

**FREE PAPER
SESSION 4**

Bluebird Room, 08:15h, 6th April 2019

08:15 – 08:25 Evaluation of the Accuracy of a Single Lead Adhesive ECG Patch Monitoring Device (S-Patch) in Patients Post Myocardial Infarction

Tony Li¹ ; Toon Wei Lim^{*1}

¹Cardiology/ National University Hospital / Singapore

08:25 – 08:35 The Prognostic Value of Electrocardiographic Changes with Treatment of Pulmonary Embolism

Mayank Dalakoti¹ ; Ching Hui Sia¹ ; Pipin Kojodjojo¹

¹Cardiology/ NUHS/ Singapore

08:35 – 08:45 Long-Term Outcomes Following Catheter Ablation in Patients with Atrial Fibrillation and Heart Failure: 7-Year Follow-Up of the ARC-HF Trial

Cheney Wong¹ ; Rosita Zakeri² ; Tom Wong² w

¹Internal Medicine/ Singhealth/ Singapore, ²Cardiology/ Royal Brompton Hospital/ United Kingdom

08:45 – 08:55 Prevalence of Brugada Syndrome in a Multi-Ethnic Singaporean Young Male Cohort

Xiayan Shen¹ ; Ching Hui Sia¹ ; Tee Joo Yeo^{1,2} ; Boon Yew Tan³ ; Chun Yih Paul Lim³ ; Chi Ming Kelvin Chua³ ; Kah Leng Ho³ ; Tien Siang Eric Lim³ ; Chi Keong Ching³ ; Wee Siong Teo³ ; Thuan Tee Daniel Chong^{1,3}

¹Medical Classification Centre, Central Manpower Base/ Singapore Armed Forces Medical Corps/ Singapore, ²Department of Cardiology/ National University Heart Centre/ Singapore, ³Department of Cardiology/ National Heart Centre/ Singapore

08:55 – 09:05 Survival Analysis on Implantable Cardioverter Defibrillator for Primary Prevention Indications in Chronic Kidney Disease Patients

Weixian Alex Tan¹ ; Ying Hui Kong² ; Lisa Teo² ; Kelvin Wong¹ ; Colin Yeo¹ ; Vern Hsen Tan¹

¹Cardiology/ Changi General Hospital/ Singapore, ²Clinical Measurement Unit/ Changi General Hospital/ Singapore

09:05 – 09:15 Clinical Characteristics and Outcomes of Patients with Differing Haemoglobin Levels Undergoing Semi-Urgent and Elective Percutaneous Coronary Intervention

Rui Huai Lau¹ ; Ching Hui Sia² ; Pei Ying Ho¹ ; Tiong Cheng Yeo^{1,2} ; Huay Cheem Tan^{1,2} ; Mark Yan Yee Chan^{1,2} ; Joshua Ping Yun Loh^{1,2}

¹Yong Loo Lin School of Medicine / National University of Singapore/ Singapore, ²Department of Cardiology / National University Heart Centre, Singapore/ Singapore

Evaluation of the Accuracy of a Single Lead Adhesive ECG Patch Monitoring Device (S-Patch) in Patients Post Myocardial Infarction

Tony Li¹ ; Toon Wei Lim^{**1}

¹Cardiology/ National University Hospital / Singapore

Objective(s)

With technological advances and promulgation of smart devices, remote cardiac rhythm monitoring has garnered increasing interest. One population that stands to benefit are patients with a recent acute coronary syndrome (ACS) event and are at heightened risk of arrhythmias and sudden cardiac arrest. Till now, they can only be reasonably monitored for short periods with ward based systems. With an accurate yet portable system, monitoring may be done remotely and safely.

Material and Method

This is a proof of concept study that aims to assess if a single-lead adhesive ECG patch monitoring device (S-Patch) can reliably detect arrhythmias in patients soon after an ACS event and become a potential tool for extended post-discharge monitoring.

We recruited 42 patients [mean age: 59.8 (40-82), 29 male (69.0%)] post myocardial infarction who were admitted with telemetry beyond 24 hours. This included patients with STEMI post coronary angiogram and patients with NSTEMI on monitoring. Subjects were concurrently placed on conventional and S-patch monitoring for 48 hours or till telemetry was discontinued. An in-house machine-learning algorithm was applied to identify notable arrhythmias on S-patch recordings. Results were compared to conventional telemetry.

