

Monocusp function in patients with Tetralogy of Fallot: comparison of echocardiography and cardiac magnetic resonance

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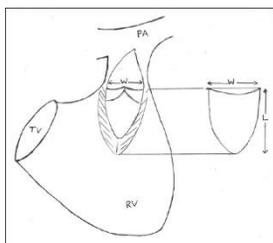
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Introduction

In patients with Tetralogy of Fallot, one of the surgical methods that relieves right ventricular outflow tract obstruction is the transannular patch with insertion of a monocusp to prevent pulmonary regurgitation. Monitoring of monocusp regurgitation after surgery by echocardiography is a clinical practice. Its evaluation is however challenging, since the monocusp is placed in the right ventricular outflow tract and methods for evaluation of its function are neither described nor tested. We sought to test a method used for assessing regurgitation of the monocusp valve by echocardiography and compare with regurgitation measured by cardiac magnetic resonance (CMR).

Figure 1

Figure 1: Illustration of operative technique with monocusp and transannular patch. PA: Pulmonary Artery, TV: Tricuspid Valve, RV: Right ventricle



Methods

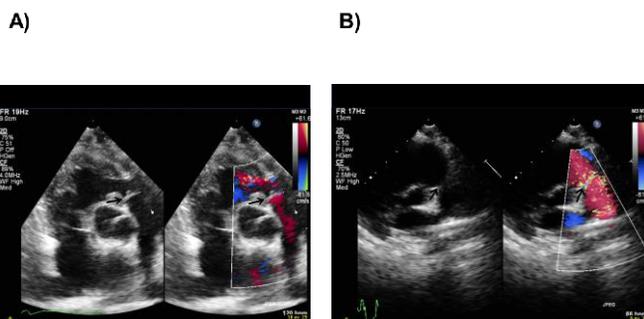
Tetralogy of Fallot patients with inserted monocusp (n=15, 3,5±2 years) had an echocardiogram and CMR within one week of each other. On echocardiogram, the monocusp regurgitation was measured using parasternal and subcostal short axis views with a color Doppler. The regurgitation was graded on a scale of zero to four (0=none, 1=mild, 2=mild to moderate, 3=moderate to severe, 4= severe), depending on the width of the regurgitation jet in the outflow tract in diastole. On cardiac magnetic resonance, monocusp regurgitation fraction (RF) was graded as mild (RF<20%), moderate (RF=20–40%), and severe (RF>40%). Inter-observer variability of the echocardiographic data was calculated.

Results

On CMR, mean RF was 40 ± 11 %. Echocardiography had good sensitivity identifying cases with RF>40% (sensitivity 80%; 95% CI: 38–96%) but overestimated the amount of monocusp regurgitation when RF<40% (false-positive rate 36%; 95% CI: 18–57%). The width of the regurgitation jet in the outflow tract on echocardiogram showed moderate correlation with RF on CMR (R=0.75; P<0.01). Interobserver variability of the echocardiographic measurements was moderate. 23 % of observations differed in 1 grade, 9 % observations differed in 2 grades.

Figure 2

Figure 2: Parasternal short axis view with color Doppler image on the right side. A) Aortic valve is in the middle and black arrow is pointing on the monocusp valve. Colour image is showing grade 1 out of 4 monocusp regurgitation. B) Aortic valve is in the middle and black arrow is pointing on the place where monocusp valve is supposed to be. Color image is showing Grade 4 out of 4 monocusp regurgitation.



Conclusion

This study suggests that width of the regurgitation jet in the outflow tract may make a modest contribution to the assessment of monocusp regurgitation in patients with repaired tetralogy of Fallot as compared with CMR.