

5 Key Insights on Assessing Mitral Regurgitation

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No disclosures

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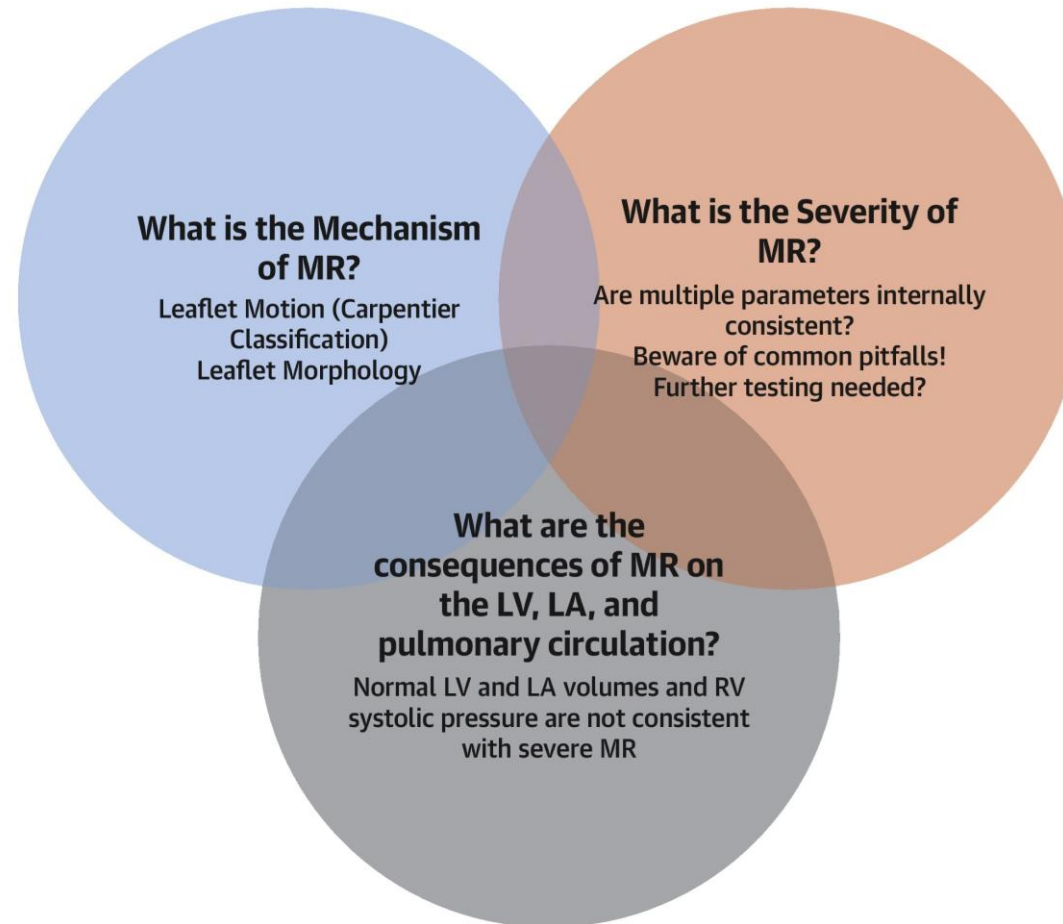
Key Imaging Questions in Mitral Valve Disease

What is the **MECHANISM** ?

What is the **SEVERITY** ?

What are the **CONSEQUENCES**?

