Is it possible to differentiate between Takotsubo Cardiomyopathy and Acute Anterior ST-Elevation Myocardial Infarction in patients presenting with acute coronary syndrome using ST-segment based ECG-characteristics?

Fabienne E. Vervaat[a], Thomas E Christensen[b,d], Loes Smeijers[c], Lene Holmvang[b], Philip Hasbak[d], Balázs M Szabó[e], Jos WMG Widdershoven[f], Lia E Bang[b] & Anton PM Gorgels[a]

[a] Department of Cardiology, Maastricht University Medical Centre[+], the Netherlands

[b] Department of Cardiology, Copenhagen University Hospital, Denmark

[c] Department of Psychology, Tilburg University, the Netherlands

[d] Department of Clinical Physiology, Nuclear Medicine & PET, Copenhagen University Hospital, Denmark

[e] Department of Cardiology, st. Elisabeth hospital, Tilburg, the Netherlands

[f] Department of Cardiology, TweeSteden hospital, Tilburg, the Netherlands

Abstract

Introduction: Several studies have investigated the ability of the twelve-lead electrocardiogram (ECG) to reliably distinguish Takotsubo cardiomyopathy (TC) from an acute anterior ST-segment elevation myocardial infarction (STEMI). In these studies patients with TC had ECG changes – ST-segment deviation and/or T-wave inversion – whereas the acute anterior STEMI patients had to meet STEMI criteria. Also, in the majority of these studies, patients of both genders were used whereas TC predominantly occurs in women. The aim of this study is to see whether TC can be distinguished from acute anterior STEMI in a predominantly female study population where all patients meet STEMI-criteria.

Methods: Retrospective analysis of the ST-segment changes was done on the triage ECGs of 37 patients with TC (34 female) and was compared to the triage ECGs of 103 female patients with acute anterior STEMI. Patients with acute anterior STEMI were divided into the following subgroups: 46 patients with proximal, 47 with mid and 10 with distal LAD occlusion. Three ST-segment based ECG criteria were analysed: 1] Existing criterion: ST-segment depression >0.5mm in lead aVR + ST-segment elevation ≤1mm in lead V1, 2] Frontal plane ST-vector and 3] Mean amplitude of ST-segment deviation in each lead.

Results: The existing ECG criterion was less accurate (76%) than in the original study (95%), with a large difference in sensitivity (26% vs. 91%). Only a frontal plane ST-vector of 60° could significantly distinguish TC from all acute anterior STEMI subgroups ($p<0.01$) with an overall diagnostic accuracy of 81%. The mean amplitude in inferior leads II and aVF was significantly higher for patients with TC compared to all patients with acute anterior STEMI ($p<0.01$ and $p<0.05$ respectively) and the mean

amplitude in the precordial leads V1 and V2 was significantly lower compared to proximal and mid LAD occlusion ($p<0.01$).

Conclusions: Given the consequences of missing the diagnosis of an acute anterior STEMI the diagnostic accuracy of the ECG criteria investigated in this retrospective study were insufficient to reliably distinguish patients with TC from patients with an acute anterior STEMI. To definitely exclude the diagnosis of an acute anterior STEMI coronary angiography, which remains the gold standard, will need to be performed.