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Advancing cardiovascular risk assessment and diagnostics

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EDITORIAL

Advancing cardiovascular risk assessment and diagnostics

Advancing cardiovascular risk assessment and diagnostics is crucial in improving disease prediction and management [1]. Emerging markers, such as the triglyceride-glucose (TyG) index and inflammatory indices, provide new insights into coronary and hypertensive conditions [2,3]. Innovations in blood pressure monitoring enhance risk evaluation, while exercise-induced changes reveal hypertension's complexity [4]. Molecular pathways further connect hypertension to organ damage, underscoring the need for targeted interventions [5]. Disparities in access to life-saving treatments, such as defibrillators, highlight ongoing healthcare challenges [6]. As research evolves, integrating these advancements into clinical practice can refine diagnosis, treatment, and prevention strategies.

Type 2 diabetes mellitus (T2DM) is a major contributor to coronary artery disease (CAD), with insulin resistance playing a key role in its progression [2]. The TyG index has emerged as a novel marker for identifying insulin resistance. The study of Li et al. examined the association between the TyG index and CAD severity in 280 T2DM inpatients [7]. Patients were classified into CAD and non-CAD groups, with further stratification based on SYNTAX scores. Results showed a strong positive correlation between the TyG index and SYNTAX score ($r = 0.70$, $p < 0.01$). The TyG index significantly predicted moderate to severe CAD, with an area under the ROC curve of 0.79. Higher LDL-C and TyG index levels were associated with increased CAD severity. These findings suggest that the TyG index could serve as a valuable tool for assessing CAD risk in T2DM patients.

The office white-coat effect tail (OWCET), a decline of ≥10 mmHg in systolic blood pressure during office visits, has been proposed as a potential predictor of long-term cardiovascular risk. Humbert et al. analysed 4937 men from the European cohorts of the Seven Countries Study to assess its association with mortality [8]. Despite initially higher hypertension, OWCET showed no significant link to cardiovascular or all-cause mortality over 60 years. Adjusted analyses confirmed no predictive value for CVD death in both Northern and Southern European cohorts. Competing risk analysis also found no association with non-CVD mortality. These findings suggest OWCET does not improve long-term CVD risk stratification. Consequently, it has limited clinical relevance for predicting fatal cardiovascular events.

The cardiometabolic index (CMI), which combines abdominal obesity and lipid abnormalities, is a potential predictor of cardiovascular disease risk, but its link to myocardial infarction (MI) remains unclear. Zhang et al. analysed data from 13,923 participants in the NHANES 2005–2018 survey, using weighted logistic regression and restricted cubic splines to assess the relationship between CMI and MI [9]. Results showed a significant positive association, particularly in males, individuals with BMI >30 kg/m^2, and alcohol drinkers. Sensitivity analysis confirmed the robustness of this link, even in those taking lipid-lowering drugs. These findings suggest CMI as a useful tool for MI risk assessment.

Nocturnal blood pressure dipping is important for cardiovascular health, but the effect of exercise on this process remains unclear. Lopez et al. investigated whether a single aerobic exercise session influences nocturnal blood pressure dipping in 20 medicated hypertensive adults [10]. Participants were randomly assigned to an exercise or control group, with 24-h ambulatory blood pressure monitoring used to assess changes. Results showed no significant differences in nocturnal blood pressure dipping between the exercise and control groups for both systolic and diastolic blood pressure. These findings suggest that a single aerobic exercise session does not affect nocturnal blood pressure dipping in individuals with controlled hypertension.

The effects of increased pulse pressure on renal damage and tubulointerstitial fibrosis in elderly rats with isolated systolic hypertension (ISH) were investigated [11]. Results showed that ISH rats exhibited increased pulse pressure, abnormal renal function, and higher shear stress, leading to interstitial fibrosis. Key molecular changes included reduced E-cadherin expression, increased α-SMA and Vimentin levels, and upregulation of the TGF-β1/Smad3 signalling pathway. These findings suggest that increased pulse pressure contributes to renal injury by inducing epithelial–mesenchymal transition and fibrosis through the TGF-β1/Smad3 pathway.

