

CARDIOMAG NEWSLETTER

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Dear Doctor,

Greetings from Micro Labs Limited. We are happy to bring you “Cardio Mag” which contains latest and interesting news in the field of Cardiology

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- Relationship between bone fracture and myocardial infarction occurrence during long-term follow-up.
- Correlation between acute kidney injury and the systemic inflammatory response index in patients undergoing elective percutaneous coronary intervention.
- Case report on Arrhythmogenic right ventricular cardiomyopathy with sustained ventricular tachycardia

Association of triglyceride to high-density lipoprotein cholesterol ratio and long-term adverse clinical outcomes in patients deferred revascularization following fractional flow reserve

INTRODUCTION—The fractional flow reserve (FFR) is a well-established diagnostic indicator for myocardial ischemia associated with coronary artery stenosis. The amount of myocardial ischemia evaluated using a coronary pressure wire is an important predictor of outcomes for individuals with stable coronary artery disease (CAD).¹ Deferred revascularization is strongly recommended for coronary intermediate lesions with normal fractional flow reserve, according to guidelines. There has been extensive research on the impact of TG/HDL-C ratio on cardiovascular disorders. However, the relationship between TG/HDL-C and long-term unfavourable clinical outcomes in individuals who postponed revascularization after FFR remains uncertain. This study aimed to investigate the relationship between TG/HDL-C levels and long-term cardiovascular events in patients deferred revascularization following fractional flow reserve.²



Cardiovascular disease

METHODS—This was a retrospective study that included 374 CAD patients who underwent FFR and CAG for coronary intermediate lesions. FFR and CAG procedures were carried out by trained operators following strict guidelines. The composite of MACCEs, which includes nonfatal myocardial infarction, repeat revascularization, nonfatal stroke, and all-cause mortality, was the primary outcome measured. In terms of TG/HDL-C tertiles, all patients were divided into three subgroups ($T1 < 0.96$, $0.96 \leq T2 < 1.58$, $T3 \geq 1.58$). Model 1 took into account both age and sex; Model 2 took into account age, diabetes mellitus, BMI, smoking, and hypertension; and Model 3 took into account age, diabetes mellitus, BMI, smoking, hypertension, EF, CRP, LDL-C, uric acid, and FFR. An RCS analysis with four knots was plotted to investigate the link between the risk of MACCEs and TG/HDL-C, a continuous variable. The relationship between TG/HDL-C and the occurrence of MACCEs was found using three different Cox regression models.

RESULTS—The current study showed that there were 252 people (67.4%) who were male, and the average age was 58.63 ± 9.05 years. TG/HDL-C had a mean value of 1.49 ± 1.04 , with $T1 < 0.96$, $0.96 \leq T2 < 1.58$, and $T3 \geq 1.58$ as the tertiles. Of the 47 MACCE instances that were recorded throughout a median follow-up period of up to 79 months, 12.6% of the cases were identified. In the T1, T2, and T3 groups, there were 7, 16, and 24 MACCEs during the follow-up period, respectively. The cumulative risk of MACCEs significantly increased when the TG/HDL-C tertiles rose (log-rank $P = 0.0026$). In comparison to patients in the T1 group, individuals in the T2 and T3 groups experienced a higher risk of MACCEs (Model 3, T2 vs. T1: HR 1.71, 95% CI 0.65–4.49; T3 vs. T1: HR 2.55, 95% CI 1.05–6.21, P for trend = 0.001). An RCS curve was used to look at the potential nonlinear relationship in more detail. When the ratio of TG/HDL-C exceeds 1.28, there is a considerable increase in the risk of MACCE events, and the HR increases with the ratio. ROC and time-dependent ROC were used to determine the ratio TG/HDL-C's predictive ability. The results showed that when compared to BMI, LDL-C, TG, and HDL-C, TD/HDL-C had a higher AUC (Figure 1). At various times,

time-dependent ROC curves also showed a good predictive value. The baseline FFR value for patients with delayed revascularization also offers significant prognostic value for their long-term prognosis. TG/HDL-C and FFR together showed superior diagnostic effectiveness compared to each test alone.

