

Cardiac magnetic resonance left atrial ejection in atrial fibrillation and heart failure

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Background

The left atrium's conduit, reservoir and contractile functions are integral to overall cardiac performance.

The impact of catheter ablation (CA) compared to medical rate control (MRC) on contractile atrial function in AF HFrEF patients and its effect on exercise capacity has not been explored. In this study we use serial cardiac magnetic resonance (CMR), considered the gold standard for assessing cardiac chamber volume and function, to assess changes in bi-atrial size and function following the CA and MRC.

Objective

- We aimed to compare CMR changes in bi-atrial parameters and exercise capacity in AF HFrEF patients from CAMERA-MRI I and II multicentre studies which compared CA to MRC.

Method

- The CAMERA MRI and CAMERA MRI-II trials investigated LVEF recovery in AF HF patients based on cardiac magnetic resonance (CMR) late gadolinium enhancement (LGE) status.
- In the current study, we report changes in bi-atrial size and function using serial CMR (see Figure 1), comparing patients who received CA versus MRC.
- Exercise capacity was assessed by serial 6MWT.
- The study was approved by the Alfred Hospital Human Ethics and Research Committee (Melbourne, Australia).

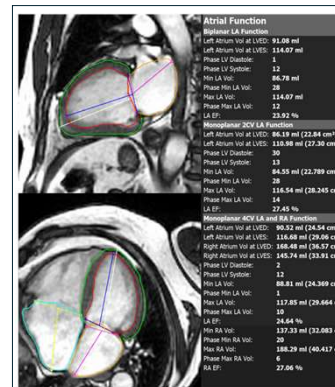


Figure 1: Calculation of LA ejection fraction involves manually tracing the atrium in 2 and 4 chamber orientation throughout the cardiac cycle to estimate biplane minimal and biplane maximal left atrial volumes. LA ejection fraction is calculated via the formula (maximal LAV - minimal LAV) / maximal LAV x 100%

Results

123 patients (age 60.7±11.1, 17 females, 82 CA, 41 MRC) were included. Baseline atrial measurements and 6MWT distance were similar between the two groups.

CA patients had reverse remodelling of left and right atria across all structural and functional parameters (P<0.001), compared to no significant change in any parameters for MRC.

Delta LAEF better predicted delta LVEF (R=0.60, B coefficient=0.54, 95%CI 0.41-0.67, P<0.001) compared to SR (R=0.40, B coefficient=-10.97, 95%CI -15.50--6.44, P<0.001), and RAEF (R=0.02, B coefficient=0.01, 95%CI -0.14-0.17, P=0.856).

6MWT improved in 20 (48.8%) MRC compared to 63 (76.8%) CA patients (P=0.002). **Univariate predictors of 6MWT change included LAEF (R=0.27, B coefficient=1.50, 95%CI 0.52-2.47, P=0.003) and LVEF (R=0.23, B coefficient 1.43, 95%CI 0.33-2.52, P=0.011), but not SR (R=0.16, B coefficient -28.05, 95%CI -58.47-2.37, P=0.070) nor RAEF (R=0.01, B coefficient=-0.07, 95% CI -1.07-0.93, P=0.892).**

	Medical therapy N= 41 (%)		P value (MRC T0 v T1)	Catheter Ablation N= 82 (%)		P value (CA T0 v T1)
	Baseline	Follow-up		Baseline	Follow-up	
6 minute walk test distance	423.5±123.5	442.4±112.4	0.079	422.7±111.1	484.89±91.1	<0.001*
LVEF	37.2±8.1	40.2±8.5	0.084	32.0±8.6	51.7±9.7	<0.001*
Indexed minimum left atrial volume	51.7±20.3	53.4±22.5	0.478	50.6±18.4	30.4±14.4	<0.001*
Indexed maximum left atrial volume	65.8±21.7	69.7±22.8	0.057	66.8±20.0	51.9±17.6	<0.001*
Biplane LA EF	22.2±7.9	23.3±10.9	0.600	25.5±11.0	43.1±10.5	<0.001*
Indexed minimum right atrial volume	42.9±14.8	40.5±17.0	0.249	43.7±19.0	27.5±11.9	<0.001*
Indexed maximum right atrial volume	57.1±18.4	56.8±19.1	0.886	62.3±22.1	47.5±17.8	<0.001*
RA EF	27.9±8.2	30.3±10.8	0.172	31.0±11.0	42.8±9.7	<0.001*

Conclusion

Sinus rhythm restoration achieved through catheter ablation, along with reduction in bi-atrial size, leads to increases in bi-atrial EF compared to medical rate control.

LA EF predicts improvement in LVEF and exercise capacity suggesting restoration of atrial contractile function is a key feature of LV recovery in HFrEF.

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