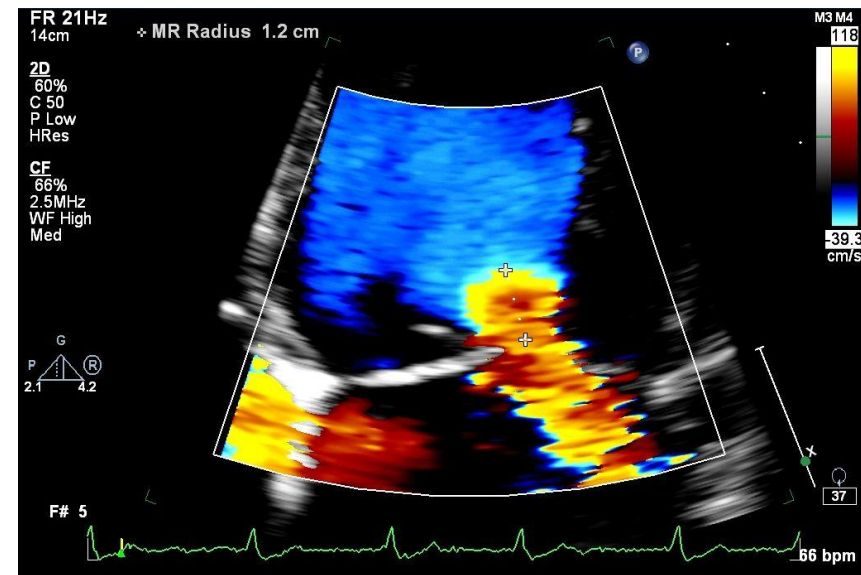
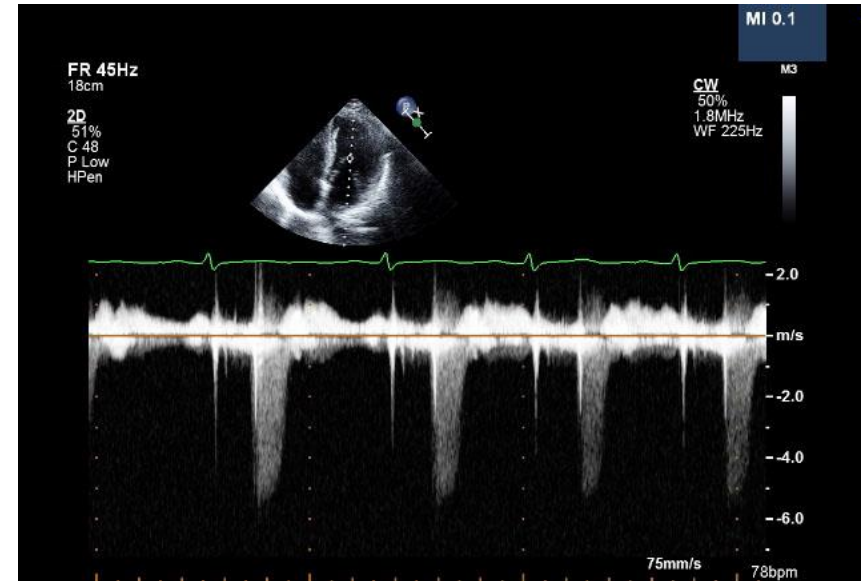
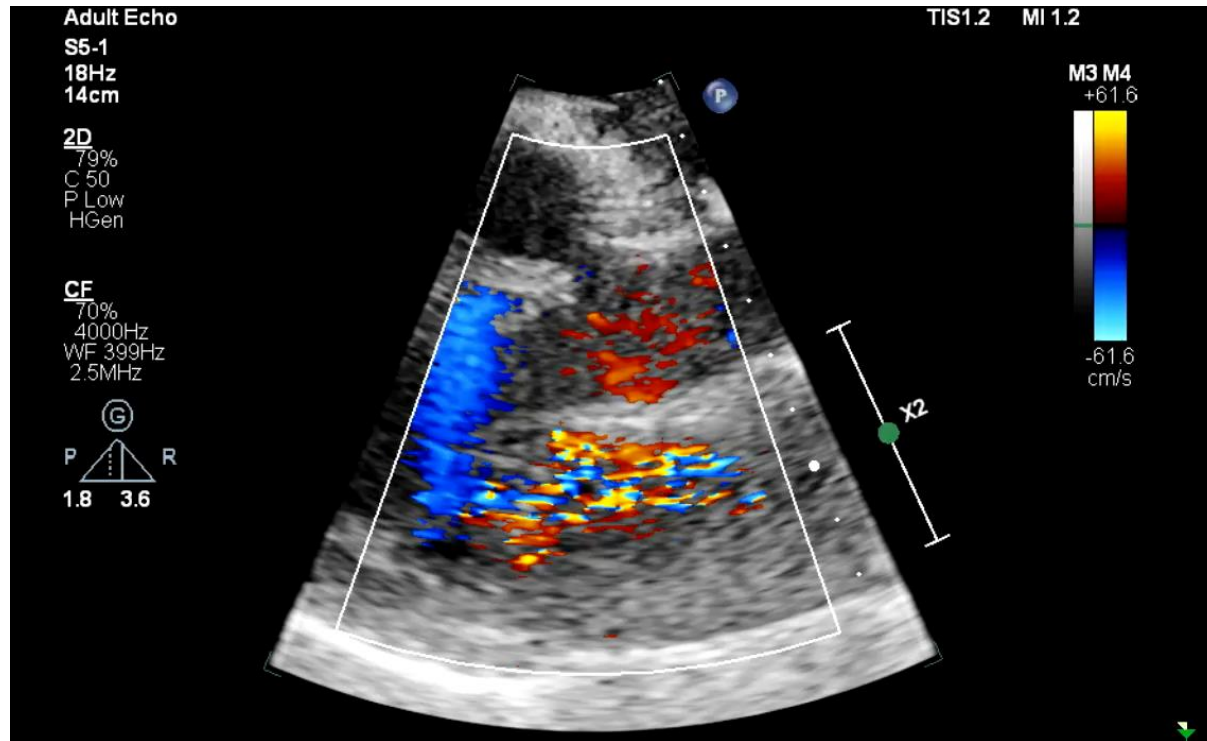
Key Imaging Questions in Mitral Valve Disease