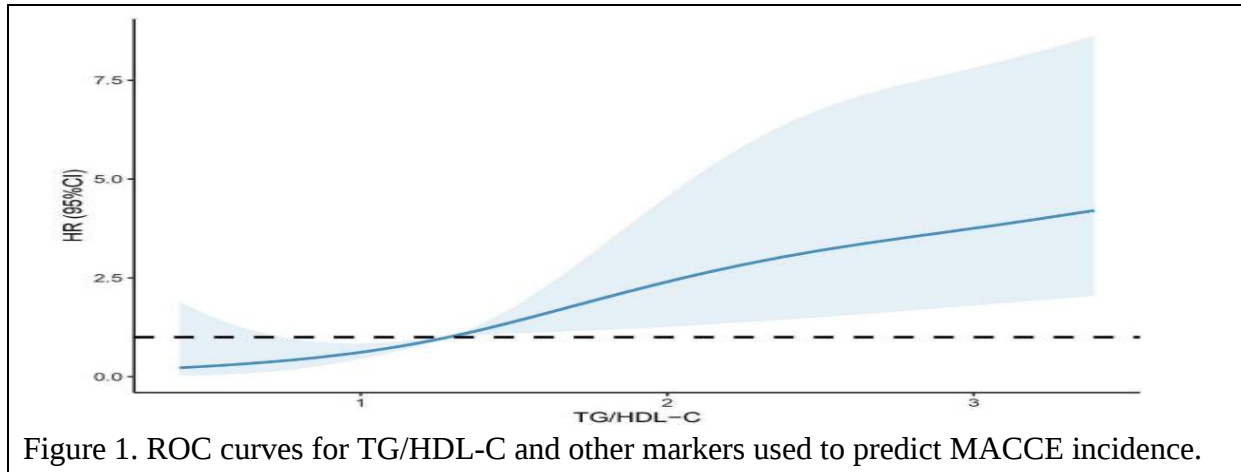


Figure 1. ROC curves for TG/HDL-C and other markers used to predict MACCE incidence.

DISCUSSION

The current study showed that patients with higher ratios of TG/HDL-C were more likely to experience cardiac events. TG/HDL-C could be used as a reliable predictor of MACCEs in individuals who have had their revascularization delayed after FFR.² Similar to this study, Sultani R et al. showed that an elevated TG/HDL-C ratio was highly correlated with an increased risk of MACE and was an independent predictor of long-term all-cause death.³

CONCLUSION

The current study concluded that TG/HDL-C was correlated with the probability of MACCEs in patients with CAD who delayed revascularization after FFR. In this cohort, TG/HDL-C may be a reliable indicator of long-term cardiovascular events.

The probability of MACCEs in CAD patients who postponed revascularization after FFR was correlated with TG/HDL-C. TG/HDL-C may be a reliable long-term predictor of cardiovascular events.

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Relationship between bone fracture and myocardial infarction occurrence during long-term follow-up

INTRODUCTION-Myocardial infarction is an acute coronary syndrome induced by a pathogenic event in the presence of myocardial ischemia, resulting in significant cardiac insult and injury.¹ Myocardial infarction has a global incidence of 1.5 to 2.3 per 1000 person-years, with a higher prevalence among young and middle-aged individuals. Like myocardial infarction, osteoporotic fractures are more common as people get older. Although bone fracture and myocardial infarction involve different organ systems, they are linked via the interaction of bones and blood vessels. Although fundamental study suggests a relationship between fractures and heart attacks involving bones and arteries, population studies have not offered conclusive proof. So, this study aimed to examine the relationship between bone fractures and myocardial infarctions in a natural population over time.²

METHODS-This was a prospective cohort study comprised of 13,196 adult participants who had previously suffered a bone fracture. The baseline study was conducted between 1997 and 2009, and the results were monitored until 2015. Records pertaining to myocardial infarction and bone fractures were kept started from 1997. The study examined the relationship between myocardial infarction incidents and bone fractures in individuals 18 years of age and older during the baseline study in surveys conducted from 1997 to 2009, and monitored the results until survey 2015. The main outcome of this study was myocardial infarction, and data were collected from the baseline year (which was not included) until 2015. In particular, out of the individuals, 433 had myocardial infarctions, and 104 of those happened before 1997. In addition to other variables, the associations between myocardial infarction and bone fracture were evaluated using univariate and multivariate Cox regression models.

