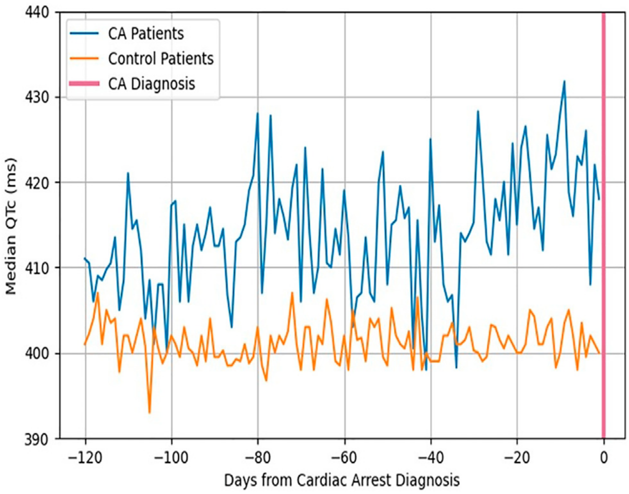
days prior to the SCA diagnosis is reported with a random 120-day period used for the non-SCA patients. The paired difference in median QTc between days 1-20 days pre-SCA diagnosis and days 100-120 pre-SCA were analyzed using the Wilcoxon signed rank test. The Wilcoxon rank-sum test was used to compare QTc 20-days prior to SCA for the SCA group versus the control group.
Results: A total of 271 patients (avg. age: 76±7 years, 60% male) with ICM were included in the analysis. 35 patients (avg. age: 77±8 years, 60% Male) had SCA. 236 patients (avg. age: 76±7 years, 60% Male) did not have SCA and served as control. Median QTc is higher in SCA patients 1-20 days prior to SCA (median[IQR] = 422[401,435] msec) compared to 100-120 days prior (median[IQR] = 409[390,424] msec), p=0.005. This increase was not observed in the control group 1-20 days prior (median[IQR] = 401[383,425] msec) and 100-120 days prior (median[IQR] = 401[382,422] msec), p=0.796. QTc intervals were higher, p=0.006 in SCA patients in the 20 days prior to SCA compared to the control group (figure).
Conclusion: Dynamic QTc intervals as continuously monitored by ICM increase prior to SCA. The use of continuous QTc monitoring in ICM can potentially be used for SCA prevention in patients.



MP-470547-009

LEADLESS PACEMAKER IMPLANTATION CLINICAL OUTCOMES AFTER CARDIAC SURGERY: A MULTICENTER, REAL-WORLD EXPERIENCE

Marco Schiavone; Alessio Gasperetti; Alexander Breitenstein; Gianfranco Mitacchione; Fabrizio Tundo; Elisabetta Montemerlo; Cinzia Monaco; Simone Gulletta; Pietro Palmisano; Paolo Compagnucci; Giovanni Rovaris; Daniel Hofer; Gian B. Chierchia; Gaetano Fassini; Mauro Biffi; Antonio Dello Russo; Massimo Moltrasio; Carlo de Asmundis; Antonio Curnis; Claudio Tondo and Giovanni B. Forleo