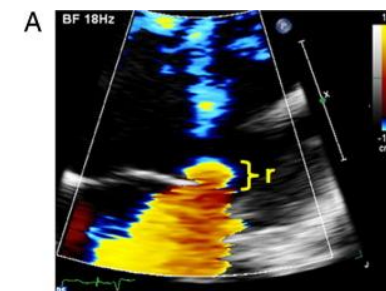
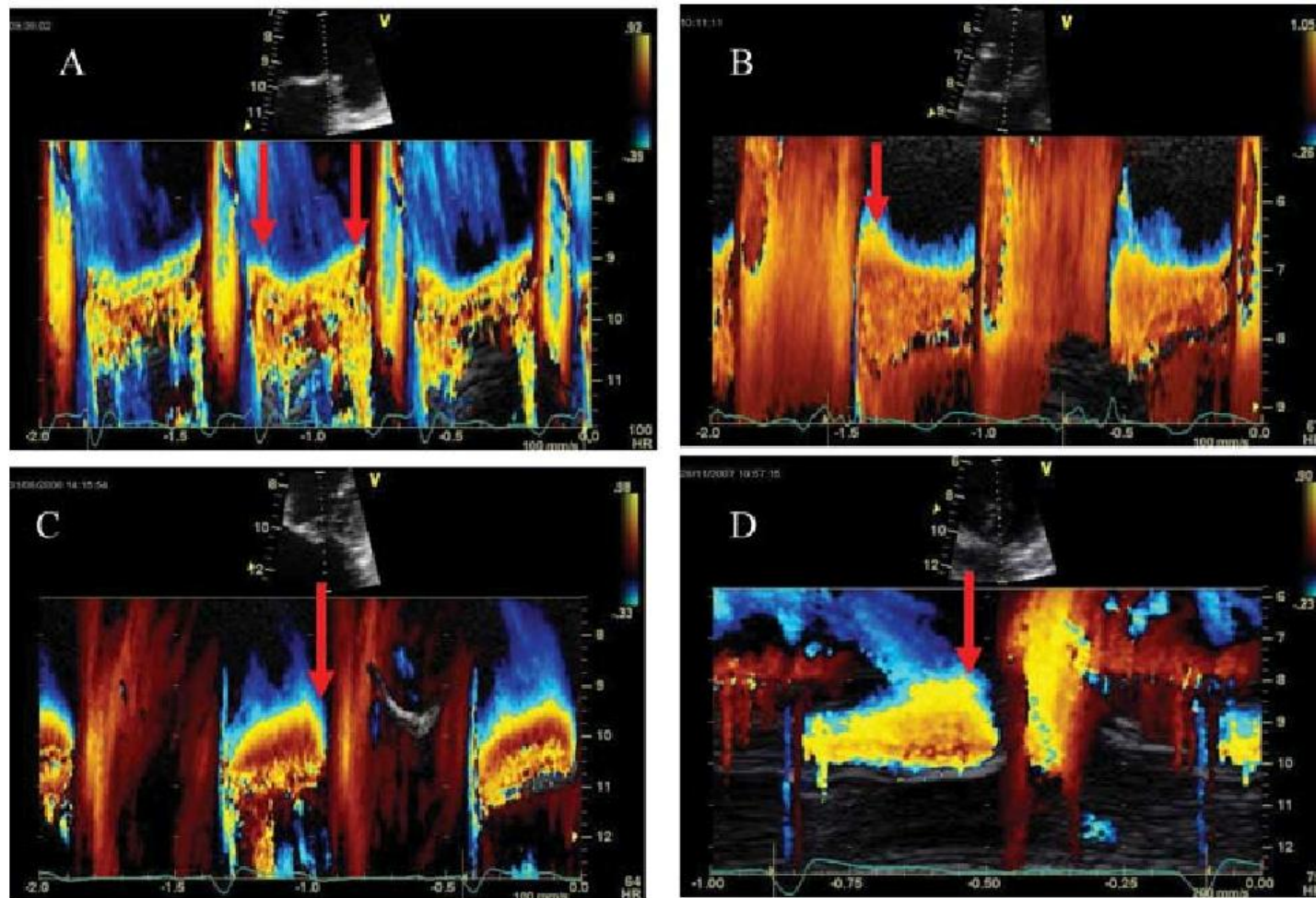
Grayburn, P.A. et al. J Am Coll Cardiol Img. 2021;14(4):843-53.