RESULTS- A total of 329 incident cases of myocardial infarction were found between 1997 and 2015. Participants with a history of bone fractures were more likely to be male, have hypertension, diabetes, smoking, and drinking behaviours, as well as higher rates of myocardial infarction, age, and BMI. A history of bone fracture was linked to a higher incidence risk of myocardial infarction in the general population in both univariate and multivariate Cox regression analysis (HR=2.56, 95% CI 1.83–3.53, $P<0.001$ for the crude model, and HR=1.43, 95% CI 1.02–1.99, $P=0.036$ for the multivariate model). Three age groups of participants were identified: <40 , 40–60, and ≥ 60 years. The incidence of myocardial infarction was 0.5%, 4.1%, and 13.6% ($P<0.001$) in these groups, whereas the fracture rates were 3.3%, 7.6%, and 12.3% ($P<0.001$) (Figure 1). In the stratified analysis, bone fracture was significantly associated with an increased risk of incident myocardial infarction in subjects ≥ 50 years of age (HR=1.80, 95% CI 1.23–2.63, $P=0.003$), but not with an increased risk in subjects <50 years of age (HR=0.71, 95% CI 0.34–1.47, $P=0.356$). An increased risk of incident myocardial infarction was also linked to older age (HR=1.09, 95% CI 1.08–1.10, $P<0.001$) and greater BMI (HR=1.05, 95% CI 1.03–1.07, $P<0.001$) in the analysis of variables on incident myocardial infarction. A history

of hypertension was also linked to a higher chance of incident myocardial infarction (HR=1.59, 95% CI 1.22-2.09, $P<0.001$).

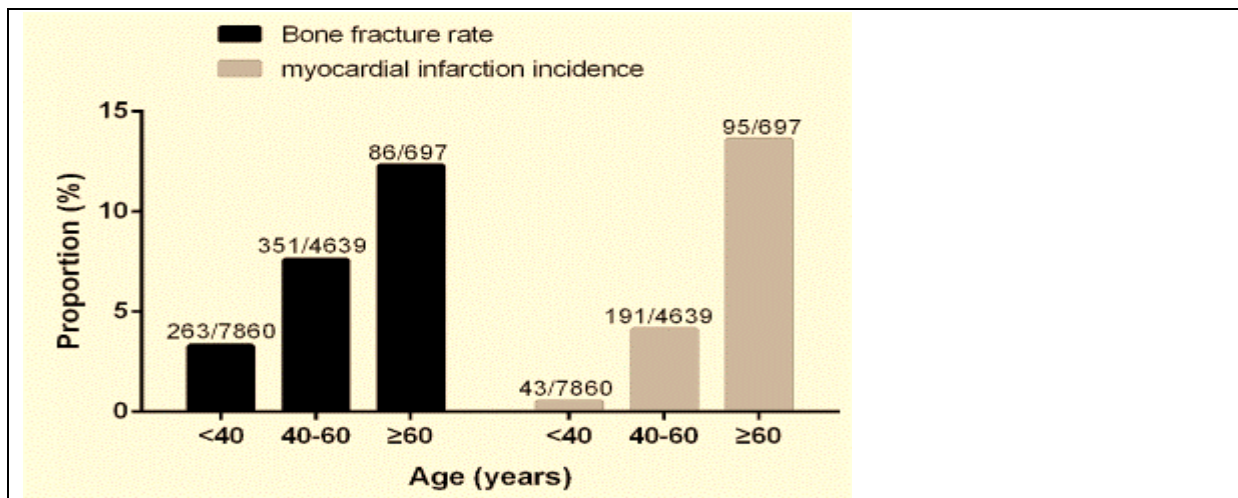


Figure 1. Baseline rates of bone fractures and myocardial infarction occurrences among age groups (total number of fractures or incident MI was displayed)

DISCUSSION-The current study showed a strong correlation between a history of bone fracture and a higher risk of myocardial infarction incidence.² Similar to this, Kwon YE et al. showed that in hemodialysis patients, but not in pre-dialysis individuals with chronic kidney disease (also in a high-risk population), vertebral fractures (but not femoral or fractures at other locations) were linked with myocardial infarction.³

CONCLUSION-The current study concluded that fractures and myocardial infarction risk were more likely to be significantly associated in high-risk populations, especially in the elderly or those with chronic kidney disease. There is evidence that aging and chronic renal disease are risk factors for osteoporosis.

