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Anterior early repolarization pattern and T-wave inversion in a healthy African-Japanese athlete

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1 | CASE REPORT

A 20-year old asymptomatic professional male athlete with no past medical history was referred to our institute for early repolarization pattern and T-wave inversion in precordial leads (Figure 1). He is an African-Japanese and family history was noncontributory. These abnormal electrocardiogram (ECG) findings were pointed out during the periodical medical checkup by a team doctor who suspected a cardiomyopathy (eg, arrhythmogenic right ventricular cardiomyopathy (ARVC) and hypertrophic cardiomyopathy(HCM)).

How do you manage this young athlete and interpret these abnormal ECG findings?

2 | DISCUSSION

In the present case, 12-lead electrocardiogram (ECG) showed the early repolarization pattern in V2-3 leads and biphasic T-wave inversion in V1-3 leads and QRS voltage fulfilled the Sokolow-Lyon index (RV5 + SV1 = 4.00 mV), suggesting the presence of left ventricular (LV) hypertrophy. In general, T-wave inversion in the precordial leads is thought to be an abnormal ECG finding, suggesting the presence of myocardial ischemia, hypertrophic cardiomyopathy (HCM), and arrhythmogenic right ventricular cardiomyopathy (ARVC).[1] Echocardiography was performed to rule out those diseases and it demonstrated only borderline left ventricular hypertrophy (Intraventricular septum = 12 mm, Posterior wall thickness = 12 mm, Figure 2), which was consistent with the findings of an athlete's heart.

News concerning sudden cardiac death during sport competitions has been occasionally reported and its influence for society can be meaningful. In order to prevent sudden cardiac deaths during competition sport, pre-competition as well as periodical medical checkup and interviews regarding family history have been performed not only for the professional athletes but also amateur players, school children, and university students. [2,3]

Various ECG and echocardiographic features of the "athlete's heart," including the electrocardiographic and echocardiographic LV hypertrophy findings have been well-documented. These changes are considered to a physiological change of the heart adapting to the hard athletic load and are therefore considered to be normal variant. Based on the Seattle criteria published in 2012[4], some ECG changes such as sinus bradycardia, second-degree Wenckebach atrioventricular block, early repolarization etc are frequently observed in young athletes and no additional testing are required to allow the athlete to participate in training or competition.

According to the previous report,[5] the early repolarization pattern with T-wave inversion preceded by ST-segment elevation in the anterior leads was observed in approximately 12% of male athletes of African/Afro-Caribbean origin. Although the mechanism of these ECG findings in healthy athletes is still debated, it is thought that these ECG changes are a benign variant and additional testing including blood examination, myocardial biopsy, and gene examination were unnecessary.

Moreover, geographical change of athlete heart depending on the ethnicity was recently reported.[6] Interestingly, while athletes from West Africa demonstrated the ST-segment elevation as well as the anterior T-wave inversion, black athletes from East Africa showed negligible repolarization abnormality.

