

Methods: All critical alerts on RM which triggered active patient call back between July 2012 and July 2016 were reviewed. By the end of this period 1060 patients were being monitored by RM.

Results: In the four-year study period, 45 cases (4.25% of RM cohort) were identified in which RM picked up a device complication leading to changes in patient management. In only 4 cases were the patients symptomatic. The mean time from date of device implantation to RM alert was 37 weeks (0.5–360, SD = 70.13) with 36 cases following a de novo implant and 9 following a generator replacement.

Events detected included abnormal lead impedance (16), high lead threshold (12), lead undersensing (10), and inappropriate VF detection (7).

A definite cause for the alert was identified in 24 cases (53.3%). Of these, 8 were due to lead displacement, 8 to lead fracture, 4 to lead perforation, 1 to pocket haematoma and 1 to pocket infection.

Therapeutic intervention, including lead replacement/revision, device replacement, or pocket washout, was required in 32 cases (71.1%), whilst 13 (28.9%) were managed conservatively.

Conclusion: RM remains a valuable tool in the follow-up of patients with CIEDs. It can facilitate the early detection of potentially serious device complications, particularly in otherwise asymptomatic patients.

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Early and Long-Term Outcomes After Manual and Remote Magnetic Navigation Guided Ventricular Tachycardia Ablation



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Background: Remote magnetic navigation (RMN) is a safe and effective means of performing ventricular tachycardia (VT) ablation. It may have advantages over manual methods due to ease of manoeuvrability and catheter stability.

Aim: We sought to compare the safety and efficacy of RMN versus manual VT ablation.

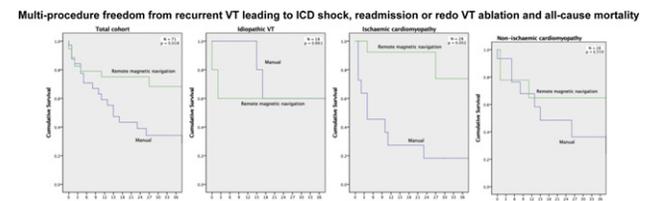
Methods: Retrospective study of procedural outcomes of 139 consecutive VT ablation procedures (69 RMN, 70 manual ablation) in 113 patients between 2009 and 2015 was performed.

Results: RMN was associated with overall higher acute procedural success (80% vs. 60%, $p=0.01$), with a trend to fewer major complications (3% vs. 9% $p=0.09$). In the ischaemic cardiomyopathy subgroup, RMN was associated with longer survival from the composite endpoint of VT recurrence leading to defibrillator shock, re-hospitalisation or redo catheter ablation and all-cause mortality; single procedure adjusted HR 0.240 (95% CI 0.070-0.821) $p=0.023$, multi-procedure HR 0.170 (95% CI 0.046-0.632) $p=0.002$. In

patients with implanted defibrillators, multi-procedure VT free survival was superior with RMN, HR 0.199 (95% CI 0.060-0.657) $p=0.003$.

Conclusion: Remote magnetic navigation may improve clinical outcomes after catheter ablation of VT in patients with ischaemic cardiomyopathy. Further prospective clinical studies are required to confirm these findings.

Figure. Multi-procedure freedom from recurrent VT leading to ICD shock, readmission or redo VT ablation and all-cause mortality



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Early Complications of Cardiac Pacemaker and Defibrillator Implantation Among Hospitals in Australia and New Zealand



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Background: Variation in early outcomes following pacemakers (PPM) and implanted cardiac defibrillators (ICD) are uncertain. We assessed variation in complications within the first 90-days after a PPM or ICD implantation among hospitals in Australia and New Zealand (NZ).

Method: We used hospitalisation data from all Australian States (except the Northern Territory) and the NZ Ministry of Health from 2010-2015 linked with Death Registries to identify post-discharge deaths. We identified new and replacement PPMs and ICDs among patients ≥ 18 years of age using Australian Classification of Health Interventions procedure codes. Consistent with prior literature, early device-related complications were defined as the composite of (1) death in-hospital or within 30-days of discharge; or (2) device (generator, lead or pocket) reoperation or hospitalisation for a device-related complication up to 90-days post-discharge.

