

Case presentations: challenges in heart valve diseases

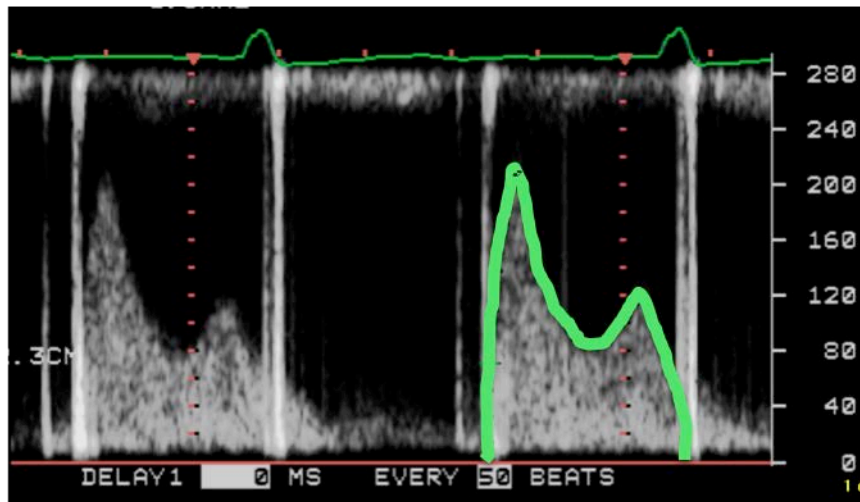
A patient with high gradient on a prosthetic valve

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Clinical case

- 33 year old woman from Algeria
- MVR by a StJude # 27, 3 years ago for MVS (Rheumatic disease)
- Previously asymptomatic – Last follow-up 6 months before adm unremarkable (see below)



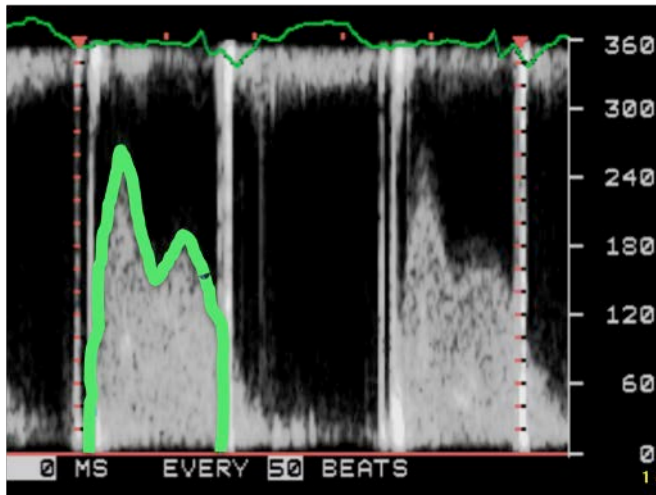
BP 140/80 mm Hg HR 72 bpm
Peak Gradient = 17 mmHg
Mean Gradient = 5 mmHg
Systolic PA Pressure = 39 mmHg
EOA = 2.2 cm²
BSA = 1.75 m²

Patient history



Patient history (2)

- The patient presents with SOB class III progressively increasing since 3 months. She also complains of fatigue
- Increasing weight (7kg/3m)
- Peripheral ankle oedema during the same period



