Follow up in pulmonary hypertension using three-dimensional knowledge-based reconstruction from two dimensional echocardiography – a single center experience

Johannes P. Schwaiger[1], Daniel S. Knight[1], Adele Gallimore[1], Benjamin E. Schreiber[1], Clive Handler[1,] John G. Coghlan[1]

(1) Department of Cardiology. Royal Free London NHS Foundation Trust.

Introduction

Right ventricular (RV) function is the key determinant in pulmonary arterial hypertension (PAH). Although Cardiac MRI is the gold standard for volumetric quantification of the RV chambers, it is cost- and resource-intensive and not widely available. Besides routine 2 D echocardiography we have used a novel two-dimensional echocardiography technique that involves knowledge-based reconstruction (2DKBR) of the RV to follow up RV-indices in patients with PH.

Patients

In this ongoing series we have so far followed up 12 patients with 2DKBR (10 in group 1 PH; 2 in group 4 PH). During follow up 7 patients were newly commenced on targeted therapy, two received additional targeted therapy, one patient underwent pulmonary endarterectomy and four patients were routinely followed up. 15 echocardiograms were done immediately after Right Heart Catheterization in the same unit or within 2 weeks. All echocardiograms were done by the first author.

Results

Mean follow up was 5.8 months. Three out of 24 (12,5%) echocardiograms had to be excluded from 2D reconstruction due to insufficient image quality. Patients on new treatment significantly improved their functional class (mean 3 vs. 2.1; p= 0.006), NT-proBNP level (193 vs. 59 pmol/l; p = 0.036), 6-minute walking test result (409 vs. 320m; p=0.05) and pulmonary vascular resistance (PVR) (685 +/- 258 vs. 483 +/- 177; p=0.021). With 2DKBR echocardiography we observed a significant improvement in RV ejection fraction (40% vs. 31%; p=0.031), but not in other RV indices (EDVI 90 vs. 84 ml; ESVI 65 vs. 52ml).

Conclusion

In this follow up study using echocardiography with knowledge-based reconstruction of the right ventricle in a population with pulmonary hypertension we demonstrated the feasibility of this technique in a busy tertiary setting. Within this first group of patients we observed a significant change in RV ejection fraction after targeted treatment parallel to significant improvements in functional class, NT-proBNP levels, 6 minute walking test and pulmonary vascular resistance.