The Top Common Errors in Assessing Mitral Regurgitation

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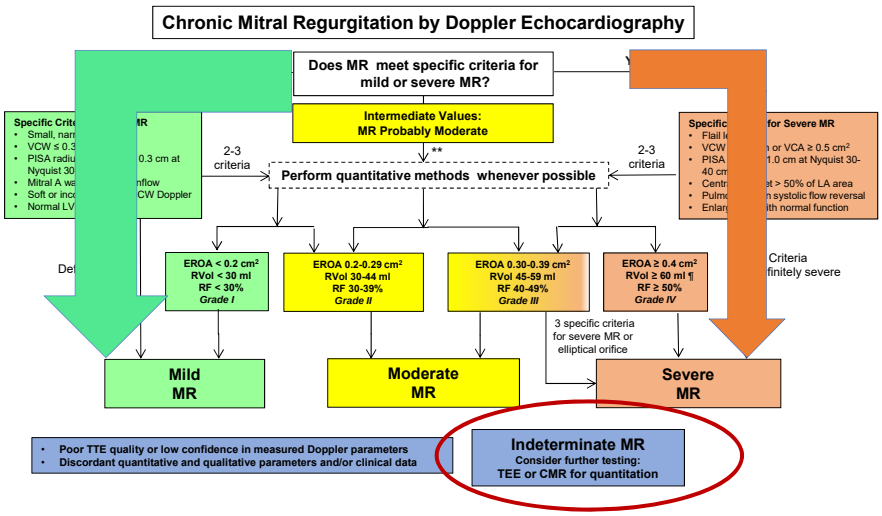


Zoghbi et al, 2017 ASE Guidelines for Quantitation of Native Valvular Regurgitation, J Am Soc Echo 2017 in press

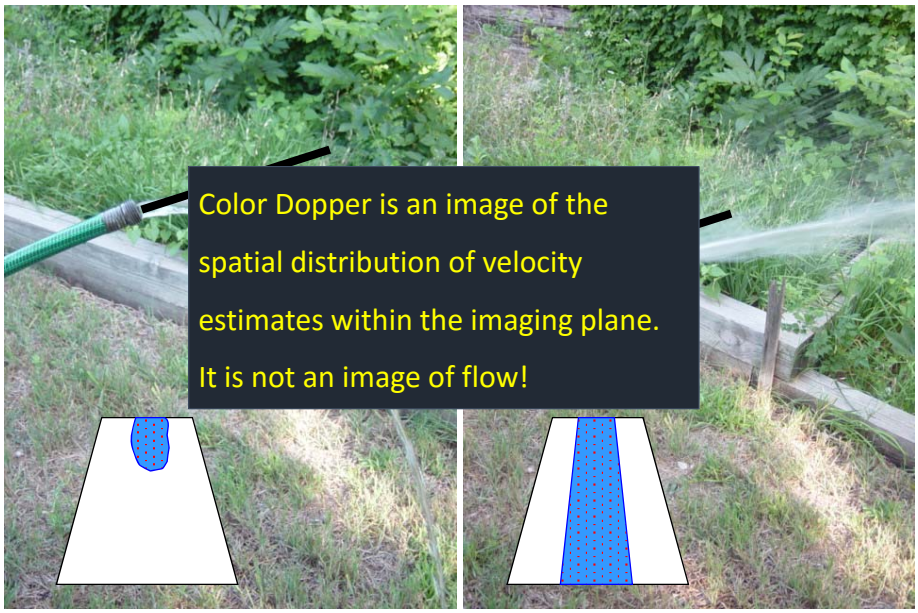
Echo Assessment of MR: Main Point

- All measurements of MR severity suffer from technical limitations and a wide range of error
- Integration of multiple parameters is required
- Sole reliance of visual grading of color Doppler jet size/area is ***NOT*** recommended
- There will be instances where echo is not clear and further testing is needed (CMR, stress echo, RLHC)

Comprehensive Echo for Assessment of MR List of Echo Parameters Required

- Blood pressure, heart rate, rhythm
- Mitral valve morphology and motion
- LV size (volume index, esp 3D, diameters)
- LA size (volume index)
- Color Doppler jet in multiple views and 3D
- PISA radius with appropriate aliasing velocity
- EROA, RgVol, Rg F by multiple methods
- Pulsed Doppler of mitral inflow, LVOT outflow
- CW Doppler of MR jet
- Pulmonary vein flow pattern
- Estimated PA systolic pressure

