Acta Cardiologica

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/tacd20

Ischaemic heart disease: innovations in diagnosis and comprehensive management

Patrizio Lancellotti, Orianne de la Brassinne Bonardeaux & Laurent Davin

To cite this article: Patrizio Lancellotti, Orianne de la Brassinne Bonardeaux & Laurent Davin (29 Jan 2025): Ischaemic heart disease: innovations in diagnosis and comprehensive management, Acta Cardiologica, DOI: 10.1080/00015385.2025.2457285

To link to this article: https://doi.org/10.1080/00015385.2025.2457285

Published online: 29 Jan 2025.

ACTA CARDIOLOGICA
https://doi.org/10.1080/00015385.2025.2457285

Taylor & Francis
Taylor & Francis Group

EDITORIAL

Ischaemic heart disease: innovations in diagnosis and comprehensive management

Ischaemic heart disease (IHD) remains a major global health challenge, necessitating continuous advancements in its diagnosis and management [1,2]. Accurate risk assessment and early detection are critical to preventing adverse outcomes and guiding effective interventions. Alongside traditional diagnostic methods, the integration of non-invasive imaging and biomarker evaluation has enhanced precision in identifying at-risk patients [3–8]. Advances in therapeutic strategies, including optimised pharmacological treatments and innovative interventional techniques, have significantly improved patient outcomes [9]. Comprehensive management approaches now emphasise personalised care, addressing both the underlying pathology and patient-specific risk factors [10]. Post-intervention strategies such as cardiac rehabilitation and lifestyle modifications have further contributed to reducing morbidity and enhancing recovery [11,12]. These developments highlight the importance of a multifaceted approach in tackling the complex challenges posed by IHD.

Endothelial dysfunction is a key pathological feature in the development and progression of cardiovascular diseases, including coronary artery disease (CAD) [13]. It is characterised by impaired vasodilation, increased inflammation, and a pro-thrombotic state, all of which contribute to vascular damage and reduced blood flow. Factors such as oxidative stress, inflammation, and an imbalance in nitric oxide production play pivotal roles in its onset [14]. Beyond traditional risk factors like hypertension, diabetes, and smoking, psychosocial factors have also been increasingly recognised as important contributors to endothelial dysfunction. A study of 200 patients revealed that those with severe coronary stenosis had higher levels of anxiety, depression, and Type A behaviour, alongside lower social support [15]. These factors negatively correlated with endothelial function, including vasodilation and nitric oxide synthesis. Anxiety, depression, Type A behaviour, and low social support were identified as independent contributors to endothelial dysfunction. Addressing these psychosocial elements may reduce cardiovascular risks and improve vascular health. Integrating psychosocial care into CAD management could enhance prevention and treatment outcomes.

Type 2 diabetes mellitus (T2DM) and metabolic dysfunction-associated fatty liver disease (MAFLD) are linked to systemic inflammation, endothelial dysfunction, and increased risks of cardiovascular and skeletal complications [16]. Endothelial dysfunction, measured by flow-mediated dilation (FMD), and reduced bone mineral density (BMD) are significant markers of these risks. Investigating the relationship between vascular health and skeletal health may offer insights into early diagnostic and treatment strategies for at-risk populations. The relationship between vascular endothelial function and BMD in T2DM patients with MAFLD was explored in 872 patients [17]. FMD was positively associated with BMD and negatively correlated with fracture risk and osteoporotic history in MAFLD (+) patients with FMD < 4%, particularly in females, but no associations were observed in MAFLD (−) patients or those with FMD ≥ 4%. These findings suggest that decreased FMD may signal reduced BMD and higher fracture risk, emphasising its potential in early osteoporosis diagnosis for this population.

Achieving low-density lipoprotein cholesterol (LDL-C) targets is a critical component of reducing cardiovascular risk, particularly in patients with atherosclerotic cardiovascular disease (ASCVD) or at high risk [18]. Lipid-lowering therapies, including statins, ezetimibe, and PCSK9 inhibitors, play a key role in managing these risks. T2DM, closely linked to CAD, further complicates cardiovascular risk due to the role of insulin resistance (IR) in disease progression. The triglyceride-glucose (TyG) index, a marker for IR, was studied to assess its association with CAD severity in T2DM patients [19]. A strong positive correlation was observed between the TyG index and SYNTAX score, which measures CAD severity. The TyG index demonstrated high predictive power for moderate to severe CAD, with an area under the ROC curve of 0.79. Higher TyG index and LDL-C levels were associated with significantly increased risks of severe CAD. These findings suggest the TyG index is a valuable tool for identifying IR and assessing CAD risk in T2DM patients.

