

IMAGES IN INTERVENTION

Is the Intracoronary Electrocardiogram Lesion Specific?



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The intracoronary electrocardiogram (IC-ECG) is a practical, inexpensive, and underused method that can provide valuable insight into the elucidation of myocardial ischemia pathophysiology (1). The IC-ECG was proposed as a diagnostic tool for assessing myocardial recovery (2), viability (3), recruitable collaterals, and the significance of coronary stenoses (4).

In an inspiring paper by Balian et al. (4), the IC-ECG was shown to be closely correlated with fractional flow reserve (FFR). This finding has 2 thought-provoking implications: 1) IC-ECG may replace the pressure wire as a cheaper alternative; and more importantly, 2) it may serve as a more physiological indicator of ischemia than FFR, which in turn, provides indirect information deduced from the pressure drop across a lesion.

On the other hand, IC-ECG may also have some drawbacks. The extent and proximity of ischemic myocardium represented by changes in the IC-ECG is not precisely known. Theoretically, it is possible that the IC-ECG may be influenced by an ischemic region that is supplied by a critically narrowed artery adjacent to the artery being investigated. This is especially important for left coronary system, where neighboring lesions may cause ischemic IC-ECG changes in a noncritical lesion during nonselective adenosine hyperemia.

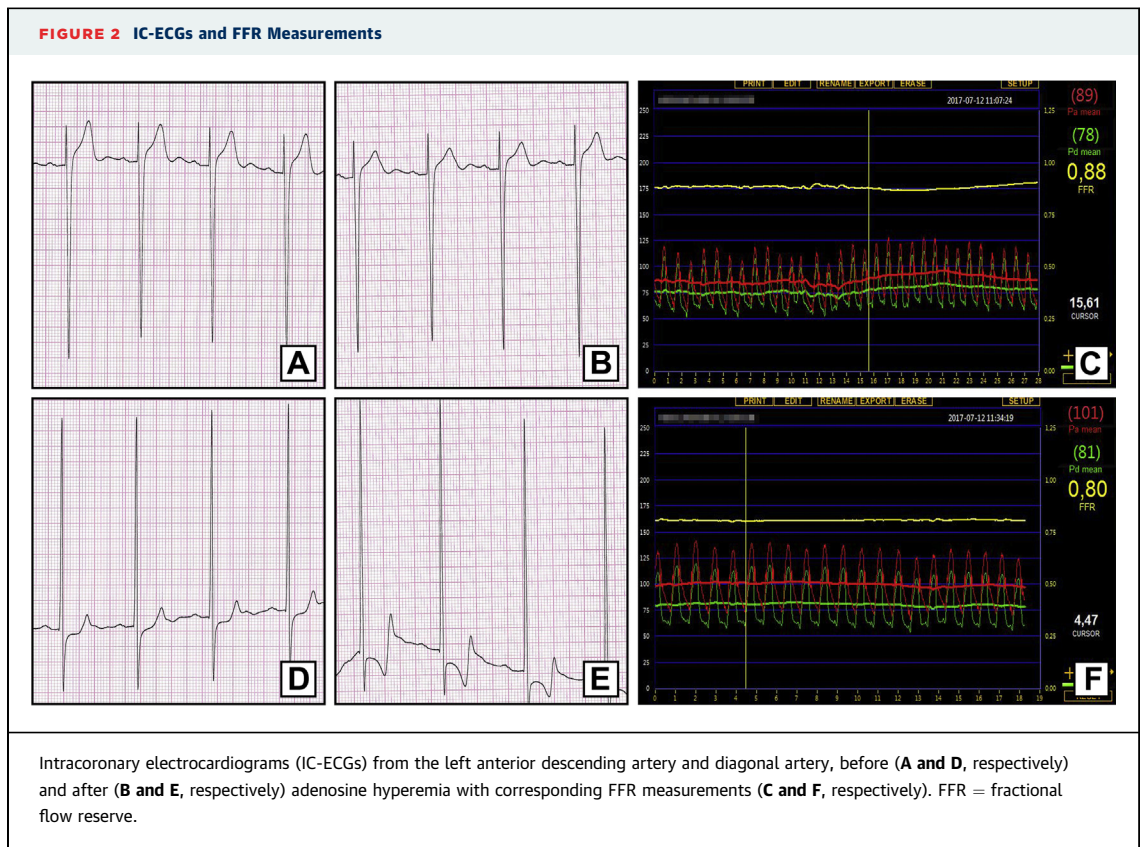
We report a case in which close proximity of 2 lesions in 2 adjacent vessels enabled us to study the effects of nonselective left coronary adenosine hyperemia on the IC-ECG. In a 60-year-old man with typical angina, coronary angiogram revealed 2

seemingly critical adjacent lesions in the left anterior descending and diagonal arteries (Figure 1). To evaluate the hemodynamic significance of the lesions, a pressure wire was first advanced to the distal left anterior descending coronary artery. An IC-ECG was recorded by an alligator clip attached to the pressure wire and V₁ lead. Wilson's central terminal was constructed by attaching 3 limb electrodes to the electrocardiogram machine. After 300 µg of intracoronary adenosine induced hyperemia, the FFR

FIGURE 1 Coronary Angiogram



Two lesions in the left anterior descending and diagonal arteries supplying nearby myocardial territories.



was 0.88 (**Figure 2C**), and the IC-ECG showed no changes (**Figure 2A** vs. **Figure 2B**). Then, pressure wire was advanced to distal diagonal artery. Adenosine hyperemia revealed an FFR of 0.80 (**Figure 2F**) that was accompanied by IC-ECG changes (**Figure 2D** vs. **Figure 2E**). Adenosine hyperemia was repeated twice for both arteries, which reproduced the same FFR and IC-ECG findings. The diagonal lesion was stented without any complication. The patient was asymptomatic at 1-month follow-up.

To our knowledge, this is the first time that an investigation on lesion specificity of the IC-ECG

has been undertaken. This case reveals that the IC-ECG seems not to be influenced by closely adjacent ischemic territories. This information is clinically relevant, because a better understanding of IC-ECG behavior may pave the way for its widespread use.

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