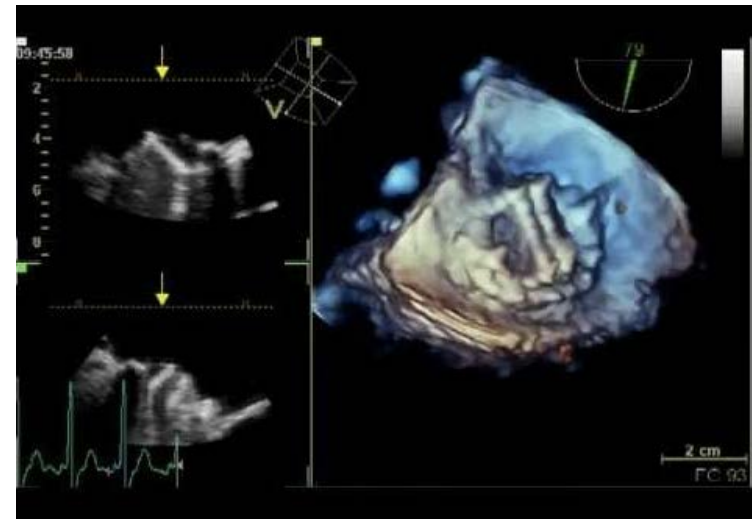
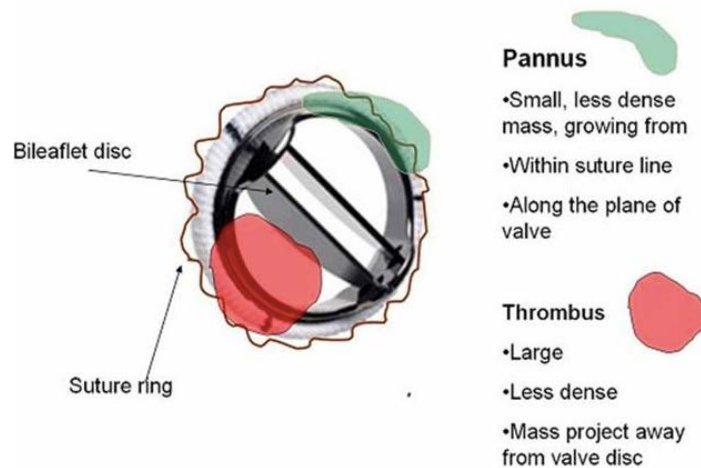
BP 150/90 mm Hg HR 92 bpm reg
Peak Gradient = 27 mmHg
Mean Gradient = 14 mmHg
Systolic PA Pressure = 50 mmHg
EOA = 2 cm²
BSA = 2.1 m²

Patient history (3)