During long-term follow-up, bone fractures may be linked to an elevated risk of acute myocardial infarction in the older population.

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Correlation between contrast-associated acute kidney injury and the systemic inflammatory response index in patients undergoing elective percutaneous coronary intervention

INTRODUCTION-The clinical outcomes are negatively impacted by contrast-associated acute kidney damage (CA-AKI), which was linked to higher mortality rates both in the short and long term, as well as major adverse cardiac events (MACE) in patients after percutaneous coronary intervention (PCI).¹ The Systemic Inflammatory Response Index (SIRI) is a new inflammatory marker that was intended to represent the systemic inflammatory response. It was produced from counts of peripheral blood cells, such as neutrophils, monocytes, and lymphocytes. According to recent studies, there was a strong correlation between SIRI levels and the onset and progression of cardiovascular illnesses. Studies on the connection between SIRI levels and the prevalence of CA-AKI in PCI patients are limited nevertheless. Thus, the goal of the current study was to find out how predictive SIRI was for the development of CA-AKI in patients having elective PCI.²

METHODS-This was a retrospective study that included a total of 5685 participants. Patients receiving elective PCI were consecutively enrolled; these included patients with stable angina, chronic stable coronary artery disease, and patients diagnosed with acute myocardial infarction after the therapeutic window or without prompt emergency PCI. Using an electronic medical record database, all demographic, clinical, laboratory, and angiographic data were gathered. Venous blood samples were taken either the morning after admission or the day of admission in order to acquire the experimental data. The concentration of SCr was measured both during the surgery and two days later. Expert interventional cardiologists carried out every PCI procedure utilizing non-ionic, low-osmolality contrast agents (Ultrafast or Iopamiiron, both 370 mg I/mL). Throughout the perioperative period, patients received an intravenous drip of saline solution at a continuous infusion rate of 1 mL/kg/h (0.5 mL/kg/h for patients with heart failure). An increase in SCr from baseline of 50% or 0.3 mg/dl within 48 hours of contrast exposure was considered CA-AKI.

RESULTS-The AUC values of SIRI to predict CA-AKI were 0.620 [95% confidence interval (CI):0.590–0.651, $p < 0.001$], as indicated by the receiver operating characteristic curve. Based on the ideal cut-off value, patients were split into two groups: low SIRI (SIRI < 1.39) and high SIRI (SIRI > 1.39). About 352 patients (6.1%) experienced CA-AKI. A nonlinear association between SIRI and CA-AKI risk was found in the logistical regression analysis using a restricted cubic spline curve (P for non-linearity < 0.001 , Figure 1). After controlling for sociodemographic factors, high SIRI values were substantially correlated with CA-AKI in Model 1 (high SIRI group VS low SIRI group: odds ratio (OR)=2.260, 95% CI: 1.813–2.819, $p < 0.001$). The link between SIRI and CA-AKI was shown to be significant in Model 2, even after the comorbidities and contrast dose were further corrected (high SIRI group VS low SIRI group: OR = 2.147, 95% CI: 1.719–2.681, $p < 0.001$). After accounting for the acute myocardial infarction in Model 3, comparable outcomes were also noted (high SIRI VS low SIRI: OR = 1.580, 95% CI: 1.253–1.993, $p < 0.001$). A substantial interaction between eGFR and the association between SIRI and CA-AKI was observed. Based on eGFR values,

subsequent analyses were stratified. The findings showed a significant positive connection between SIRI and CA-AKI, but only in those whose eGFR was more than 60 mL/min/1.73 m². A median follow-up of 2.8 years revealed 448 deaths, or 7.8% of the total. Increased SIRI levels were associated with increased cumulative mortality, as demonstrated by the Kaplan-Meier curve. Furthermore, multivariate Cox regression models adjusted for age >75 years, gender, diabetes, hypertension, anemia, history of myocardial infarction, eGFR, contrast volume >150 mL, and acute myocardial infarction revealed a strong correlation between higher values of SIRI and long-term mortality [Hazard ratio (HR)=1.400, 95%CI: 1.164-1.684; $p < 0.001$].