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Account for Dynamics of MR Orifice

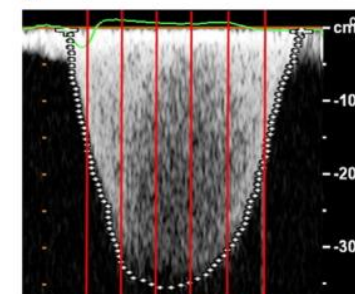


Dynamic MR within 1 cardiac cycle



PISA-VTI

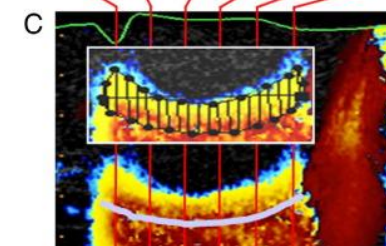
$$\begin{aligned} \text{MRSV} &= \frac{2\pi \cdot r^2 \cdot v(Ny) \cdot \text{VTI}}{V_{\text{max}}} \\ &= \frac{2\pi \cdot (0.7 \text{ cm})^2 \cdot 15.4 \text{ cm/s} \cdot 111 \text{ cm}}{354 \text{ cm/s}} \\ &= 14.9 \text{ ml} \end{aligned}$$



MV VTI	
Vmax	354 cm/s
Vm	249 cm/s
Max PG	50 mmHg
MPG	29 mmHg
VTI	111 cm

Serial PISA

$$\begin{aligned} \text{MRSV} &= \sum_{i=1}^n \frac{2\pi \cdot r_i^2 \cdot V_{\text{max}}}{\text{color Doppler frame rate}} \\ \text{frame rate} &= 18 \text{ frames/sec} \\ r \text{ (cm)} &= 1.1; 0.9; 0.7; 0.6; 0.8; 0.8 \\ \text{MRSV} &= 6.5 + 4.4 + 2.6 + 1.9 + 3.4 + 3.4 \text{ ml} \\ &= 22.2 \text{ ml} \end{aligned}$$



M-mode PISA

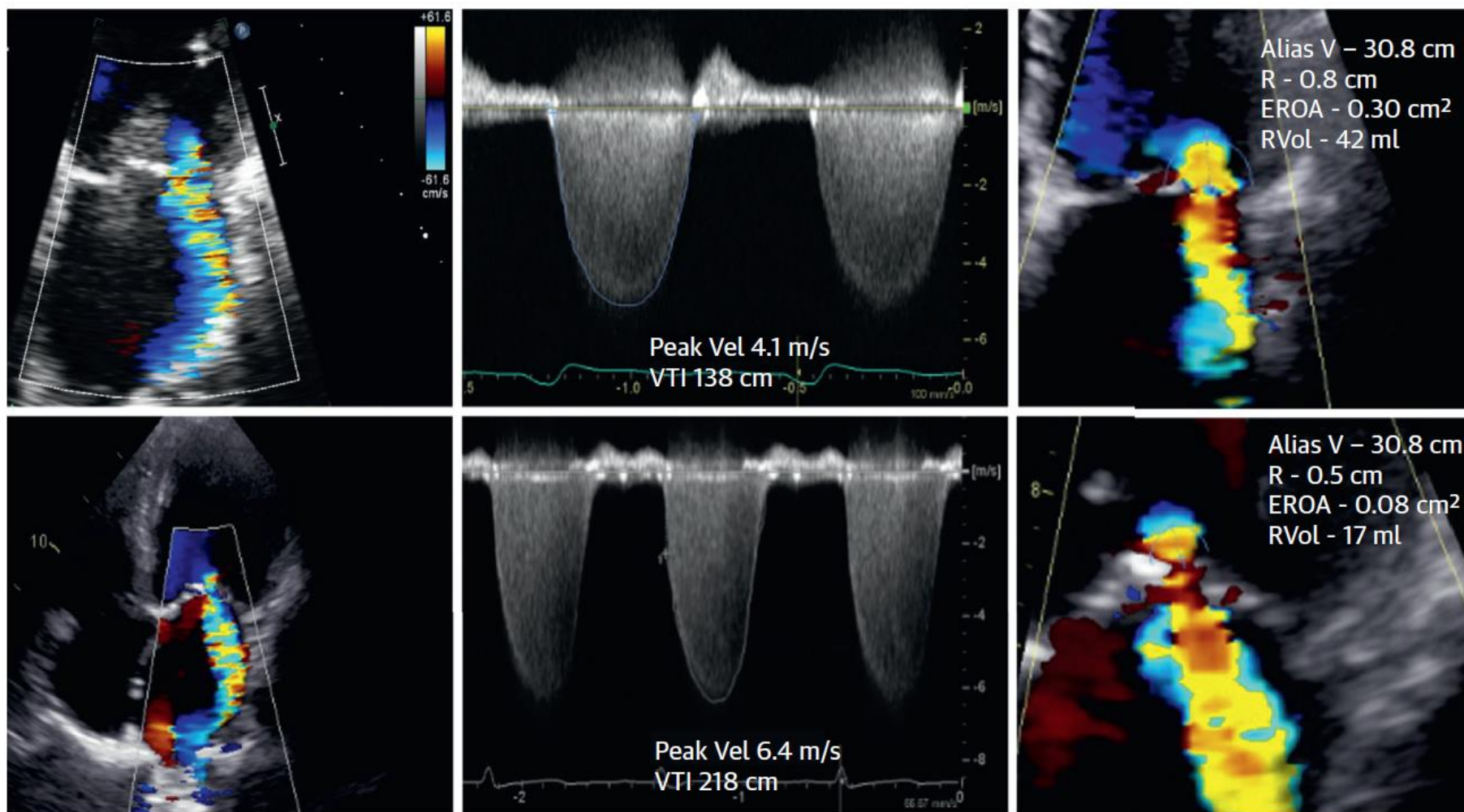
$$\begin{aligned} \text{MRSV} &= \frac{8 \cdot \text{Vol (PISA)} \cdot v(Ny) \cdot t(\text{PISA})}{\text{length (PISA)}} \\ &= \frac{8 \cdot 1.8 \text{ ml} \cdot 15.4 \text{ cm/s} \cdot 0.39 \text{ sec}}{3.1 \text{ cm}} \\ &= 27.9 \text{ ml} \end{aligned}$$