Background: Pacemaker implantation is common after cardiac surgery. Leadless pacemakers (LPMs) have emerged as a useful alternative to transvenous pacemakers (TV-PMs), especially in selected patients. Little is known about LPMs' clinical outcomes after cardiac surgery.
Objective: To investigate whether patients implanted with LPMs after cardiac surgery present differences in clinical outcomes compared to naïve patients.
Methods: This observational study included consecutive patients who received a Micra VR or Micra AV (Medtronic Inc.) at 12 EU centers. Patients were divided into two groups: post-surgical (PS) with an LPM implanted following cardiac surgery for coronary artery bypass grafting (CABG), valvular diseases, or congenital heart disease (CHD) vs surgical-naïve patients. Device performance during long-term follow-up (FU) was the primary outcome. Periprocedural complications and the need for conversion to TV-PMs were secondary outcomes.
Results: Among the 1154 patients enrolled, n=166 (14.4%) represented the PS cohort (n=78 CABG, n=81 valvular interventions, n=7 CHD interventions). No significant differences were found regarding median age (PS 79 [74-84] vs naïve 80 [74-85] years, p=0.362) or female sex (PS n=53, 31.9% vs naïve n=360, 36.5%, p=0.262). The AV-LPM implantation rate was significantly higher in the PS group (n=31, 21.1% vs n=75, 7.6%, p<0.001). After a median FU of 25 [24–39] months (no differences among groups), no significant differences in mid-term device thresholds were detected among groups: n=2 (1.2%) patients with very-high-pacing threshold (>2V@0.24 ms) in the PS group vs n=17 (1.7%) in the naïve group, p=0.629. Receiving a LPM after a surgical intervention did not predict high-pacing threshold development during FU (OR 0.696, 95% CI 0.159-3.043, p=0.630), periprocedural complications (OR 1.184, 95% CI 0.544-2.575, p=0.6698), or the need for conversion to TV-PM (OR 1.176, 95% CI 0.484-6.523, p=0.387). While the mean right ventricle pacing (RVP) burden at the first FU was comparable among groups (PS RVP 39.1%±36.1% vs. naïve RVP 34.8%±33.7%, p=0.198), at the last FU the mean RVP was higher in the PS group (48.3%±37.4% vs 37.7%±33.8%, p=0.012).
Conclusion: LPMs offer a useful and safe alternative to TV-PMs after cardiac surgery. Surgical patients were more likely to be implanted with an AV-LPM device compared to a naïve cohort. Previous heart surgery was not a predictor of either a high pacing threshold or conversion to TV-PMs over the medium-term FU.

Moderated Poster MP-470548: Practical Applications of AI and Digital Health in Clinical Electrophysiology

Friday, May 17, 2024
3:45 PM - 5:15 PM

MP-470548-001

DIAGNOSTIC ACCURACY OF A MOBILE, ARTIFICIAL INTELLIGENCE-GUIDED, 12-LEAD ECG DEVICE

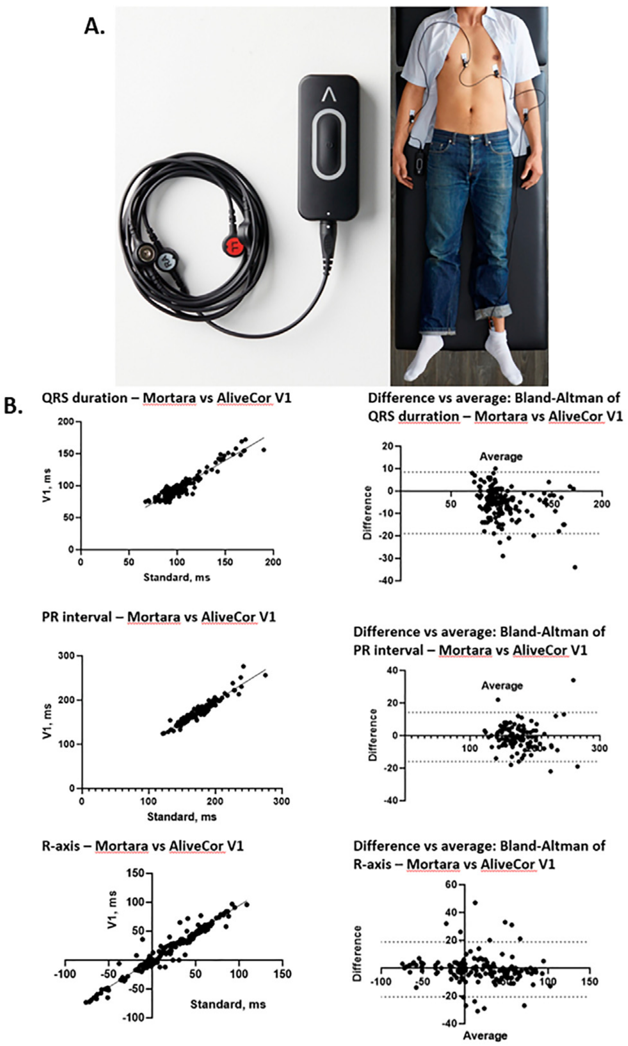
Seabrook Whyte; Karlie Sample; Irina Mustafina; Lynsie Morris; Joel Xue; Dave Albert and Stavros Stavrakis

