Reviewer’s report

Title: The impact of different geometric assumption of mitral annulus on the assessment of mitral regurgitation volume by Doppler method

Version: 0 Date: 28 Dec 2019

Reviewer: Darae Kim

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Authors compared different geometric assumption of mitral annulus quantifying MR Rvol.

It is well known that a major challenge with all volumetric methods is that each of the component SVs has intrinsic error, in part due to the multiple parameters that must be combined into each one.

These errors increase as the root sum square when diameters of mitral annulus or LVOT is not accurately measured.

It is well expected that ellipse geometric assumption would better correlate to true MRvol that circular geometric assumption.

1. As the authors stated, gold standard method, MRI data is not presented.
2. Comparisons of measurement of flow area by 2D vs. 3D would be more simpler design.
   What was CSA of mitral annulus when measured with 3D?
3. A recent study of 3D color flow quantitation demonstrated 95% confidence limits of mitral flow (relative to CMR) of ±18.9 mL and ±17.8 mL for the aortic valve. (J Am Soc Echocardiogr, 25 (2012), pp. 56-65) With 3D Echo available, measuring 3D mitral annulus and LVOT area, rather than applying assumption of ellipse geometry of mitral annulus would bring true 3D volume.
   It would have been more practical, if authors compared 3D mitral annulus vs. MRI vs. 2D derived with ellipse geometry.
4. In practical point of view, how many patients had misclassified MR severity when applying traditional circular MA asumption when compared to 3D quantification vs. 2D ellipse geometry?
   Because despite unrealistic assumption of circular mitral annulus geometry, overall, assumption of a circular geometry has worked well clinically (Circulation, 70 (1984), pp. 425-431, J Am Coll Cardiol, 7 (1986), pp. 1273-1278)
   Authors should provide their opinion on this issue.

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