Pitfall # 1
Eyeballing Jet Area



Jet Area in MR –Guidelines

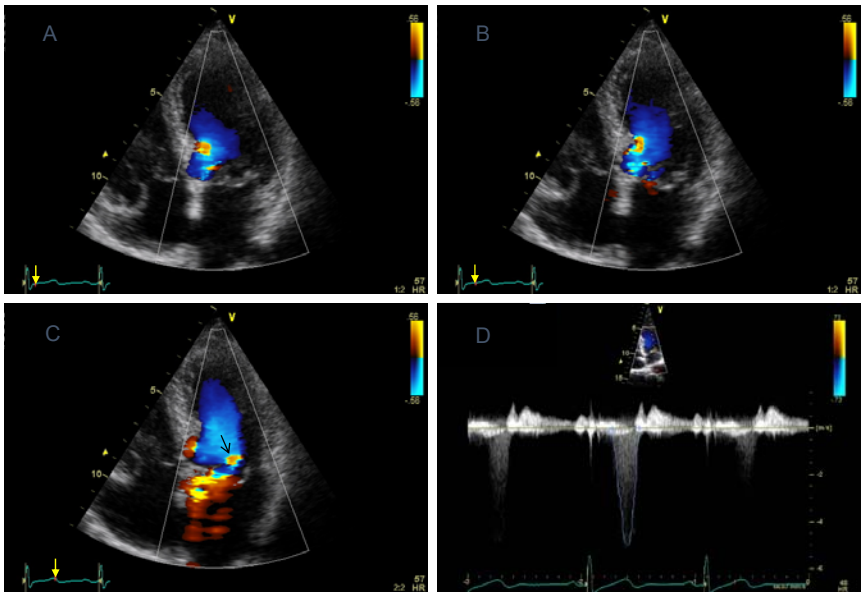
- "…determination of the severity of MR by "eyeballing" or planimetry of the MR color flow jet area only, is not recommended."
  - ASE *J Am Soc Echocardiogr* 2003

- "the colour flow area of the regurgitant jet is not recommended to quantify the severity of MR."
  - ESC/EAE *Eur J Echocardiogr* 2010

"Color flow" or "Color Doppler flow" are misnomers - it is not an image of flow!

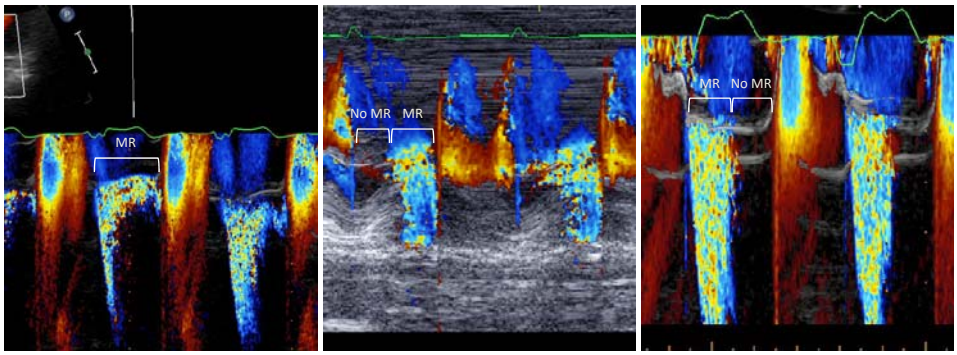
Pitfall # 2
Non-Holosystolic MR

Beware Late Systolic MR in MVP



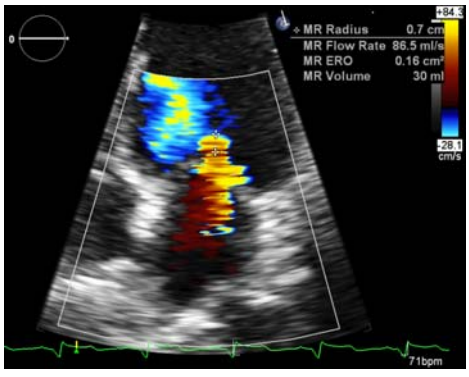
Grayburn, Weissman, Zamorano. *Circulation* 2012