Background: The AliveCor (AC) Kardia 12L device is a novel device that can record 12-lead ECG. The diagnostic accuracy of this device remains unknown.
Objective: In this study, we evaluated the accuracy of Kardia 12L device recordings and interpretation, compared to a 12-lead ECG.
Methods: Patients seen in an outpatient cardiology clinic were enrolled in this study. At the supine position, Alivecor Kardia 12L recordings were obtained, with lead setup utilizing V2 (right arm, V2, V4, left arm, left leg). A standard 12-lead ECG was taken simultaneously using a Mortara Eli10 device. Kardia 12L uses a deep neural network model to expand the 8 leads into a complete 12-lead ECG. The automated measurements of the two devices were compared using Pearson's correlation and Bland-Altman plots. ECG interpretation by each device, including rhythm and morphology was also compared. Specificity and

sensitivity for the Kardia 12L were derived, using the Mortara VERITA™ interpretation algorithm as the gold standard.

Results: 150 participants (median age 51 years, 55% female) were included. All measurements showed very good correlation with 12 lead ECG. (QRS duration r= 0.88), R axis r=0.94, PR interval r= 0.95 all with p values <0.0001; Figure). AC sensitivity for sinus rhythm and atrial fibrillation. was 1.0 and 0.88, respectively. AC specificity was 0.73 for sinus rhythm and 1.0 for atrial fibrillation.

Conclusion: The measurements and ECG interpretation of 12L AC Kardia 12L are highly similar to the standard 12-lead ECG, enabling rapid acquisition of complete ECG information. This approach has significant implications for rapid ECG diagnosis in clinical practice.



MP-470548-003

ARTIFICIAL INTELLIGENCE-DRIVEN ELECTROCARDIOGRAPHIC AGING IS ASSOCIATED WITH THE RISK OF EARLY- AND NEW-ONSET ATRIAL FIBRILLATION: A MULTI-NATIONAL COHORT STUDY

Seunghoon Cho; Sujeong Eom; Daehoon Kim; Tae-Hoon Kim; Jae-Sun Uhm; Hui-Nam Pak; Moon Hyoung Lee; Pil-Sung Yang; Seng Chan You; Hee Tae Yu and Boyoung Joung

Background: The application of artificial intelligence (AI) algorithms to 12-lead electrocardiogram (ECG) provides promising age prediction methods.

Objective: We investigated whether the discrepancy between AI-predicted age from ECG (AI-ECG age) and chronological age, termed the AI-ECG age gap or electrocardiographic aging (ECG-aging), is associated with atrial fibrillation (AF) risk.

Methods: We developed an AI-ECG age prediction model using a large-scale dataset (1,533,042 ECGs from 689,639 participants) and validated it with six multi-national datasets sourced from South Korea, UK, US, China, and Germany (737,133 ECGs from 330,794 participants). The AI-ECG age gap was calculated across four cohorts: two from South Korea with follow-ups of 4.1 (standard deviation [SD], 4.3) years for 111,483 participants and 6.1 (3.8) years for 37,517 participants, the UK cohort of 40,973 participants followed up for 3.0 (1.6) years, and the US cohort of 90,639 participants for 12.9 (8.6) years. Based on this gap, participants were classified into two groups: Normal group (age gap <+7 years) and ECG-aging group (age gap ≥+7 years). We assessed the predictive capability of ECG-aging for early- and new-onset AF risk.

Results: In the two South Korean cohorts, the mean AI-ECG ages were 51.9 (SD, 16.2) and 47.4 (12.5) years with age gaps of 0.0 (6.8) and -0.1 (6.0) years. In the UK, the mean AI-ECG age was 68.4 (7.8) years with a 4.7 (8.7) age gap, and in the US, 56.7 (14.6) years with a -1.4 (8.9) age gap. In the ECG-aging group, increased risks of new-onset AF were observed with hazard ratios of 2.50 (95% confidence interval, 2.24–2.78) and 1.89 (1.46–2.43) in the two South Korean cohorts, 1.90 (1.55–2.33) in the UK, and 1.76 (1.67–1.86) in the US. For early-onset AF, odds ratios were 2.89 (2.47–3.37), 1.94 (1.39–2.70), 1.58 (1.06–2.35), and 1.79 (1.62–1.97) in these cohorts compared to the normal group. There were increased risks of both early- and new-onset AF with an increasing AI-ECG age gap.