Coronary artery calcium (CAC) scoring is a critical tool for assessing cardiovascular risk, providing valuable information about the burden of atherosclerotic plaque in the coronary arteries [20]. It is widely used to guide risk stratification and inform treatment decisions, particularly in patients with intermediate cardiovascular risk [21]. However, concerns about radiation exposure during CAC scoring remain a significant consideration, especially for younger patients or those requiring repeated imaging over time. A low-dose protocol using reduced tube current, lower kilovoltage peak, and advanced iterative reconstruction was compared to the standard method for reliability and safety [22]. CAC scores obtained with the low-dose protocol strongly correlated with those from

the standard protocol ($r = 0.99$), with a formula developed to adjust low-dose scores for precise equivalence. Validation showed excellent agreement in scores and risk classification between the two methods. The low-dose approach reduced radiation exposure by 88.87%, offering significant safety advantages. This reliable and low-radiation alternative is especially suitable for screening low-to-intermediate risk populations.

Detecting significant coronary artery stenosis in patients with stable angina pectoris is challenging, and conventional echocardiography has limitations in assessing longitudinal mechanics. Two-dimensional strain echocardiography (2D-STE) offers improved diagnostic accuracy for identifying myocardial ischaemia and coronary artery stenosis [23–25]. In a study of 70 patients, global longitudinal strain (GLS) was significantly lower in those with severe coronary artery disease (CAD) compared to those with normal or non-obstructed arteries [26]. A GLS cut-off of −17.35% predicted significant stenosis with 97.6% sensitivity and 93.3% specificity. Segmental longitudinal strain (SLS) was also effective in identifying lesions in specific coronary territories, with high sensitivity and specificity across the left anterior descending artery (LAD), left circumflex artery (LCX), and right coronary artery (RCA). These findings highlight 2D-STE as a valuable tool for diagnosing significant coronary stenosis and localising affected coronary territories in stable angina patients.

Trans-radial coronary angiography (TR-CAG) is a preferred diagnostic approach due to its reduced risk of complications compared to transfemoral access, with Judkins and Tiger-II catheters as commonly used tools [27]. Tiger-II catheters stand out for their significant advantages, including reduced fluoroscopy time, shorter procedural durations, and lower contrast volume, making them particularly beneficial for patients at risk of contrast-induced nephropathy or requiring multiple procedures [28]. The lower incidence of radial artery spasm associated with Tiger-II catheters enhances patient comfort and minimises procedural difficulties, improving overall outcomes. Despite these differences, both Tiger-II and Judkins catheters demonstrate comparable success rates and radiation exposure, ensuring the reliability of either

