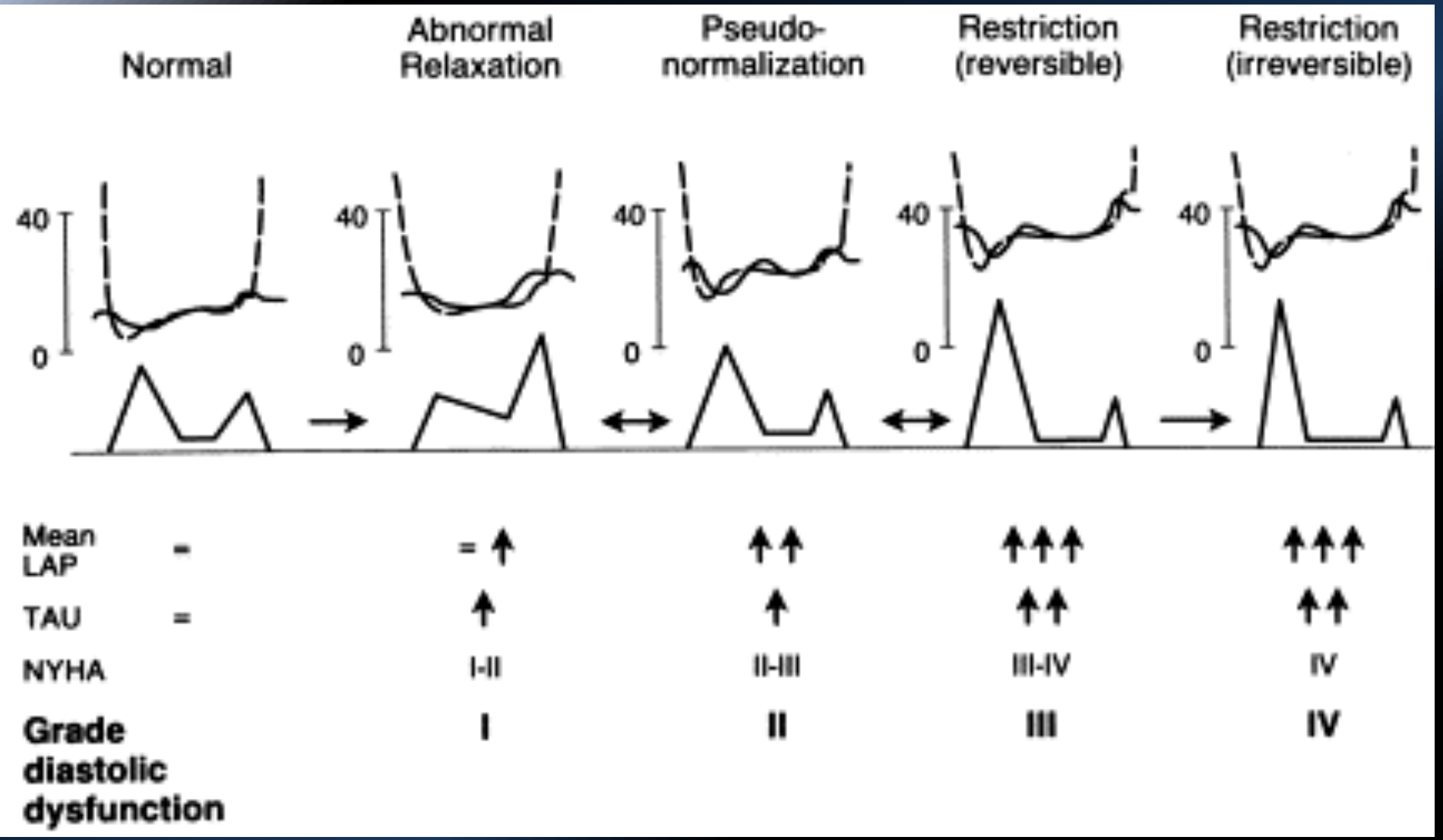
Evaluation of Diastolic Filling of Left Ventricle in Health and Disease: Doppler Echocardiography Is the Clinician's Rosetta Stone

RICK A. NISHIMURA, MD, FACC, A. JAMIL TAJIK, MD, FACC

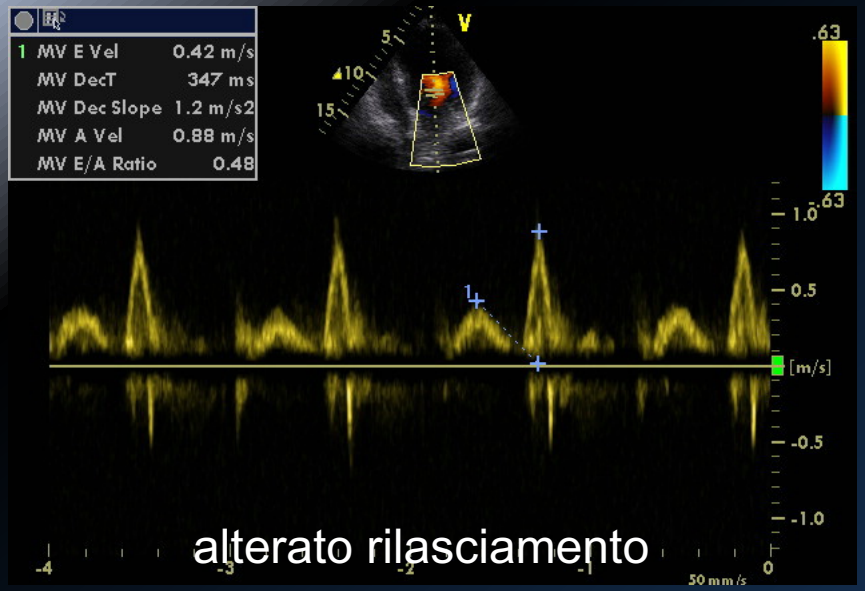
Rochester, Minnesota

JACC 1997; 308-18

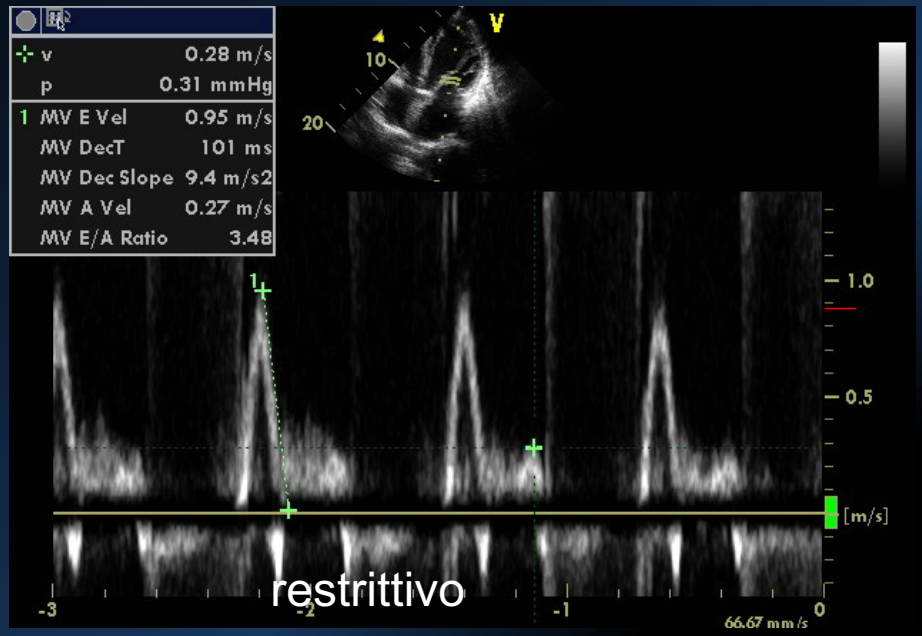
50% circa dei pz con insufficienza cardiaca (scompenso "diastolico")



