Perioperative Evaluation of LV Systolic and diastolic Function

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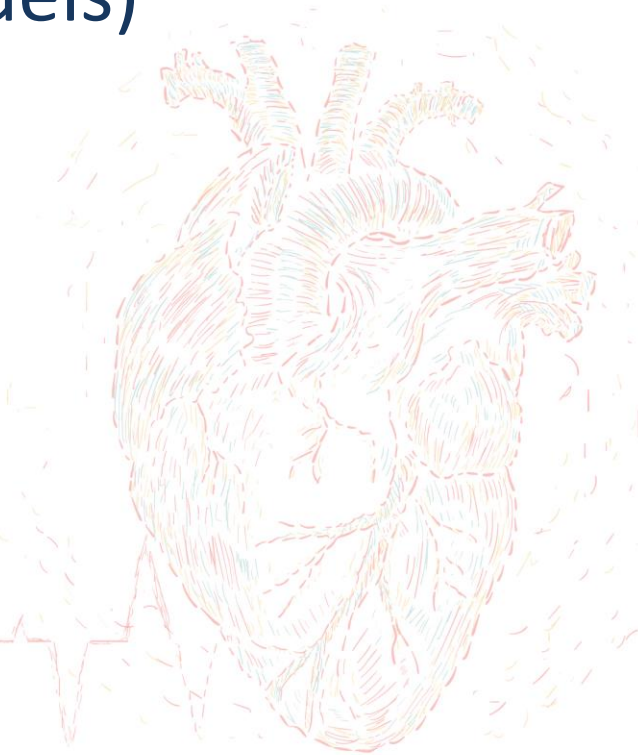
Fellowship of Cardiac Anesthesia

EACVI certification

Ventricular Systolic Function

- **1-Load-dependent variables:**
- FS-FAC-EF (with different models)
- TDI
- **2-Load-independent variables:**
- SR-Speckle tracking

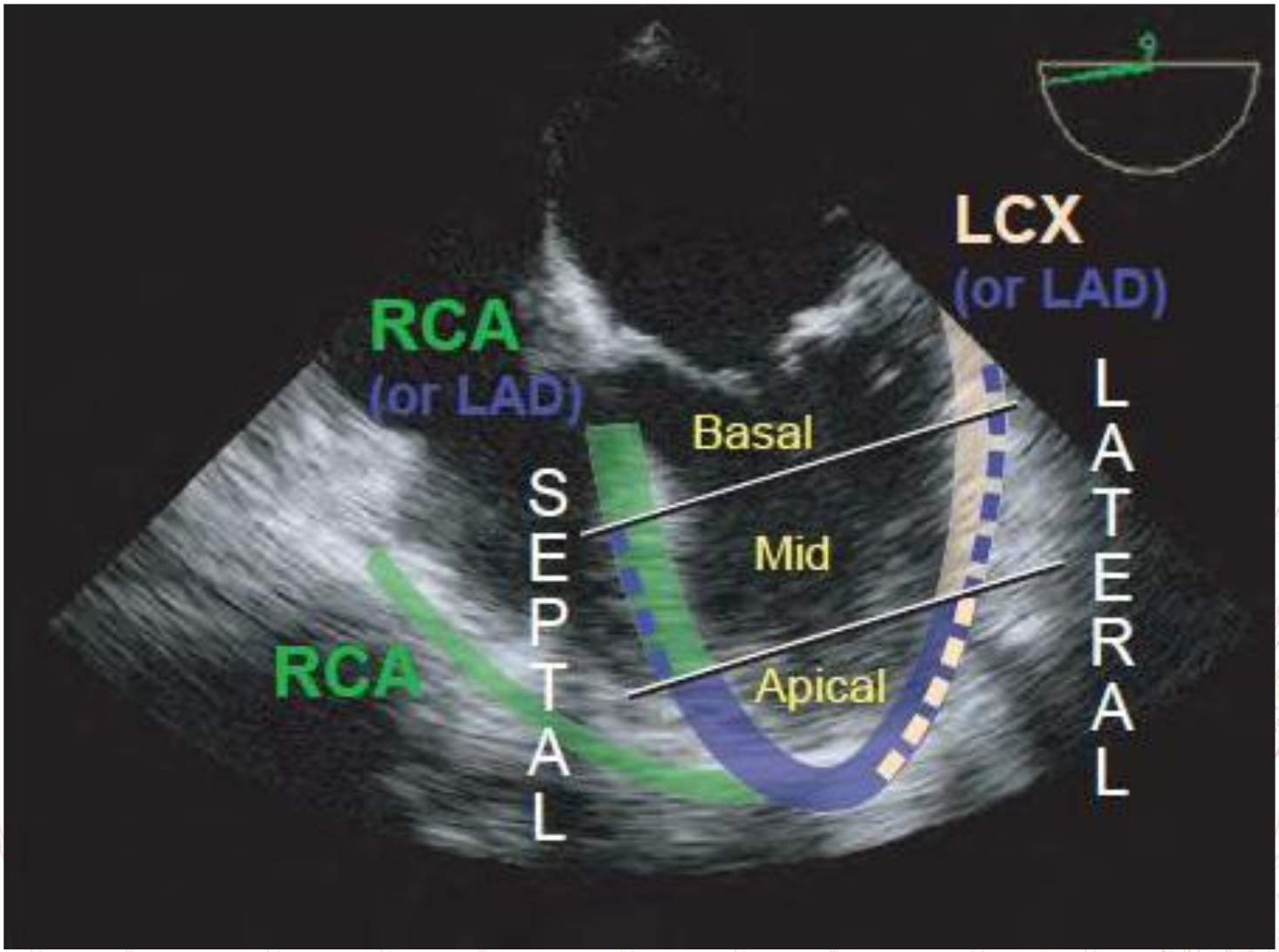


EF(Ejection Fraction)