Result(s)

S-patch performed favourably in identifying critical arrhythmias but was more sensitive to baseline noise. 17 VT and 15 SVT episodes were identified by S-patch while conventional telemetry noted 2 VT and 1 SVT episodes. The SVT episode was correctly identified by both systems. For VT episodes on telemetry, one was correctly identified as noise by S-patch whilst the other occurred after S-patch had been terminated and was missed. Rest of events picked up by S-patch were due to baseline noise.

Conclusion

S-patch demonstrated reasonable accuracy in detection of arrhythmias in patients post myocardial infarction. With further development and validation in broader populations, it could become an economical yet effective tool for diagnoses of arrhythmias and improve preventive healthcare.

Keywords: Ambulatory ECG; Remote Monitoring

The Prognostic Value of Electrocardiographic Changes with Treatment of Pulmonary Embolism

Mayank Dalakoti¹ ; Ching Hui Sia¹ ; Pipin Kojodjojo¹
¹Cardiology/ NUHS/ Singapore

Objective(s)

Electrocardiographic (ECG) changes in pulmonary embolism (PE) reflect right heart strain (RHS) and resolution may predict short-term outcomes. This study investigated ECG changes in patients with European Society of Cardiology intermediate-high and high risk PE, and evaluated if persistence of ECG changes after treatment predicted survival to hospital discharge.

Material and Method

Consecutive patients with intermediate-high risk and high risk PE, confirmed by CT pulmonary angiography, were recruited from an academic medical centre registry. 4 ECG parameters indicative of RHS at the time of diagnosis and after treatment of PE, which included thrombolysis and thrombectomy, were reviewed. Primary outcome was survival to hospital discharge.

Result(s)

The prevalence of ECG abnormalities in 71 patients is shown in the Table. The average age was 62.3 years \pm 13.8, and 70.0% of the cohort was female. Following treatment, sinus tachycardia and S1Q3T3 persisted in 47% and 57% respectively ($p < 0.01$). Persistence of ECG changes, however, did not predict survival to hospital discharge.

Table. Results of changes of electrocardiographic parameters at diagnosis of pulmonary embolism and after treatment (n=71)

ECG Parameters	At time of diagnosis	After treatment	p-value
S1Q3T3	37 (52)	21 (31)	<0.01
Sinus Tachycardia	45 (63)	21 (31)	<0.01
Right Bundle Branch Block	11 (16)	6 (9)	0.10
T wave inversions in V2-V4	31 (44)	38 (56)	0.06

Proportions displayed as number (percentage %)

Conclusion

In patients with intermediate and high-risk PE, resolution of ECG changes with treatment did not predict survival to hospital discharge.

Keywords: ECG Pulmonary embolism

Long-Term Outcomes Following Catheter Ablation in Patients with Atrial Fibrillation and Heart Failure: 7-Year Follow-Up of the ARC-HF Trial

Cheney Wong¹ ; Rosita Zakeri² ; Tom Wong²

¹Internal Medicine/ Singhealth/ Singapore, ²Cardiology/ Royal Brompton Hospital/ United Kingdom

Objective(s)

Catheter ablation has been shown to improve symptoms, exercise performance and neurohormonal status, as compared to medical (rate control) therapy in patients with co-existing atrial fibrillation (AF) and heart failure with reduced ejection fraction (HFrEF). Recent trials have suggested a reduction in early mortality associated with ablation in this group, however long-term outcomes remain unclear.

Material and Method

We performed a longitudinal follow-up of patients enrolled in the ARC-HF trial which randomised 52 patients (1:1) to undergo catheter ablation or medical therapy. All subjects had persistent AF, New York Heart Association class II-IV HF and a left ventricular ejection fraction $\leq 35\%$ at enrolment. Follow-up was conducted through 31st May 2018. The primary endpoint of this analysis was death from any cause.

Result(s)

After a median follow up of 7.2 years (IQR 5.1 to 8.0 years), 15 patients in the medical therapy arm had crossed over to ablation for refractory symptoms. The primary endpoint occurred in 16 patients overall (30.8%). Intention-to-treat analysis demonstrated that all-cause mortality did not significantly differ between patients randomised to ablation versus medical therapy (n=9 deaths [34.6%] ablation group vs. n=7 deaths [26.9%] control group, HR 1.36, 95% CI 0.51 to 3.66, p=0.54; see Figure). Improvement in peak VO_2 , as was observed in the ARC-HF 12-month follow-up, was not significantly associated with long-term mortality.