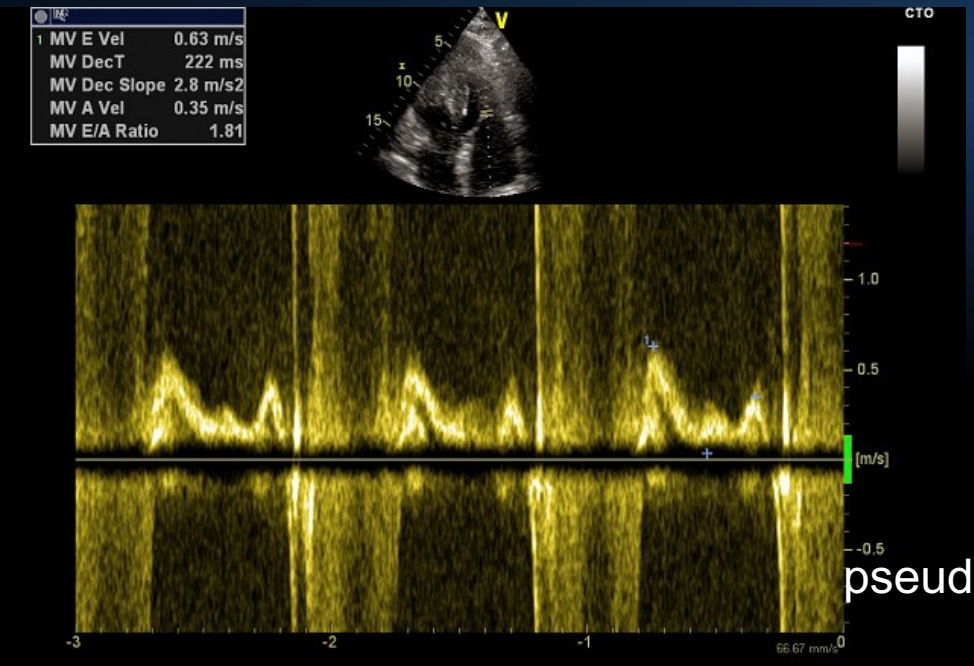
Nishimura e Tajik - JACC 1997; 308-18



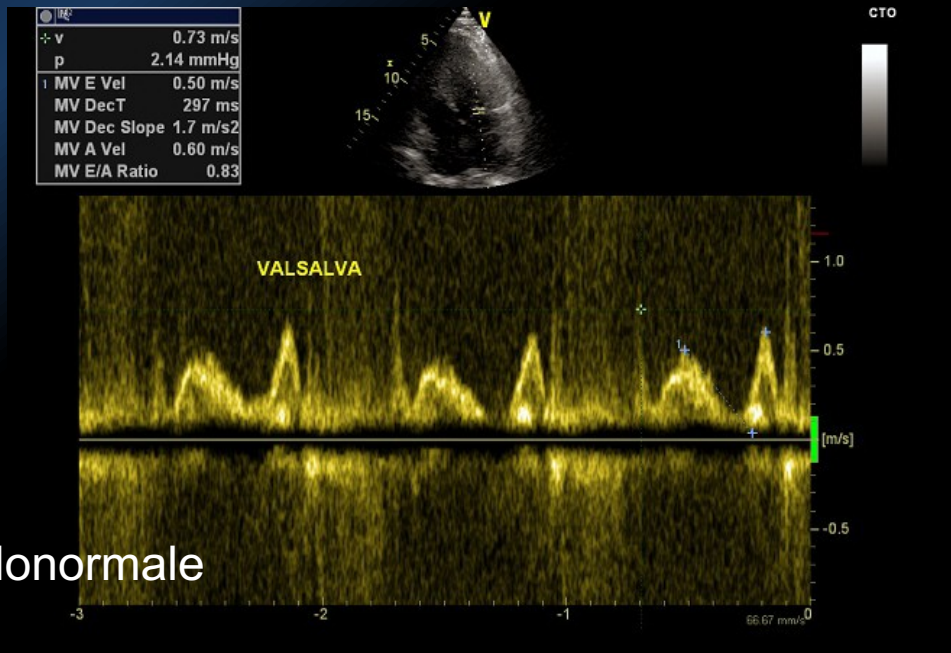
alterato rilasciamento

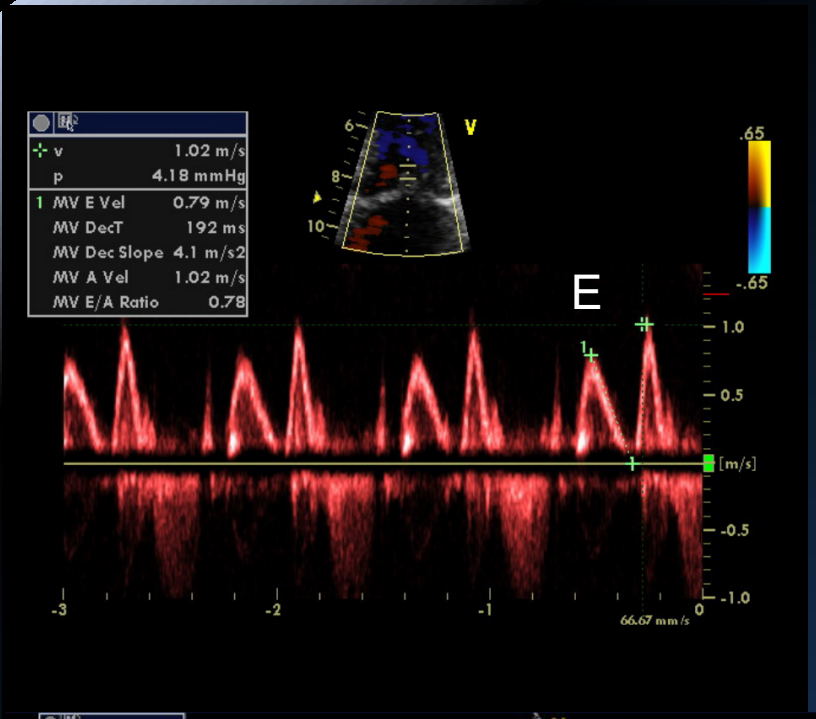


restrittivo



pseudonormale

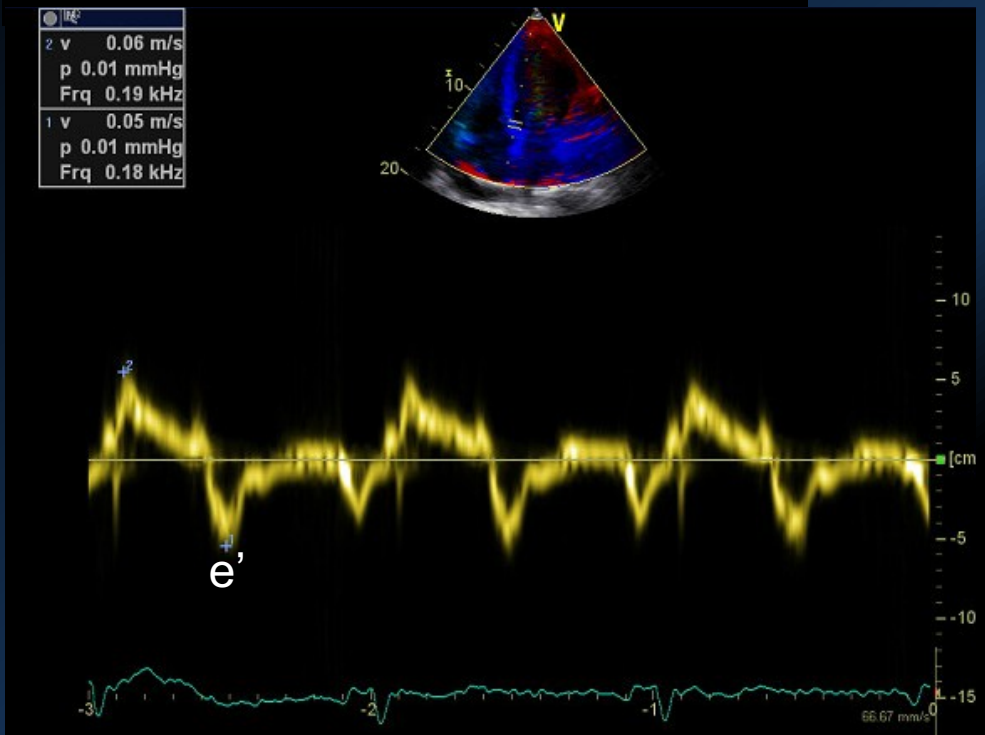


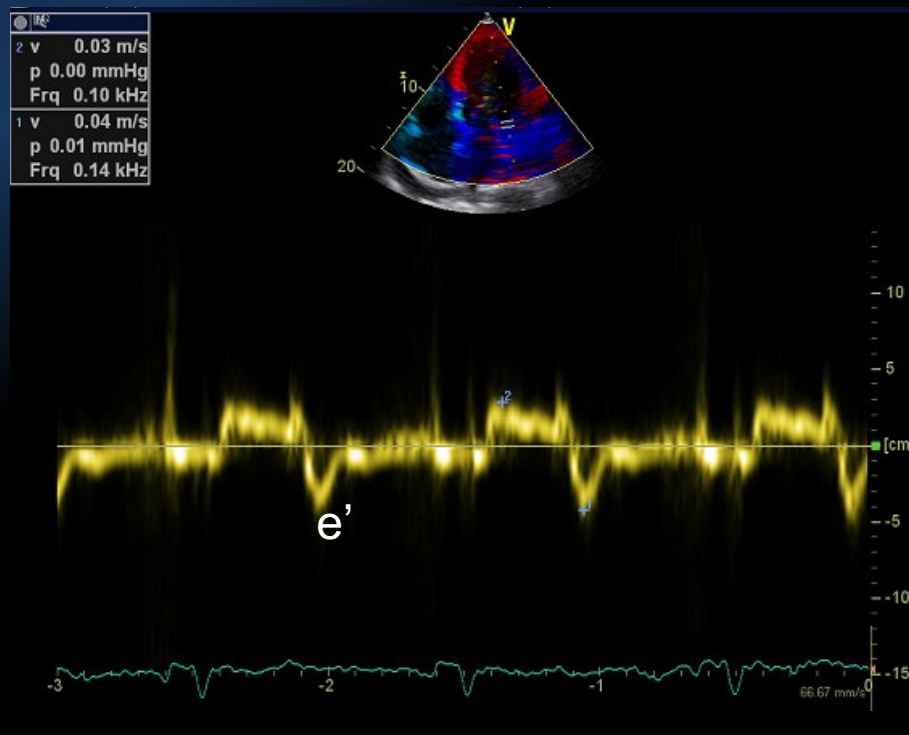


E/e’