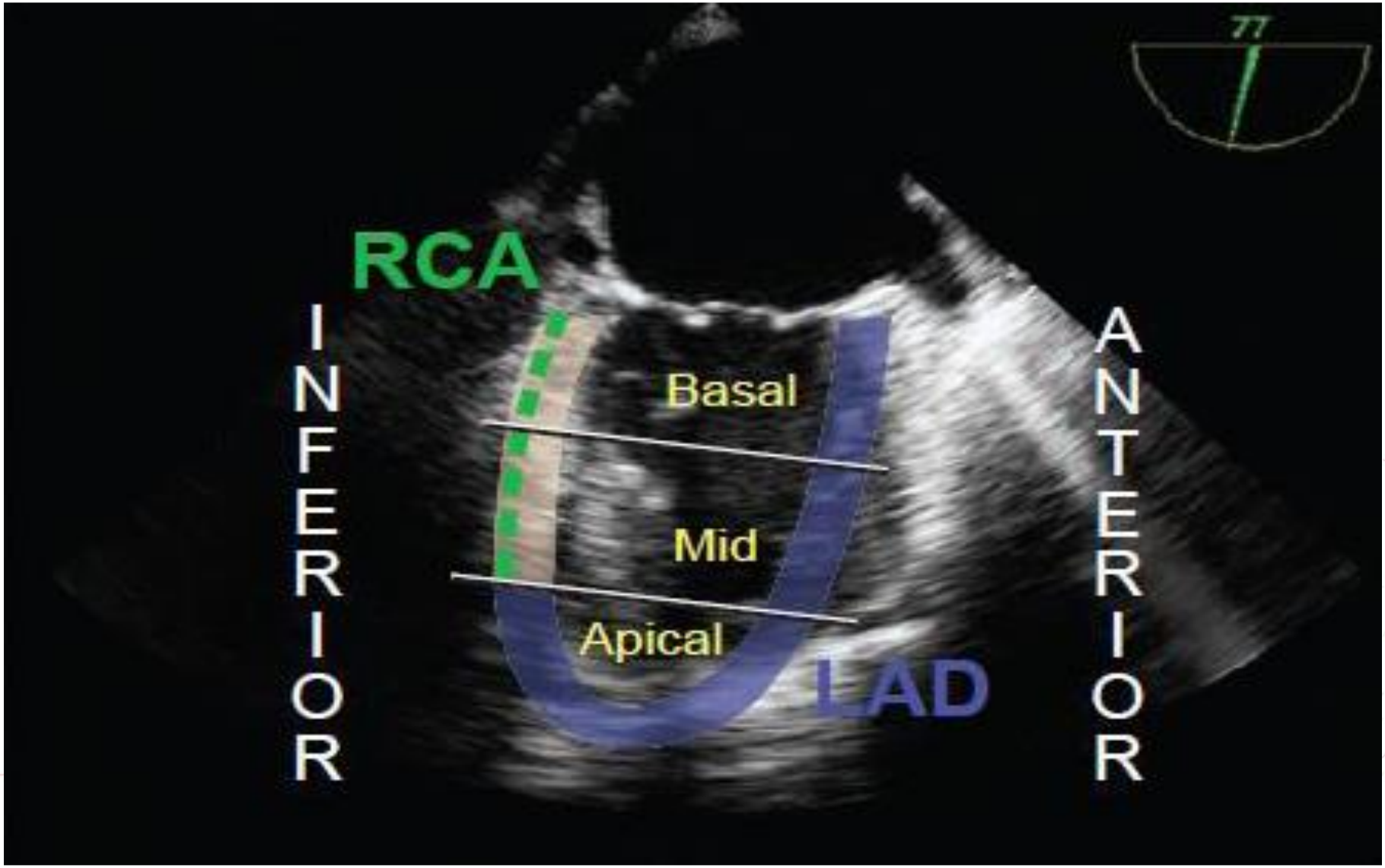
- $\mathbf{LVEF = (EDV - ESV) \div EDV}$

