Serial ECGs were more sensitive than an initial ECG for diagnosing chest pain


Question
Is automated serial 12-lead electrocardiogram (ECG) monitoring better than an initial 12-lead electrocardiogram (ECG) for detecting acute injury or ischemia in patients presenting to the emergency department and admitted for chest pain?

Design
Blinded assessment of SECG monitoring and initial ECG monitoring to detect acute injury or ischemia.

Setting
The emergency department of a university teaching hospital in the United States.

Patients
1000 adults (mean age 56 ± 9 years, 61% men, 80% white) presenting with chest pain suspicious for coronary ischemia who were admitted and had ≥ 1 hour of SECG monitoring. Exclusion criteria were recent cocaine use; chest pain in the presence of a tachyarrhythmia or pulmonary edema; or presence of a demand pacemaker.

Diagnostic properties of initial electrocardiogram (ECG) and serial ECG (SECG) monitoring for acute myocardial infarction (MI) and acute coronary syndromes (ACSs)

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Sensitivity (95% CI)</th>
<th>Specificity (CI)</th>
<th>+LR*</th>
<th>-LR*</th>
</tr>
</thead>
<tbody>
<tr>
<td>MI using ECG</td>
<td>55.4 (48.6 to 62.2)</td>
<td>94.6 (93.0 to 96.2)</td>
<td>10.3</td>
<td>0.47</td>
</tr>
<tr>
<td>MI using SECG</td>
<td>68.1 (61.7 to 74.5)</td>
<td>94.8 (93.3 to 96.4)</td>
<td>13.1</td>
<td>0.34</td>
</tr>
<tr>
<td>ACSs using ECG</td>
<td>27.5 (23.6 to 31.3)</td>
<td>97.1 (95.6 to 98.6)</td>
<td>9.5</td>
<td>0.73</td>
</tr>
<tr>
<td>ACSs using SECG</td>
<td>34.2 (30.1 to 36.3)</td>
<td>99.4 (98.7 to 100)</td>
<td>57.0</td>
<td>0.66</td>
</tr>
</tbody>
</table>

Conclusion
12-lead automated serial electrocardiogram monitoring was more sensitive than an initial 12-lead electrocardiogram for detecting acute myocardial infarction and acute coronary syndromes in patients with chest pain admitted through the emergency department.

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Reference

However, despite the attractiveness of SECG monitoring, its actual effect on care has not yet been shown. The study by Fesmire and colleagues showed modest improvements in sensitivities in the diagnosis of acute myocardial infarction and acute coronary syndromes, which may have been overestimated given the relatively low interobserver reliability for ECG interpretation (89.8%). Standardized computerized waveform measurements in future studies may minimize interobserver variability by supplementing physician ECG interpretation (1).

Despite these and other limitations, such as the exclusion of patients not admitted to the hospital and patients without chest pain, studies such as this one represent an important step in evaluating SECG monitoring. Future large, prospective, randomized studies that include all patients presenting to an emergency department and incorporate bedside clinical information will provide proper validation of this technology for diagnosis and clinical outcome prediction in the emergency department.

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