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IMAGING VIGNETTE

BEGINNER

ECG CHALLENGE

# de Winter Electrocardiographic Pattern Caused by Diagonal Branch Lesion

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## ABSTRACT

A woman in her 50s developed acute coronary syndrome with de Winter pattern electrocardiogram (ECG). A coronary angiography revealed diagonal branch lesion caused by spontaneous coronary artery dissection, whereas the left-anterior descending artery was intact. The ECG change was transient and returned to normal without treatment 2 h later. (**Level of Difficulty: Beginner.**) (J Am Coll Cardiol Case Rep 2020;2:1451–3) © 2020 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

A woman in her 50s presented to the emergency room because of chest pain lasting for 90 min. Twenty years before this presentation, she had myocardial infarction (MI) with atrioventricular (AV) branch lesion of the right coronary artery (RCA), which was treated medically, and renal artery stenosis, which was treated with angioplasty.

Initial blood pressure was 138/80 mm Hg, heart rate was 70 beats/min, and respiratory rate was 30/min. Electrocardiogram (ECG) revealed marked down sloping ST-segment depression in $V_2$ to $V_4$ and mild ST-segment elevation in lead I and aVL (**Figure 1A**). Her next ECG, taken 39 min later during coronary angiography (CAG), revealed typical de Winter pattern with ST-segment depression in $V_2$ to $V_5$ and peaked T-wave in $V_3$ to $V_5$ (**Figure 1B**). Emergency CAG revealed high-grade abrupt tapering at the diagonal branch, which distributed parallel to the normal left anterior descending (LAD) artery (**Figures 1D and 1E**, Videos 1 and 2). There was no significant stenosis at the RCA (**Figure 1F**, Video 3). Because there was a Thrombolysis In Myocardial Infarction (TIMI) flow grade 3, and the morphology of the stenosis was consistent with type 2 spontaneous coronary artery dissection (SCAD), coronary intervention was deferred (1). Moreover, the history of renal artery stenosis (fibromuscular dysplasia) and complete resolution of AV branch lesion were also consistent with SCAD. The ECG change resolved in 2 h (**Figure 1C**), and her clinical course was stable. Repeat CAG 9 months later showed normalized diagonal lesion (Video 4).

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The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the *JACC: Case Reports* author instructions page.

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**ABBREVIATIONS AND ACRONYMS**

**AV** = atrioventricular
**CAG** = coronary angiography
**ECG** = electrocardiogram
**LAD** = left anterior descending
**LAO** = left anterior oblique
**MI** = myocardial infarction
**RAO** = right anterior oblique
**RCA** = right coronary artery
**SCAD** = spontaneous coronary artery dissection
**TIMI** = Thrombolysis In Myocardial Infarction

The de Winter ECG pattern is usually caused by occlusion of the proximal LAD artery (2). de Winter ECG patterns caused by non-LAD artery lesion have been seldom reported. Montero Cabezas reported a case in which occlusion of the diagonal branch was the cause (3). The diagonal branch was large and distributed parallel to the LAD artery, as in the current case. Another important point learned from this case is that de Winter ECG pattern may reflect 1 frame of a dynamic ECG change, as shown in Figures 1A to 1C.

Recognition of de Winter ECG pattern is important, as it must be regarded as an ST-segment elevation MI (STEMI) equivalent requiring urgent CAG.