Conclusion: AI-derived ECG-aging was associated with the risk of early- and new-onset AF, suggesting its potential utility as a risk predictor for AF prevention across diverse populations.

Table. The incidence and risk of new-onset and early-onset AF stratified by the ECG-aging group and the increasing AI-ECG age gap

Cohort	Group	New-onset AF				Early-onset AF		
		No. of events* / Total No.	Event rates† (95% CI)	Adjusted HR (95% CI), Model 1‡	P-value	No. of events / Total No.	Adjusted OR (95% CI), Model 1‡	P-value
Severance hold-out	Normal (age gap <+7)	1567 / 96418	4.12 (3.67–4.62)	1 [reference]	[reference]	489 / 72782	1 [reference]	[reference]
	ECG-aging (age gap ≥+7)	456 / 15065	10.25 (9.75–10.77)	2.50 (2.24–2.78)	< 0.001	247 / 12731	2.89 (2.47–3.37)	< 0.001
	Per 1-increase in AI-ECG age gap			1.06 (1.05–1.07)	< 0.001		1.07 (1.06–1.08)	< 0.001
SHC	Normal (age gap <+7)	383 / 33254	1.83 (1.45–2.31)	1 [reference]	[reference]	184 / 30434	1 [reference]	[reference]
	ECG-aging (age gap ≥+7)	73 / 4263	3.82 (3.44–4.24)	1.89 (1.46–2.43)	< 0.001	44 / 4073	1.94 (1.39–2.70)	< 0.001
	Per 1-increase in AI-ECG age gap			1.04 (1.03–1.06)	< 0.001		1.04 (1.02–1.06)	0.001
UK Biobank	Normal (age gap <+7)	329 / 24673	4.15 (3.47–4.97)	1 [reference]	[reference]	39 / 9480	1 [reference]	[reference]
	ECG-aging (age gap ≥+7)	209 / 16300	8.83 (7.92–9.85)	1.90 (1.55–2.33)	< 0.001	80 / 13419	1.58 (1.06–2.35)	0.024
	Per 1-increase in AI-ECG age gap			1.04 (1.03–1.06)	< 0.001		1.03 (1.00–1.06)	0.029
Mayo Clinic	Normal (age gap <+7)	7959 / 76159	8.38 (7.88–8.92)	1 [reference]	[reference]	1423 / 46046	1 [reference]	[reference]
	ECG-aging (age gap ≥+7)	1649 / 14480	16.24 (15.85–16.62)	1.76 (1.67–1.86)	< 0.001	647 / 11808	1.79 (1.62–1.97)	< 0.001
	Per 1-increase in AI-ECG age gap			1.03 (1.03–1.03)	< 0.001		1.03 (1.02–1.03)	< 0.001

Participants aged 66 years or older at the start of follow-up (the first ECG acquisition date or index date) were further excluded from the early-onset AF risk analysis.
* The total number of new-onset AF events includes early-onset AF cases.
† The event rates were adjusted for chronological age and sex and presented per 1,000 person-years.
‡ Model 1 was adjusted for chronological age and sex.
Abbreviations: AF, atrial fibrillation; AI, artificial intelligence; CI, confidence interval; ECG, electrocardiogram; ECG-aging, electrocardiographic aging; HR, hazard ratio; OR, odds ratio; SHC, Severance health check-up.

MP-470548-004

PERFORMANCE AND INTEROPERABILITY OF A VECTORCARDIOGRAM DEEP LEARNING ALGORITHM TO DETECT ATRIAL FLUTTER COMPARED TO ELECTROCARDIOGRAM ANALYSIS BY ELECTROPHYSIOLOGISTS

Joshua Lampert; Branislav Vajdic; Alexei Shvilkin; Peter J. Zimetbaum; Abdulhalik Oguz; Akhil Vaid; Girish Nadkarni and Vivek Y. Reddy