- < 8 normal LV filling pressure
- 8-15 ?
- > 15 high LV filling pressure

ASE/EAE 2009





E/e’ limiti

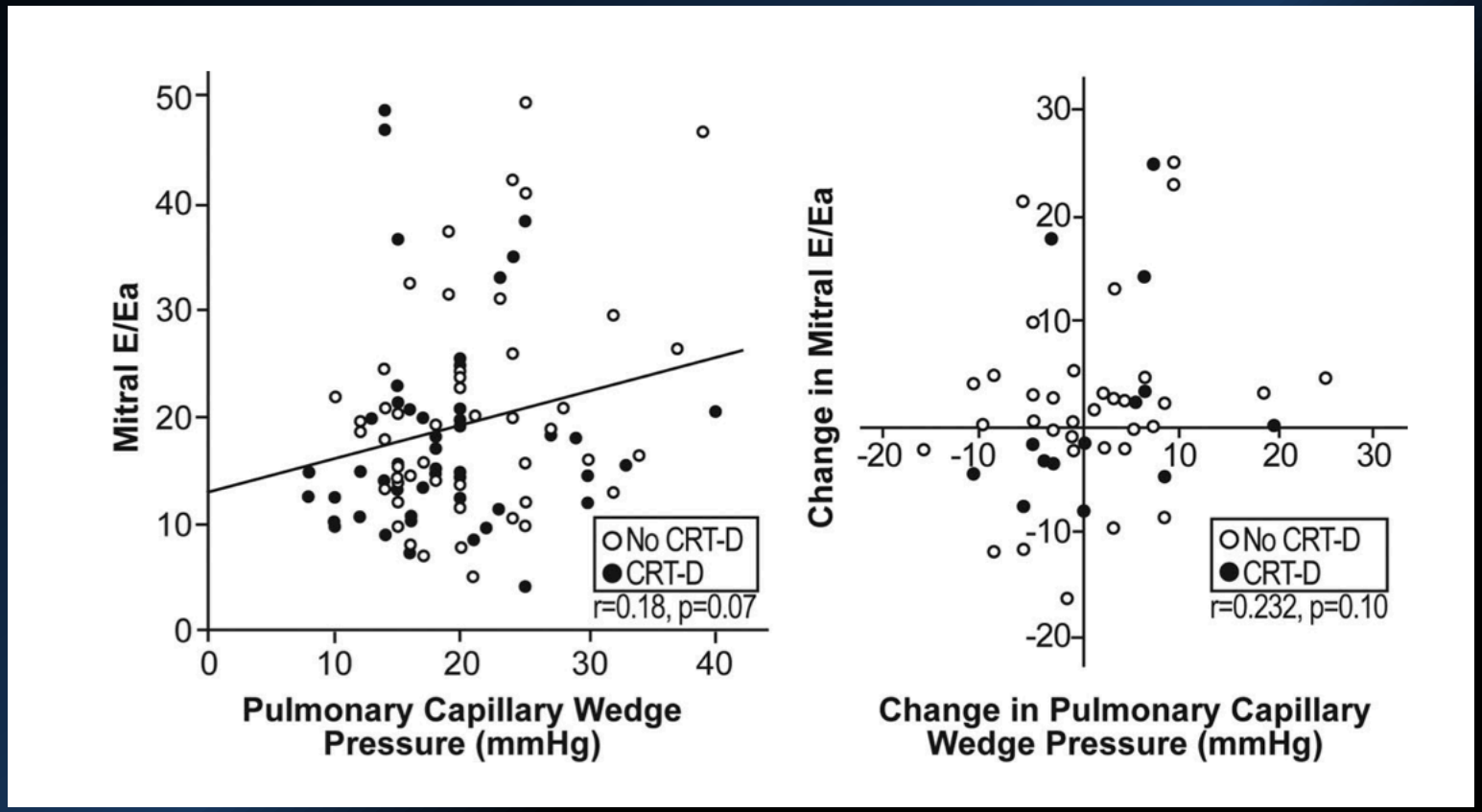
- Soggetti normali
- Stenosi mitralica
- Protesi valvolari mitraliche
- Anelli protesici mitralici
- Calcificazioni importanti anulus mitralico

ASE/EAE 2009

Tissue Doppler Imaging in the Estimation of Intracardiac Filling Pressure in Decompensated Patients With Advanced Systolic Heart Failure

EF≤30%

Wilfried Mullens, MD; Allen G. Borowski, RDCS; Ronan J. Curtin, MD; James D. Thomas, MD; W.H. Tang, MD



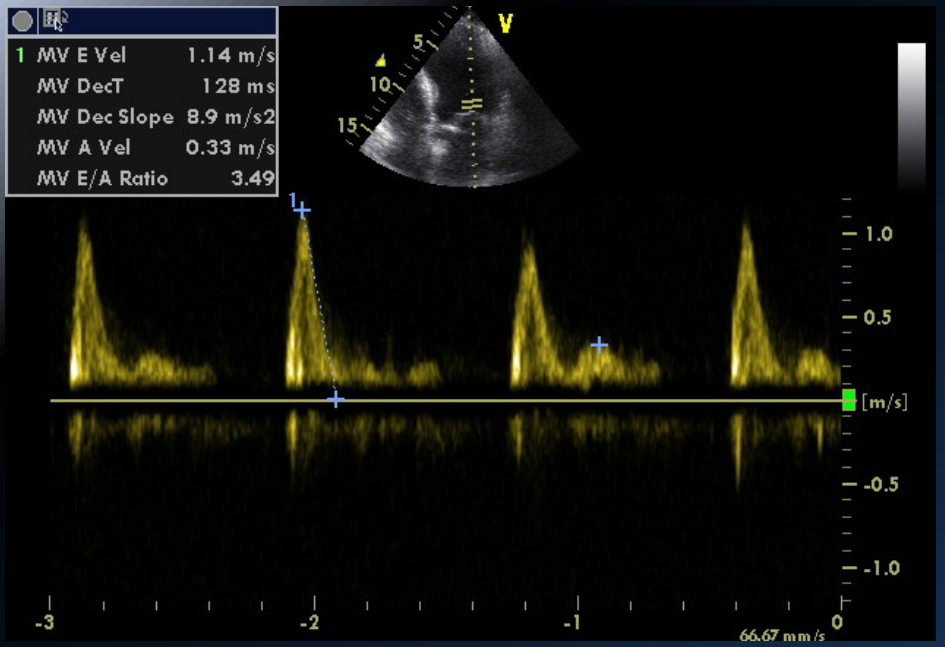
Mullens et al. Circulation 2009;119-62-70

Table 1 Specific echocardiographic monitoring parameters and monitoring values

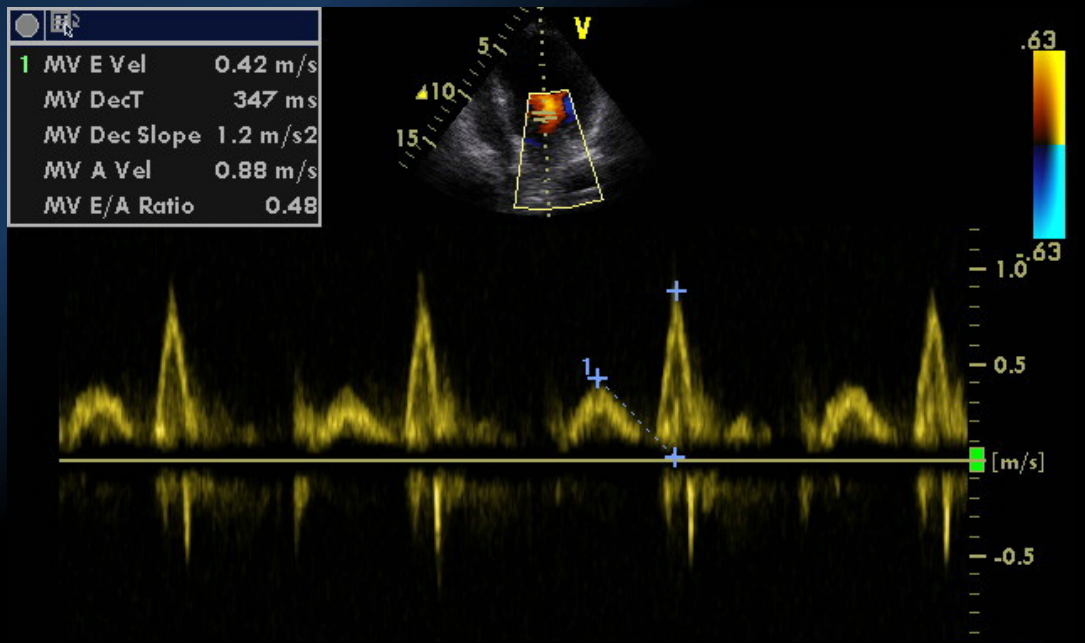
Monitoring parameter Role Reference	System requirements	Important technical features	Specific values to use while guiding interventions
Transmitral E/e′ for LAP Nagueh *et al*.[15]	Pulsed Doppler Tissue Doppler	Doppler alignment End-expiratory acquisition	E/e′ < 8; normal LVEF = normal LAP E/e′ ≥ 13; normal LVEF = increased LAP E/A > 2; DT < 150 msec; depressed LVEF = increased LAP E/A < 1 and E < 50 cm/sec; depressed LVEF = normal LAP

Specific values to use while guiding interventions
E/e′ < 8; normal LVEF = normal LAP E/e′ ≥ 13; normal LVEF = increased LAP
E/A > 2; DT < 150 msec; depressed LVEF = increased LAP E/A < 1 and E < 50 cm/sec; depressed LVEF = normal LAP