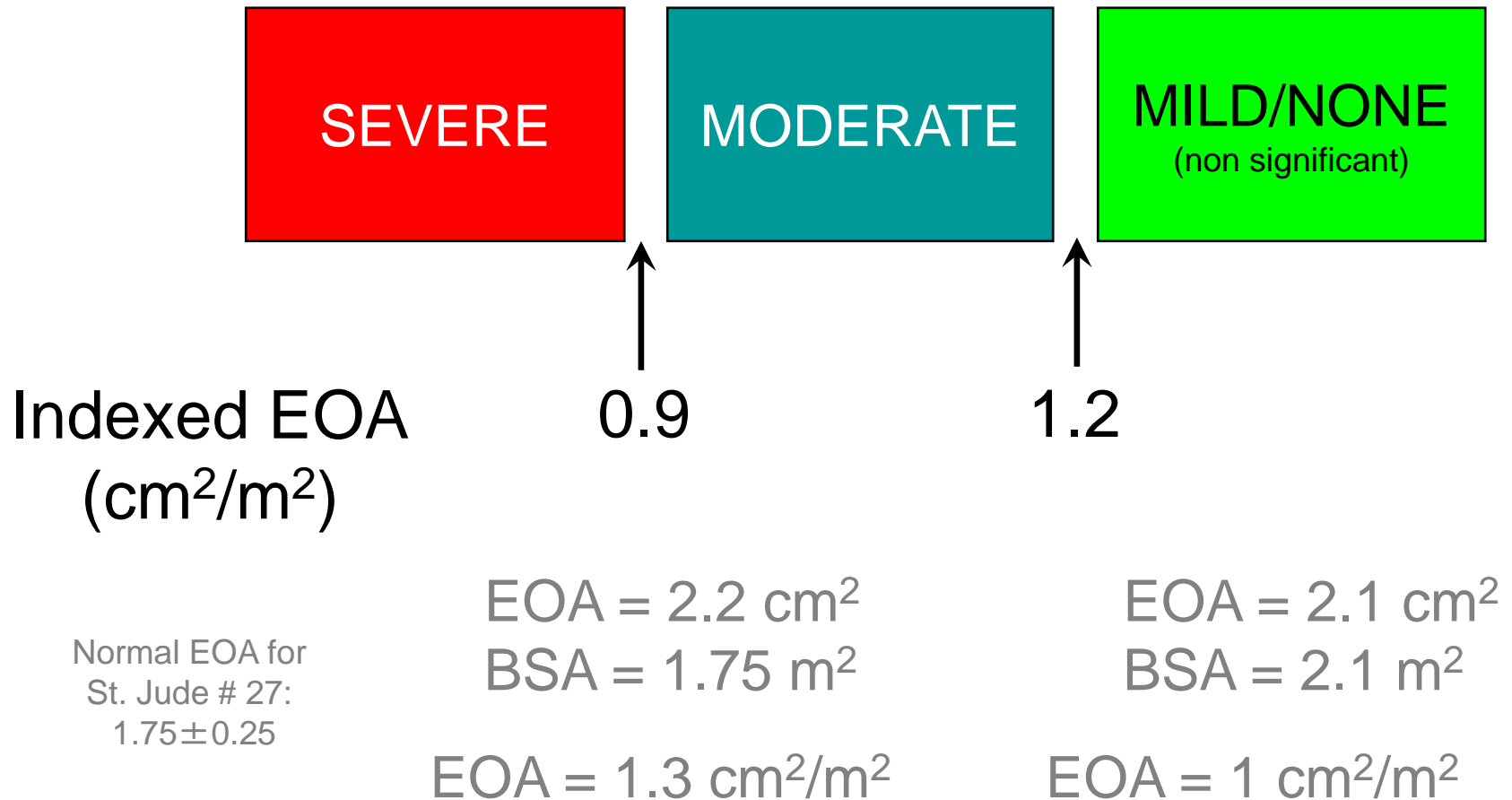


MVP dysfunction ? Thrombosis / Pannus

- **INR = 3.5 < 2 weeks before admission**
 - May be chronic (previous INR might have been lower)
 - VT occurring within recommended therapeutic range not unfrequent
 - EOA not significantly modified
- **Pannus**
 - Small one is enough
 - More often aortic valve



MVP dysfunction? PPM ?



High transprosthetic gradient late FUP

Compare EOA to normal reference value (\pm SD)