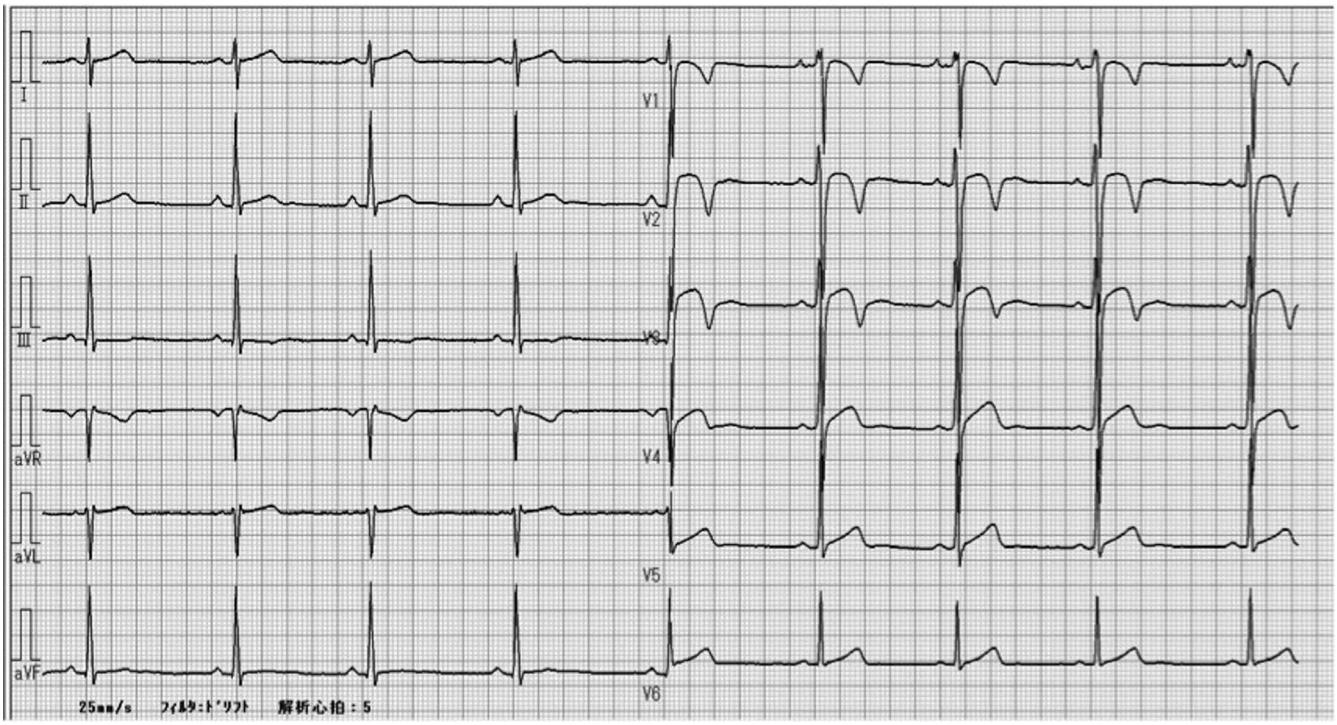

FIGURE 1 12-lead electrocardiogram demonstrating the early repolarization pattern and T-wave inversion in precordial leads. ST segment elevation (2 mm) in V2-3 and T-wave inversion in V1-3 leads were observed when referred to our hospital. QRS voltage was satisfied with the Sokolow-Lyon index (RV5 + SV1 = 4.00 mV), suggesting the presence of left ventricular hypertrophy

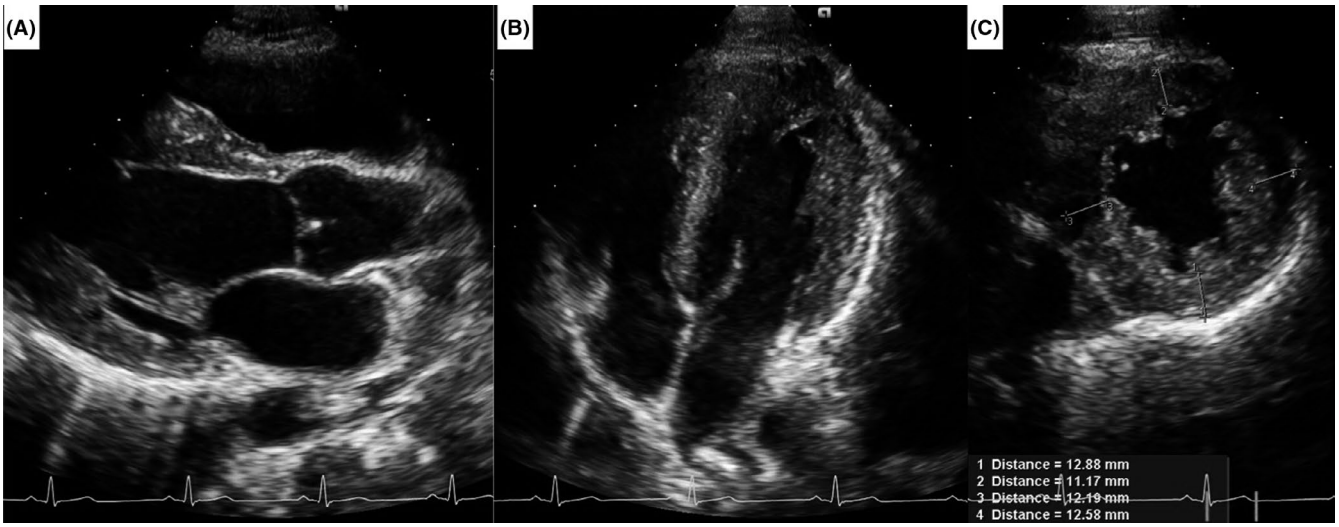

FIGURE 2 Ultrasound echocardiogram demonstrated the presence of slight left ventricular hypertrophy, and preserved left ventricular ejection fraction. (Intraventricular septum = 12 mm, Posterior wall thickness = 12 mm Left ventricular ejection fraction = 68% (Simpson methods)) No significant valvular disease was observed. (A) Parasternal long-axis view; (B) Apical 4-chamber view; (C) Parasternal short-axis view

For physicians, it is essential to differentiate the pathological T-wave inversion from a benign athlete's heart-dependent anterior T-wave inversion. Calore et al stated that the combination of J-point elevation ≥1 mm and T-wave inversion not extending beyond V4 can exclude the presence of either ARVC or HCM with 100% sensitivity.[1] In the present case, both cardiomyopathies can be excluded with J-point elevation ≥2 mm and T-wave inversion not beyond V4 lead.

3 | CONCLUSION

In the Asian country population, precordial lead T-wave inversion is considered to be an abnormal ECG finding and treatment is often necessary. However, precordial lead T-wave inversion subsequent to early repolarization is thought to be a normal variant in African athletes and that additional testing is unnecessary. With the international sporting events just around the corner including the Olympic game in 2020

and the increasing number of foreign people living in and traveling to Asian countries, it is becoming crucial for physicians to understand the abnormal ECG change in African athletes. This typical type of electrocardiogram for African athlete might be rare and worthy materials for physicians in Asian countries.

CONFLICT OF INTEREST

The authors declare no conflict of interests for this article.

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