Blood pressure (BP) control is crucial in haemodialysis (HD) patients, but peri-dialytic measurements may not accurately reflect hypertension or predict cardiovascular risk. Huart et al. assessed BP classification and long-term outcomes in 43 chronic HD patients using 44-hour interdialytic ambulatory BP monitoring (iABPM) and 6-day home BP monitoring (HBPM) [12]. Nearly 25% of patients classified as normotensive pre-dialysis had masked hypertension, while 23% of hypertensive patients exhibited white-coat hypertension. After a 6-year follow-up, 25 patients had died, including 6 from cardiovascular causes. Daytime systolic BP measured by iABPM was significantly associated with all-cause mortality after adjusting for age and gender (Figure 1). These findings highlight the importance of iABPM and HBPM in accurately diagnosing hypertension and assessing mortality risk in HD patients.

Kawasaki disease (KD) can lead to coronary artery lesions (CALs), making early risk assessment essential for better management. Huang et al. analysed the relationship between the platelet-to-lymphocyte ratio (PLR) and CALs in 364 KD patients [13]. Among them, 17.3% had CALs, and statistical analysis identified PLR as a significant

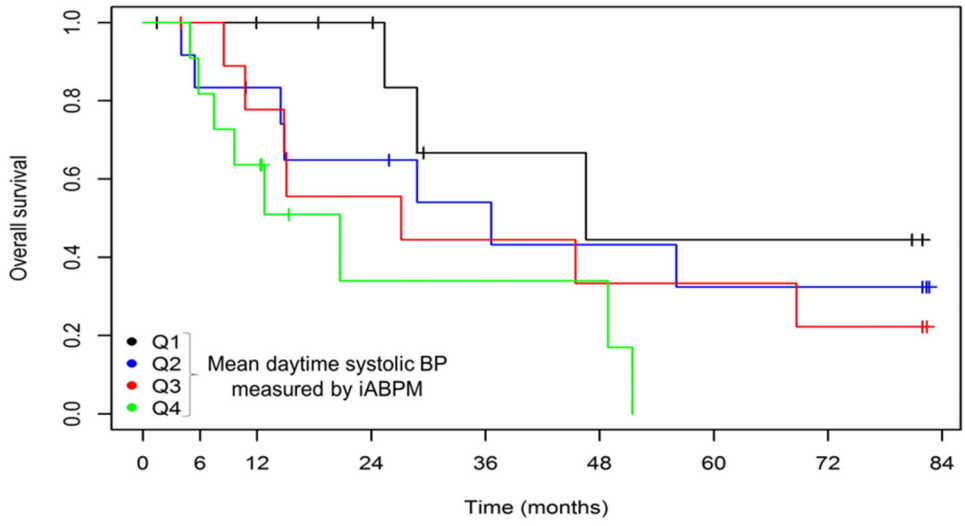

Figure 1. Univariable survival analysis (Kaplan-Meier) for 6-year all-cause mortality according to the quartiles of mean daytime systolic BP measured by iABPM (Q1: <122 mmHg; Q2: 122–136 mmHg; Q3: 136–148 mmHg; Q4: >148 mmHg) (from reference [12]).