- 1-Eye Global
- 2-FS and FAC
- 2- Modified Simpson rule

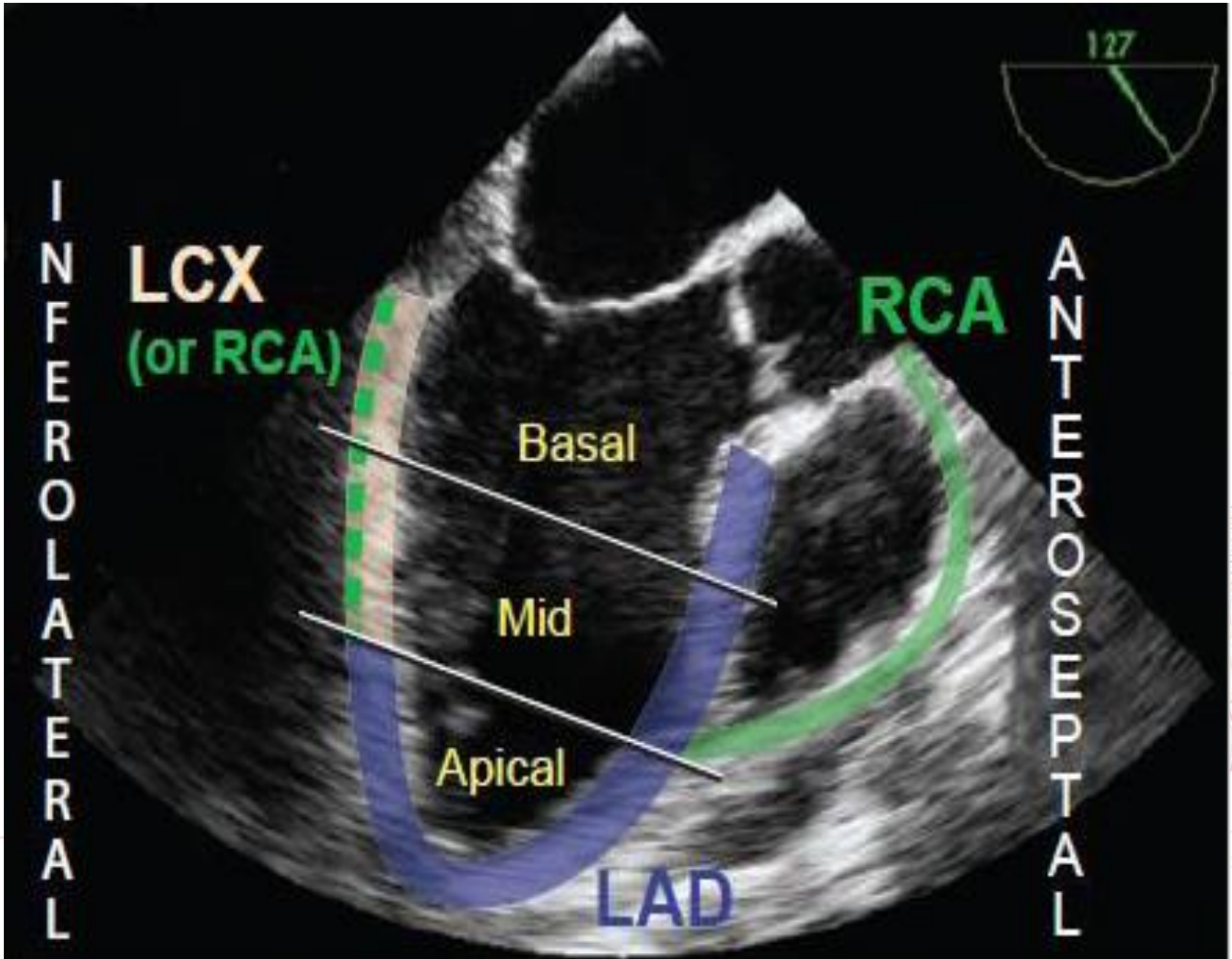
ME 4-Chamber



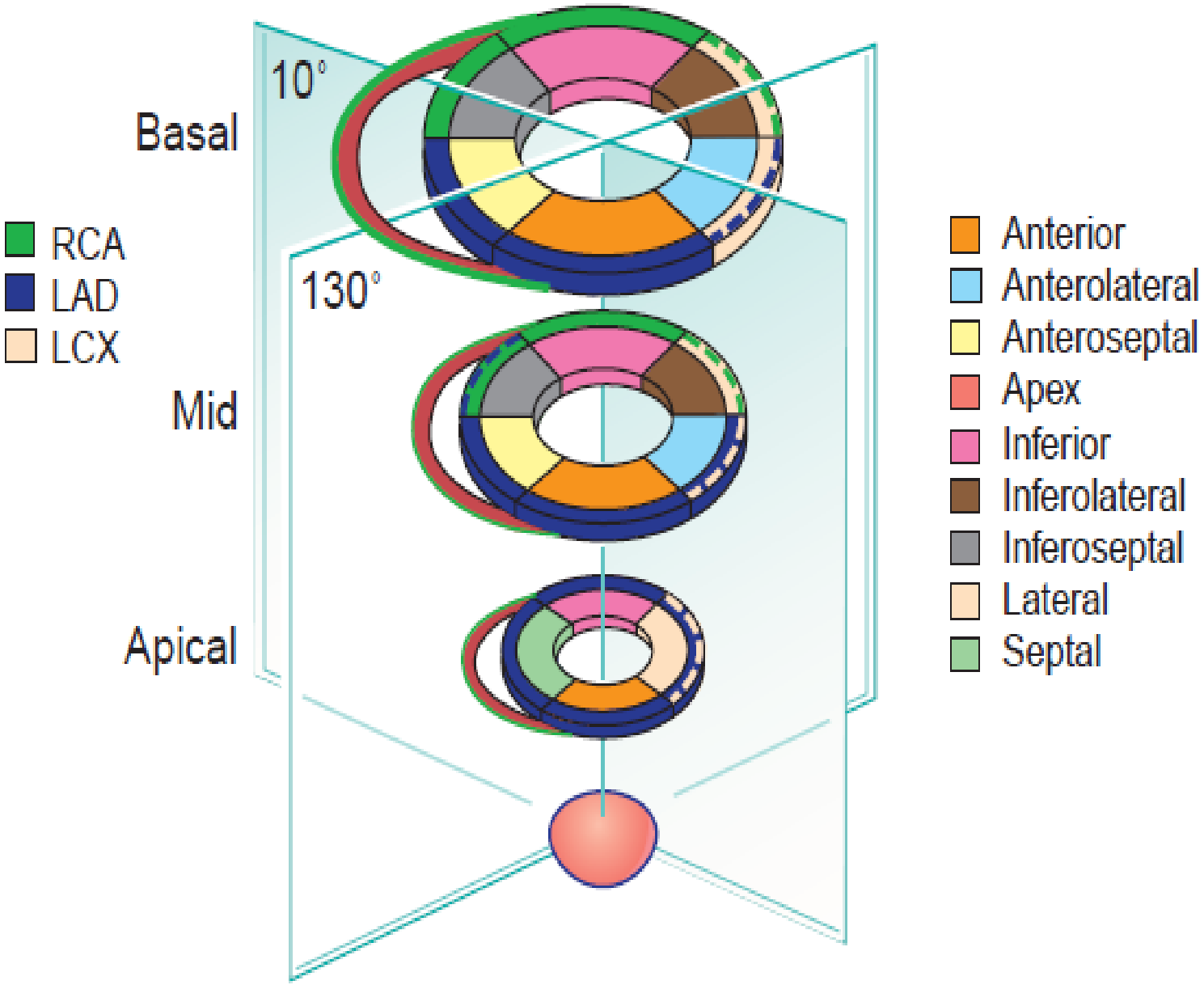
ME 2-Chamber

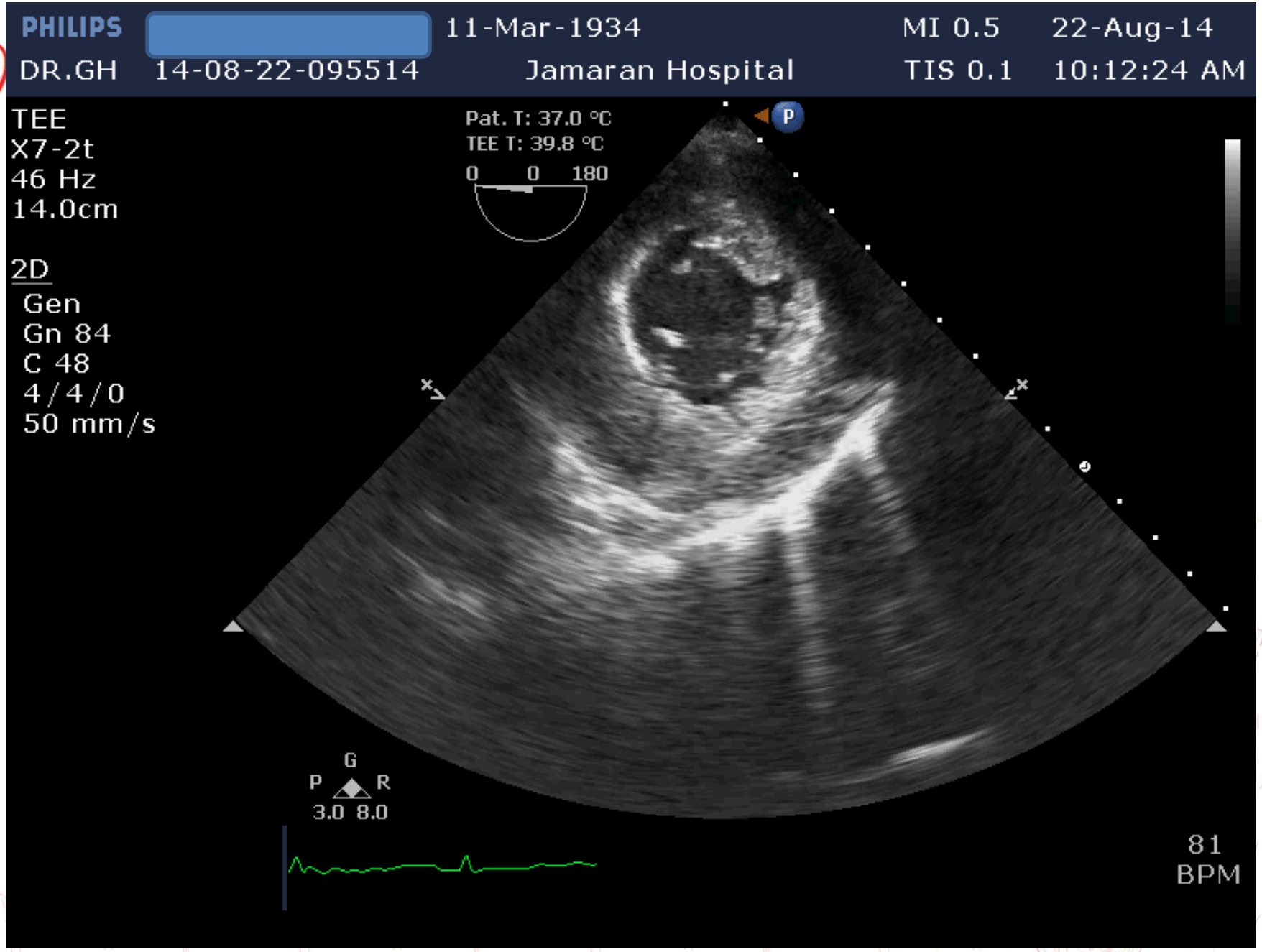


ME Long Axis


127
INFEROLATERAL
ANTEROSEPTAL
LCX
(or RCA)
RCA
Basal
Mid
Apical
LAD

TG SAX Views


10°
130°
Basal
Mid
Apical
RCA
LAD
LCX
Anterior
Anterolateral
Anteroseptal
Apex
Inferior
Inferolateral
Inferoseptal
Lateral
Septal


PHILIPS
11-Mar-1934
MI 0.5
22-Aug-14
DR.GH
14-08-22-095514
Jamaran Hospital
TIS 0.1
10:12:24 AM
TEE
X7-2t
46 Hz
14.0cm
2D
Gen
Gn 84
C 48
4/4/0
50 mm/s
Pat. T: 37.0 °C
TEE T: 39.8 °C
0 0 180
P
G
P R
3.0 8.0
81
BPM

Assessment and Grading of Regional Wall Contraction Abnormalities

Five-grade Scale of Segmental Wall Contraction Abnormalities

		Radial shortening	Myocardial thickening
Grade 1	Normal contractility	>30%	+++ (30–50%)
Grade 2	Mild hypokinesis	10–30%	++
Grade 3	Severe hypokinesis	<10%	+
Grade 4	Akinesis	0	0
Grade 5	Dyskinesis	Lengthening	Thinning