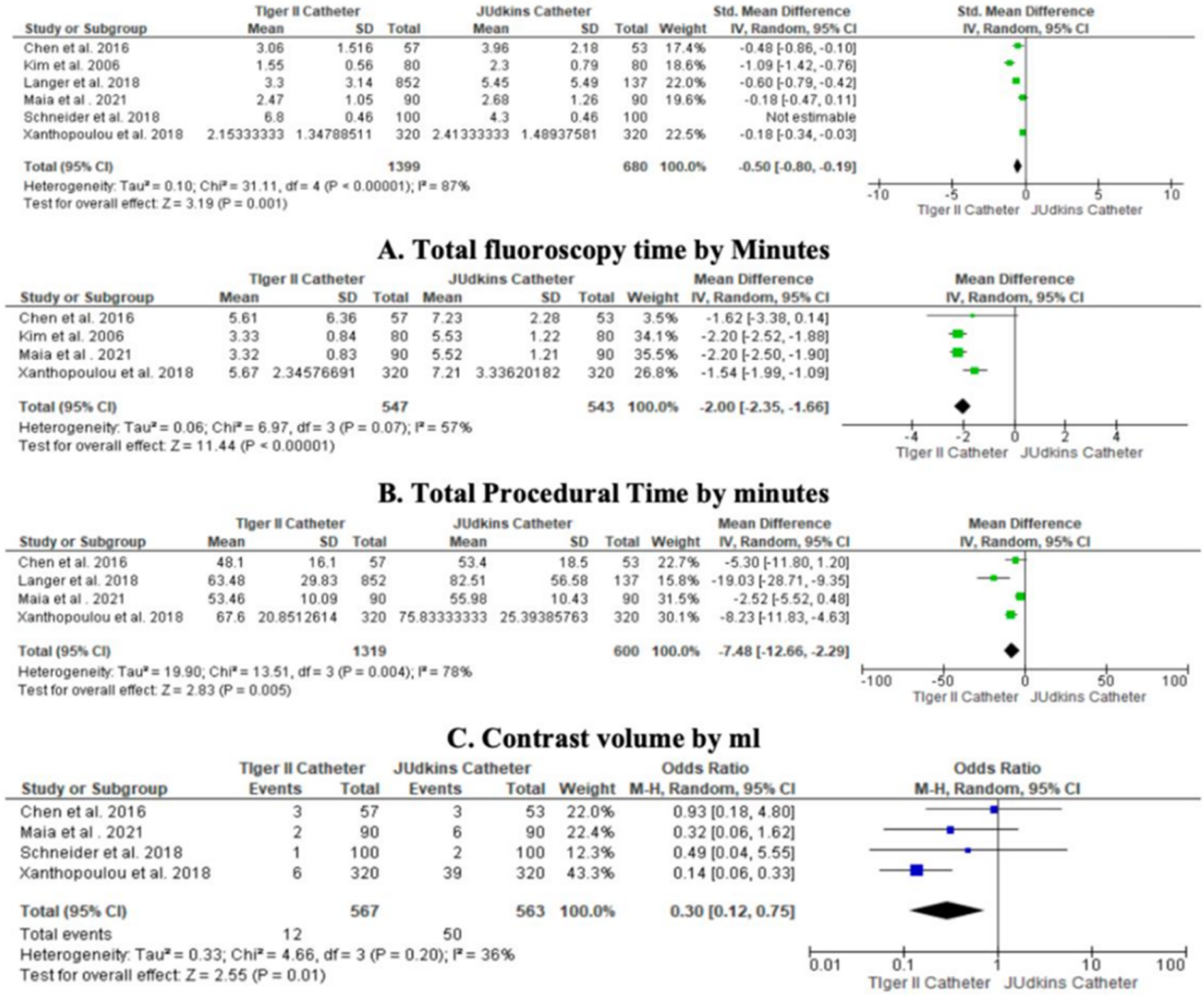

Figure 1. Forest plots comparing the safety and efficacy of tiger II versus judkins catheters in trans-radial coronary angiogram. (A) Total fluoroscopy time; (B) Procedural time; (C) Total contrast volume usage (from reference [28]).