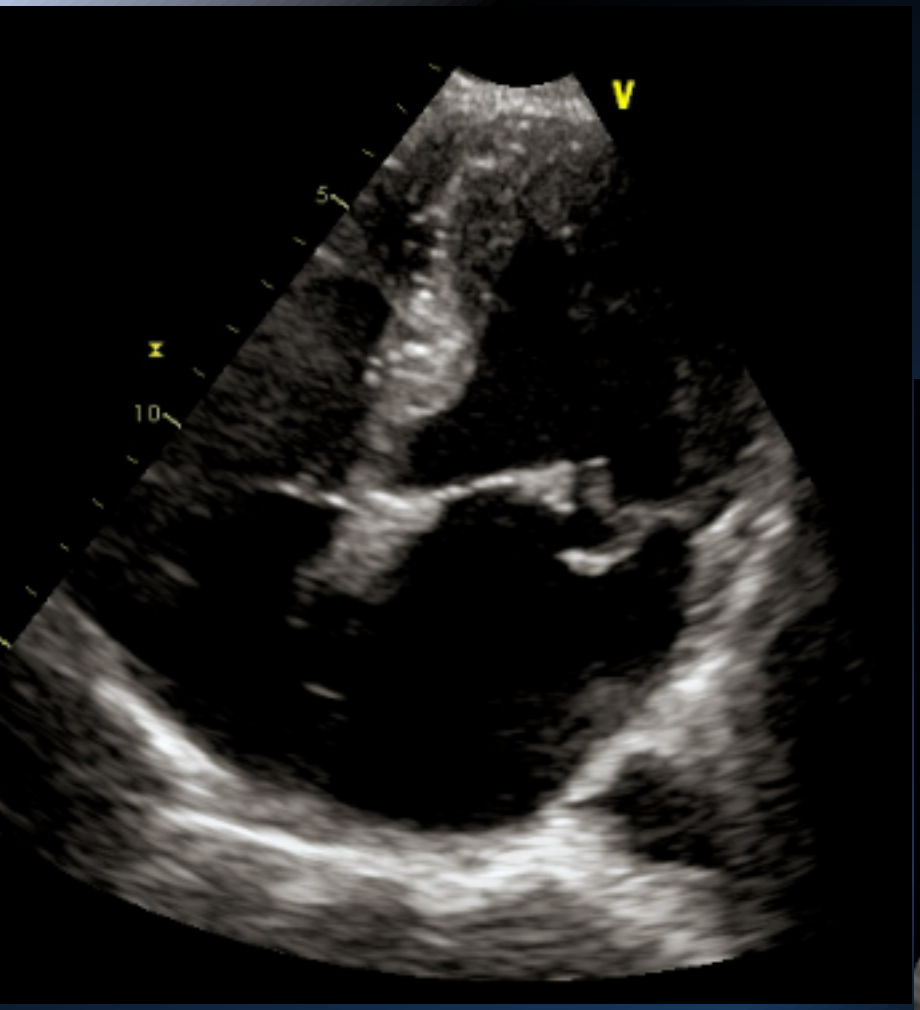
ASE-EAE 2015

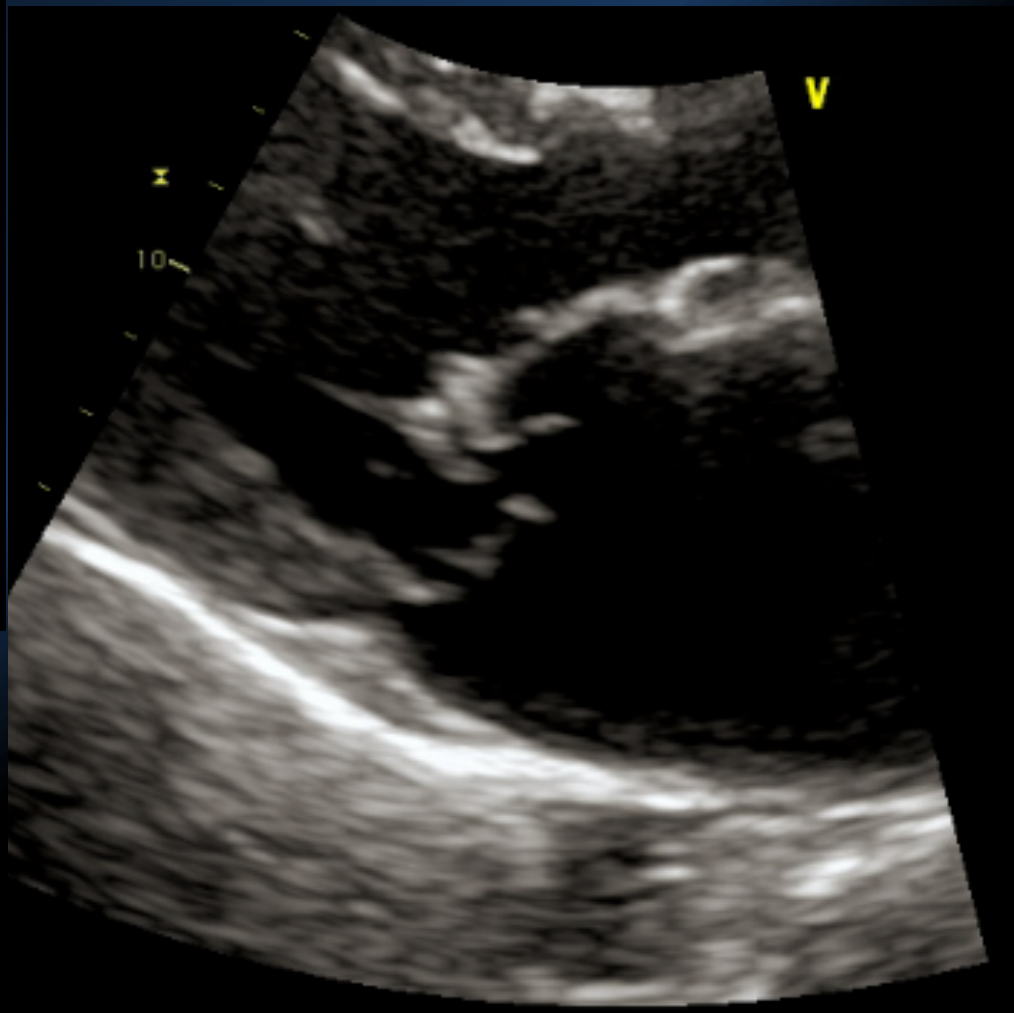


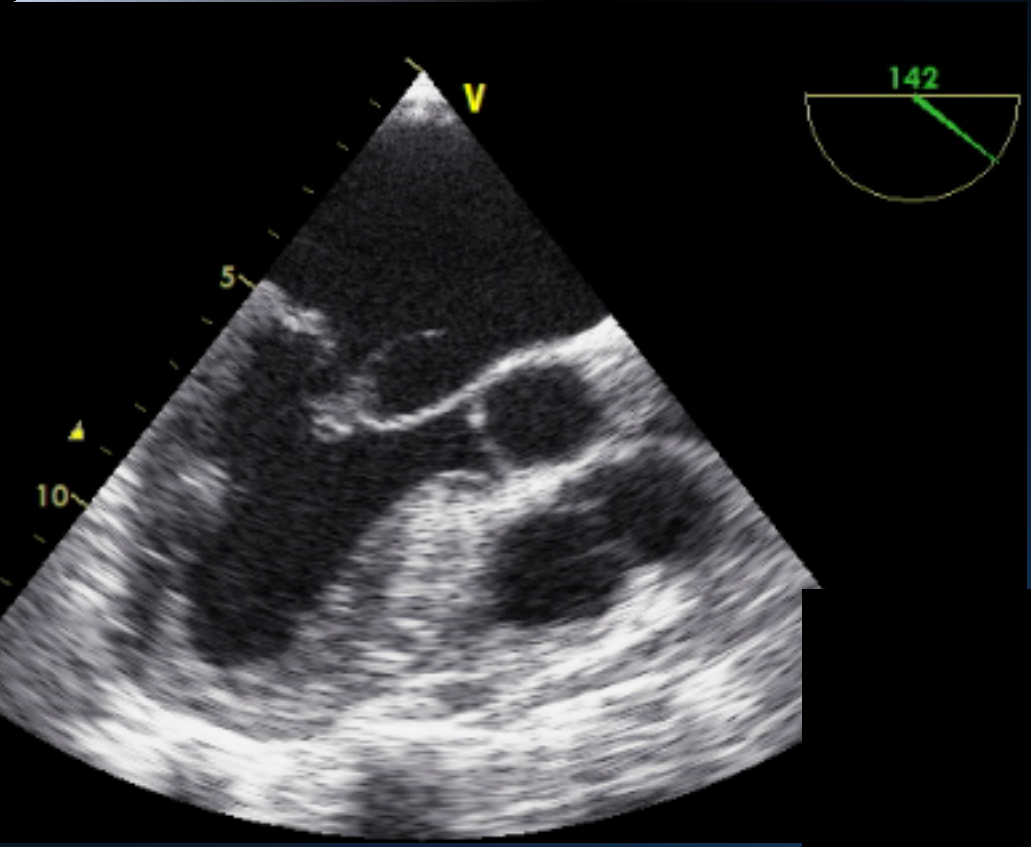
Monitoraggio effetti terapia

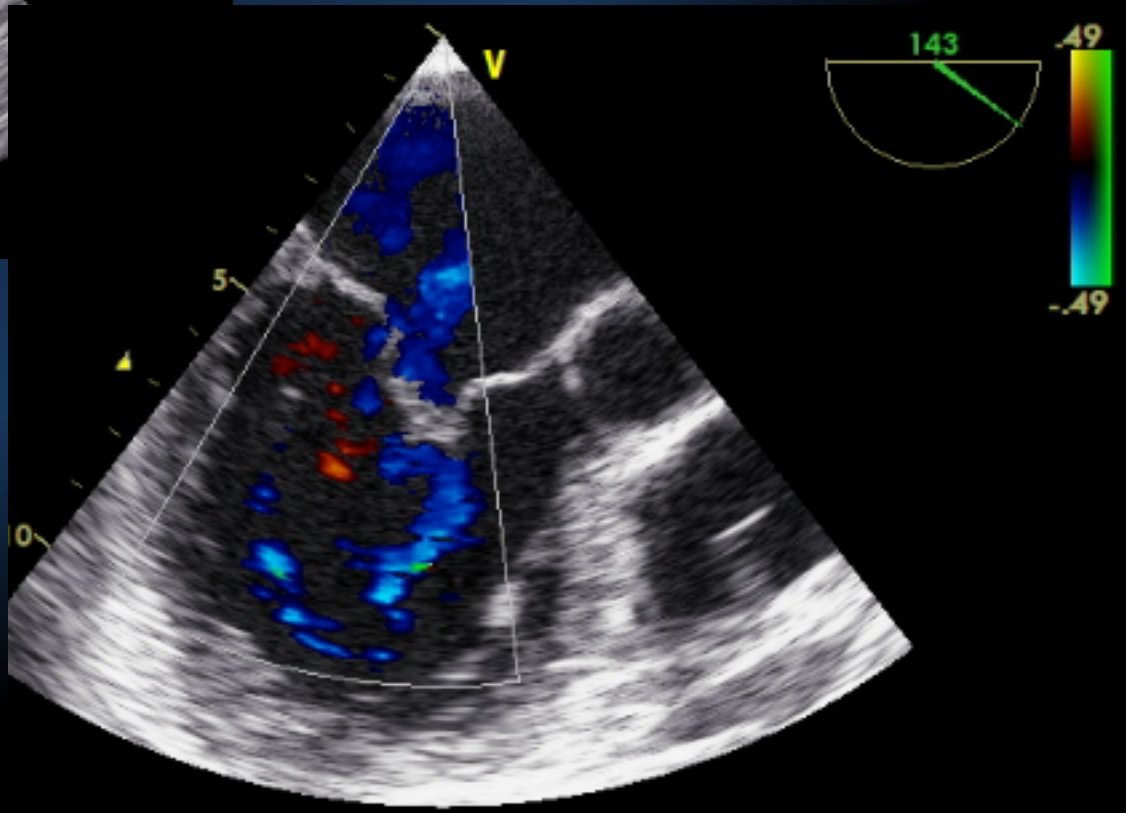


Altre cause di EPA

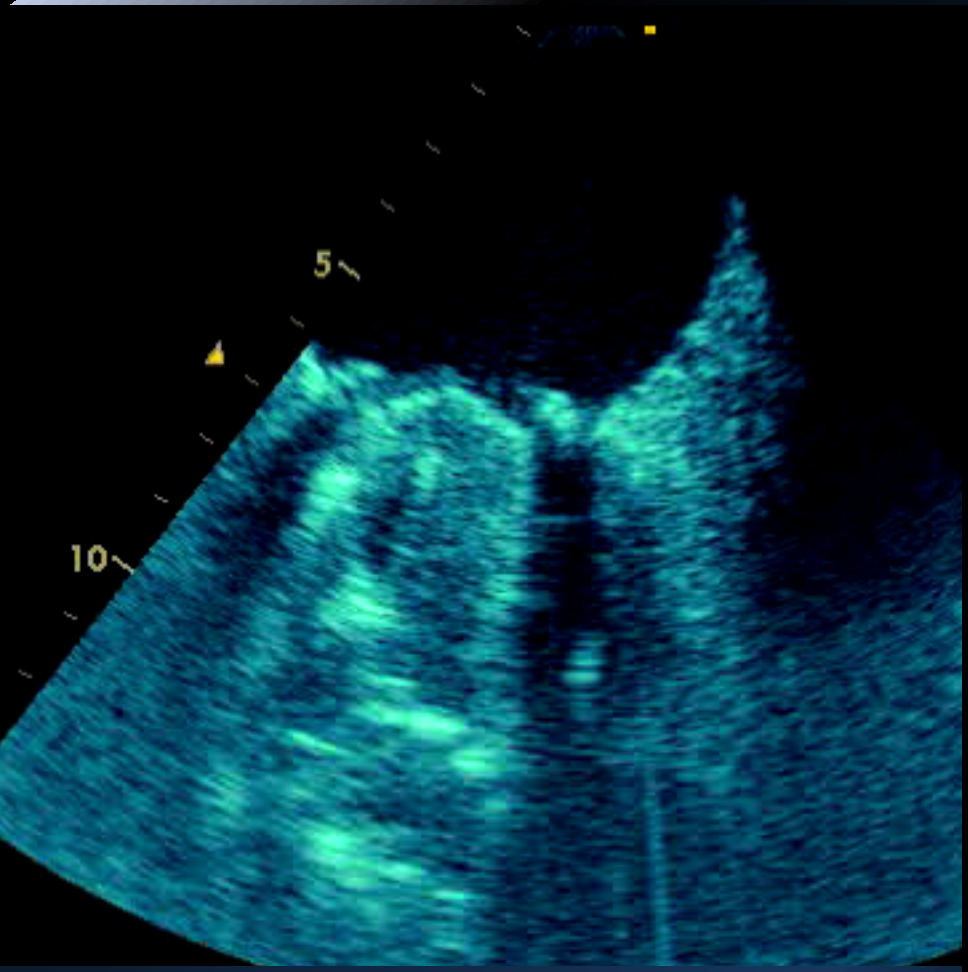





V
142
5
10

