CASE REPORT

Lambda-like J wave due to acute myocardial infarction of the diagonal branch

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Abstract : The culprit lesion of acute myocardial infarction could be predicted by electrocardiogram findings. However, we experienced some cases with coronary angiographic finding in the area of ST-T elevation that was different from that predicted. The lambda-like J wave could be caused by ischemia although the mechanism has not been fully elucidated. We report a case of acute myocardial infarction that showed discrepancy between ST-T elevation with lambda-like ischemic J wave in a broad area and coronary angiographical finding of diagonal branch occlusion. J. Med. Invest. 66 : 185-187, February, 2019

Keywords **:** *J wave, diagonal branch, acute coronary syndrome*

INTRODUCTION

The culprit lesion of acute myocardial infarction (AMI) could be predicted by electrocardiogram findings. However, we experienced some cases with coronary angiographic finding in the area of ST-T elevation that was different from that predicted. The J wave is a dome or hump morphology of the J point, the junction of the QRS complex and the ST segment on the electrocardiogram (ECG) (1), and is defined as an end-QRS notch on the downslope of a prominent R-wave entirely above the baseline ; J pointis ≥0.1 mV in 2 or more contiguous leads in 12-lead ECG, excluding leads V1 to V3, with QRS duration < 120 ms, according to a consensus report (2). The J wave may be accompanied by ST-T segment elevation called the lambda-like J wave. The J wave is associated with life-threatening cardiac arrhythmia and is caused by hypothermia, hypercalcemia, Takotsubo cardiomyopathy, and ischemia (3).

We report a case of acute myocardial infarction that showed discrepancy between ST-T elevation with lambda-like ischemic J wave in a broad area and coronary angiographical finding of diagonal branch occlusion.

CASE REPORT

An 80-year-old woman felt sudden-onset chest pain at rest during preoperative electrocardiogram (ECG) examination in our hospital for central retinal vein occlusion operation. She had a history of hypertension, but not hyperlipidaemia, and had chronic atrial fibrillation for 25 years and had been taking anticoagulation medication. She was mildly obese (body mass index, 26 kg/m^2). A 12-lead ECG 6 months before the onset of AMI showed ST depression in V4-6 without J wave (Figure 1A), but the ECG at onset showed ST elevation in leads I, aVL, and V2-6 with J wave and ST depression in leads III and aVF (Figure 1B).

Five minutes later, the shape of the precordial wave changed from a coved pattern to a saddleback ST-elevation pattern (Figure 1 C). The ECG findings suggested broad anterior AMI due to the occlusion of the proximal left anterior descending coronary artery (LAD), but echocardiography showed no wall motion abnormality. Emergency coronary angiography showed no stenosis or occlusion in the LAD, but it showed occlusion of the tip of diagonal branch, contrary to our expectation (Figure 2A). Negative T waves in leads I, aVL, and V2-5 were observed the next day after the angioplasty (Figure 1D). Coronary angiography 2 weeks after the treatment of anti-coagulation therapy showed reperfusion of the diagonal branch (Figure 2 B), indicating that the tip of the diagonal branch may be occluded with thrombus due to atrial fibrillation. The result of the delayed enhanced magnetic resonance imaging showed small infarction of the anterolateral left ventricle wall (Figure 2C). She discharged our hospital without complication 3 weeks after the onset of AMI.

DISCUSSION

Ischemic J wave could be caused by any culprit lesion of the coronary artery including the right and left coronary arteries (4) (5). The J waves were more often located in the inferior leads and more frequently in an inferior myocardial infarction (6). In patients with acute ST-elevation myocardial infarction who underwent successful percutaneous coronary intervention, J waves were reportedly present in 60.5% (≥0.1 mV) or 48.9% (≥0.2 mV) of 152 patients 1 week after AMI and were associated with ventricular arrhythmia (6), but critical ventricular arrhythmia was not detected in this patients.