Conclusion

While catheter ablation plays an important role in the management of refractory symptoms in patients with co-existing AF and HFrEF, it is not associated with a long-term reduction in all-cause mortality when compared with medical therapy. Appropriate patient selection is of paramount importance and future attempts to individualize therapy may identify a subgroup in which ablation provides a mortality benefit.

Keywords: Ablation; Atrial Fibrillation; Heart Failure

Prevalence of Brugada Syndrome in a Multi-Ethnic Singaporean Young Male Cohort

Xiayan Shen¹; Ching Hui Sia¹; Tee Joo Yeo^{1 2}; Boon Yew Tan³; Chun Yih Paul Lim³; Chi Ming Kelvin Chua³; Kah Leng Ho³; Tien Siang Eric Lim³; Chi Keong Ching³; Wee Siong Teo³; Thuan Tee Daniel Chong^{1 3}
¹Medical Classification Centre, Central Manpower Base/ Singapore Armed Forces Medical Corps/ Singapore, ²Department of Cardiology/ National University Heart Centre/ Singapore, ³Department of Cardiology/ National Heart Centre/ Singapore

Objective(s)

To investigate the prevalence of BrS in an asymptomatic young male population in a large multi-ethnic Southeast Asian cohort.

Material and Method

All Singaporean men undergo pre-prescription medical screening prior to enlistment for compulsory military service, where demographic, anthropometric and electrocardiogram (ECG) variables were collected prospectively from January 2015 – December 2016. All individuals with ECG suspicious of Brugada pattern (any type), as well as those with a known family history of Brugada Syndrome (BrS) or sudden cardiac death (SCD) were referred to a tertiary centre for clinical evaluation by certified cardiac electro-physiologists, underwent structural evaluation with a transthoracic echocardiogram and were offered Flecainide study if indicated. Subsequently, all patients diagnosed with Brugada Syndrome were followed up over a 2-year period for outcomes including sudden cardiac death and malignant tachyarrhythmias.

Result(s)

54,599 consecutive males (mean age 18.7±1.6 years) underwent medical screening. 840 individuals were referred for further evaluation. 287 had confirmed Brugada pattern ECG (any type) after electrophysiologist review. Spontaneous Type 1 Brugada ECG was present in 3 individuals. The other 284 had ECG features consistent with Type 2 or 3 Brugada pattern and were offered flecainide challenge testing. 214 subjects underwent flecainide testing. Of these, 53 (25%) tested positive for BrS. 56 individuals had a final diagnosis of BrS, yielding a prevalence of 0.10% in our large unselected young male population. Over 2 years' follow-up, there were no tachyarrhythmia or SCD reported. No patient was lost to follow-up.

Conclusion

In a young, multi-ethnic South-east Asian male population, we found the prevalence of Brugada syndrome to be 0.10%. 2-year follow-up revealed no clinical events. Long-term follow-up studies will be needed to characterize the clinical significance and prognosis of individuals with BrS.

Keywords: Brugada Syndrome; Sudden Cardiac Death; Prevalence

Survival Analysis on Implantable Cardioverter Defibrillator for Primary Prevention Indications in Chronic Kidney Disease Patients

Weixian Alex Tan^{*1}; Ying Hui Kong²; Lisa Teo²; Kelvin Wong¹; Colin Yeo¹; Vern Hsen Tan¹
¹Cardiology/ Changi General Hospital/ Singapore, ²Clinical Measurement Unit/ Changi General Hospital/ Singapore

Objective(s)

Observational studies as well as meta-analysis have shown that implantable cardioverter defibrillator (ICD) patients with chronic kidney disease have increased mortality and therefore the value of device therapy remained uncertain. Accordingly, we sought to perform survival analysis on ICD for primary prevention indications in chronic kidney disease patients in our centre.

Material and Method

This is a retrospective study using ICD registry from 2009 to 2017. Chronic kidney disease (CKD) is defined as GFR <60mL/min/1.73m². Those patients with secondary prevention indications were excluded. Survival analysis using Kaplan—Meier was performed comparing those with CKD versus those without CKD.

Result(s)

240 patients received ICD as primary prevention indication during the study period. 41.2% of patients have chronic kidney disease. Mean follow up was 3.0±1.3 years (95% CI: 2.7-3.3).