EOA Normal

EOA \ll Normal

Change in EOA during follow-up

EOA is stable

EOA decreases

Calculation of indexed EOA

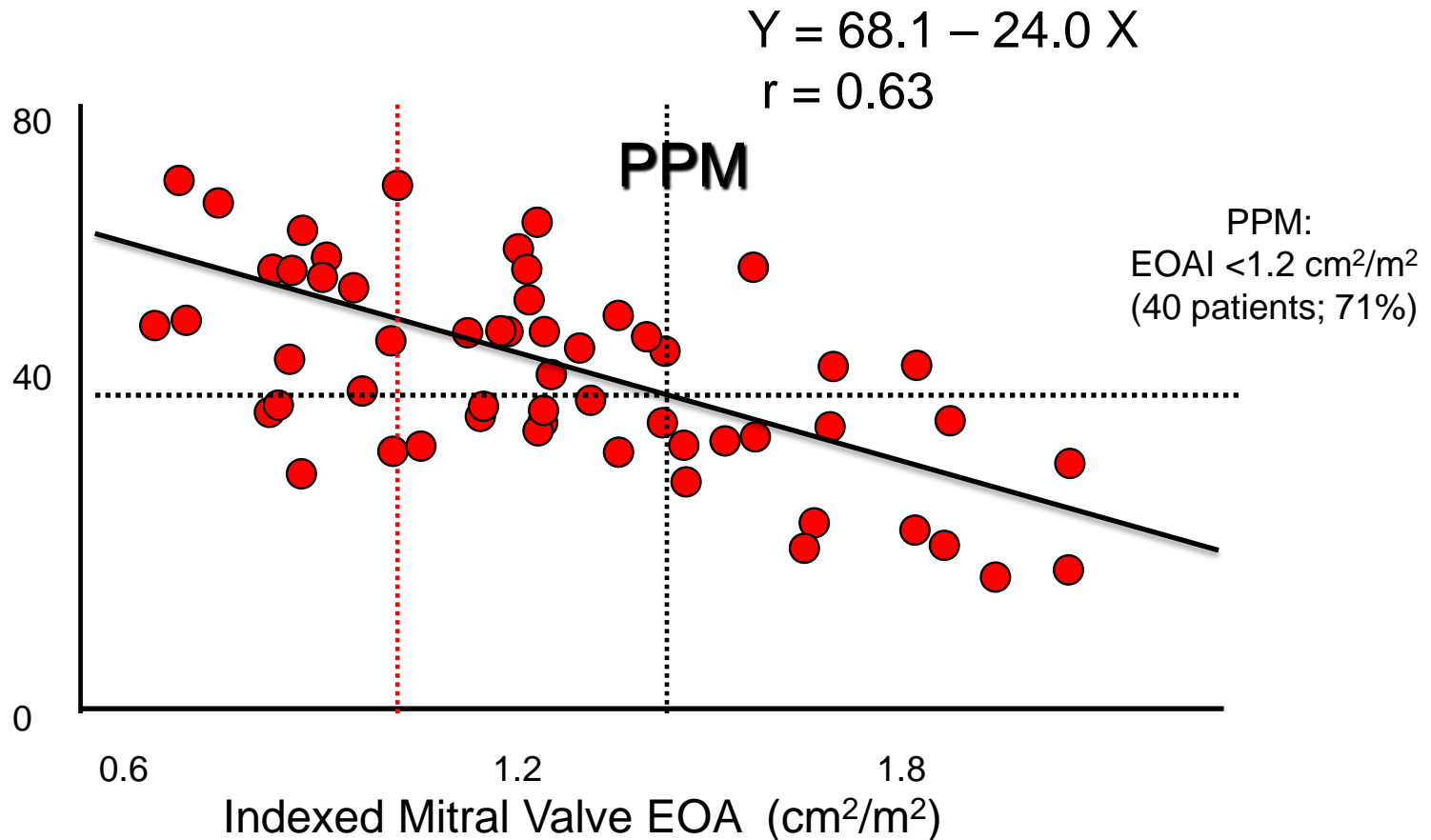
Indexed EOA $\leq 1.2 \text{ cm}^2/\text{m}^2$
($\leq 0.9 \text{ cm}^2/\text{m}^2$ severe)

P dysfunction

PPM

PAPs vs EOAI in MV prosthesis mismatch

Systolic PA
Pressure
(mmHg)



Is that so simple ?



**KEEP CALM
BE PATIENT
TOMORROW
IS HOLIDAY!!!**

The good questions...

- Is the BSA really increasing ?
- Does the patient really have a PPM ?
- Why are the transvalvular gradients increasing ?
- Why is the patient becoming symptomatic?
- Do we need more exams ?

BSA increasing? How does it change EOAI?

