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Evaluation of Right Ventricular Volume and Systolic Function – A Comparison of 2 and 3-Dimensional Echocardiography with Cardiac Magnetic Resonance

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Background: Cardiac magnetic resonance (CMR) is the gold standard for non-invasive assessment of right ventricular (RV) size and function, but is limited by its availability. Real time 3D echocardiography (RT3DE) is an emerging technology. We compared 2D and 3D echo with CMR for RV assessment in a prospective cohort.

Method: Over a six month period, patients referred for CMR also underwent echocardiography on the same day. RV volumes and ejection fraction (EF) were measured on both RT3DE and CMR. On 2D echo, we measured RV area, fractional area change (FAC), tricuspid annular plane systolic excursion (TAPSE), peak tricuspid annular systolic velocity (RV S′) and peak tricuspid regurgitation velocity.

Results: Thirty patients were recruited (mean age 40; 67% male). Three-dimensional image analysis was performed on 22 cases as image quality was suboptimal in eight. RT3DE analysis of RV end diastolic and end systolic volumes (RVEDV and RVESV) correlated well with CMR (RVEDV $r = 0.83$, $p < 0.001$; RVESV $r = 0.87$, $p < 0.001$). Correlation between RT3DE and CMR measurement of RVEF was weaker ($r = 0.60$, $p = 0.003$). Two-dimensional measurements were suitable for analysis in all 30 patients. There was strong correlation between 2D RV area and CMR RV volume (RVEDV $r = 0.90$, $p < 0.001$; RVESV $r = 0.94$, $p < 0.001$), and weaker correlation between CMR RVEF and both RVFAC ($r = 0.56$, $p < 0.001$) and TAPSE ($r = 0.48$, $p = 0.01$).

Conclusion: RT3DE is comparable to CMR for assessment of RV volume and EF. Two-dimensional measurement of RV area correlates with CMR RV volume, which may be helpful in patients with poor RT3DE image quality.

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Risk Reduction Interventions in Atrial Fibrillation: A Systematic Review

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Background: Approximately 240,000 Australians live with atrial fibrillation (AF), many having multiple cardiovascular risk factors and high stroke risk, but most are not included in structured risk reduction programs. We aimed to determine if risk reduction programs can improve physical activity levels, quality of life (QoL) or cardiovascular risk in AF sufferers.

Methods: We conducted a systematic review of clinical trials evaluating lifestyle and biomedical risk reduction interventions in AF patients. Trials were identified by searching electronic databases, reference lists and grey literature. Trials were included if conducted by a health professional, and changes in multiple risk factor levels or QoL were reported.

Results: Five trials were identified (166 participants): two randomised controlled trials, one comparative cohort and two pre-post designs. Exercise capacity improved at follow-up (2–12 months) in the intervention group in all trials. Two measured VO_2max (2.5–5.4 ml/kg/min (17–32%) improvement, $p < 0.02$); one measured six minute walking distance (114 m (27%) improvement, $p < 0.001$); one measured cumulated work (564 W/min (37%) improvement, $p < 0.001$) and one utilised incremental exercise testing (11 m/min (10%) improvement, $p = 0.05$). Three trials evaluated heart rate (HR), identifying resting HR reduction of 7–13 bpm ($p < 0.05$) and two identified HR reduction during exertion of 9 bpm ($p < 0.05$). Two trials measured QoL, both reporting significant improvements in SF-36 physical summary scores.

Conclusions: Literature suggests risk reduction interventions for AF can improve exercise capacity, QoL and reduce HR, however the evidence base is small, methodologically compromised and only evaluates exercise therapy. High quality research in this area is required to help the numerous Australians living with AF.

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