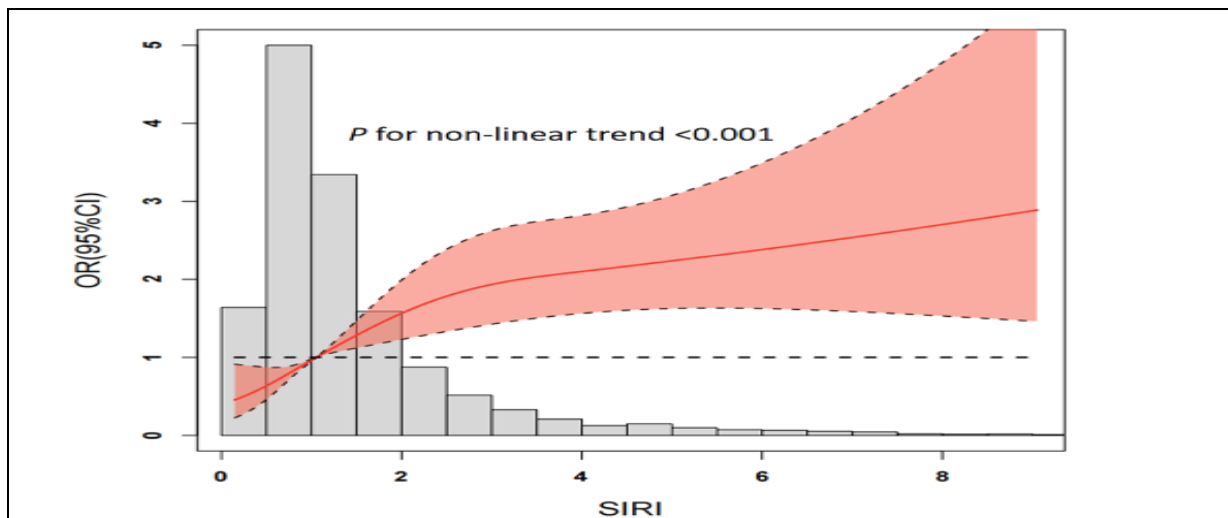


Figure 1. A restricted cubic spline curve using logistic regression to correlate Ca-aKi with SiRi score.

DISCUSSION—The current study showed that in patients receiving elective PCI, high levels of SIRI were independent predictors of long-term mortality and CA-AKI.¹ Similar to this study, Han et al. showed that in ACS patients having PCI, SIRI levels could be utilized as an independent predictor of the probability of MACE.³

CONCLUSION—The current study concluded that high preoperative SIRI levels in patients receiving elective PCI may be linked to long-term mortality and the emergence of CA-AKI. SIRI is an easy-to-use, affordable, and widely accessible inflammatory index that can be used to predict contrast-related renal problems in high-risk patient groups through risk stratification.

In patients receiving elective PCI, high levels of SIRI are independent indicators of long-term mortality and CA-AKI.

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Case report on Arrhythmogenic right ventricular cardiomyopathy with sustained ventricular tachycardia

INTRODUCTION-Arrhythmogenic right ventricular cardiomyopathy (ARVC) is a hereditary, progressive illness marked by the replacement of one or more ventricles with fibrofatty tissue. Traditionally, the left ventricle (LV) is frequently involved but the right ventricle is primarily affected. Recent data indicates that left-sided involvement may be more common than previously believed, with evidence of left-sided disease present in 87% of cases of AC-related mortality and isolated right ventricular (RV) involvement in 13% of cases.¹ The symptoms of ARVC can manifest in a variety of ways, but arrhythmia episodes, syncope, and even sudden cardiac death (SCD) are common. Notably, recurrent and prolonged ventricular tachycardia (VT) is typically the predominant clinical sign and the first symptom of this cardiomyopathy.²