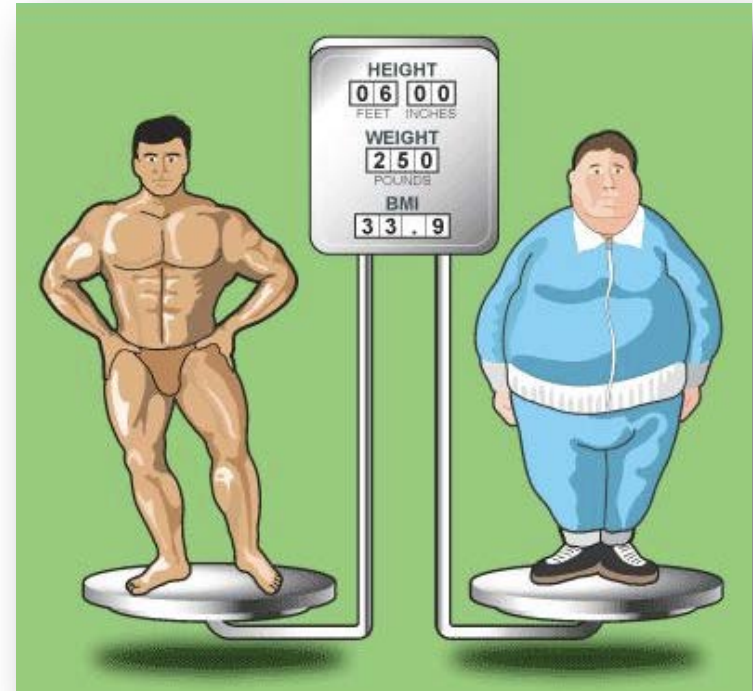
BSA

DuBois Formula:

$$BSA = 0.007184 \times W^{0.425} \times H^{0.725}$$

Mosteller Formula:

$$BSA (m^2) = \sqrt{\frac{Ht (Cm) \times Wt (kg)}{3600}}$$



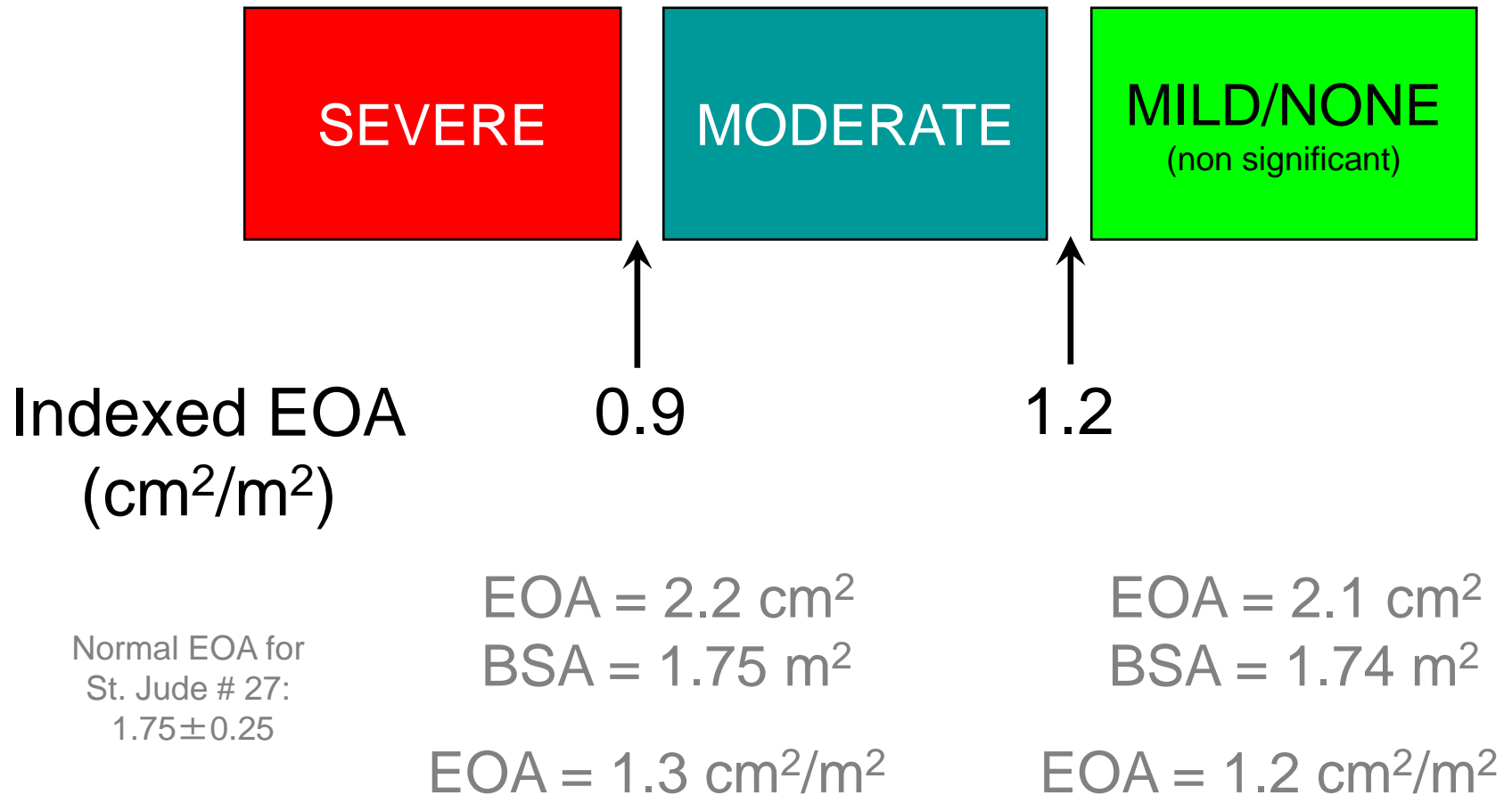
Same EOA – Increasing BSA

	Patient number				
	1	2	3	4	5
Body surface area (m ²)	1.5	1.75	2.0	2.25	2.5
Cardiac output (l/min)	4.5	5.25	6.0	6.75	7.5
Valve EOA (cm ²)	1.3	1.3	1.3	1.3	1.3
Mean pressure gradient (mm Hg)	13	17	22	28	35

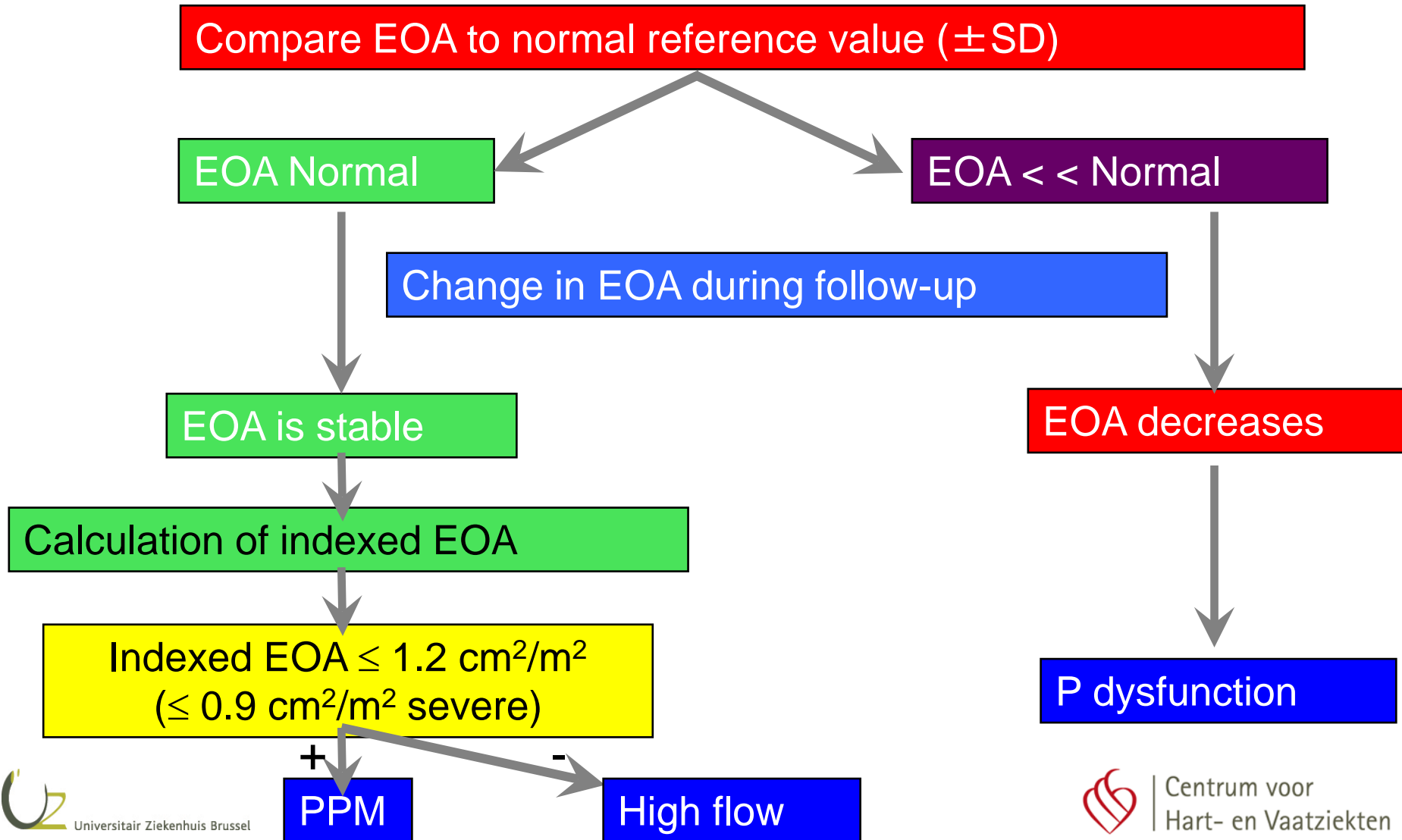
- **Fat free mass** is the main determinant of cardiac output requirement
- FFM (bio-impedance) in order to provide equivalent to a BSA of 1.85 m² in a normal weight patient