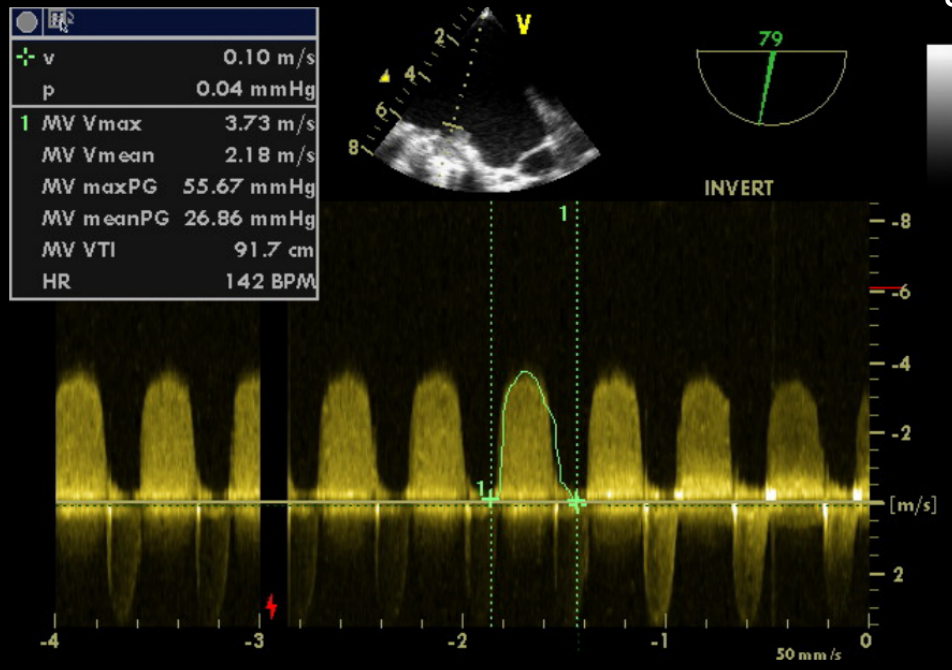

V
143
.49
-.49
5

- M
- Età 37 anni
- 2002 valvuloplastica mitralica percutanea
- 2005 sostituzione mitralica con MIRA 27
- Da circa un settimana dispnea ingravescente
- Trasferito da altro PO, giunge in gravi condizioni cliniche
- Intubazione orotracheale

