

anonymous manner. Genomic DNA was extracted from these and telomere length measured by telomere PCR. Each telomere length was expressed as a ratio (telomere length: single copy gene). Telomerase activity was measured using Roche Telo TAAGGG ELISA kit. All samples were analysed in duplicate and investigators were semi-blinded to arrhythmia history. Continuous data were compared using unpaired t test and categorical data by  $\chi^2$  test. Logistic regression analysis was performed to determine if telomere length/telomerase activity independently predict the likelihood of a shock (fatal VA). A probability value of  $p < 0.05$  was defined as significant.

**Results** There were no significant differences between the Shock (patients received appropriate shocks from ICD;  $n=25$ ) and Non-shock (patients received no shock;  $n=48$ ) groups in terms of baseline demographics as shown in Abstract 056 table 1. There was no significant difference in the age, sex and WCC adjusted telomere length between the Shock and Non-shock groups ( $p=0.439$ ). Expected age and WCC turnover related telomere attrition ( $p=0.031$  and  $0.031$ ) was observed. In contrast, telomerase activity was significantly higher in the Shock group than in the Non-shock group ( $0.5682$  vs  $0.2105$ ) and co-related to the incidence of shock ( $p=0.01$ ). This did not appear to be related to an acute response associated with VA.

Abstract 056 Table 1

	Group1 (shock)	Group 2 (non-shock)	p Value
Number of patients	25	48	
Age, mean (range)	70.8 (56–87)	70.8 (46–87)	0.97
Female gender (%)	4	16.67	0.15
Diabetes (%)	5 (20)	14 (29.2)	0.57
Hypertension (%)	5 (20)	14 (29.2)	0.57
Time since implant (months), mean	50.68	34.13	0.06
LVEF	27.64	27.29	0.84

**Conclusion** This is the first study to characterise the telomere dynamics of patients at high risk of sudden cardiac death and correlate this with the incidence of VA. Leucocyte telomerase activity independently predicted the likelihood of shock in ischaemic cardiomyopathy patients with primary prevention ICDs. Thus leucocyte telomerase activity may be a potential biomarker for prediction of fatal arrhythmia and guide ICD prescription. To validate these results, a prospective study is now ongoing.

### 057 A RANDOMISED CONTROLLED TRIAL OF CATHETER ABLATION VS MEDICAL TREATMENT OF ATRIAL FIBRILLATION IN HEART FAILURE (THE CAMTAF TRIAL)

doi:10.1136/heartjnl-2012-301877b.57

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**Introduction** Although atrial fibrillation (AF) has deleterious effects in patients with heart failure (HF), rhythm control using medication has limited efficacy. Catheter ablation (CA) of AF is effective in restoring sinus rhythm, raising the question: if it can be shown to be safe and effective in HF patients, might it improve left ventricular (LV) function and HF symptoms? We sought to compare the impact of a CA strategy to a medical rate control strategy (MED) in patients with persistent AF and HF.

**Methods** Patients with persistent AF, symptomatic HF, and a LV ejection fraction (EF)  $< 50\%$ , were randomised to CA or MED. HF medication and anticoagulation were optimised prior to baseline observations. For those with recurrent AF in the CA group, a repeat

procedure was performed at the end of the 3-month blanking period and follow-up re-started. The primary end-point was the difference in LV EF between groups on echocardiography at 6 months. Echocardiographic data were anonymised and core reported by a blinded collaborating centre. Secondary end-points included difference in NYHA class, Minnesota living with heart failure questionnaire score, and peak oxygen consumption at 6 months.

**Results** 55 patients were randomised, but five were excluded (LV function normalised during optimisation of medications prior to baseline tests in 2, and 3 withdrew un-happy with their treatment allocation). Patients were  $58 \pm 11$  years and 96% were male. Baseline LV EF was  $31 \pm 10\%$  in the CA group and  $33 \pm 9\%$  in the MED group. NYHA class was  $2.5 \pm 0.5$  in both groups. Patients underwent  $1.6 \pm 0.7$  procedures. There were two complications: (1) stroke and 1 tamponade. In the CA group 1 patient withdrew after a procedural stroke, and in the MED group 1 patient died. In total 21 of 24 in the MED group and 24 of 26 in the CA group had reached 6-months follow-up and were included in this analysis of the primary end-point. Freedom from AF was achieved in 21/24 (88%) off antiarrhythmic drugs in the CA group, whereas all those in the MED group remained in AF. LV EF in the CA group at 6 months was  $39 \pm 10\%$  compared to  $32 \pm 13\%$  in the MED group ( $p < 0.05$ ). NYHA class was also significantly lower in the CA group at 6 months ( $1.7 \pm 0.8$  compared to  $2.3 \pm 0.6$  in the medical group;  $p < 0.05$ ). CA was associated with better peak oxygen consumption ( $22.4 \pm 6.3$  ml/kg/min vs  $18.6 \pm 6.0$  ml/kg/min,  $p=0.053$ ) and Minnesota living with heart failure questionnaire score ( $24 \pm 23$  vs  $48 \pm 25$ ,  $p=0.002$ ) compared to the MED group.