Results: We identified 106,405 devices (82,899 PPMs, 23,506 ICDs; 67.1% elective). These patients had mean age of 74.6 ± 12.8 y and 62.3% were male. Of these procedures, 1070(1.0%) resulted in death in-hospital or up to 30-days post-discharge. By 90-days post-hospital discharge, a further

2,463(2.3%) required a pocket, lead or generator reoperation (including lead/generator replacements) and 3,463(3.3%) experienced at least one hospitalisation for a device-related complication. Overall, 5.1% of patients experienced the composite endpoint of any device-related complication with a higher rate observed after ICD vs PPM implantation (6.6% vs 4.7%, $P < 0.01$). Among 93 hospitals implanting at least 25 devices, the crude complication rate varied from 0.0% to 13.4%.

Conclusion: Early device-related complications are not uncommon following PPM or ICD and markedly among implanting hospitals.

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Endocardial Electrogram Morphology to Predict Myocardial Substrate Results from Needle VT Ablation

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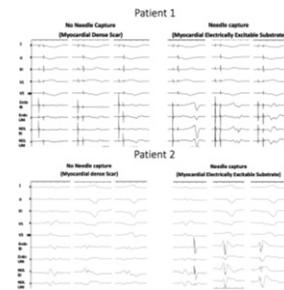
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Background: Deep arrhythmogenic ventricular tachycardia (VT) substrate may be ablated using an ablation catheter with an extendable/retractable needle at the tip.

Methods: Two patients undergoing needle catheter ablation for recurrent VT were included. At each site of needle deployment, endocardial bipolar and unipolar electrograms were recorded. Unipolar pacing was delivered from the needle at 10 mA, 2 and 9 ms pulse width. Sites where pacing did not result in ventricular capture were defined as Dense Scar (DS). Electrograms were examined by an electrophysiologist blinded to the pacing outcome. Signals were examined for frequency (high/low), timing of high frequency signals, fractionation (3 or more positive deflections) and late potentials.

Results: Complete data was available for 73 sites of needle deployment; DS was present in 26 (36%). Compared to DS, electrically excitable substrate (EES) was associated with sharp unipolar EGMs (48.9% vs 23.1%, $p = 0.031$), but not sharp bipolar EGMs (70.2% vs 57.7% $p = 0.28$). No differences were observed for fractionation or late potentials. EES had larger unipolar voltage (1 ± 0.56 vs 0.78 ± 0.28 mV, $p = 0.01$) and bipolar voltage (0.33 ± 0.25 vs 0.19 ± 0.17 mV, $p = 0.006$). Local timing of sharp bipolar potentials predicted EES, as sharp signals were observed in 83% of EES vs 50% in DS ($p = 0.026$).

Conclusion: Endocardial EGM analysis provides valuable information about myocardial substrate.



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Endocardial Left Ventricle Lead Implantation for Cardiac Resynchronisation Therapy



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Introduction: Traditional left ventricular (LV) lead placement for cardiac resynchronisation therapy (CRT) may not always be technically feasible via the coronary sinus approach. Endocardial LV lead implantation via a transeptal atrial approach may be a potential alternative.

Purpose: We sought to review the feasibility and clinical outcomes in patients undergoing endocardial LV lead implantations in an Australian tertiary centre.

Methods and Results: Between August 2015 and December 2016, four patients underwent endocardial LV lead implantation (3 males, mean age 71 ± 5 years). All patients had previously failed LV lead placement via the coronary sinus. Pre-procedural LVEF was $24 \pm 8\%$, QRS duration 161 ± 19 ms. Baseline NYHA was III ($n = 3$) or IV ($n = 1$). All patients had existing indications for therapeutic anticoagulation. LV access was via femoral transeptal access, with a snare from superior subclavian venous access providing access to the left atrium. The lead was inserted via the deflectable guiding sheath into the lateral LV endocardial wall. Successful implantation was achieved in all patients. One patient had a thromboembolic complication (non disabling stroke) post procedure. That patient subsequently died from progressive heart failure within a month of the procedure. The 3 remaining patients: follow up 10 ± 7 months, biventricular pacing volume $93 \pm 5\%$, LVEF $35 \pm 7\%$. All 3 patients had an improvement by at least one NYHA class.

Conclusion: Endocardial LV lead implantation via a transeptal atrial approach is a feasible alternative for CRT in patients with failed lead placement via traditional coronary sinus approach. Thromboembolic complications despite therapeutic anticoagulation remain the major risk.

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