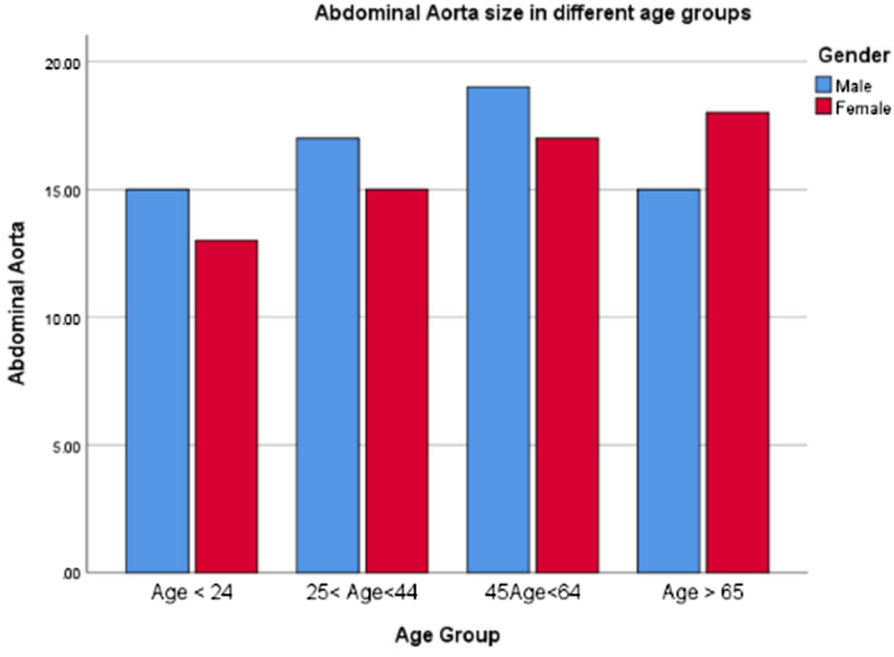

Figure 2. Abdominal aorta size classified by age and gender (from reference [14]).

predictor of their occurrence. Higher PLR levels were associated with an increased risk of CALs, as confirmed through logistic regression analysis. These findings suggest that PLR could serve as a useful marker for early risk stratification in KD patients. Incorporating PLR into clinical assessment may improve disease monitoring and therapeutic decision-making.

Determining normal abdominal aorta size and its relationship with demographic factors is essential for diagnosing and managing aortic diseases. Bodagh et al. assessed aortic dimensions in 167 healthy Iranian participants, primarily women (67.7%) [14]. Significant differences in aortic measurements were observed across four age groups, with men in the 45–64 age group showing larger aortic dimensions (Figure 2). Correlation and regression analyses revealed that an increase in ascending or descending aorta diameter corresponded to a 0.23 and 0.35 mm increase in abdominal aorta diameter, respectively. Age emerged as a significant predictor of abdominal aorta size, along with other factors such as gender, weight, body surface area, and systolic blood pressure. These findings highlight the importance of considering age-related changes in aortic assessment. Echocardiographic screening of the abdominal aorta may help in early detection of aneurysmal changes, improving diagnostic and preventive strategies.

Dobutamine stress echocardiography (DSE) is often used to assess coronary artery disease (CAD), but its