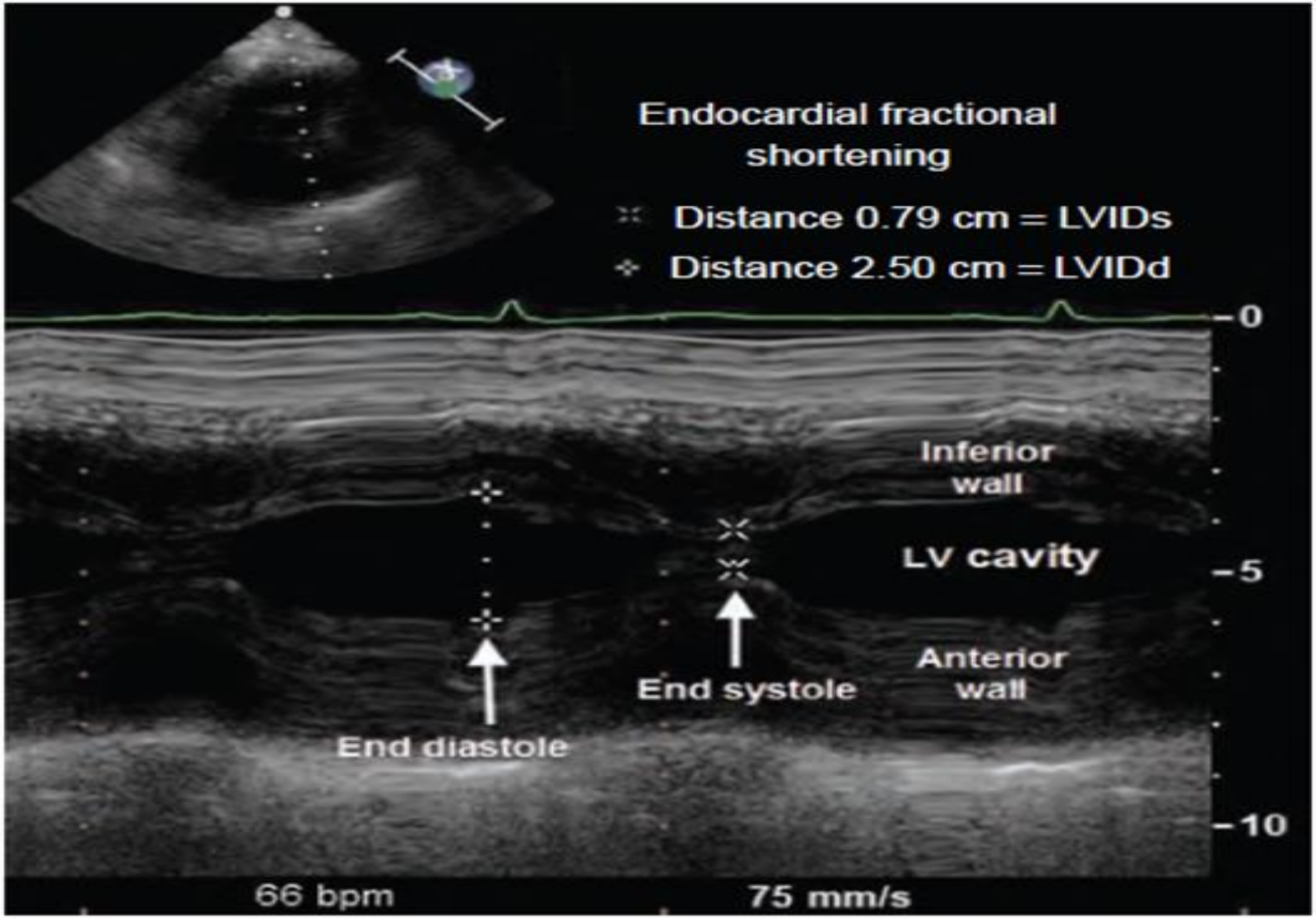
Endocardial Fractional Shortening

- $\mathbf{FS = (EDD - ESD) \div EDD.100\%}$

- EDD =LV End Diastolic Diameter
- ESD =LV End Systolic Diameter

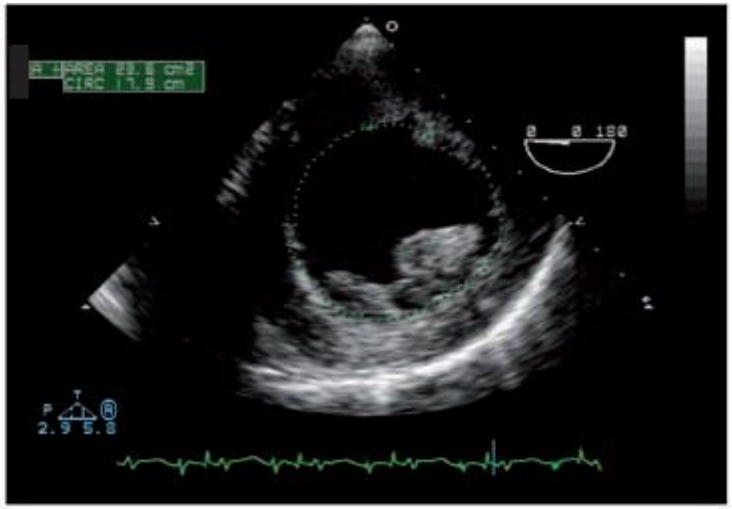
- TG Mid SAX by M-mode
- Normal range 25-45% in absence of RWMA.
- TG SAX just above PMs.

F.S.(Fractional Shortening)



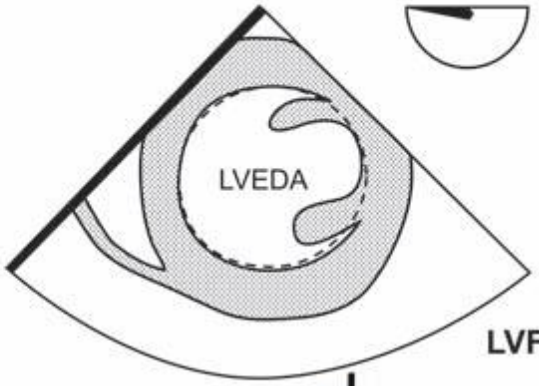
FAC(Fractional Area Change)

A



LVEDA : 23.6 cm^2

B



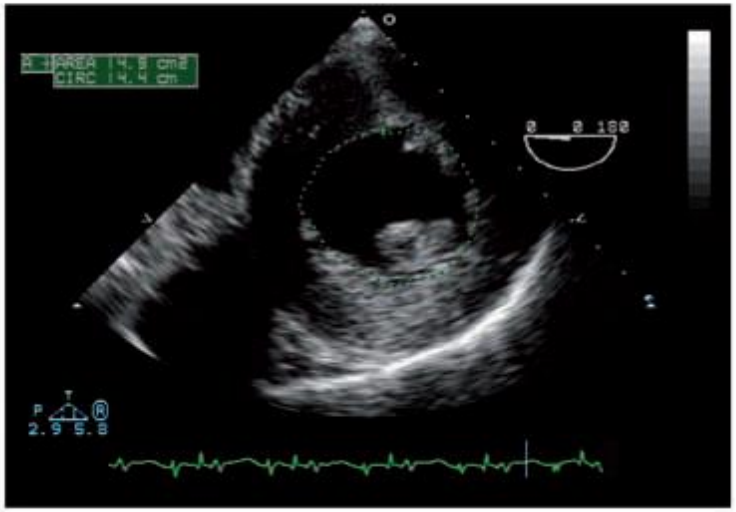


LVFAC : $\frac{\text{LVEDA} - \text{LVESA}}{\text{LVEDA}}$

LVFAC : $\frac{23.6 - 14.9}{23.6}$

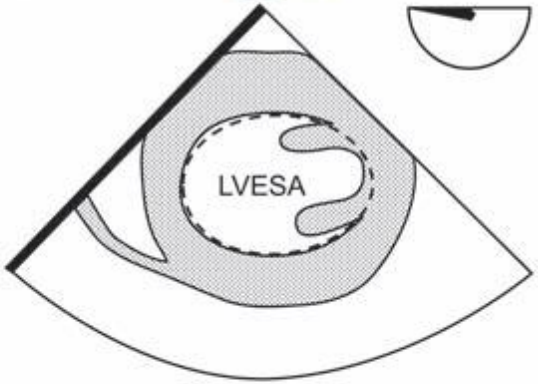
LVFAC : 37% (normal > 50%)

C



LVESA: 14.9 cm^2

D



FAC

- The endocardial surface is traced without considering the PMs in systole and diastole.
- A close correlation with radionuclide angiography EF.