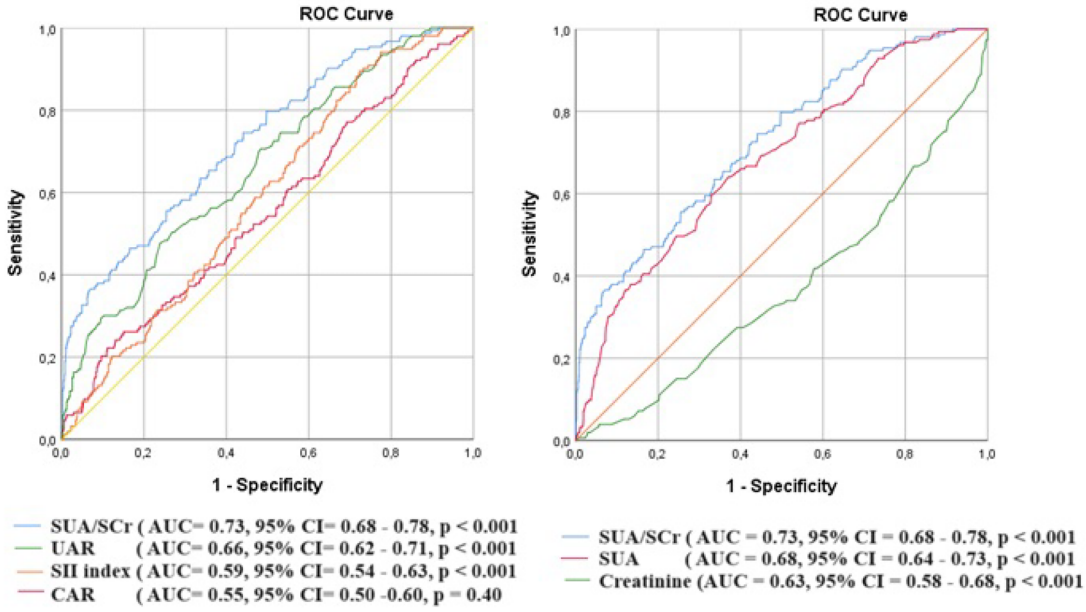

Figure 2. ROC curves of the uric acid, creatinine, serum uric acid to serum creatinine ratio (SUA/SCr), the uric acid to albumin ratio (UAR), C-reactive protein to albumin ratio (CAR), and systemic immune inflammation index (SII) in predicting the NRP. Compared with other derived biomarkers, area under the curve of the SUA/SCr was adequate and better in predicting the development of NRP (from reference [36]).

choice. The efficiency and reduced resource demands of Tiger-II catheters are especially advantageous in high-volume catheterisation labs, enabling faster patient throughput without compromising safety or outcomes. Their nephroprotective benefits further position them as a preferred option for at-risk populations. These combined factors underscore the value of Tiger-II catheters as a practical and effective choice for TR-CAG procedures across various clinical scenarios (Figure 1).

Reducing microvascular obstruction (MVO) and infarct size, while promoting effective reperfusion and minimising inflammation, is a critical goal in managing ST-segment elevation myocardial infarction (STEMI) patients, particularly those with a high thrombotic burden undergoing primary percutaneous coronary intervention (pPCI) [29,30]. Distal intracoronary infusion of glycoprotein IIb/IIIa (GpIIb/IIIa) inhibitors, such as tirofiban, has emerged as a promising approach, offering targeted delivery of the drug directly to the affected area. This method bypasses systemic circulation barriers and overcomes microvascular resistance, ensuring improved drug penetration to jeopardised myocardial tissue. Among 75 STEMI patients with high thrombus burden or slow-flow/no-reflow phenomena, intracoronary infusion of GpIIb/IIIa inhibitors was associated with improved outcomes compared to systemic intravenous infusion [31]. Cardiac magnetic resonance imaging (MRI) showed significantly lower MVO ($p = 0.048$) and reduced infarct size ($p = 0.030$) in patients receiving intracoronary tirofiban. Baseline characteristics between the two groups were generally similar, with the exception of a lower diabetes rate in the intracoronary infusion group ($p = 0.006$). The findings highlight that directly delivering GpIIb/IIIa inhibitors to the infarct-related artery improves drug efficacy by overcoming microvascular resistance and ensuring targeted platelet inhibition. This approach may reduce myocardial damage, improve recovery, and enhance long-term outcomes in high-risk STEMI patients undergoing pPCI. By providing more precise therapy, distal intracoronary infusion of tirofiban shows promise as a valuable strategy in optimising outcomes for patients in this critical population.

The no-reflow phenomenon (NRP) is a significant complication in patients with non-ST-elevated acute coronary syndrome (NSTE-ACS), often leading to poor outcomes despite successful revascularization. It is characterised by impaired blood flow in the microvasculature despite the successful opening of the epicardial coronary artery, typically caused by microvascular damage, inflammation, or distal embolisation [32–35]. Identifying reliable predictors for NRP is crucial for improving management and preventing complications. The serum uric acid to serum creatinine ratio (SUA/SCr) has emerged as a potential marker for predicting NRP [36]. Patients with NRP exhibited significantly higher SUA/SCr ratios, SUA to albumin ratios (UAR), C-reactive protein to albumin ratios (CAR), and systemic immune inflammation (SII) index levels compared to those without NRP. Multivariate analysis identified SUA/SCr, UAR, CAR, and SII index as independent predictors of NRP, with SUA/SCr demonstrating the highest predictive value. A SUA/SCr ratio ≥5.34 predicted NRP with 75% sensitivity and 55% specificity (Figure 2). These findings suggest that the SUA/SCr ratio is a practical and reliable tool for predicting NRP in NSTE-ACS patients, aiding in better risk stratification and management.