CASE PRESENTATION-A 43-year-old male patient who had been in good health earlier that day complained of severe palpitations and chest pain that worsened after drinking, eventually leading to syncope. With a heart rate (HR) of 230 beats per minute (bpm), the electrocardiogram (ECG) identified VT. After the patient had pharmaceutical treatment and radiofrequency ablation (RFA), the patient's consciousness returned. A month later, the same symptoms reappeared despite the fact that the ECG did not indicate VT and the second RFA attempt failed to properly produce VT. Since the patient's first two episodes of arrhythmia were treated at other hospitals, the post-discharge drug regimen was not available. After the patient suffered chest tightness and palpitations following alcohol consumption one week ago, no more instances were reported for the next eight years. An ECG confirmed VT at a heart rate of 193 bpm. Restoring sinus rhythm required cardioversion due to persistent hemodynamic instability. A coronary myocardial bridge and slower blood flow were detected by subsequent coronary angiography in the right coronary artery, although no notable plaques or stenoses were found in the main branches of the coronary artery. The patient was referred to the hospital so that we could look into what was causing the repeated VT episodes. A physical examination found no anomalies, and laboratory results were within normal limits with the exception of slightly elevated levels of procalcitonin (PCT) and high-sensitive troponin T (TnT). An examination of the ECG obtained after admission revealed sinus bradycardia, biphasic P wave alterations in lead II indicating left atrial enlargement, T-wave inversions in several leads, and pathological Q waves in leads I&AVL. Interestingly, leads V1–V3 showed evidence of epsilon waves. RV dilatation was observed on two-dimensional echocardiography along with ventricular wall thickness and reduced motion. Furthermore, the left ventricular (LV) apex showed evidence of a flake isoechoic lesion, and as a result, the LV apex's movement diminished. To determine whether there was a thrombus in the left ventricle (LV), contrast echocardiography was used; however, left ventricular opacification (LVO) revealed no filling deficiency. On the other hand,

a significant decrease in apical epicardial perfusion was detected by myocardial contrast echocardiography (MCE). Cardiovascular magnetic resonance imaging (CMR) clarified the subendocardial diffuse stripy late gadolinium enhancement (LGE) in the left ventricular apex-middle free wall and the linear intensification on the delayed enhanced scan of the RV (Figure 1). Finally, frequent transmural fibrosis in the right ventricular free wall and subepicardial myocardial fibrosis in the left ventricular apex free wall were used to confirm the diagnosis of ARVC. The patient refused to have an intracardiac defibrillator (ICD) implanted, so he had another RFA. During the procedure, VT, which originated from the base of the RV and the tricuspid annulus free wall, was successfully induced. After receiving therapy, the patient was discharged with instructions to take verapamil as needed and make preparations for further monitoring.

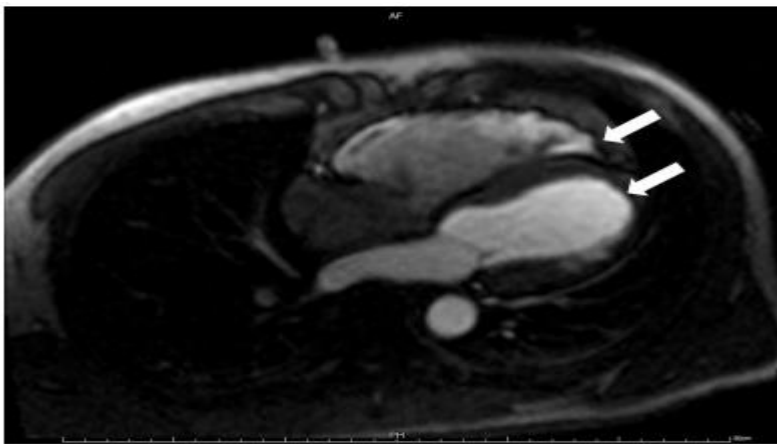


Figure 1. In the left ventricular apex-middle free wall, delayed enhancement in CMR shows subendocardial diffuse patchy linear enhanced lesions.

DISCUSSION- This case report showed that the ECG revealed sinus bradycardia, along with repeated T-wave inversions, biphasic P wave alterations in lead II indicative of left atrial enlargement, and pathological Q waves in leads I and AVL. Epsilon waves were intriguingly found in leads V1–V3.² Similar to this, Latt H et al. showed that the patient's EKG revealed potentially epsilon waves in the right precordial leads as well as symmetrically inverted T waves.³

CONCLUSION- ARVC was an uncommon primary cardiomyopathy, can be difficult to diagnose, which can cause treatment to be delayed, especially in younger patients. Therefore, in order to prevent delays in the necessary treatments and management, it is crucial to perform extensive examinations to ensure that this uncommon ailment was not neglected. Here, reduced subepicardial filling during MCE suggests that it may be useful in indicating cardiac abnormalities linked to ARVC.

Early detection of ARVC is essential for managing and intervening in a timely manner. MCE might provide a useful and efficient method for identifying myocardial involvement in ARVC patients.

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