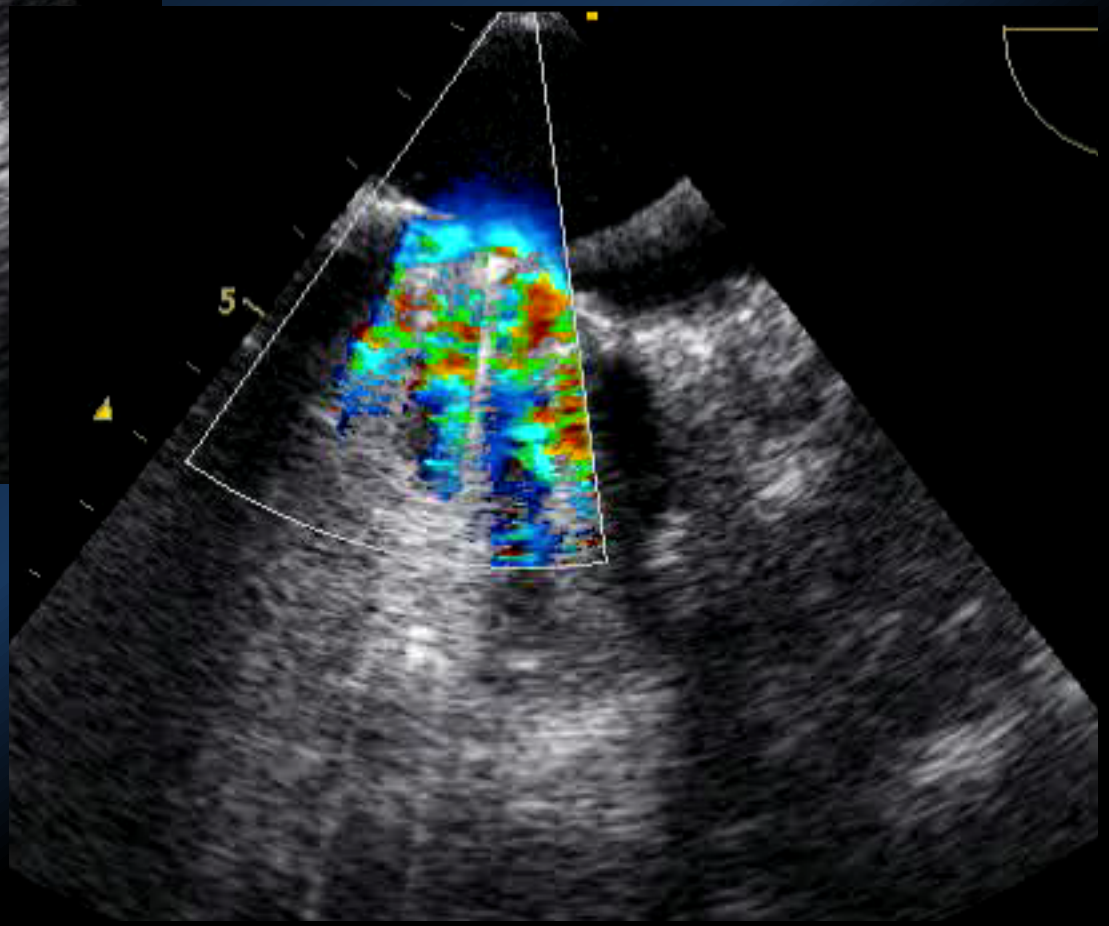

5
10

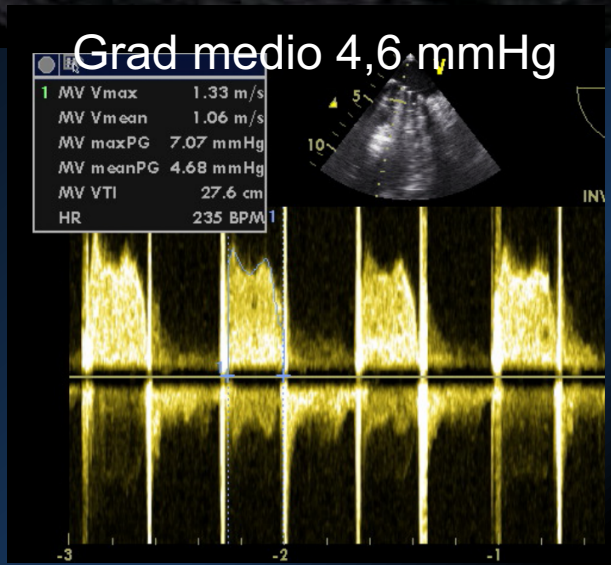

5

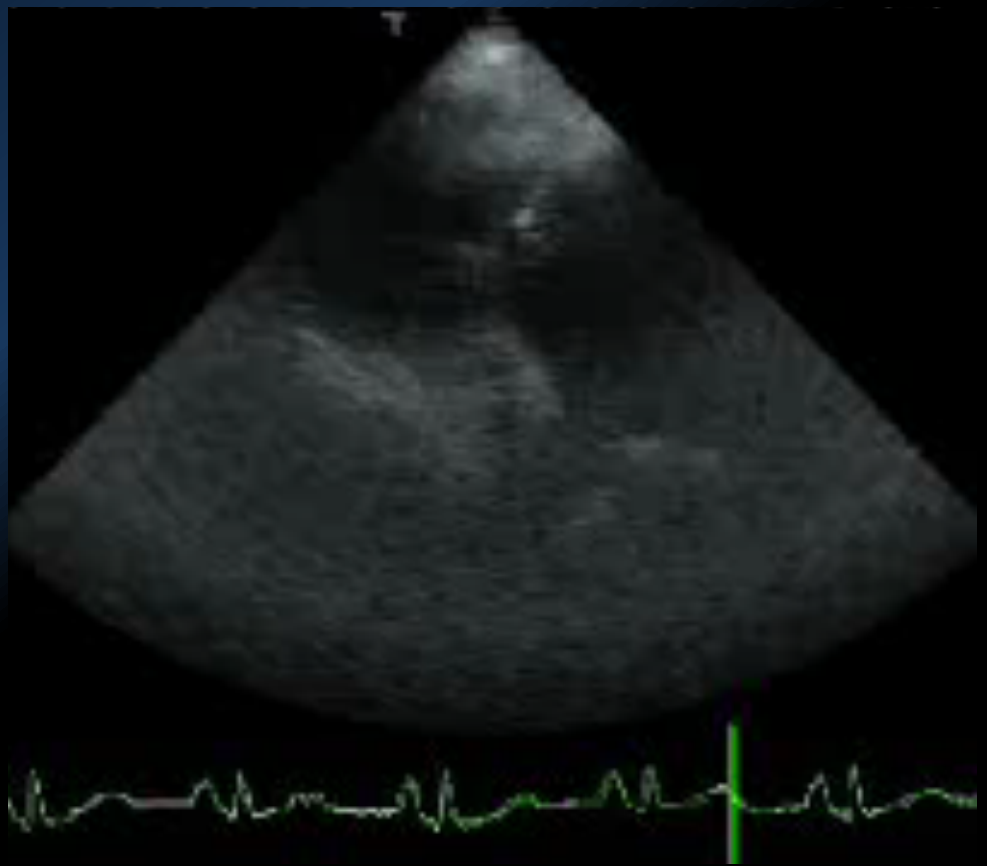
Grad. Medio 26.8 mmHg

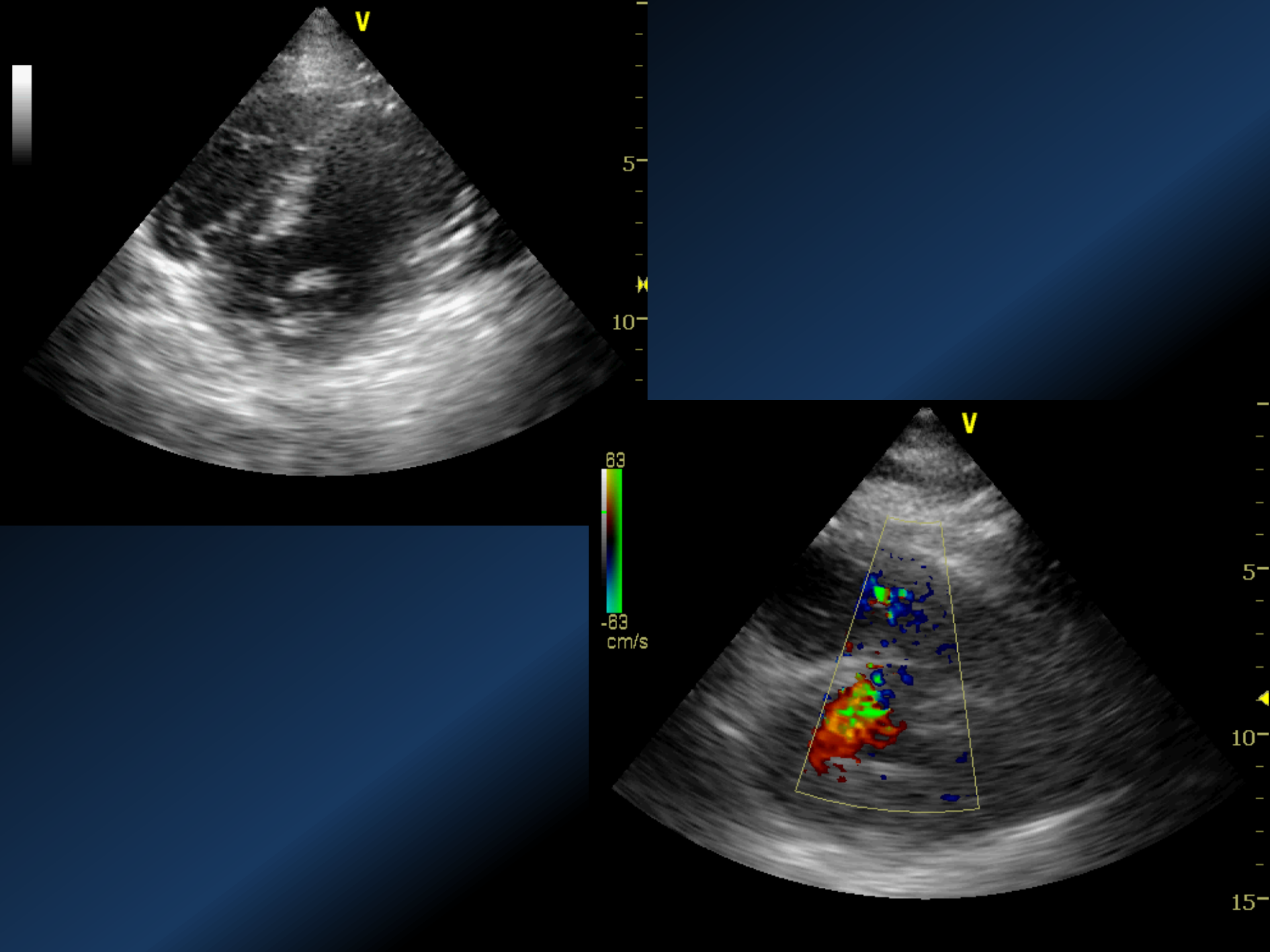


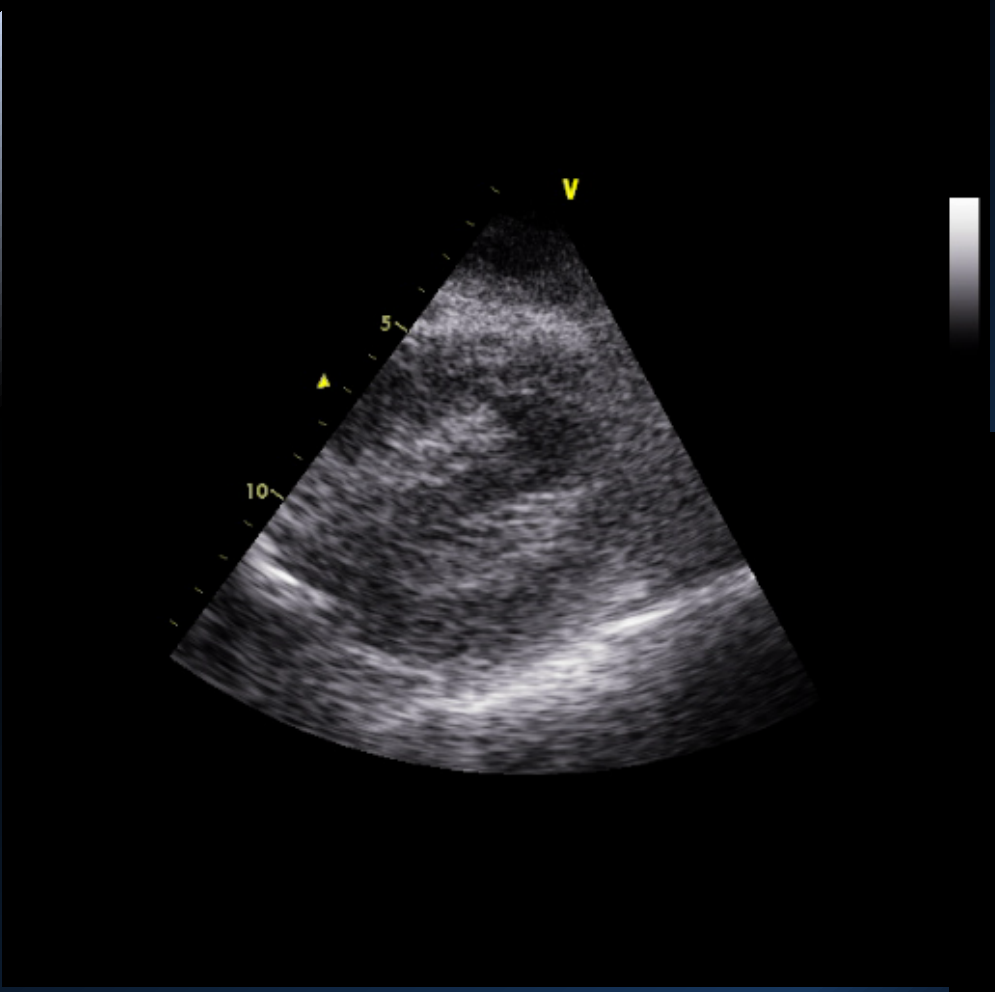
5 ore dopo trombolisi

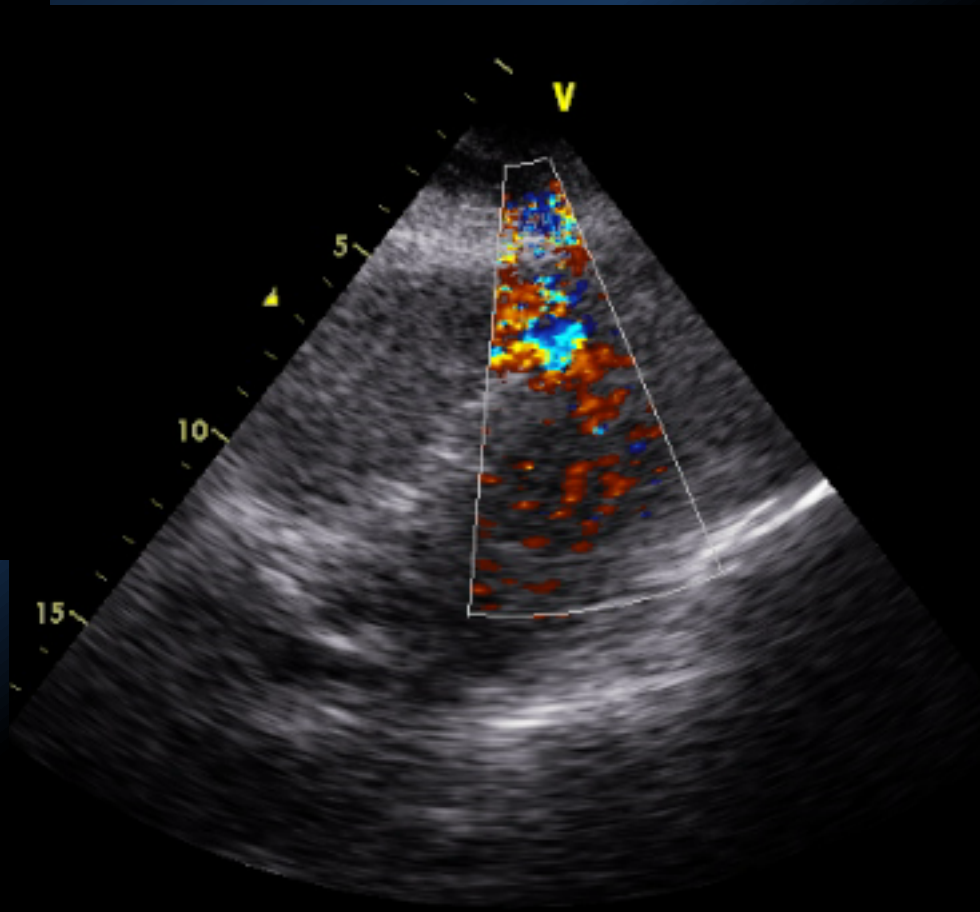







V
5
10
63
-63
cm/s
V
5
10
15


V
5