Normal values: Men 56% to 62%, women 59% to 65%

- EDA<5.5 cm2/m2 ⟹ hypovolemia

Cardiac Output

- **CO** (L/min) = **SV** (L) × **HR** (min^{-1})
- **CI** ($L/min/m^2$) = **CO** (L/min) / **BSA** (m^2)

➢ **SV=CSA .VTI**

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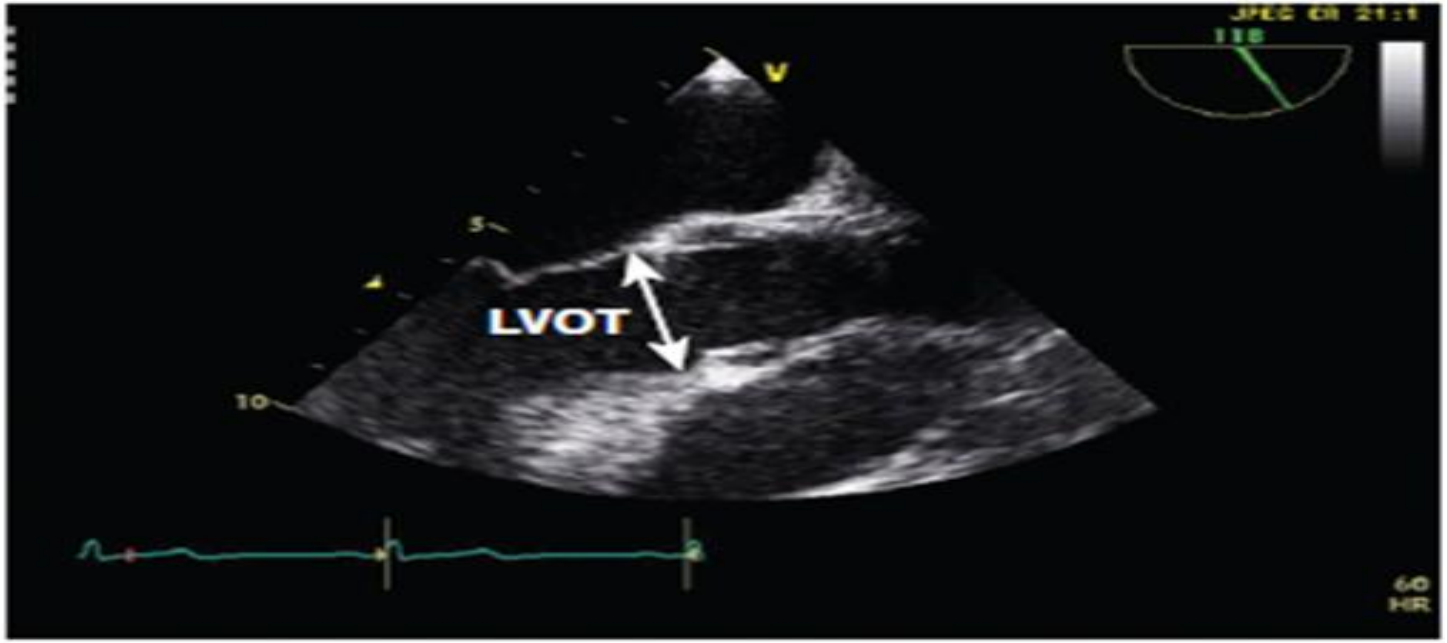
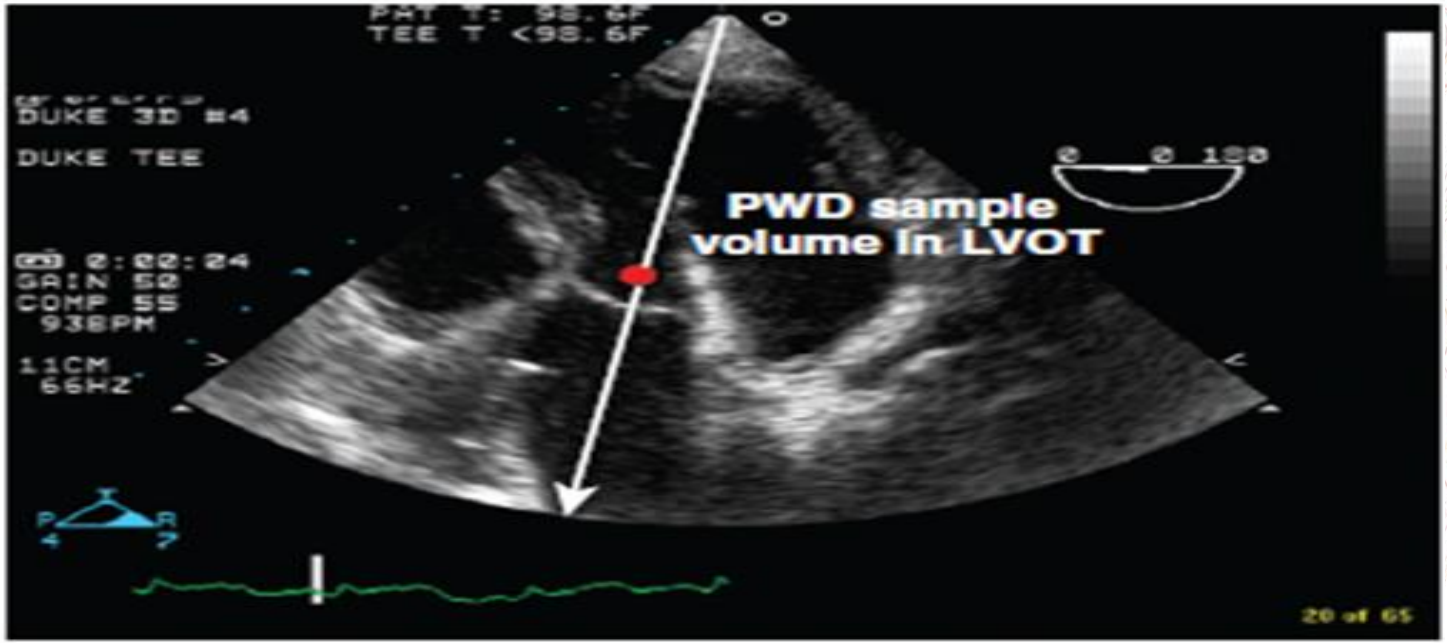
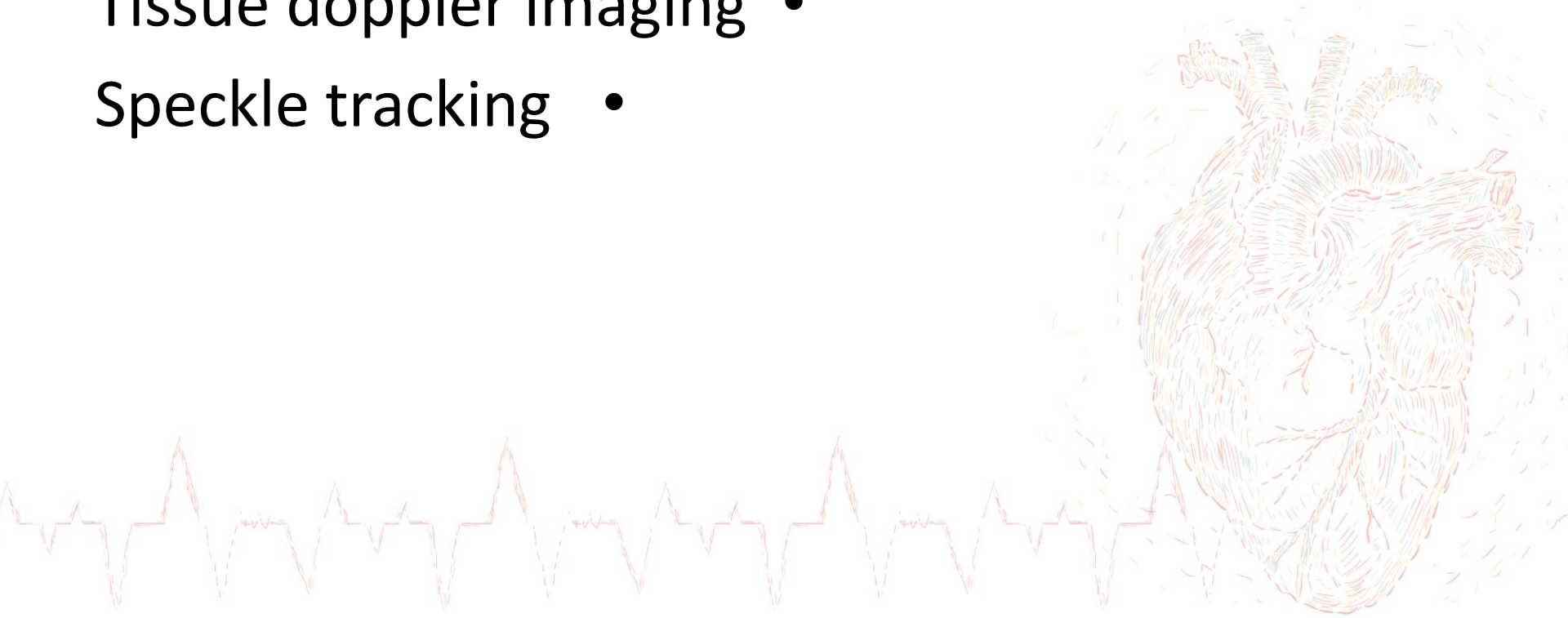