Does the patient really have PPM ?

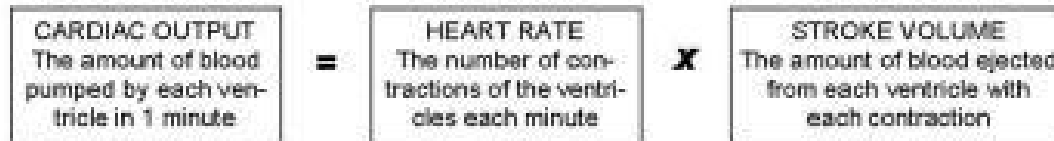


High transprosthetic gradient late FUP



Why are the gradients increasing? High flow

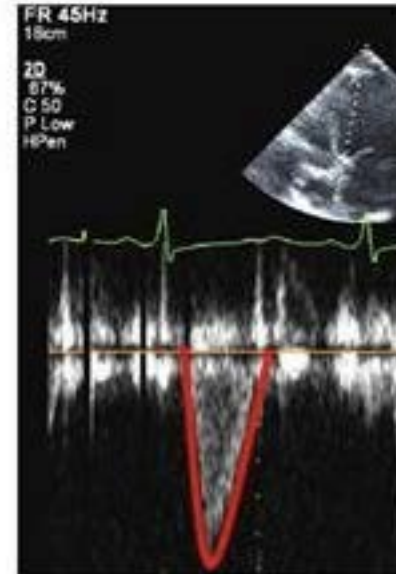
$$\mathbf{CO} = \mathbf{HR} \times \mathbf{SV}$$



AVERAGE 4000 — 5000 ml	=	70	X	70 ml
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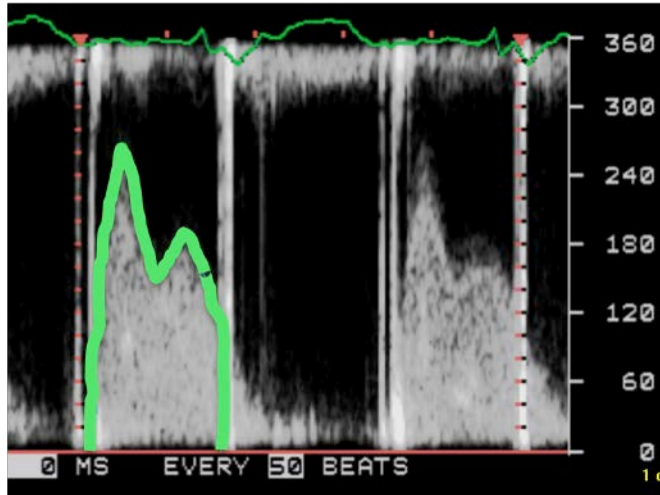