Holosystolic MR **Late Systolic MR** **Early Systolic MR**

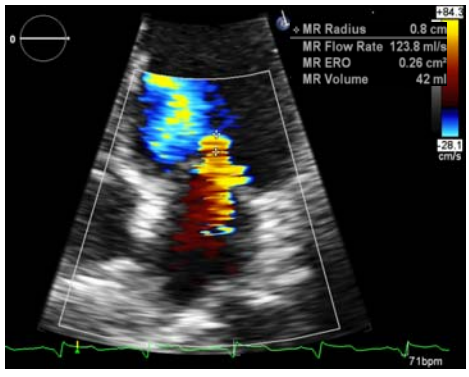


Pitfall # 3
Small Measurement Errors

Error in Radius Measurement



PISA radius 7 mm
EROA 0.16 cm^2
RVol 30 ml



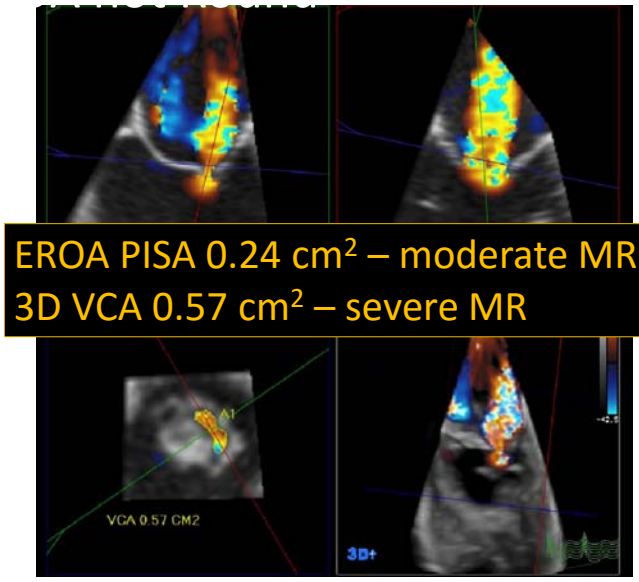
PISA radius 8 mm
EROA 0.26 cm^2
RVol 42 ml

Examples Relevant to EROA

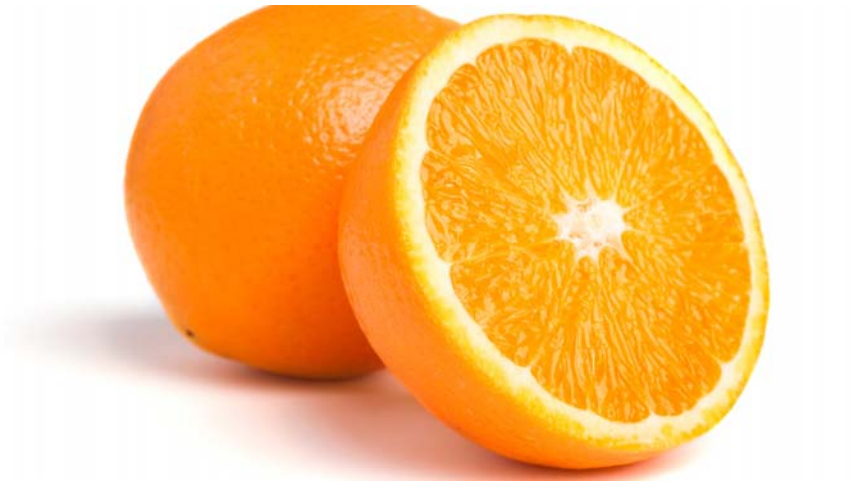
 # 2 pencil
Diameter 7 mm
CSA 0.38 cm²

Oral thermometer
Diameter 4.5 mm
CSA 0.16 cm²

Pitfall # 4
Non-Circular Orifice



Hemisphere



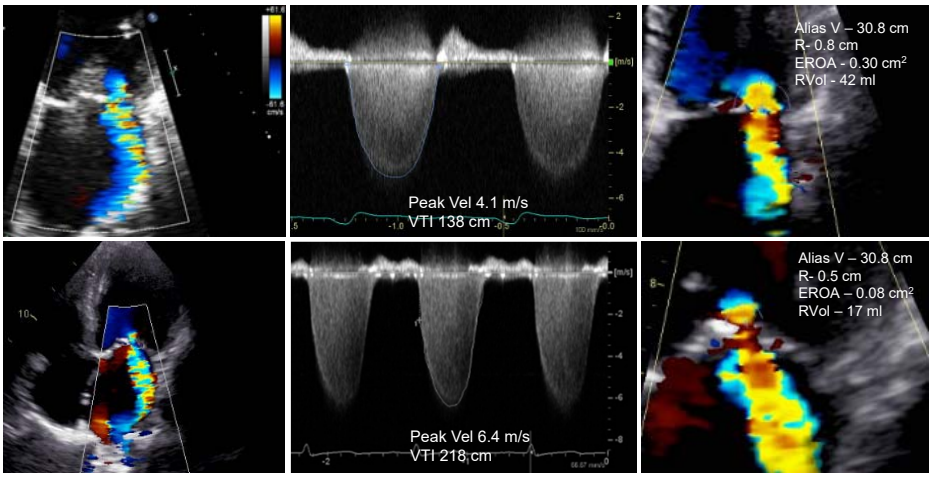
PISA formula works for a hemisphere ($2\pi r^2$)

Hemibanana?

