

POSTER PRESENTATION

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# A simple technique to measure TAPSE and MAPSE on CMR and normal values

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## Background

Mitral and Tricuspid Annular Plane Systolic Excursion (MAPSE, TAPSE) add valuable information to functional assessment of the right and left heart, highlighting abnormality even when ejection fraction is normal. To date, CMR-equivalents of MAPSE and TAPSE have been variably measured by a number of different methods but no formally published CMR guidelines on methodology, or normal values, exist. Further evaluation is required. The feasibility of a simple and quick technique is assessed in terms of its reproducibility, in order to provide age-stratified normal values.

## Methods

Healthy volunteers ( $n = 68$ , 24 to 83 years-old, 32 males) were recruited from local advertisements. CMR-equivalent MAPSE and TAPSE were measured on standard 4-chamber SSFP cine images, independently by 2 blinded observers. The straight-line distance travelled by the lateral tricuspid and mitral annulus from end-diastole to end-systole was measured as shown in Figure 1. Inter-observer variability and intra-observer variability were calculated in a sample ( $n = 20$ ) of subjects. Normal values were then grouped according to age: group 1: 20-39 yrs ( $n = 25$ ); group 2: 40-59 yrs ( $n = 21$ ) and group 3:  $\geq 60$  yrs ( $n = 22$ ).

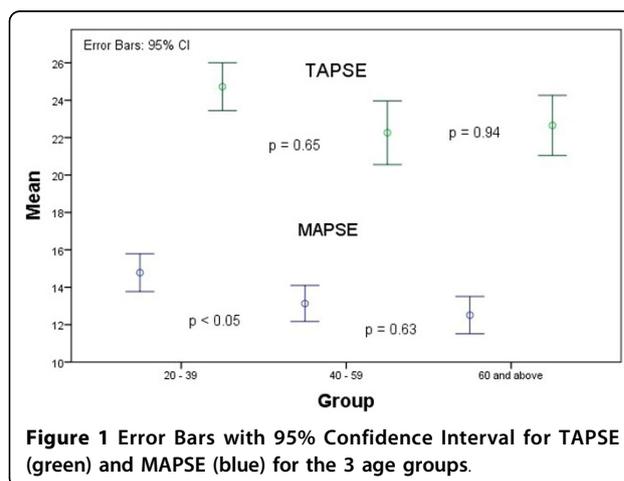
## Results

There was good inter-observer agreement for MAPSE (Intraclass Correlation Coefficient (ICC) of 0.84, 95% CI 0.60 - 0.94,  $p < 0.001$ ) and TAPSE (ICC 0.77, 95% CI 0.43 - 0.91,  $p < 0.05$ ). There was also very good intra-observer agreement (ICC for MAPSE: 0.84, 95% CI 0.64

- 0.93, ICC for TAPSE: 0.92, 95% CI 0.80 - 0.97,  $p < 0.001$ ). There were no significant differences in MAPSE and TAPSE between genders. Subgroup analysis showed no difference in TAPSE in the 3 different age groups. MAPSE was different between groups 1 and 2 and but there was no statistical difference between groups 2 and 3 (Figure 2). Therefore, from our cohort of healthy individuals, TAPSE was  $23.3 \pm 3.6$  mm for the whole cohort. MAPSE was  $14.8 \pm 2.4$  mm for those between 20 to 39 years of age and  $12.8 \pm 2.2$  mm for those aged 40 years old and above.

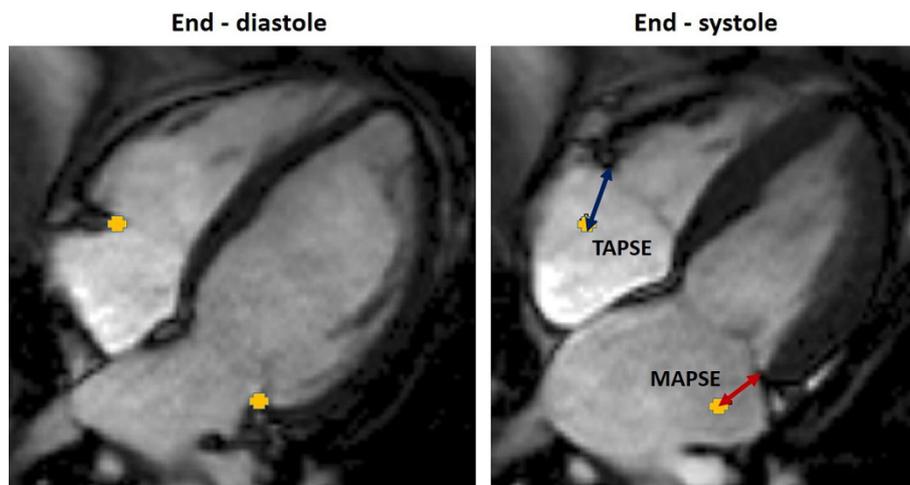
## Conclusions

MAPSE and TAPSE are easily measured, highly reproducible CMR parameters. Although these parameters should not replace formal volumetric evaluation of systolic function, they add value in patients with impaired left ventricular function despite normal EF (e.g. hypertrophic cardiomyopathy), complement our assessment of



**Figure 1** Error Bars with 95% Confidence Interval for TAPSE (green) and MAPSE (blue) for the 3 age groups.

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**Figure 2** The distance travelled by the lateral annulus from end-diastole to end-systole are measured to obtain CMR-equivalent of TAPSE and MAPSE.

right ventricle function, and provide a platform to determine their clinical importance.

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