10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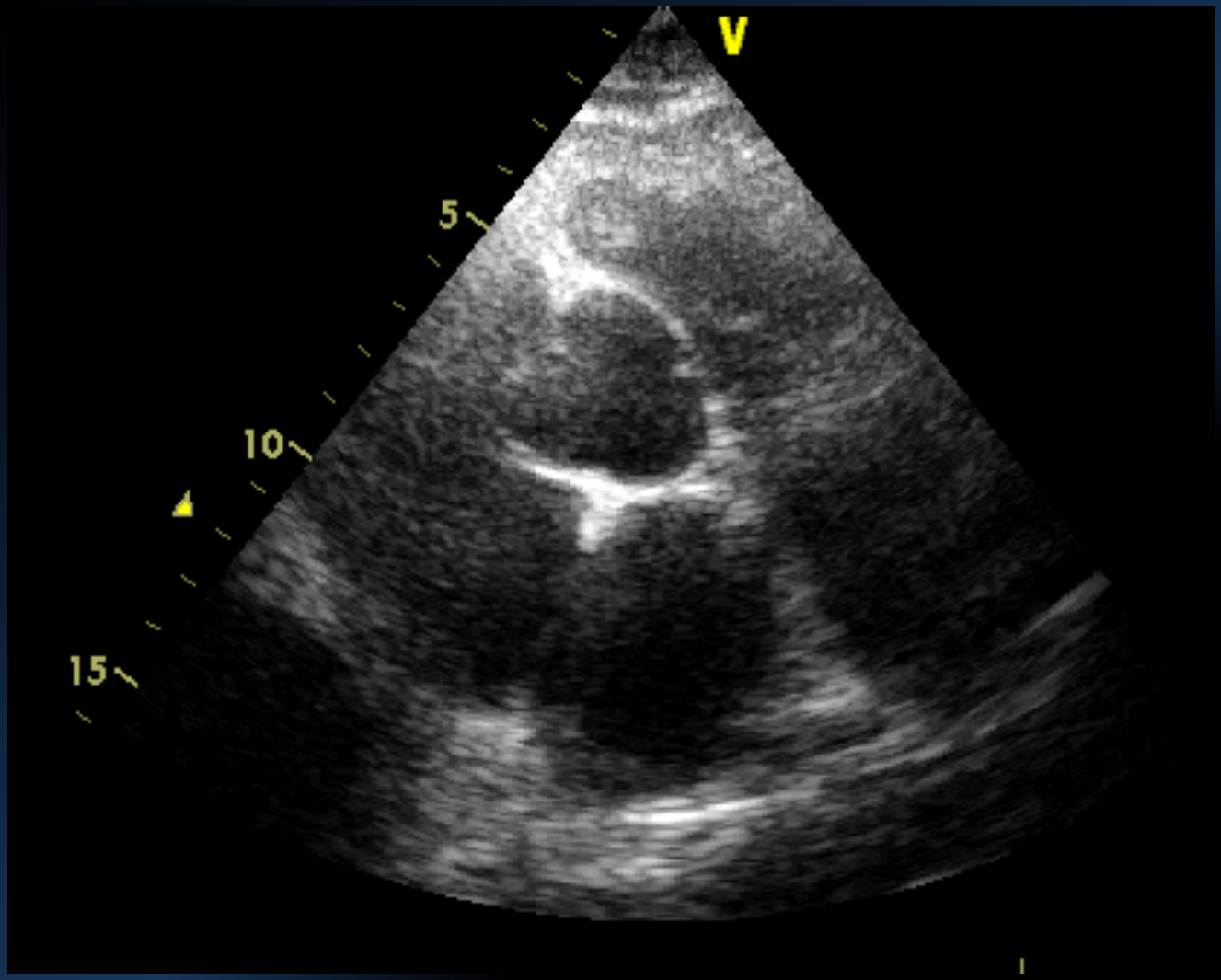


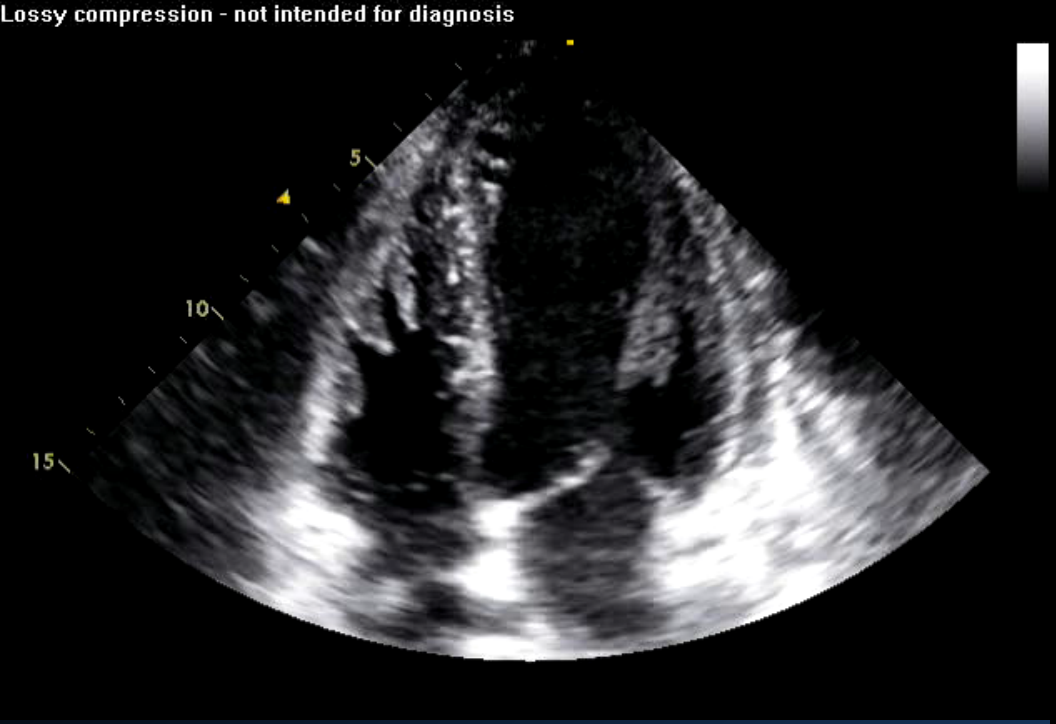
Cortesia dr. Nardiello

Ecocardiogramma e EPA

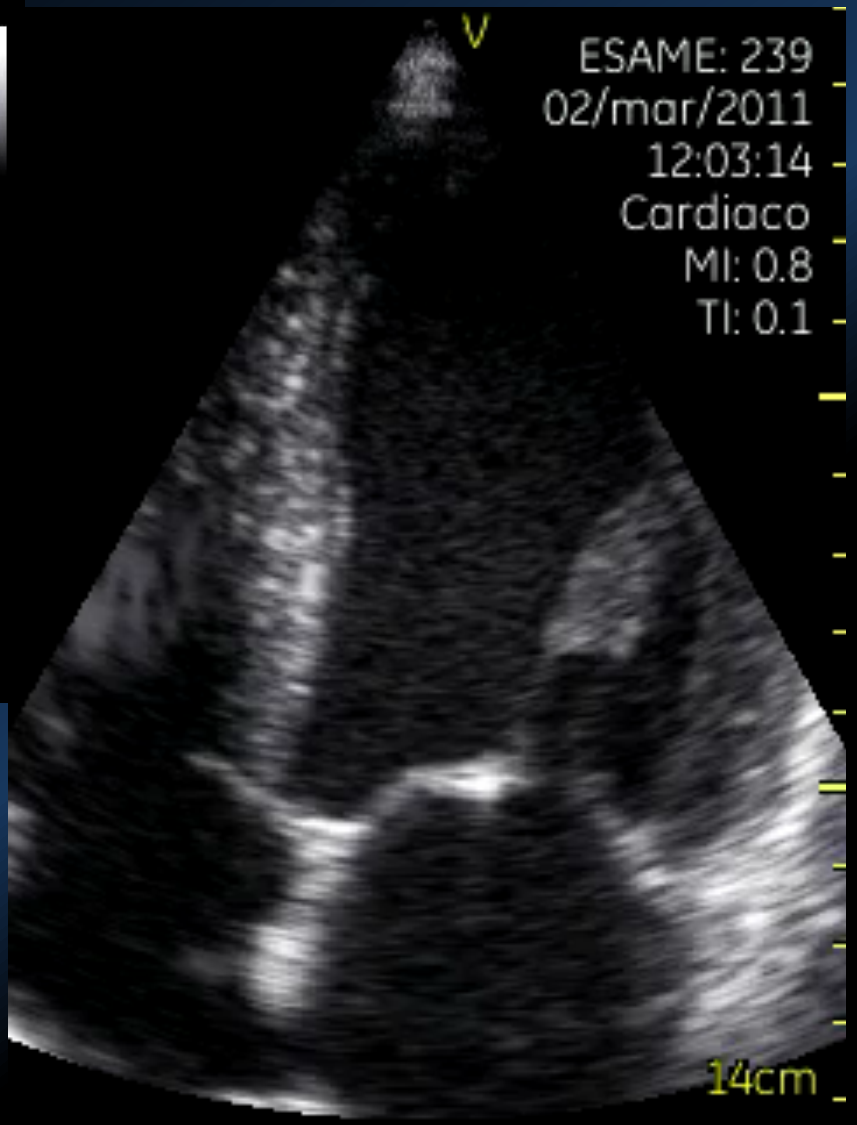
- E' sempre utile o necessario?
- Quando deve essere eseguito?
- Come conciliare i punti di vista:
  - del cardiologo?
  - dell'urgentista?