PISA formula ($2\pi r^2$) does not work at all

Pitfall # 5
Pay Attention to Driving Velocity
Jet Size is Proportional to Jet Momentum
$= \rho A V^2$

Effect of Pressure Difference on Regurgitation Severity



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

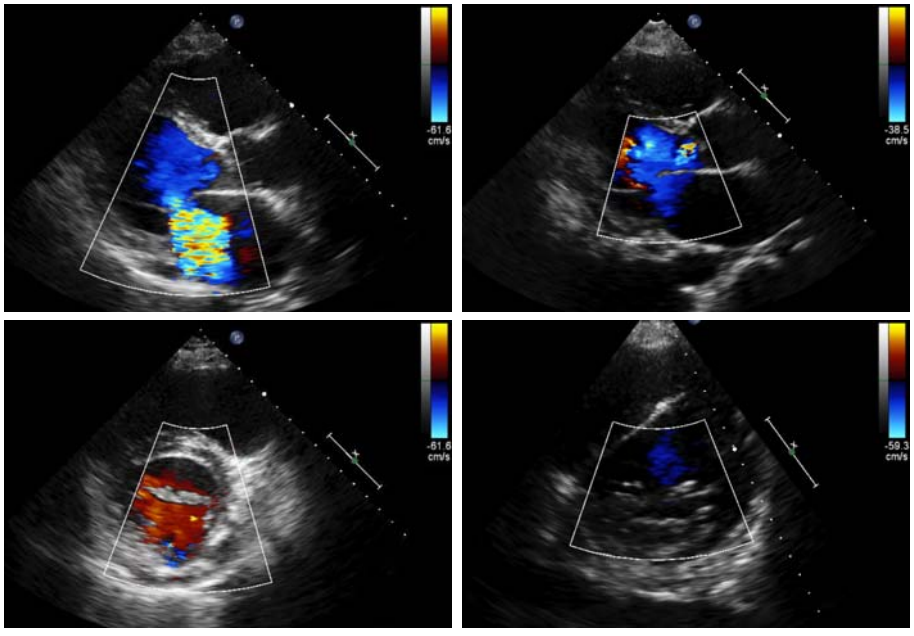
Pitfall # 6
MR is Dynamic!

Dynamic Nature of FMR

- 83 yr old WM referred to MV Clinic
- S/P CABG X 2 (1981, 1994), no need for PCI
- CHF with 10 lb wt gain, BNP 1500, Cr 1.4
- LVEF 30% with severe FMR
- Afib with poor rate control (98-128)
- STS score 11.3%
- Admitted for IV diuresis, rate control

Baseline

3 Days Later



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Defining "Severe" Secondary Mitral Regurgitation

Emphasizing an Integrated Approach

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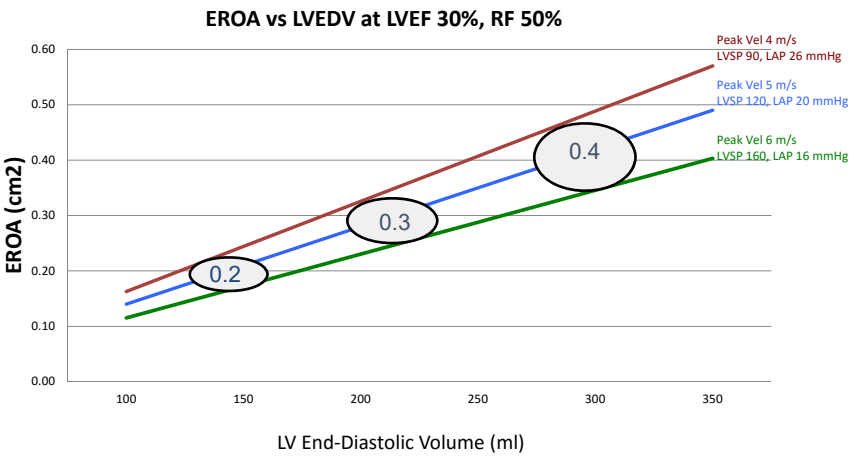
ABSTRACT

Secondary mitral regurgitation (MR) is associated with poor outcomes, but its correction does not reverse the underlying left ventricular (LV) pathology or improve the prognosis. The recently published American Heart Association/American College of Cardiology guidelines on valvular heart disease generated considerable controversy by revising the definition of severe secondary MR from an effective regurgitant orifice area (EROA) of 0.4 to 0.2 cm^2, and from a regurgitant volume (RVol) of 60 to 30 ml. This paper reviews hydrodynamic determinants of MR severity, showing that EROA and RVol values associated with severe MR depend on LV volume. This explains disparities in the evidence associating a lower EROA threshold with suboptimal survival. Redefining MR severity purely on EROA or RVol may cause significant clinical problems. As the guidelines emphasize, defining severe MR requires careful integration of all echocardiographic and clinical data, as measurement of EROA is imprecise and poorly reproducible. (J Am Coll Cardiol 2014;64:2792–801)



Grayburn, Carabello, Hung, et al, JACC 2014