

Poster presentation

## Obstructive sleep apnea: effects of continuous airway pressure on cardiac remodeling as assessed by cardiac MRI

Jane Colish\*, Jonathan Walker, Nader Elmayergi, Matthew Lytwyn, Tielan Fang, Sat Sharma and Davinder S Jassal

Address: St. Boniface General Hospital, University of Manitoba, Winnipeg, MB, Canada

\* Corresponding author

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### Background

Obstructive sleep apnea (OSA) is associated with an increased risk of cardiovascular morbidity and mortality. Previous transthoracic echocardiographic (TTE) studies have demonstrated short term improvement in cardiovascular remodeling in OSA patients on continuous positive airway pressure (CPAP). However, due to the increased prevalence of obesity in OSA patients, the quality of TTE is often poor due to limited acoustic windows. Although cardiac MRI (CMR) is considered the gold standard for the noninvasive assessment of left ventricular (LV) dimensions, volumes and ejection fraction (EF) due to its higher spatial resolution, little is known about its utility in the delineation of LV remodeling in OSA patients on CPAP therapy over the long term.

### Objectives

To determine the long term benefits of CPAP on both right and left ventricular systolic and diastolic function in patients with OSA using serial cardiac biomarkers, echocardiography and CMR.

### Methods

A prospective study of 50 OSA patients was performed between 2007 and 2009 inclusive. Cardiac biomarkers including C-reactive protein, N-terminal pro-B-type natriuretic peptide and troponin T were measured at baseline and serially over one year. All patients underwent baseline and serial TTE and CMR to assess for cardiac remodeling.

### Results

All three cardiac biomarkers were within normal limits at baseline and did not change significantly after 12 months of CPAP therapy. As early as 3 months, TTE revealed an improvement in left ventricular end-diastolic diameter ( $59 \pm 5$  mm to  $52 \pm 4$  mm), right ventricular end-diastolic diameter ( $41 \pm 3$  mm to  $36 \pm 5$  mm), and the degree of pulmonary hypertension ( $54 \pm 6$  mmHg to  $42 \pm 4$  mmHg), which continued to improve over one year of follow-up. Left atrial filling pressures decreased from  $16 \pm 3$  to  $8 \pm 2$  at 12 months on TTE. On serial CMR, there was a decrease in left atrial volume index ( $48 \pm 2$  ml/m<sup>2</sup> at baseline to  $28 \pm 2$  ml/m<sup>2</sup> at 12 months,  $p < 0.05$ ), left ventricular end-diastolic volume ( $195 \pm 10$  at baseline to  $130 \pm 6$  ml at 12 months,  $p < 0.05$ ), and LV mass ( $185 \pm 4$  g/m<sup>2</sup> at baseline to  $151 \pm 3$  g/m<sup>2</sup> at 12 months,  $p < 0.05$ ) (Table 1).

### Conclusion

Using both TTE and CMR, the present study demonstrated an improvement in systolic and diastolic functions as early as 3 months into CPAP therapy, with continued improvement in cardiac remodeling over the one-year period.

Table 1:

CMR parameters	Baseline	6 months	12 months	p value
<b>LA and LV parameters</b>				
LAVI (ml/m <sup>2</sup> )	48 ± 2	35 ± 1*	28 ± 2*	< 0.05
LVEDV (ml)	195 ± 10	150 ± 8*	130 ± 6*	< 0.05
LVESV (ml)	58 ± 6	48 ± 5	46 ± 3	0.22
LVEF (%)	68 ± 2	68 ± 1	66 ± 2	0.75
LV mass (g/m <sup>2</sup> )	185 ± 4	162 ± 3*	151 ± 3*	< 0.05
<b>RA and RV parameters</b>				
RAVI (ml/m <sup>2</sup> )	48 ± 5	33 ± 2*	31 ± 3*	< 0.05
RVEDD (mm)	44 ± 1	34 ± 2*	29 ± 2*	< 0.05

Absolute *p*-values for the overall interaction of time are shown in the far right column. \**p* < 0.05 vs. at baseline.

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