LVOT
5
4
10
60
HR


TEE T <98.6F
DUKE 3D #4
DUKE TEE
GAIN 50
COMP 55
938PM
11CM
66HZ
PWD sample
volume in LVOT
20 of 65

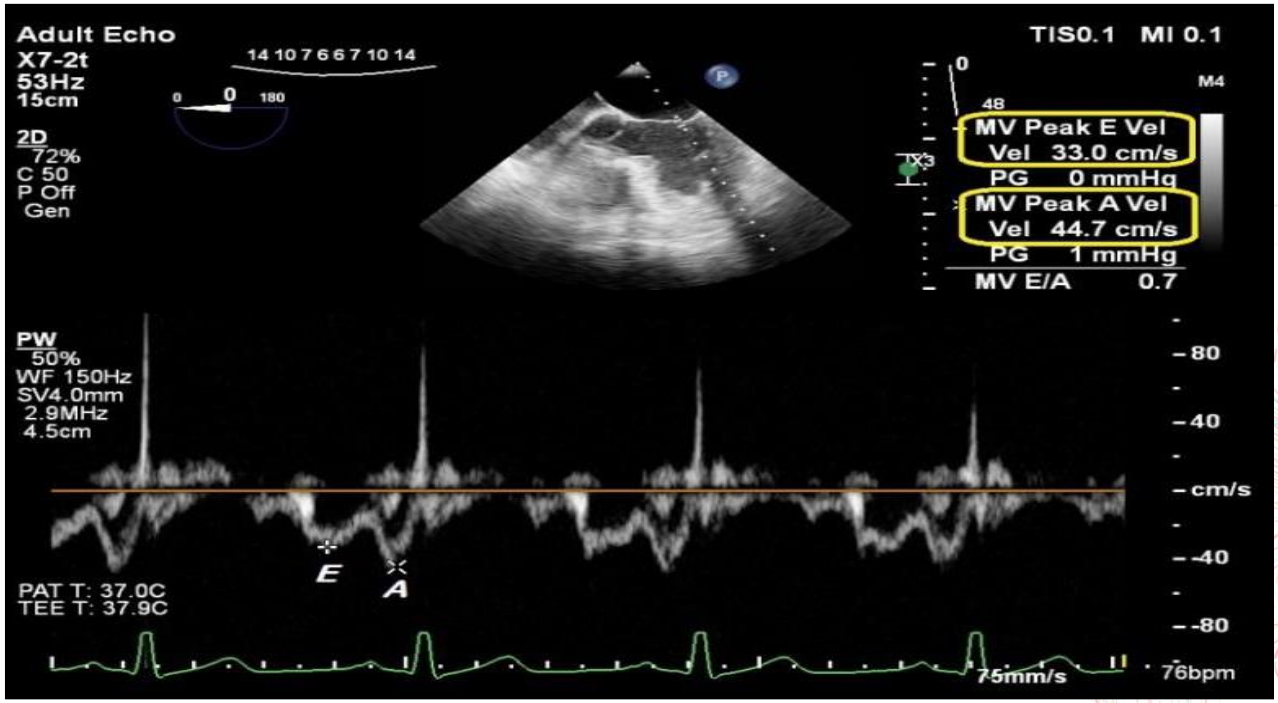
Diastolic Funtion

- Mitral flow doppler
- Pulmonary vein flow doppler
- Tissue doppler imaging
- Speckle tracking



