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Editorial

Myocardial Infarction with Non Obstructive Coronary Arteries (MINOCA): Are there ethnic differences?

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The diagnosis and management of acute myocardial infarction (MI) is well documented in guidelines from professional societies [1,2]. These guideline recommendations are based on the premise that atherothrombosis is the underlying pathophysiological process responsible for the acute MI presentation; a concept that is consistent with the presence of obstructive coronary artery disease (CAD) on coronary angiography. Accordingly, therapies targeting the atherothrombotic process have been evaluated and shown to be of benefit with a large evidence-base.

In contrast, when there is no evidence of CAD on angiography, the question arises as to whether the patient experienced an MI or if there is an alternative (non-ischaemic) explanation for the clinical presentation. Moreover, if the patient did experience an MI, then was a non-atherothrombotic process responsible for the MI (e.g. coronary vasospasm). These dilemmas prompted the term MINOCA (Myocardial Infarction with Non-Obstructive Coronary Arteries) to be coined [3] and this diagnostic label has provided a forum to improve our understanding of this puzzling disorder.

Previous studies of MINOCA have reported a prevalence of 6%, with clinical characteristics that differ to those patients with CAD (MI-CAD = MI with obstructive coronary artery disease) [4]. Not surprisingly, the MINOCA patients with their apparently lower atheroma burden (on angiography) were more likely to be younger and female but less likely to have hyperlipidaemia, as compared to their MI-CAD counterparts [4]. Moreover, the MINOCA patients had a better prognosis compared to MI-CAD with better all-cause mortality at 12 months [4]. The difference in prognosis between MINOCA & MI-CAD patients may reflect differences in the underlying pathophysiological mechanisms, but equally may merely reflect differences in risk factor profile.

In this issue of the *Journal*, Abdu et al. [5] presents the first investigation of MINOCA within a Chinese population. This study prospectively followed 2029 Chinese patients admitted with acute MI for a 12-month period, evaluating the baseline clinical characteristics and major adverse coronary events (MACE) at follow-up for both MINOCA and MI-CAD patients. The findings from this Chinese MI cohort were similar to prior studies, including a 6.3% prevalence of MINOCA, with patients more likely to be younger and female but less likely to have a history of cardiovascular (CV) risk factors (smoking, diabetes, hypertension, or hyperlipidaemia) compared to those with MI-CAD. Furthermore, at 12-month follow-up, the occurrence of MACE (CV death, non-fatal MI, stroke, heart failure and CV-related admissions) was lower in MINOCA compared to MI-CAD (20% vs 35%, $p < 0.05$), although CV death was not statistically different between the two groups (3.7% vs 6.7%) [5].

The similarity in the findings between the Chinese cohort and European/North American studies may suggest that similar mechanisms are involved in the pathogenesis of MINOCA, irrespective of ethnicity. This contrasts to other acute coronary syndromes, such as vasospastic angina, where Japanese & Korean patients have a noteworthy predisposition to coronary vasospasm [6]. This is of particular relevance to MINOCA since coronary vasospasm is believed to be an important cause of this condition. With the prevalence of MINOCA being similar between Chinese and European/North American MI patients, this may suggest that ethnic differences do not play a major role in the pathogenesis of MINOCA.

Interpreting the current study by Abdu et al. [5] in the context of the previous literature, reflects some of the limitations with the contemporary MINOCA studies. As the authors acknowledge, the study is from a single centre with a small sample size and utilises a broad definition of MINOCA (including patients with tako-tsubo syndrome). Also, cardiac magnetic resonance imaging studies were not routinely performed so that patients with myocarditis may have been included. Hence the study population may be heterogeneous in nature with multiple mechanisms involved. However, compatible with the earlier studies, the

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authors did utilise the European Society of Cardiology criteria for MINOCA, which were based upon the third universal definition of MI [7].

Future MINOCA studies will utilise the fourth universal definition of MI [8], where there is a distinction between 'myocardial injury' and 'myocardial infarction', with both identified by an elevated cardiac biomarker (e.g. troponin) but with the later only being applied in the context of myocardial ischaemia. Hence, as per the definition [8], patients with the Tako-tsubo syndrome are not considered as having experienced an MI and therefore not considered as having MINOCA. This new definition has been incorporated into the American Heart Association scientific statement on MINOCA [9]. Accordingly, future MINOCA studies are likely to include a more homogeneous population who have experienced an ischaemic infarct although the cause of the MI may involve different ischaemic mechanisms.

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