**Conclusions** CA is effective in restoring sinus rhythm in the majority of patients with persistent AF. A CA strategy for patients with AF and HF is associated with improved LV function and heart failure symptoms compared to medical treatment alone.

### 058 THE RELATIONSHIP OF LEFT ATRIAL REMODELLING TO ATRIAL FIBRILLATION BURDEN IN PACEMAKER POPULATION

doi:10.1136/heartjnl-2012-301877b.58

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**Background** Cumulative ventricular pacing (VP) is associated with development of atrial fibrillation and cardiac remodelling. Contemporary pacemaker devices are able to quantify atrial high-rate episodes (AHREs) and atrial fibrillation burden (AFB). No previous study has investigated the relationship of reverse LA remodelling and AHRE. We tested the hypothesis that reverse LA remodelling parameters are associated with greater AF burden and larger percentage of cumulative ventricular pacing in pacemaker population.

**Methods** 101 patients [mean age  $72 \pm 11$  years, 69 (68%) men], mean follow-up of  $359.09 \pm 83.85$  days] with dual-chamber pacemaker underwent two-dimension (2D) and tissue Doppler imaging (TDI) echocardiography. LA volume (LAV) was evaluated by area-length method and function by septal A'. LV systolic and diastolic parameters were evaluated by mitral inflow velocity (E, A), LV ejection fraction (biplane Simpson's) and septal TDI velocity. The presence of AHREs (defined by atrial-rate  $\geq 220$  bpm and  $\geq 5$  min) and AFB were derived from pacemaker diagnostics.

**Results** The incidence of AHRE in our study was 35% ( $n=35$ ) with median percentage AF burden of 2.6 (IQR 0.1–26.4). Patients with AHREs had significantly larger LA volume ( $p=0.014$ ) and reduced LA function at follow-up ( $p=0.034$ ), as were LV diastolic parameters, LV and RV longitudinal systolic function (all  $p < 0.05$ ) [Abstract 058

table 1]. AFB correlated well with LAV ( $R=0.505$ ,  $p=0.003$ ), E/A ( $R=0.545$ ,  $p=0.002$ ) and inversely correlated with Septal A' ( $R=0.548$ ,  $p=0.001$ ). Stepwise regression analysis demonstrated that percentage atrial pacing (OR 2.28,  $p=0.032$ ) and E/A ratio (OR 4.14,  $p<0.01$ ) were independently predictive of greater AF burden. On linear regression analysis, E/A, Sep A', AF burden remained predictive of changes in LA volume (all  $p<0.05$ ).

Abstract 058 Table 1

Variables	Baseline	Follow-up	p Value
Indexed LAV, ml/m <sup>2</sup>	33.2±10.1	37.9±8.4	0.014
Septal A', cm/s	8.1±2.7	6.9±2.1	0.034
Ejection Fraction (Simpson), %	52.7±12.5	50.8±10.4	0.511
E/A	0.79 (0.66–0.86)	0.90 (0.78–1.40)	0.022
Septal S, cm/s	6.45±1.56	5.69±1.58	0.009
TAPSE, cm	2.20±0.46	1.97±0.58	0.039
Atrial pacing (%)	52.0 (4.9–94.8)	65.0 (3.6–91.0)	0.559
Ventricular pacing (%)	59.0 (11.0–99.8)	89.0 (12.3–100.0)	0.090

**Conclusion** Reverse LA remodelling (increased LA volume and decreased global LA function) is evident in patients with AHREs despite similar cumulative atrial and ventricular pacing. This increased AF burden was associated with reverse LA remodelling, as was cumulative AP and diastolic parameters. These structural and functional changes within the LA may predispose individuals to develop AHREs and increased AF burden.