Mitral flow doppler

1-Impaired relaxation



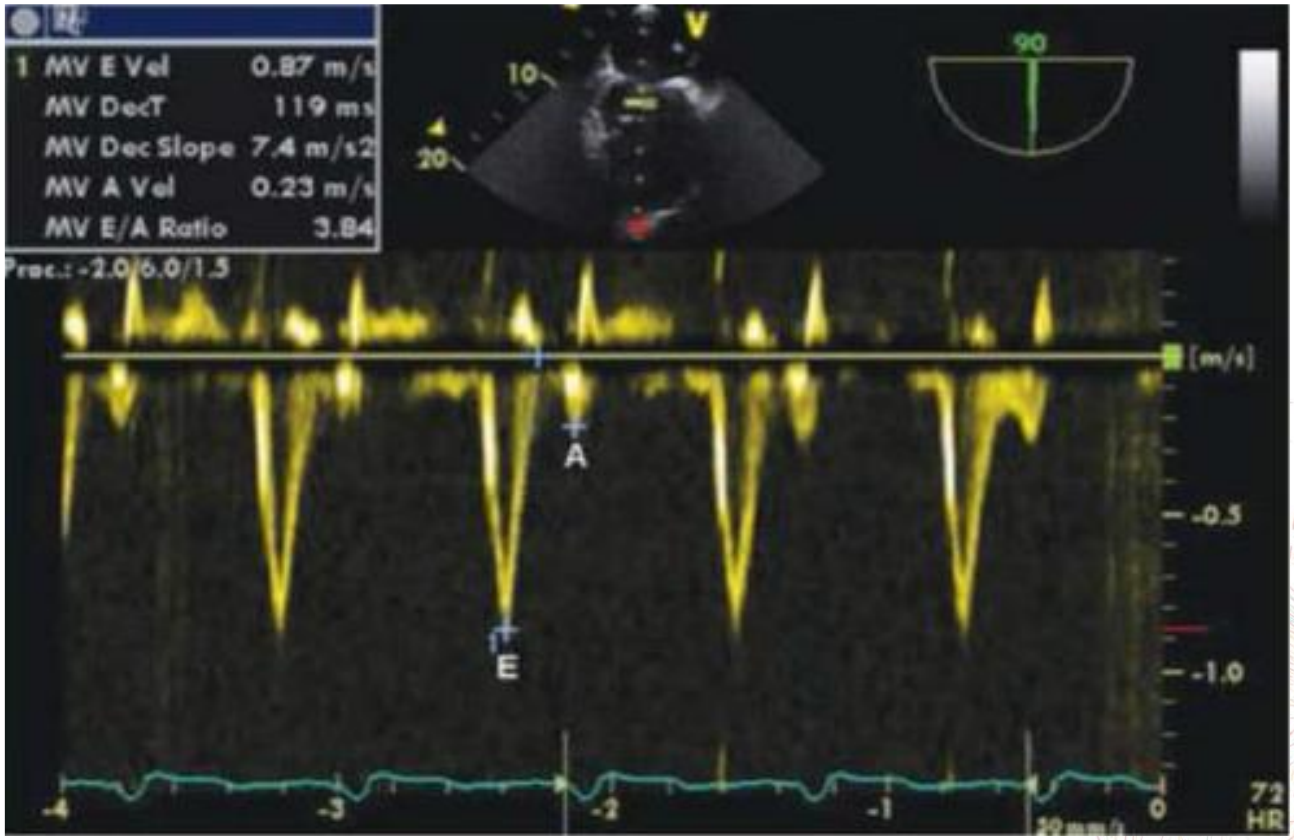
E⇓ , DT⇑, A⇑

E/A < 1 , IVRT⇑

2-Pseudonormal pattern(stage 2)

$$E \Uparrow, A \Downarrow, E/A > 1$$

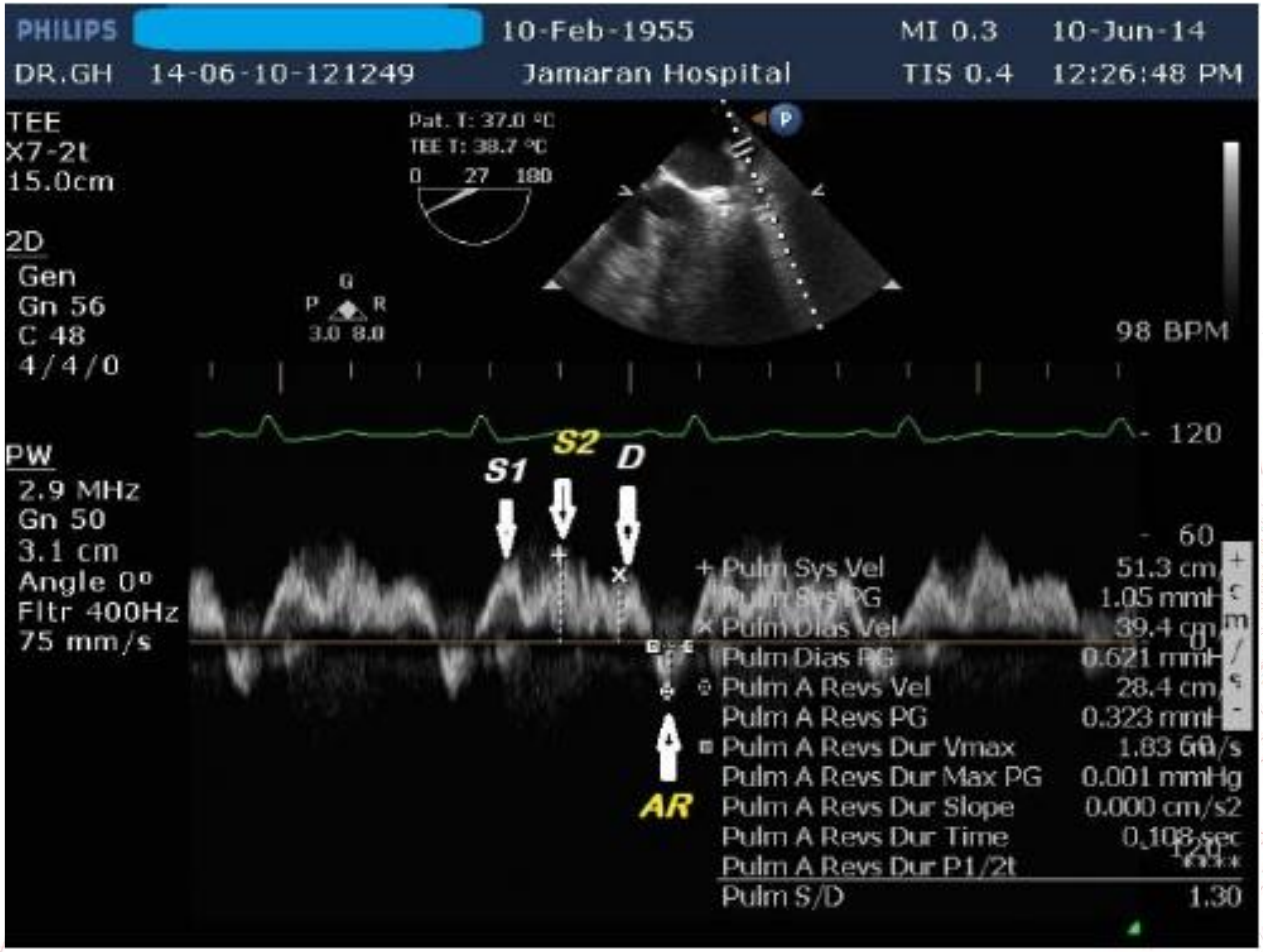
3-Restrictive pattern(stage 3)

