Utility of lead aVR for identifying the culprit lesion in acute myocardial infarction

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CRD summary
This review concluded that absence of ST elevation in aVR (right arm lead in an electrocardiogram) appeared to exclude left main stem stenosis as the cause for myocardial infarction, but its presence can indicate a lesion in the proximal left anterior descending artery. Poor reporting, lack of a quality assessment and other limitations make the reliability of the conclusions uncertain.

Authors' objectives
To assess the utility of the unipolar limb lead on the right arm (aVR lead) during electrocardiogram for identifying the causative lesion in acute myocardial infarction.

Searching
MEDLINE and Google Scholar were searched. Search terms, but not search dates, were reported. There were no language restrictions. Bibliographies of included studies were screened for additional articles.

Study selection
Studies with more than 25 participants, which assessed lead aVR for identifying the causative lesion in acute myocardial infarction, were eligible for inclusion. Studies were required to have the following inclusion criteria: typical chest pain; clinically significant ST-segment deviations; and appropriate alterations in coronary enzyme levels. The reference standard for diagnosis of causative lesion was lesion coronary arteriography. Studies of patients with left bundle branch block, electrocardiographic signs of left ventricular hypertrophy according to the Sokolow-Lyon criteria, or previous history of myocardial infarction or cardiac surgery were excluded.

Included studies addressed the role of lead aVR in identifying acute myocardial infarction caused by left main stem stenosis, in anterior ST-segment elevation myocardial infarction (STEMI) and in inferior STEMI. The aVR diagnostic threshold for ST-segment elevation was any elevation to 0.1 mV measured 20 to 80 minutes after the J-point (where the QRS wave meets the ST wave), and ST depression of 0.1 mV measured 20 to 60 minutes after the J-point.

The authors did not state how studies were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The authors did not state that they assessed study validity; some information on blinding of investigators and delays between tests was reported for some studies.

Data extraction
Data were extracted to calculate sensitivity, specificity, and positive and negative predictive thresholds for various aVR criteria and diagnoses.

Two independent reviewers performed the data extraction.

Methods of synthesis
Studies of non-ST-segment acute myocardial infarction caused by left main stem stenosis were combined in a narrative synthesis. Pooled estimates of the diagnostic accuracy of aVR ST-segment elevation for determining the causative lesion (proximal or distal in the left anterior descending artery) in anterior ST-segment elevation myocardial infarction (STEMI), were calculated. Similarly, the accuracy of aVR ST-segment depression for differentiating lesions in the circumflex artery from those in the right coronary artery in inferior STEMI was calculated. No details were reported on how pooled estimates were calculated.

The authors stated that they assessed differences between groups using Fisher's exact test, but no methods for
investigating sources of heterogeneity were reported.

**Results of the review**
The total number of studies included in the review was inconsistently reported; between 15 and 18 studies, with at least 2,200 participants, were included.

**Lead aVR in acute myocardial infarction caused by left main stem stenosis:** Five studies assessed the role of ST-segment elevation in aVR in the diagnosis of left main stem acute myocardial infarction. Sensitivities ranged from 68% (corresponding specificity 73%) to 89% (corresponding specificity 84%). Specificities ranged from 64% (corresponding sensitivity 77%) to 86% (corresponding sensitivity 78%).

**Lead aVR in anterior ST-segment elevation myocardial infarction (STEMI):** Six studies, with a total of 489 participants, assessed the role of ST-segment elevation in aVR for distinguishing proximal from distal lesions in the left anterior descending artery in anterior ST-segment elevation acute myocardial infarction. The pooled estimate of sensitivity was 47%, and the pooled estimate of specificity was 96%.

**Lead aVR in inferior STEMI:** Five studies (total number of participants unclear- one published as an abstract only) assessed ST-segment depression in lead aVR for differentiating lesions in the circumflex artery from those in the right coronary artery in inferior STEMI. The pooled estimate of sensitivity was 37%, and the pooled estimate of specificity was 86%.

**Authors’ conclusions**
The absence of aVR ST-segment elevation appeared to exclude left main stem stenosis as the underlying cause in non-ST-segment elevation acute myocardial infarction. In anterior ST-segment elevation myocardial infarction, the presence of aVR ST-segment elevation indicated a causative lesion in the proximal segment of the left anterior descending artery.

**CRD commentary**
The review addressed a clearly stated research question, defined by appropriate inclusion criteria. The search strategy, although not restricted by language, was limited in scope and the date span was not reported, so relevant data may have possibly been omitted from the review. Measures to minimise error and/or bias were reported for the data extraction process, but it was unclear whether similar measures were applied to the rest of the review process.

No formal assessment of the methodological quality of included studies was reported, reporting of the details of included studies was generally poor, and all conclusions were based on small numbers of studies. The number of studies included in the review was unclear, with inconsistency between the abstract, text and tables. As no methods were reported for the pooling of accuracy measures, and details of the included studies were limited (results of individual studies were not reported and no estimates of variance were provided for the pooled values), it was not possible to judge whether statistical pooling was appropriate.

Given the limitations outlined, the reliability of the authors' conclusions is uncertain.

**Implications of the review for practice and research**
The authors made no recommendations for research or practice.

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**Bibliographic details**

**PubMedID**
Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.