Japan Journal of Research

Commentary

Expertise in ECG Interpretation and Artificial Intelligence ECG Models for Occlusion Myocardial Infarction Diagnosis

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- Received Date: 25 Sep 2024
- Accepted Date: 04 Oct 2024
- Publication Date: 07 Oct 2024

Keywords

artificial intelligence; electrocardiogram; occlusion myocardial infarction; STEMI

Introduction

Occlusion Myocardial Infarction (OMI)/ Non-Occlusion Myocardial Infarction (NOMI) is an emerging paradigm for acute myocardial infarction classification [1]. The current ST-segment elevation myocardial infarction (STEMI)/Non-ST-segment elevation myocardial infarction (NSTEMI) dichotomy is based on guideline-recommended ST-segment elevation (STE) criteria on the 12-lead electrocardiogram (ECG). STEMI is synonymous with, and NSTEMI without acute coronary occlusion (ACO), despite the fact that about 25% of patients with NSTEMI have ACO on the coronary angiogram [1].

STEMI criteria vs OMI

In a recent meta-analysis sensitivity and specificity for detecting ACO was 43.6% and 96.5% respectively for STEMI/NSTEMI paradigm vs 78.1% and 94.4% respectively for OMI/NOMI paradigm [2]. In other words, the ECG of more than half of the patients with proven ACO potentially does not meet STEMI criteria.

The role of ECG interpretation skills of medical providers to detect OMI

For physicians that are aware of the OMI/ NOMI strategy this low sensitivity of STEMI criteria to detect ACO is not a surprise. There are numerous of ECG features and patterns, other than the strict mm-based STE criteria [STEMI (+) OMI], that are related with ACO in patients presenting with symptoms consistent with acute coronary syndrome: hyperacute T-waves, Wellens' and de Winter's ECG patterns, Smith's modified-Sgarbossa criteria in the setting of left bundle branch block or right ventricular paced rhythm, any amount of ST-segment depression (STD) maximal in V1-V4 ECG leads, terminal QRS distortion, any STE in inferior leads with any STD or T-wave inversion in aVL ECG lead and many others [STEMI (-) OMI] [1]. Prompt recognition of these ECG presentations is crucial but can be at times very challenging. It requires advanced ECG interpretation skills. Are healthcare professionals educated enough to evaluate subtle OMI ECG signs? A recent study showed significant gaps in the ECG interpretation proficiency among medical professionals for commonly taught urgent findings [3]. Achieving expertise in ECG interpretation requires continuous training and targeted educational interventions.

Artificial intelligence ECG models for the ECG diagnosis of OMI

Development of Artificial intelligence (AI)-enhanced ECG interpretation models for OMI diagnosis is a reality. Al-Zaiti et al. developed and validated a machine learning algorithm for the ECG detection of OMI that outperformed practicing clinicians and other commercial interpretation systems [4]. Herman et al. designed and validated an AI-ECG model for OMI diagnosis that achieved superior accuracy, sensitivity and specificity compared with conventional STEMI criteria and its performance was comparable with interpretation by specialized ECG experts [5]. These AI-ECG models can be easily accessed by healthcare professionals, promise early and accurate recognition of OMI and improvement of clinical workflow. This is mainly true for STEMI (-) OMI group where ECG findings are occasionally subtle and under-recognized to inexperienced providers.

Conclusion

Machine learning methods for the ECG diagnosis of OMI can potentially be a useful tool for the emergency personnel by optimizing OMI detection and time to reperfusion therapy in patients presenting with chest pain indicative of acute coronary syndrome. Performance of these novel technologies needs to be widely tested in clinical practice. Despite the advances in the field of AI-ECG models, it is crucial for clinical practitioners to maintain and enhance their ECG interpretation skills in order to provide high quality patient care.

Citation: Avdikos G. Expertise in ECG Interpretation and Artificial Intelligence ECG Models for Occlusion Myocardial Infarction Diagnosis. Japan J Res. 2024;5(10):74.

Conflict of interest

The author declares that he has no competing interests

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