Prevalence, Incidence, and Implications of Silent Myocardial Infarctions in Patients With Diabetes Mellitus

Benjamin M. Scirica, MD, MPH

Together with a thorough history and physical examination, a simple 12-lead ECG is perhaps the most inexpensive and accessible cardiovascular assessment available. For the evaluation of coronary heart disease, the ECG is indispensable as a diagnostic, prognostic, and therapy-guiding tool in the evaluation of acute ischemic symptoms. For example, in a patient with ongoing angina, the presence of ST-segment elevation identifies a potential acute myocardial infarction (MI), categorizes a patient at high risk of death, and prompts a strategy of immediate reperfusion.

Pathological Q waves are the most well-accepted marker of myocardial damage on a surface ECG and, when discovered incidentally, are often called silent, or unrecognized, MI. Since the Framingham Study reported >40 years ago that the prevalence of ischemic heart disease is low, the data supporting universal ECG screening in the general population, in which the overall prevalence depends largely on the age and comorbidities of the population studied, is extended to an impressive 30 years. Core laboratory review identified pathological Q waves in a surprisingly high proportion of subjects at baseline (17.5%) and at 12 years (30.1%). The high prevalence of silent MI raises the concern that the ECG criteria used in this study were not specific enough to exclude non–infarct-related ECG abnormalities.

Patients with diabetes mellitus constitute another important population at high risk for cardiovascular disease in whom, logic would follow, screening ECGs could be useful. Overall, the prevalence of unrecognized or silent MI appears to be higher in patients with diabetes mellitus compared with nondiabetics, ranging from 2% to 7%; however, the prevalence depends largely on the age and comorbidities of the population studied.

The question remains about what to do in higher-risk populations. In patients with documented ischemic heart disease, the 2012 American Heart Association/American College of Cardiology “Guideline for the Diagnosis and Management of Patients With Stable Ischemic Heart Disease” states that "a resting 12-lead ECG at 1-year or longer intervals between studies in patients with stable symptoms might be reasonable." The guideline acknowledges the lack of data to support this expert consensus (Level of Evidence: C) and gives it only a Class IIb recommendation.

The opinions expressed in this editorial are not necessarily those of the editors or of the American Heart Association.

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Table 1. Prevalence of Silent Myocardial Infarction in Diabetes Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>History of Coronary Artery Disease, %</th>
<th>Total Patients, n</th>
<th>Silent MIs Detected at Baseline, n</th>
<th>Prevalence of Silent MIs, %</th>
<th>Silent MIs Associated With Outcomes?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fremantle Diabetes Study</td>
<td>25</td>
<td>1269</td>
<td>50</td>
<td>3.9</td>
<td>No</td>
</tr>
<tr>
<td>Rancho Bernardo</td>
<td>…</td>
<td>316</td>
<td>13</td>
<td>4.1</td>
<td>Yes</td>
</tr>
<tr>
<td>RECORD</td>
<td>3.9</td>
<td>669</td>
<td>13</td>
<td>1.9</td>
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</tr>
<tr>
<td>UKPDS</td>
<td>0</td>
<td>4827</td>
<td>845</td>
<td>17.5</td>
<td>Yes</td>
</tr>
</tbody>
</table>

MI indicates myocardial infarction; RECORD, Rosiglitazone Evaluated for Cardiac Outcomes and Regulation of Glycemia in Diabetes; and UKPDS, UK Prospective Diabetes Study.
Why does screening with an ECG not work in patients with diabetes mellitus? First, the ECG is an imperfect test for the detection of MI. Consistent with other studies, a high proportion of baseline Q waves identified in the UKPDS disappeared after 3 years. Given the low prevalence of vascular disease in UKPDS, most of the transient Q waves were likely false positives and not, in fact, true infarcts. Q waves also lack sensitivity because, in many cases, they recede months or years after a true infarct. In addition, a significant number of infarcts never evolve into Q waves because of either infarct location or the degree of myocardial damage.

What then are the implications for the utility of the ECG to detect silent MI? In clinical research, screening and serial ECGs may be useful in identifying potential unrecognized MI because they will increase the overall event rate by 10% to 25% and because they may be modifiable end points in a randomized trial. However, any newly identified Q wave requires further confirmation with a follow-up ECG and a formal adjudication that reviews the entire clinical history. Many silent MIs are actually unrecognized and become apparent only when the clinical history is carefully reviewed.

For clinical care, the evidence and guidelines do not support the routine use of screening ECGs to detect new Q waves in patients with diabetes mellitus. Regardless of the presence of prior MI, cardiovascular risk factors in patients with diabetes mellitus should be aggressively controlled, and in high-risk patients, antiplatelet therapy is indicated. These are the therapies that improve outcomes. If new Q waves are identified during routine clinical care, cardiac imaging should be performed to identify the presence and extent of actual myocardial damage before a “silent” MI is diagnosed. After 100 years, the role of the ECG continues to evolve. Studies like this one by Davis et al, with well-characterized populations, long follow-up, and rigorous statistical modeling, are needed to further define the optimal clinical indications for ECG testing.

Disclosures

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References


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Key Words: Editorials ▪ diabetes mellitus ▪ electrocardiography ▪ infarction
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