Buck T et al, JACC, 2008

Lancellotti et al, Eur J Echocardiogr 2010

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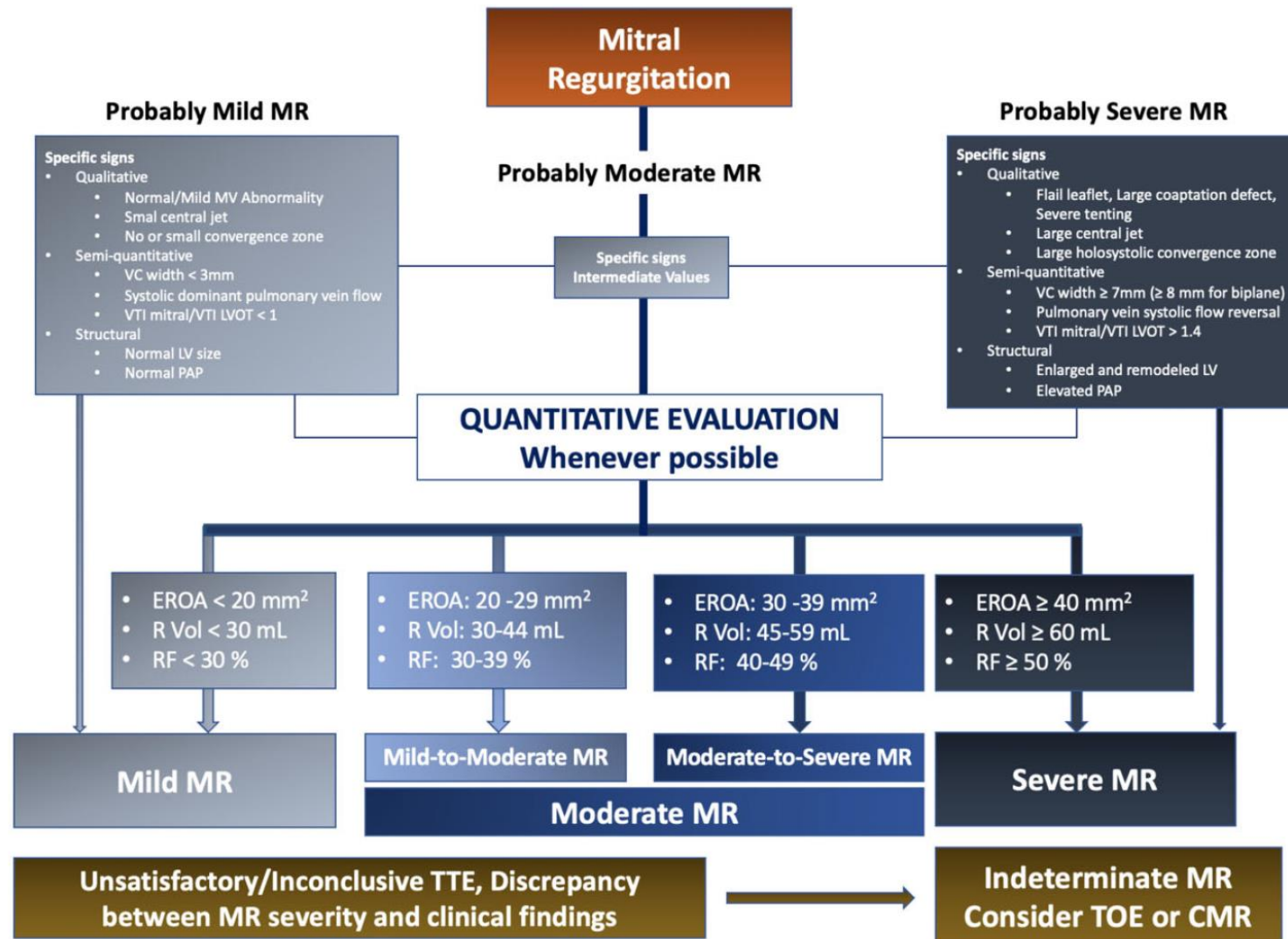
Impact of blood pressure on jet momentum flux