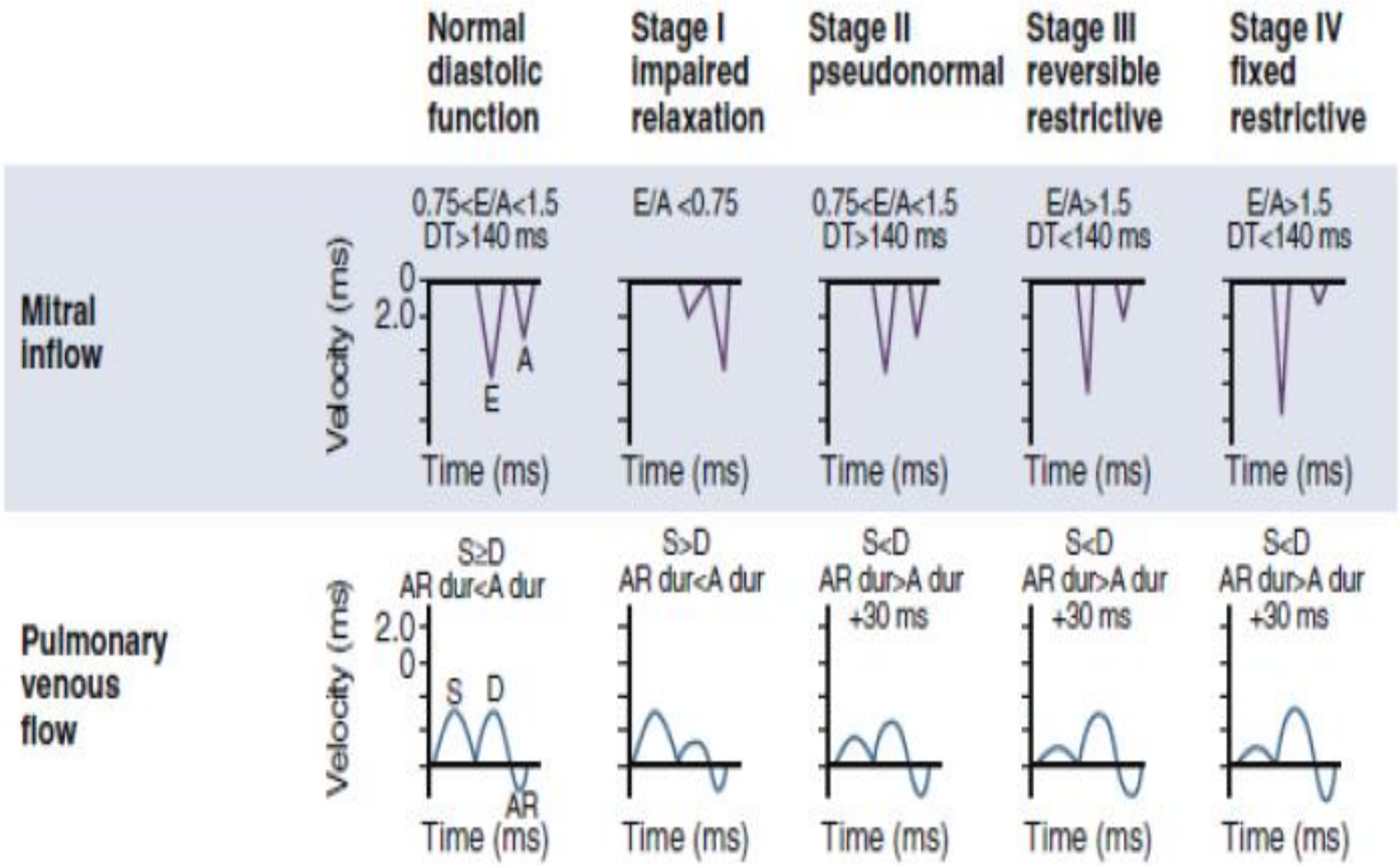


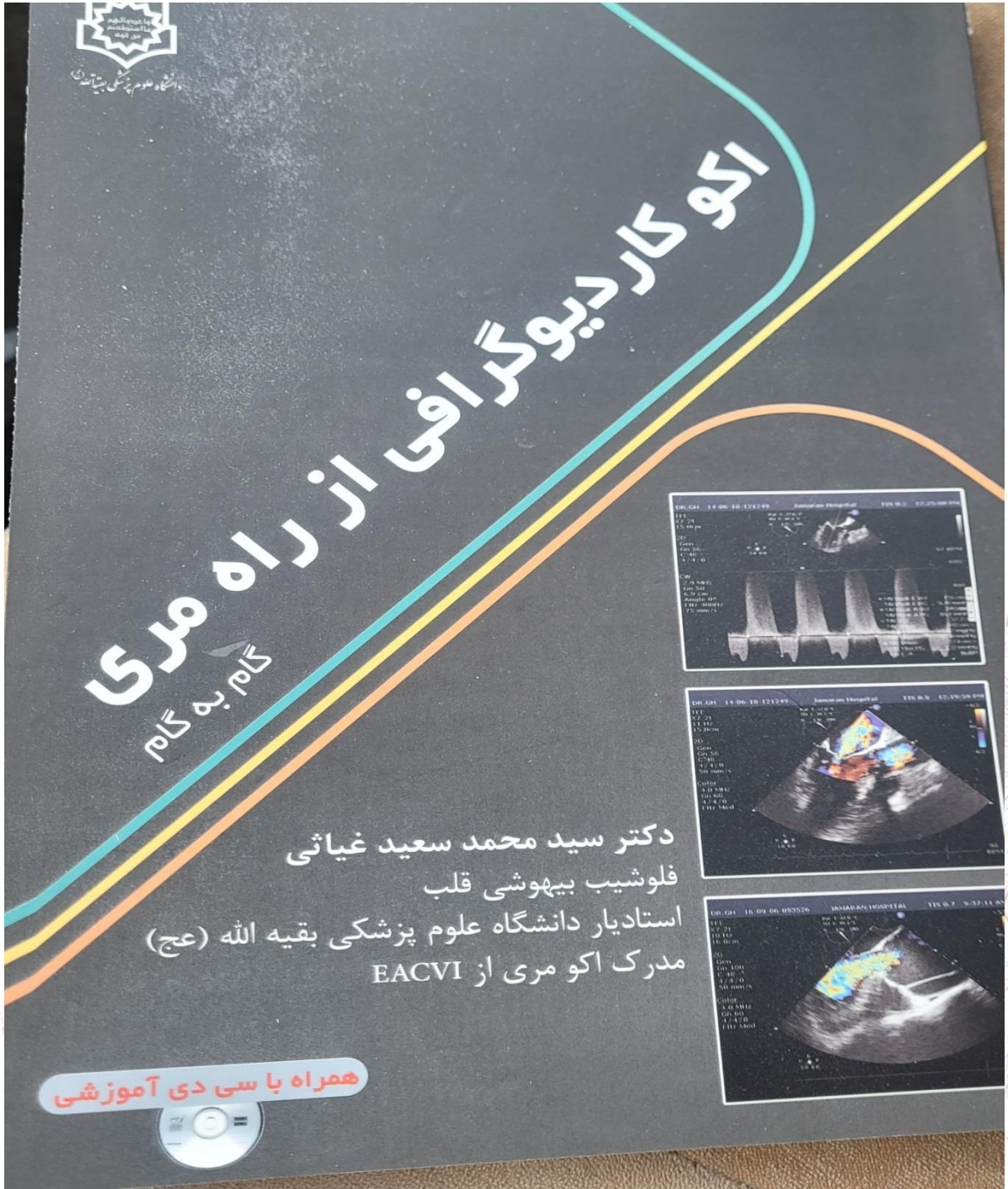
E ⇑ ⇑, A ⇓, E/A >> 1

IVRT ⇑, DT ⇓, AWD ⇓

Pulmonary vein flow doppler




Normal diastolic function
Stage I impaired relaxation
Stage II pseudonormal
Stage III reversible restrictive
Stage IV fixed restrictive
Mitral inflow
0.75<E/A<1.5
DT>140 ms
E/A <0.75
0.75<E/A<1.5
DT>140 ms
E/A>1.5
DT<140 ms
E/A>1.5
DT<140 ms
Velocity (ms)
0
2.0
E
A
Time (ms)
Pulmonary venous flow
S≥D
AR dur<A dur
S>D
AR dur<A dur
S<D
AR dur>A dur
+30 ms
S<D
AR dur>A dur
+30 ms
S<D
AR dur>A dur
+30 ms
Velocity (ms)
2.0
0
S
D
AR
Time (ms)


اکو کاردیوگرافی از راه مری
گام به گام
دکتر سید محمد سعید غیاثی
فلوشیب بیهوشی قلب
استادیار دانشگاه علوم پزشکی بقیه الله (عج)
مدرک اکو مری از EACVI
همراه با سی دی آموزشی