In this issue of Acta Cardiologica, several focus images highlighting interesting cases have also been reported [37–45].

Disclosure statement

Nothing to disclose.

References

[1] Lancellotti P, Petitjean H, Nchimi A, et al. Special issue on ischemic heart disease. Acta Cardiol. 2023;78(1):1–4. doi: 10.1080/00015385.2023.2170563.

[2] Lancellotti P. Acute and chronic coronary artery disease. Acta Cardiol. 2024;79(2):105–108. doi: 10.1080/00015385.2024.2339011.

[3] Seydel GS, Gunturk I, Akkaya H, et al. The relationship between the new inflammatory markers and disease severity in patients with acute coronary syndrome. Acta Cardiol. 2024;79(7):778–786. doi: 10.1080/00015385.2024.2403933.

[4] Lancellotti P, de la Brassinne Bonardeaux O. Biomarkers and inflammation in coronary artery disease: key insights. Acta Cardiol. 2024;79(7):747–750. doi: 10.1080/00015385.2024.2421090.

[5] Andiappan R, Govindan R, Ramasamy T, et al. Circulating miR-133a-3p and miR-451a as potential biomarkers for diagnosis of coronary artery disease. Acta Cardiol. 2024;79(7):813–823. doi: 10.1080/00015385.2024.2410599.

[6] Deschepper C, Berwouts D, Cornelis K, et al. SPECT-CCTA: guiding treatment in ischaemic heart disease. Acta Cardiol. 2022;77(4):328–332. doi: 10.1080/00015385.2021.1939511.

[7] Sdogkos E, Xanthopoulos A, Giamouzis G, et al. Diagnosis of coronary artery disease: potential complications of imaging techniques. Acta Cardiol. 2022;77(4):279–282. doi: 10.1080/00015385.2021.1911467.

[8] Minten L, Dubois C, Desmet W, et al. Economical aspects of coronary angiography for diagnostic purposes: a Belgian perspective. Acta Cardiol. 2024;79(1):41–45. doi: 10.1080/00015385.2023.2281105.

[9] Xueying C, Hua Z, Lujing Z, et al. Which patients with coronary artery disease should include oral nitrates on their discharge medication list? Acta Cardiol. 2024;79(2):136–148. doi: 10.1080/00015385.2023.2271763.

[10] Naguib AM, Sobhi MA, Zaki A, et al. Very long versus overlapping drug eluting stents for the management of long coronary artery lesions. Acta Cardiol. 2024;79(2):187–193. doi: 10.1080/00015385.2023.2289722.

[11] Racodon M, Vanhove P, Bolpaire R, et al. Is hybrid cardiac rehabilitation superior to traditional cardiac rehabilitation? Acta Cardiol. 2023;78(7):773–777. doi: 10.1080/00015385.2023.2215610.

[12] Li T, Jiang H, Ding J. The role of exercise-based cardiac rehabilitation after percutaneous coronary intervention in patients with coronary artery disease: a meta-analysis of randomised controlled trials. Acta Cardiol. 2024;79(2):127–135. doi: 10.1080/00015385.2023.2266650.

[13] Jerabek S, Zemanek D, Pudil J, et al. Endothelial dysfunction assessed by digital tonometry and discrepancy between fraction flow reserve and instantaneous wave free ratio. Acta Cardiol. 2020;75(4):323–328. doi: 10.1080/00015385.2019.1586089.

[14] Balta S. Endothelial dysfunction and inflammatory markers of vascular disease. CVP. 2021;19(3):243–249. doi: 10.2174/18756212MTA1oOTYh3.

[15] Tang N, Li K, Zhang Q, et al. Study of psychosocial factors and endothelial dysfunction in coronary heart disease patients. Acta Cardiol. 2024;3:1–9. doi: 10.1080/00015385.2024.2436810.

[16] Berezin AE. Deterioration of endothelial function as a risk factor for osteoporosis in patients with type 2 diabetes mellitus and MAFLD. Acta Cardiol. 2024;16:1–3. doi: 10.1080/00015385.2024.2442800.

