Dome-shaped ST elevation in congenital left ventricular apical diverticulum

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ABSTRACT
Congenital diverticulum of the ventricle is a rare cardiac malformation that causes cardiac abnormalities. The course of this disorder is variable, and the condition is potentially fatal in some cases. The most effective diagnostic methods for left ventricular apical diverticulum are various imaging techniques. We present a patient with congenital left ventricular apical diverticulum who presented with dome-shaped ST-segment elevation in lateral leads. In our case the dome-shaped ST-segment elevation in lateral leads contribute to the early diagnosis of left ventricular apical congenital diverticulum.

KEY WORDS: Left ventricular apical congenital diverticulum, Electrocardiogram,

INTRODUCTION
Congenital diverticulum of the ventricle is a rare cardiac malformation to cause cardiac abnormalities. The course of this disorder is variable, and the condition is potentially fatal in some cases. Current diagnostic methods for left ventricular apical diverticulum are various imaging techniques. In HCM patients, the ST-segment elevation in lateral leads is linked to apical aneurysm.1,2

CASE REPORT
A 65-year-old male was admitted with more than 10 years of worsening paroxysmal chest tightness and chest pain associated with activity or emotional tension. The repeated episodes occurred every 3 years. The patient had a 12-year history of hypertension.
At admission, the electrocardiogram revealed convex ST-segment elevation in the V2–V6 leads, followed by T wave inversion (dome-shaped) in the V3–V6 leads. Negative T waves were observed in leads I, II, III, aVF. In lead aVR, positive T waves were observed. Abnormal Q waves were not observed in precordial leads (Figure 1a). Transthoracic echocardiogram revealed a thin and bulging left ventricular apex wall, which is strongly suggestive of apical aneurysm. Transthoracic echocardiogram revealed normal left ventricular wall thickness. The patient was referred to the cardiac catheterization laboratory, where he underwent coronary angiography. The coronary angiogram was also negative, but the left ventriculogram revealed a diverticulum in the apex (Figure 1b). Cardiac troponin

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levels were slightly elevated (0.43 ng/mL), and the level of N-terminal-pro-brain natriuretic peptide (NT-proBNP) was 91.1 pg/mL. Therefore, the patient was diagnosed with left ventricular apical diverticulum.

**DISCUSSION**

Congenital diverticulum of the ventricle is a rare cardiac malformation that may present as an isolated disorder or be associated with other cardiac abnormalities, such as Cantrell syndrome. In 30% of cases, left ventricular diverticulum is not associated with congenital malformations and is referred to as isolated left ventricular diverticulum. Clinically, the disorder can lead to chest pain, arrhythmias, cardiac rupture, and sudden death, though frequently the course is asymptomatic. The ST-segment elevation in lateral leads may be a useful marker for apical aneurysm in HCM patients.\(^1\)\(^2\) Similarly, in this case, the dome-shaped ST elevation can contribute to the early diagnosis of left ventricular apical congenital diverticulum. Persistent dome-shaped ST elevation suggests the presence of persistent microvascular damage, but its fundamental mechanism remains to be clarified. Negative T waves were more broadly distributed around lead –aVR in the limb leads and the precordial leads, except lead V₁. These findings suggest that wall motion abnormalities in left ventricular apical diverticulum are centered around the apical region of the left ventricle faced by lead –aVR and less frequently extend to the regions faced by lead V₁, i.e., the right ventricular anterior region and the right paraseptal region.

In conclusion, 12-lead electrocardiography has traditionally been a vital part of the non-invasive evaluation of chest pain. Clinicians, and specifically echocardiographers, must pay special attention to the ECG to correctly detect the frequently overlooked congenital diverticulum of the ventricle, and carefully consider the presence of ST elevation in V₃₄₅ derivations. This approach may be particularly useful when the left ventricular apical characteristics are not clearly defined due to technical challenges that occur during basic transthoracic echocardiography.

**REFERENCES**