V 4.1 m/s = gradient 67 mmHg; BP 100/64; LAP 100-67= 33 mmHg
V 6.4 m/s = gradient 164 mmHg; BP 176/95; LAP 176-164= 12 mmHg

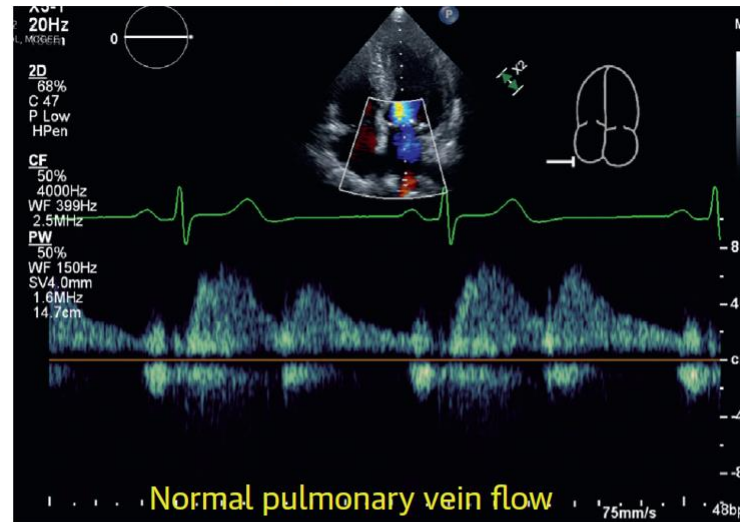
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Integrate multiple parameters in the assessment