The precise mechanisms by which AMI causes ST-segment

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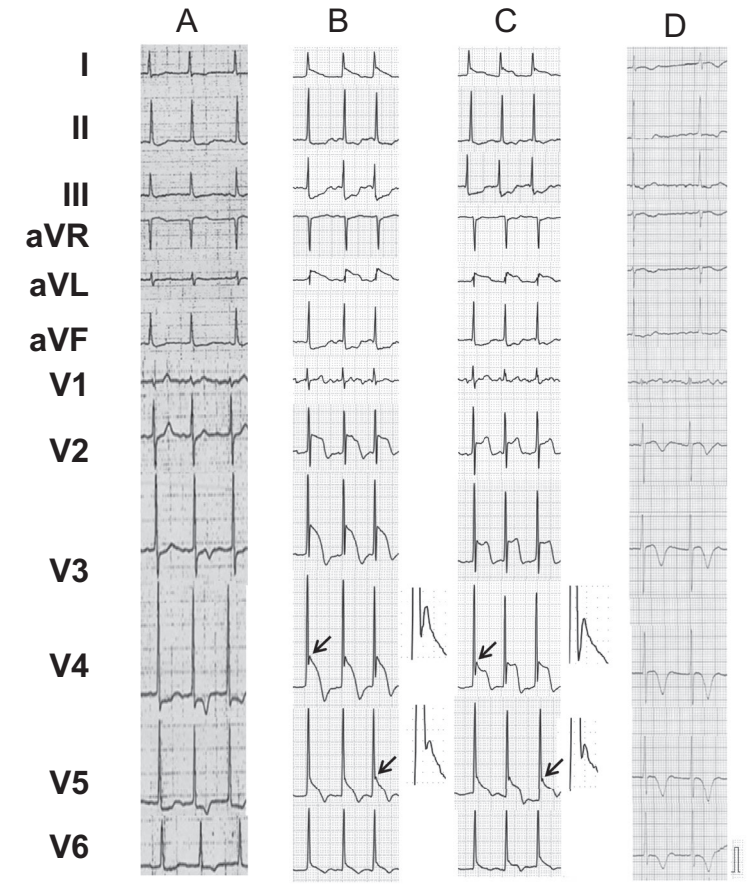

Figure 1. Twelve-lead electrocardiograms
A : Six months before the onset of acute myocardial infarction (AMI) (control)
B : Initial onset of AMI (arrow ; J wave magnified in the right)
C : Five minutes after the onset of AMI (arrow ; J wave magnified in the right)
D : Next day after the onset of AMI

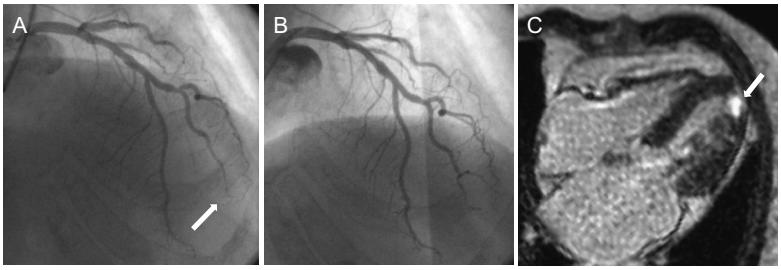

Figure 2. Coronary angiography and magnetic resonance imaging
A : Left coronary artery in emergency coronary angiography
B : Left coronary artery (arrow ; reperfused diagonal branch)
C : Four-chamber view of the delayed enhanced magnetic resonance imaging.

elevation with a prominent lambda-like J wave is unknown, but the presumed mechanism might be attributed to the abundance of transient outward current expressions in the ischemia-affected myocardium or the susceptibility of the ion channels to localized ischemia due to the abruptness of occlusion without preconditioning (4). Further experimental studies are needed to clarify the mechanism of ischemic lambda-like J wave.

In this case, an infarction site was localized in the left ventricular apical anterolateral wall ; however, ECG showed an ST-T elevation broader than that expected from the ischemia-affected area. The ECG could be recorded immediately after the onset of AMI because she was undergoing preoperative ECG screening. Early recording of ECG might be involved in the detection of ischemic J wave in this rare case. There has been no report that showed the association between infarction size and area of ST-T elevation with lambda-like J wave ; thus, further clinical studies are needed to predict the culprit lesion of coronary artery from ECG findings with ischemic lambda-like J wave.

ST-T elevation with lambda-like J wave in broad area could be evoked by the occlusion of the diagonal branch ; thus, precise

observation of coronary angiography is needed to avoid misdiagnosis.

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CONFLICT OF INTEREST

The authors have no conflicts of interest to disclose.

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