[17] Du P, Jiang J, Liu Y, et al. Correlation between vascular endothelial function and bone mineral density in type 2 diabetes mellitus patients with MAFLD. Acta Cardiol. 2024;10:1–9. doi: 10.1080/00015385.2024.2436813.

[18] van de Borne P, Peeters A, Janssens L, et al. Lipid-lowering therapy and risk-based LDL-C goal attainment in Belgium: DA VINCI observational study. Acta Cardiol. 2022;20:1–10.

[19] Li J, Li Z, Yang Q. Association between the triglyceride-glucose index and the severity of coronary artery disease in patients with type 2 diabetes mellitus and coronary artery disease: a retrospective study. Acta Cardiol. 2024;25:1–7. doi: 10.1080/00015385.2024.2413737.

[20] Kılıçkap G, Dölek BA, Çevik Nİ, et al. Time difference for the presence of coronary calcium in those with and without coronary risk factors and statin use. Acta Cardiol. 2024;19:1–9.

[21] Higny J, Dupont M. Cardiac CT findings in patients with family history of premature CAD: an observational study. Acta Cardiol. 2022;77(7):580–585. doi: 10.1080/00015385.2021.1967612.

[22] Nandi D, Pandey NN, Kumar S, et al. Evaluation of reliability and radiation dose reduction in coronary artery calcium scoring by using a low tube current and low kilo-voltage peak with advanced modelled iterative reconstruction. Acta Cardiol. 2024;3:1–8. doi: 10.1080/00015385.2024.2436314.

[23] Zygouri A, Donal E. Advancing coronary artery disease diagnosis with 2D-speckle tracking echocardiography. Acta Cardiol. 2025;4:1–3. doi: 10.1080/00015385.2024.2445341.

[24] El Mokadem MO, Hassan A, Hussein M, et al. The potential role of 2D-speckle tracking echocardiography for detecting left ventricular systolic dysfunction in patients with Parkinson's disease: a case control study. Acta Cardiol. 2021;76(9):979–986. doi: 10.1080/00015385.2020.1858251.

[25] Mahmoud E, Boshra Tadress ER, El-Khashab KA, et al. Accuracy of 2-dimensional speckle tracking echocardiography in diagnosis of coronary artery stenosis in stable angina pectoris. Acta Cardiol. 2024;79(10):1111–1118. doi: 10.1080/00015385.2024.2432590.

[26] Mahmoud E, Boshra Tadress ER, El-Khashab KA, et al. Usefulness of the addition of two-dimensional speckle tracking during dobutamine stress echocardiography for the detection of coronary artery disease. Acta Cardiol. 2024;79:1111–1118.

[27] Escutia-Cuevas HH, Alcantara Melendez M, Jiménez-Valverde AS, et al. Feasibility of distal transradial access for coronary angiography and percutaneous coronary