Ecoscopia verso Eco2DcolorDoppler: appropriatezza esecutiva e formativa

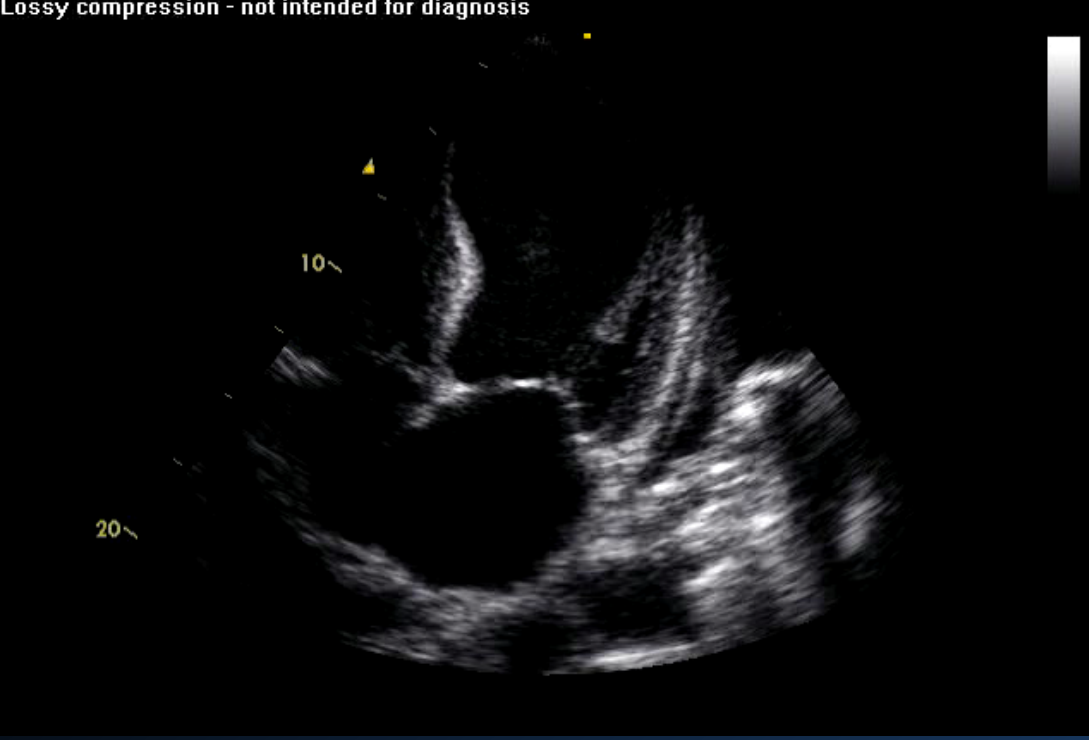
Figure 1 The 'pocket scanner'. Clockwise from top left corner: the scanner on its docking station, with probe (left) and spare rechargeable battery (right); side view; front view.

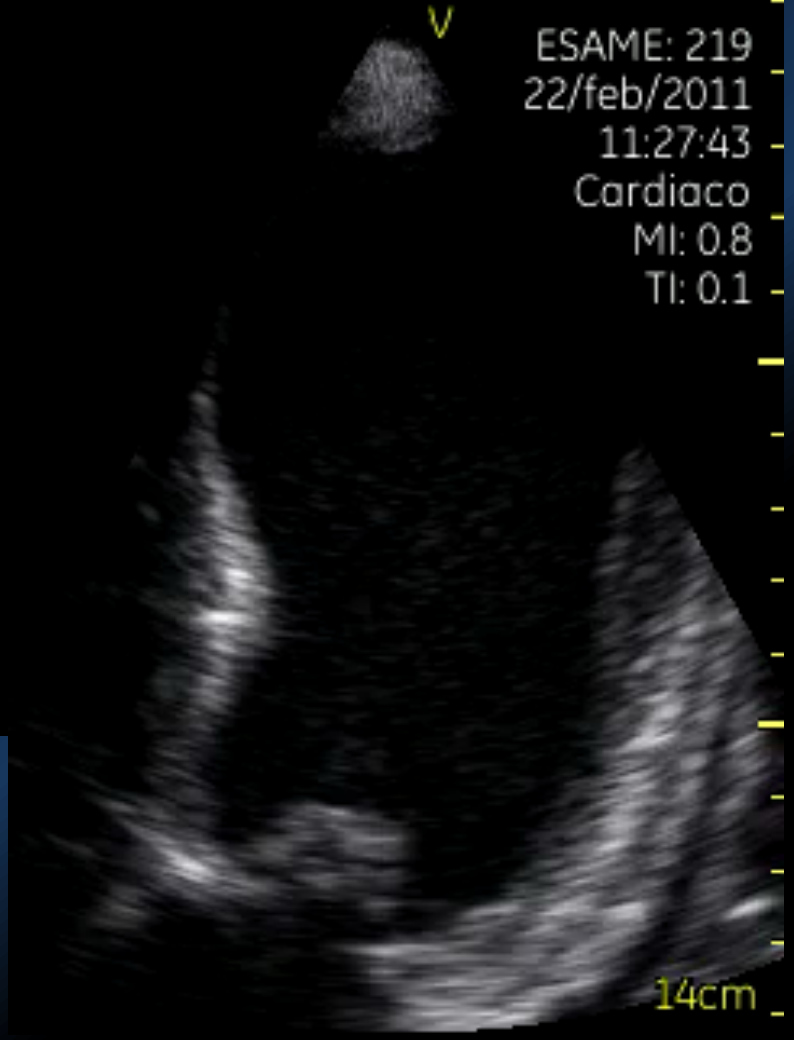


Ecocardiografo
standard



“ecoscopio”





Ecocardiografo standard

“ecoscopio”

Table 2 **Summary of indications for pocket-size devices**

1. Complement to a physical examination in the coronary and intensive care unit
2. Tool for a fast initial screening in an emergency setting
3. Cardiologic counselling in- or outside health-care facilities and hospitals
4. First cardiac evaluation in ambulances
5. Screening programmes in schools, industry, and community activities
6. Triaging candidates for a complete echocardiographic examination
7. Teaching tool
8. Semi-quantification of extravascular lung water

Sicari et al. Eur J Echocardiogr 2011;12:85-87

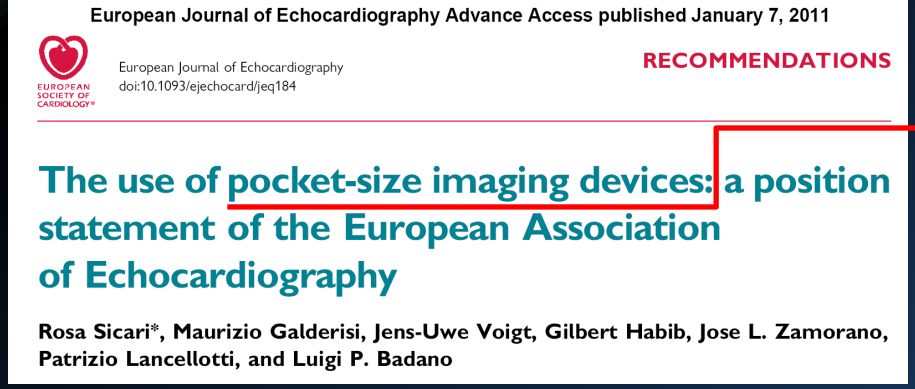
AMERICAN SOCIETY OF ECHOCARDIOGRAPHY CONSENSUS STATEMENT

Focused Cardiac Ultrasound in the Emergent Setting: A Consensus Statement of the American Society of Echocardiography and American College of Emergency Physicians

Table 1 Goals of the focused cardiac ultrasound in the symptomatic emergency department patient

Assessment for the presence of pericardial effusion
Assessment of global cardiac systolic function
Identification of marked right ventricular and left ventricular enlargement
Intravascular volume assessment
Guidance of pericardiocentesis
Confirmation of transvenous pacing wire placement

Labovitz et al. J Am Soc Echocardiogr 2010; 23:1225-30



European Journal of Echocardiography Advance Access published January 7, 2011

European Journal of Echocardiography
doi:10.1093/ejechocard/jeq184

RECOMMENDATIONS

The use of pocket-size imaging devices: a position statement of the European Association of Echocardiography

Rosa Sicari*, Maurizio Galderisi, Jens-Uwe Voigt, Gilbert Habib, Jose L. Zamorano, Patrizio Lancellotti, and Luigi P. Badano

(PSID)

- PSID do not provide a complete diagnostic echocardiographic examination
- Imaging with PSDI should be reported as part of physical examination. Image data should be stored
- With the excepion of certified cardiologists, specific training is recommended for all users
- The patient should be informed that PSID do not replace a complete echocardiogram

Conclusioni:l'ecocardiogramma nell'EPA

Integrazione dei dati clinici con l'imaging

- Valutazione della funzione sistolica e diastolica
- Individuazione di altre cause di EPA
- Evidenza strumentale dei risultati terapeutici
- Utilità pratica dell'ecoscopio quale screening iniziale, che non sostitutisce l'esame completo standard


grazie