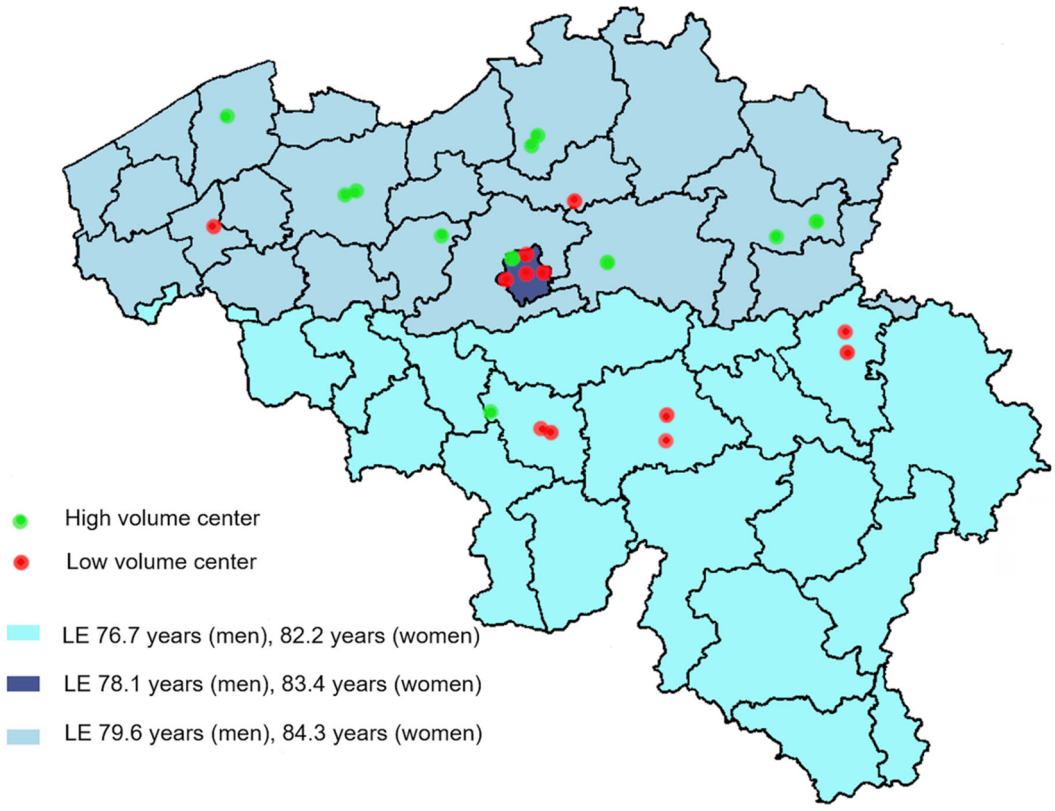

Figure 3. Distribution of ICD implanting centres in Belgium with annotation of the three main regions with their life expectancy (LE) (from reference [19]).

reliance on visual interpretation of wall motion abnormalities has limitations [15]. Ragab et al. assessed the value of speckle tracking echocardiography (STE) and global longitudinal strain (GLS) in improving CAD diagnosis [16]. Among 125 patients, global and regional post-systolic strain indices (PSI) were significantly higher in CAD patients across rest, peak stress, and recovery phases, while GLS was lower in CAD patients during recovery. The most sensitive and specific diagnostic parameters were global and regional PSI in the recovery period, with sensitivities of 95 and 98% and specificities of 93 and 95%, respectively. Combining DSE with STE improved diagnostic accuracy, sensitivity, and specificity. These findings support the use of speckle tracking during DSE for better CAD detection.

Inflammatory markers may help predict major adverse cardiovascular events (MACE) in post-CABG patients undergoing primary PCI on saphenous vein grafts (SVG). In their retrospective study, Mozafary Bazargany et al. analysed 74 patients, finding that pre-procedural platelet-to-lymphocyte ratio (PLR) was significantly higher in those who developed MACE [17]. However, only left ventricular ejection fraction (LVEF) remained an independent predictor of one-year MACE. LVEF showed better predictive power than PLR, though a PLR >104.18 had 70% sensitivity at 54% specificity. These findings suggest that pre-procedural PLR and LVEF may help assess MACE risk following PPCI on SVG.

Implantable cardioverter-defibrillators (ICDs) are crucial for preventing sudden cardiac death, but survival after implantation affects their cost-effectiveness [18]. Ingelaere et al. analysed 9647 Belgian patients who received their first ICD between 2010 and 2016, comparing demographics and mortality across implantation centres (Figure 3) [19]. Low-volume centres treated more patients with ischaemic heart disease, primary prevention indications, and more comorbidities. Kaplan-Meier analysis showed significantly higher 3-year mortality in low-volume centres (16.3 vs. 11.4%, $p < 0.001$). After adjustment, low centre volume remained an independent predictor of mortality. However, similar 30-day mortality rates (0.6 vs. 0.5%) suggest that procedural factors alone do not explain long-term survival differences. Socio-economic variables, such as regional income and general health indicators, were also associated with survival disparities. These findings highlight the need for further research into non-procedural factors influencing post-ICD implantation survival.

In this issue of Acta Cardiologica, several focus images highlighting interesting cases have also been reported [20–25].

Disclosure statement

Nothing to disclose.

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