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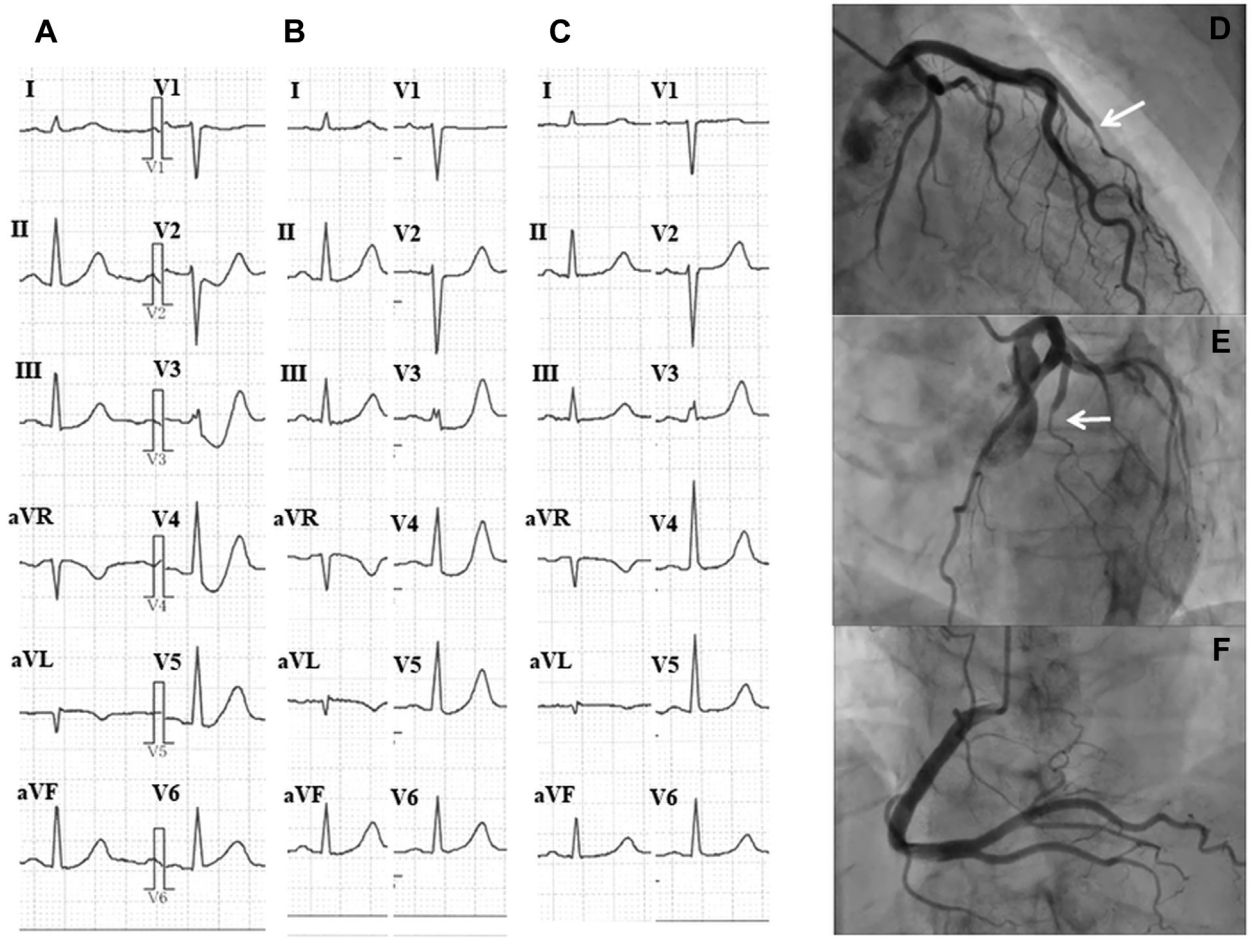
**FIGURE 1 Electrocardiogram**




**(A)** Initial electrocardiogram (ECG) showing down-sloping ST-segment depression without T peaking. **(B)** ECG taken at the time of coronary angiography (CAG), showing the classic de Winter pattern. **(C)** ECG taken 2 h post-CAG with resolution of ST-segment changes. **(D)** Left anterior oblique and **(E)** right anterior oblique: the middle of diagonal branch shows high grade tapering **(white arrow)**, whereas left-anterior descending artery is normal. **(E)** Right coronary artery is normal.

## REFERENCES

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**KEY WORDS** acute myocardial infarction, de Winter pattern, spontaneous coronary artery dissection

**APPENDIX** For supplemental videos, please see the online version of this paper.