Stroke volume increase



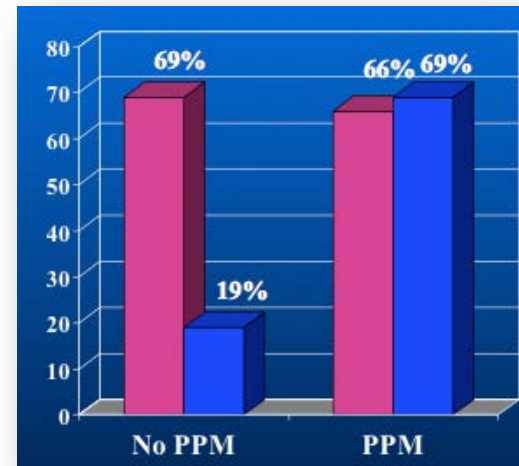
SV = 68 mL → SV = 78 mL

Why symptoms ?



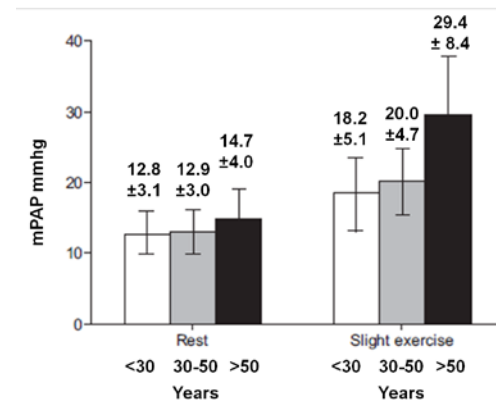
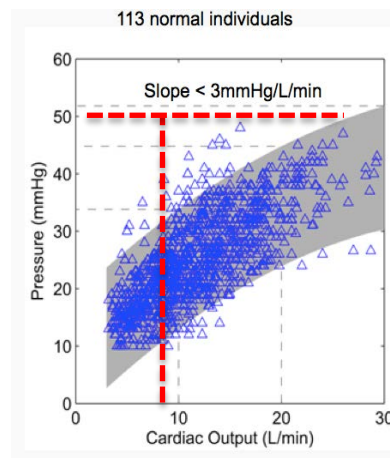
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$$\text{mPAP} = \text{PVR} \times \text{CO} + \text{LAP}$$



PAP with increasing CO: physiology

Low level exercise	CO	mPAP	LV Compl	TPR=PVR+LVFR	PVR
< 50 yrs	↑ 85 %	↑ 41 %	↑	↓ 25 %	↓ 12 %
50-70 yrs	↑ 71 %	↑ 66 %	↓	≈	≈
>70 yrs	↑ 88 %	↑↑ 119 %	↓↓	↑ 17 %	≈



Why symptoms ? Do we need more ?



Normal changes during pregnancy

Hemodynamic Parameter	Change During Normal Pregnancy	Change During Labor and Delivery	Change During Postpartum
Blood volume	↑ 40%-50%	↑	↓ (autodiuresis)
Heart rate	↑ 10-15 beats/min	↑	↓
Cardiac output	↑ 30%-50%	↑ Additional 50%	↓
Blood pressure	↓ 10mmHg	↑	↓
Stroke volume	↑ First and second trimesters; ↓ third trimester	↑ (300-500mL per contraction)	↓
Systemic vascular resistance	↓	↑	↓

Take home messages

- **Take a look at the valve**
- **Take a look at the ventricle**
- **Take a look at the haemodynamic conditions**
- **Take a look at the patient**