#### 059 PACEMAKER IMPLANTATION USING REAL-TIME ULTRASOUND GUIDANCE FOR SUBCLAVIAN VEIN ACCESS

doi:10.1136/heartjnl-2012-301877b.59

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**Background** Subclavian vein access using anatomical landmarks for guidance is widely used and is known to carry risks of serious complications. While the use of ultrasound imaging in cannulating the internal jugular vein is well established, there is currently no similar recommendation for subclavian vein puncture. This study evaluates the use of real-time ultrasound imaging for cannulating the subclavian vein over the first rib during pacemaker implantation.

**Methods** Over a 2-year period, 112 consecutive patients were studied prospectively using the ultrasound technique. They were compared with 100 consecutive patients in whom the anatomical landmark technique had been used. The same standard equipment for venous cannulation and pacemaker implantation was used by a single operator in both groups. The subclavian vein and artery were imaged in cross-section over the first rib using a portable ultrasound machine (sonosite MicroMaxx) equipped with a vascular transducer. The vein was identified by its medical location and its deformation to digital compression. Its diameter (d) and distance (s) from the skin surface were measured. The puncture technique is as shown.

**Results** There were no significant differences between the two groups (ultrasound vs anatomical landmark) with respect to age ( $77\pm 10$  vs  $78\pm 9$  years), sex (61% vs 65% male), body mass index ( $26\pm 5$  vs  $26\pm 4$  kg/m<sup>2</sup>) or history of hypertension (46% vs 49%), ischaemic heart disease (37% vs 41%), heart failure (21% vs 26%), diabetes (15% vs 17%) or dual chamber pacemakers (59% vs 47%). Median d was 0.9 cm (range 0.4–1.5) and s 1.8 cm (range 0.9–3.2). The subclavian vein was successfully punctured with ultrasound guidance in all patients and there was no pneumothorax. In contrast subclavian vein access failed in seven patients ( $p=0.004$ ) and pneumothorax occurred in four patients ( $p=0.03$ ) in the anatomical

landmark group. Further advantages of the ultrasound technique were speed of access, minimal discomfort to patients, smooth passage of introducer and multiple leads under the clavicle and identification of patients at risk of air embolism. There was no death, haematoma or wound infection in either group.

**Conclusions** Puncture of the subclavian vein using ultrasound guidance is superior to the anatomical landmark technique. It eliminates the risk of pneumothorax and failure of access. It should be used routinely in patients undergoing implantation of pacemakers and other rhythm devices.



Abstract 059 Figure 1

#### 060 THE PRACTICE AND PERCEPTION OF TRANSVENOUS LEAD EXTRACTION IN THE UK: LESSONS FROM A NATIONWIDE SURVEY

doi:10.1136/heartjnl-2012-301877b.60

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**Introduction** The rate of cardiac implantable electronic device (CIED) implantation in the UK has been rising consistently and this trend is likely to continue. We sought to establish the nature of lead extraction practice in the UK.

**Methods** The Heart Rhythm UK (HRUK) directory of members was used to compile a list of potential respondents for the survey. A link to the Survey Monkey online tool was sent with HRUK administrative support and responses were collated prior to analysis. The survey consisted of 21 questions and all results were anonymous.

**Results** In total, 29 responses were received and of these 24 (82.8%) regularly performed transvenous lead extractions. The vast majority (82.8%) were electrophysiologists. Most operators performed up to 25 procedures per year (Abstract 060 figure 1A). Most procedures were performed in the EP lab with on-site surgical cover present at all but one site. The nature of surgical cover was generally informal (Abstract 060 figure 1B). The perceived commonest reason for extraction was a combination of infection/erosion and sepsis (93.1%). After a failed attempt at manual traction the most widely used method of extraction was to use a mechanical dissection sheath (65.5%) followed by the use of a laser sheath (21.1%). Peri- and post-procedure temporary pacing mostly utilised either a standard temporary pacing wire or an externalised permanent pacemaker device. Active fixation endocardial pace/sense leads were generally perceived the easiest and safest leads to extract while dual coil defibrillator leads and active fixation coronary sinus leads were perceived the most difficult and associated with the greatest risk (Abstract 060 figure 2A,B). The perception of minor and major complication rates and the risk of death increased with device