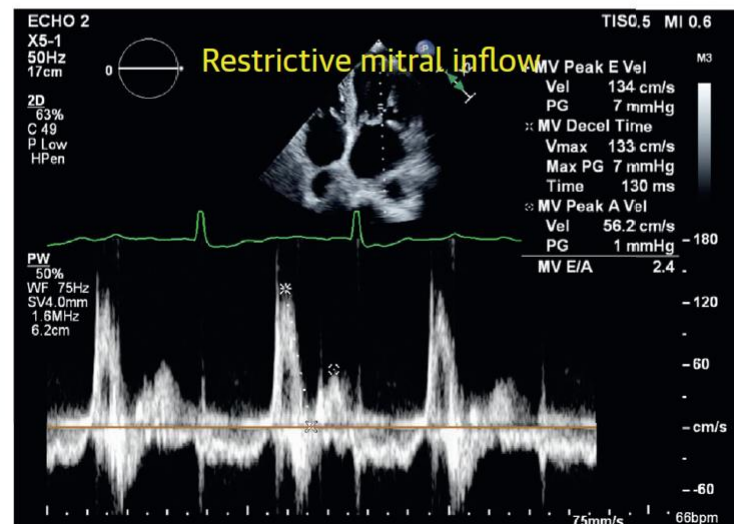
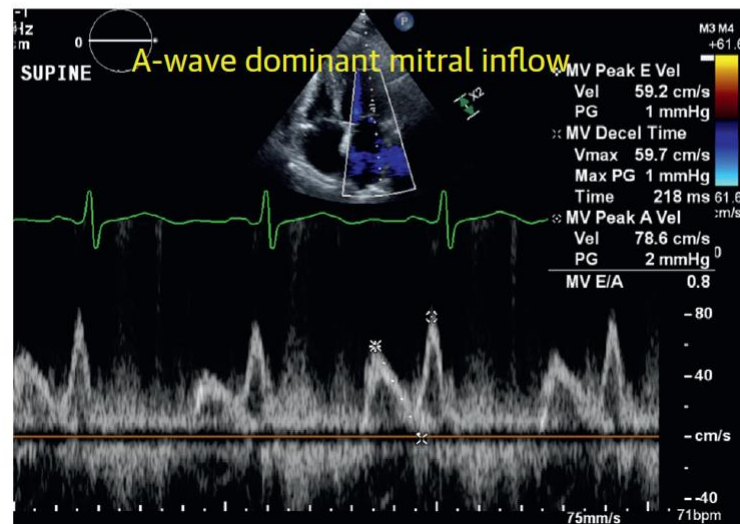
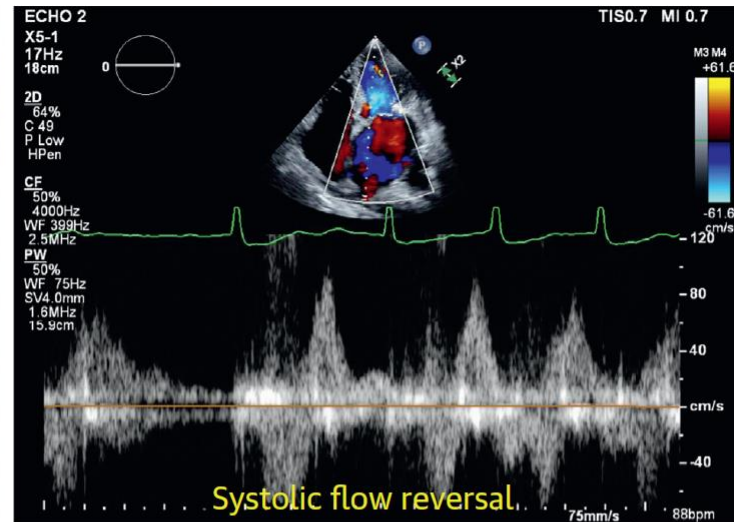