intervention: an observational and prospective study in a Latin-American Centre. Acta Cardiol. 2023;78(1):55–63. doi: 10.1080/00015385.2021.2015546.
[28] Aljabali A, Alawajneh MM, Hammad A, et al. The comparative efficacy and safety of Tiger II versus judkins catheters in coronary angiogram via the radial artery access: a meta-analysis. Acta Cardiol. 2025;9:1–5. doi: 10.1080/00015385.2024.2442799.
[29] Claeys MJ. Reperfusion injury in STEMI patients: another piece of the puzzle. Acta Cardiol. 2023;78(1):162–163. doi: 10.1080/00015385.2022.2027636.
[30] Adali MK, Buber I, Kilic O, et al. Ticagrelor improves systemic immune-inflammation index in acute coronary syndrome patients. Acta Cardiol. 2022;77(7):632–638. doi: 10.1080/00015385.2021.1973770.
[31] Tokdil H, Ohtaroglu Tokdil K, Durmaz E, et al. Impact of different glycoprotein IIb/IIIa inhibitor infusion routes on infarct size and microvascular obstruction in patients with high thrombotic risk ST elevation myocardial infarction. Acta Cardiol. 2025;16:1–10. doi: 10.1080/00015385.2025.2452097.
[32] Borracci RA, Amrein E, Alvarez Gallesio JM, et al. Remote ischaemic conditioning in patients with ST-elevation myocardial infarction treated with percutaneous coronary intervention: an updated meta-analysis of clinical outcomes. Acta Cardiol. 2021;76(6):623–631. doi: 10.1080/00015385.2020.1766259.
[33] Güler A, Gürbak İ, Panç C, et al. Frequency and predictors of no-reflow phenomenon in patients with COVID-19 presenting with ST-segment elevation myocardial infarction. Acta Cardiol. 2022;77(4):313–321. doi: 10.1080/00015385.2021.1931638.
[34] Toprak K, Kaplangoray M, Akyol S, et al. The non-HDL-C/HDL-C ratio is a strong and independent predictor of the no-reflow phenomenon in patients with ST-elevation myocardial infarction. Acta Cardiol. 2024;79(2):194–205. doi: 10.1080/00015385.2023.2299102.
[35] Jain A, Desai R, Shenwai P, et al. Impact of D-dimer levels on no-reflow phenomenon following percutaneous coronary intervention for ST-elevation myocardial infarction: a meta-analysis. Acta Cardiol. 2023;78(8):970–973. doi: 10.1080/00015385.2022.2097346.
[36] Kalyoncuoglu M, Gumusdag A, Oguz H, et al. Newly defined biomarker for the no reflow phenomenon in patients with non-ST elevation acute coronary syndrome; uric acid to creatinine ratio. Acta Cardiol. 2025;16:1–9. doi: 10.1080/00015385.2025.2452101.
[37] Kardos M, Polakova Mistinova J. Partial anomalous pulmonary venous drainage in patient after partial anomalous pulmonary vein surgery. Acta Cardiol. 2024;8:1–2. doi: 10.1080/00015385.2024.2324220.
[38] Ku L, Ma X. Giant Left Subclavian Artery Pseudoaneurysm complicating infective endocarditis. Acta Cardiol. 2024;25:1–2. doi: 10.1080/00015385.2024.2344325.
[39] Mukherjee A, Pandey NN, Kadiyani L, et al. Supracardiac totally anomalous pulmonary venous connection with an unusual drainage pathway. Acta Cardiol. 2024;22:1–2. doi: 10.1080/00015385.2024.2344327.
[40] Verma M, Kaushal M, Makhaik S. Patent ductus arteriosus complicated by pulmonary artery aneurysm and chronic thromboembolism: a rare case of "double trouble. Acta Cardiol. 2024;24:1–2. doi: 10.1080/00015385.2024.2347681.
[41] Pujitha V, Pandey NN, Ojha V, et al. Common arterial trunk with isolated left subclavian artery. Acta Cardiol. 2024;27:1–2. doi: 10.1080/00015385.2024.2371625.
[42] Singh D, Pandey NN, Gupta SK, et al. Extreme Arterial Tortuosity with Ascending Aortic Aneurysm in a child with suspected Cutis Laxa syndrome. Acta Cardiol. 2024;4:1–2. doi: 10.1080/00015385.2024.2375047.
[43] Cappannoli L, Pollio Benvenuto C, Oliva C, et al. Percutaneous retrieval of a subcutaneous contraceptive device migrated in pulmonary circulation. Acta Cardiol. 2024;3:1–2. doi: 10.1080/00015385.2024.2392315.
[44] Sobh DM, Batouty NM, Sakr SA, et al. Right coronary ostial atresia with Vieussens' arterial ring. Acta Cardiol. 2024;3:1–2. doi: 10.1080/00015385.2024.2410597.
[45] Kyriakoulis KG, Dimitriadis K, Pyrpyris N, et al. Coronary sinus reducer in an aneurysmatic coronary sinus: angina relief in challenging anatomies? Acta Cardiol. 2024;18:1–2. doi: 10.1080/00015385.2024.2443055.

Patrizio Lancellotti
Department of Cardiology, University of Liège Hospital, GIGA Institutes, Cardiovascular Sciences and Metabolism, Liège, Belgium
plancellotti@chuliege.be

Orianne de la Brassinne Bonardeaux
Department of Cardiology, University of Liège Hospital, GIGA Institutes, Cardiovascular Sciences and Metabolism, Liège, Belgium

Laurent Davin
Department of Cardiology, University of Liège Hospital, GIGA Institutes, Cardiovascular Sciences and Metabolism, Liège, Belgium