

## **Initial Experience with a Novel Echo-based Magnetic Tracking System for Reconstruction of Right Ventricular Volumes and Function in Adults with Congenital Heart Disease**

**Helen Dormand, Heiko Schneider, Paul Dunne, Vaikom S Mahadevan , Bernard Clarke , Andreas Hoschtitzky, Jaspal S Dua**

**Manchester Heart Centre, Manchester Royal Infirmary, Oxford Road, Manchester, UK**

### **Background/Hypothesis:**

Long-term monitoring of RV function in ACHD patients is important and continuous. It is critical for timing the intervention. CMR is the gold standard for this but remains time-consuming, costly resource and impossible in some patients. Technology has developed which combines magnet-based tracking with bedside echocardiography, which can be performed in much less time and cost than CMR. We hypothesized that this could be used in majority of ACHD patients with average echo windows.

### **Materials/Methods:**

We utilised industry-developed tracking-system and patented software installed on a standard computer, linked-up with a standard 2D-Echocardiography machine. Key anatomical points acquired in expiration were then processed through the software and sent securely via the internet to the industry server, where the system generated a 3-Dimensional model within seconds, providing volumetric measurements and ejection-fraction of the RV, to the user.

21(9M) patients, mean-age 27.9years (range17-64years), diagnosis: repaired Tetralogy of Fallot-16; Pulmonary stenosis-5, underwent standard echocardiography. Key anatomical points were placed and image reconstruction undertaken. In 8 patients, CMR-data was available for comparison.

### **Results:**

15 scans were suitable for reconstruction. Limited acoustic windows made reconstruction difficult, but poor delineation of valve planes and RV apex was even more important. In 6/8 patients the echo and CMR-derived RVEF were within 6%. In 2 patients with limited echo images, the RVEF differed by >10%.

### **Conclusions:**

In majority of ACHD patients with ToF, this novel and rapid technique could be performed in outpatients to assess the RV. Reconstruction can be performed in less than 10 minutes; accuracy depends on visualising right heart valves and the apex. The use can be extended to other CHD conditions like systemic RV. This will greatly reduce costs and waiting times. Further experience and data is required.