Integrate multiple parameters in the assessment

Not Compatible with Severe MR



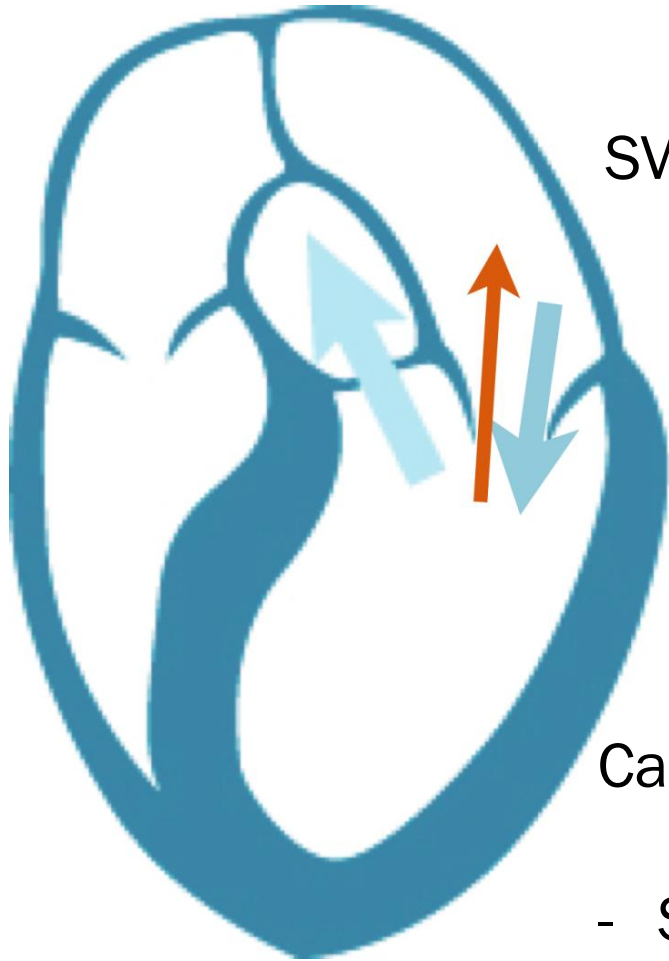
Compatible with Severe MR



Mitral inflow | PV vein flow

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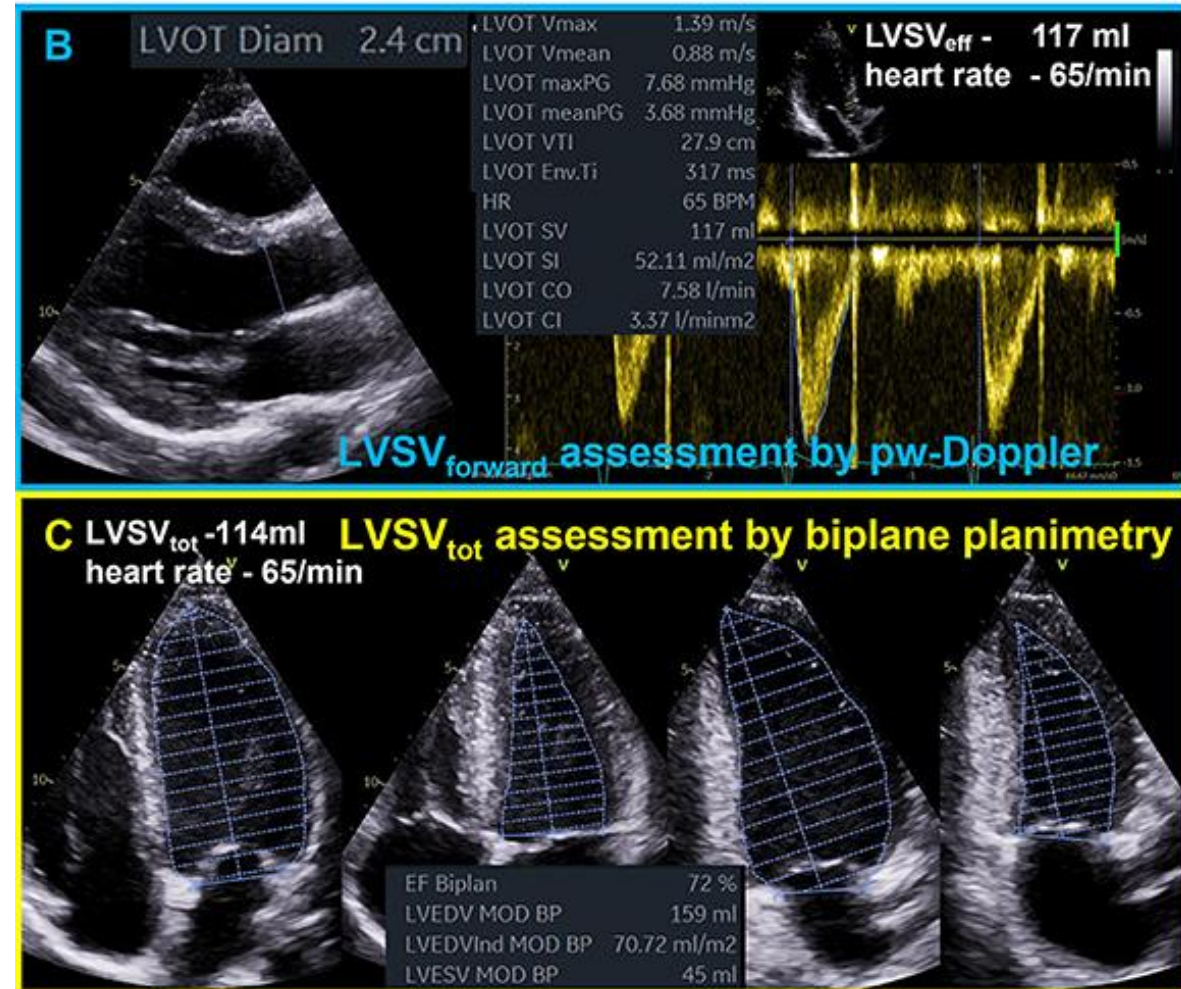
Check physiologic/biologic plausibility



$$R_{vol} = SV_{mitral\ valve} - SV_{aortic\ valve}$$

Caution:

- Shunts
- Significant AR
- Reproducibility?



Summary : 5 Key Insights on Assessing MR

- 1 : Answer The 3 Key Imaging Questions
- 2 : Account for MR Orifice Dynamics
- 3 : Impact of Blood Pressure on Jet Momentum
- 4 : Integrate Multiple Parameters
- 5 : Check Physiologic / Biologic Plausibility



Thank you

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