Comparing CKD with non-CKD, notably significant different including mean age at ICD implantation (67.0±8.5 years old vs 57.6±10.8 years old, p<0.001), eGFR(42.3 vs 60.5, p<0.001), presence of diabetes (58.6% vs 43.3%, p=0.019), hypertension (75.8% vs 46.1%, p<0.001), ischemic cardiomyopathy (72.6% vs 59.0%, p=0.032) and peripheral vascular disease (11.1% vs 2.2%, p=0.004).

Mean cumulative survival was significantly lower(p<0.001) in CKD (4.1±0.2years, 95% CI: 3.7-4.5) compared to non-CKD group (5.7±0.1years, 95%CI: 5.5-6.0). Independent predictors of survival using cox regression were age (HR: 1.075, 95%CI: 1.0-1.1, p<0.001) and absence of atrial fibrillation (HR: 0.4, 95%CI: 0.2-0.7, p=0.006). In term of cause of death, compared with non-CKD patients(16.7%), most CKD patients (42.9%) died of cardiac related death in particular ischemic heart disease(p=0.31).

Conclusion

In our cohort consists of multi-ethnic Asian population, CKD patients with ICD had decrease survival benefit as compared with non-CKD patients with ICD. Given the CKD prevalence is increasing in trend, these findings need to be confirmed by additional studies specifically focusing on patients with different stages of CKD.

Keywords: ICD; Renal Failure; Survival

Clinical Characteristics and Outcomes of Patients with Differing Haemoglobin Levels Undergoing Semi-Urgent and Elective Percutaneous Coronary Intervention

Rui Huai Lau¹; Ching Hui Sia²; Pei Ying Ho¹; Tiong Cheng Yeo^{1 2}; Huay Cheem Tan^{1 2}; Mark Yan Yee Chan^{1 2}; Joshua Ping Yun Loh^{1 2}

¹Yong Loo Lin School of Medicine / National University of Singapore/ Singapore, ²Department of Cardiology / National University Heart Centre, Singapore/ Singapore

Objective(s)

Anemia is an adverse predictor in patients with coronary artery disease undergoing percutaneous coronary intervention (PCI). The influence of anemia in patients undergoing semi-urgent and elective PCI remains unknown. This study aims to characterize the impact of differing hemoglobin levels on clinical outcomes of such patients.

Material and Method

We performed a retrospective database study of patients who underwent semi-urgent and elective PCI from January 2014 to December 2015 at a tertiary academic centre. Patients were followed-up until December 2018. The patients were stratified into 3 groups – low (L) (Hb <10g/dL), intermediate (I) (Hb 10 - 11.9g/dL), normal (N) (Hb ≥12g/dL) haemoglobin. Demographics, risk factors and end-points (time-to-event analysis) including subsequent stroke/transient ischemic attack (TIA), myocardial infarction (MI), congestive cardiac failure (CCF) and all-cause mortality were analyzed.

Result(s)

Of the 1684 patients studied, there were 83(4.9%), 225(13.4%) and 1376(81.7%) patients with low, intermediate and normal hemoglobin respectively. Low and intermediate hemoglobin patients were older (L:65.3 ± 14.3 vs I:66.7 ± 11.1 vs N:59.9 ± 10.8years) with higher proportion of females (L:54.2% vs I:44.0% vs N:13.7%, p<0.001) and co-morbid burden of hypertension, dyslipidemia, diabetes and peripheral vascular disease. In terms of outcomes, low hemoglobin patients were twice as likely to develop subsequent stroke/TIA(L:6.0% vs N:3.1%, p<0.001) and MI(L:9.6% vs N:5.4%, p<0.001) and thrice as likely to develop subsequent CCF(L:12.0% vs N:4.7%, p<0.001). Number of all-cause and cardiac-related mortality was almost 5-fold higher(33.7% vs 6.9%, p<0.001) and 7-fold higher(16.9% vs 2.5%, p<0.001) respectively in low compared to normal hemoglobin patients. Multivariate survival analysis showed that low hemoglobin patients were associated with increased all-cause mortality [adjusted HR:2.51 (95% CI 1.39-4.53)].

Conclusion

Patients with lower haemoglobin levels who underwent semi-urgent and elective PCI had a higher co-morbidity burden and greater all-cause mortality compared to patients with normal haemoglobin levels. Further studies are required to examine this association.

Keywords: Percutaneous Coronary Intervention; Outcome; Anemia; Hemoglobin; Elective