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Identification of the characteristics of occlusive myocardial infarction: are there any tell-tale signs?

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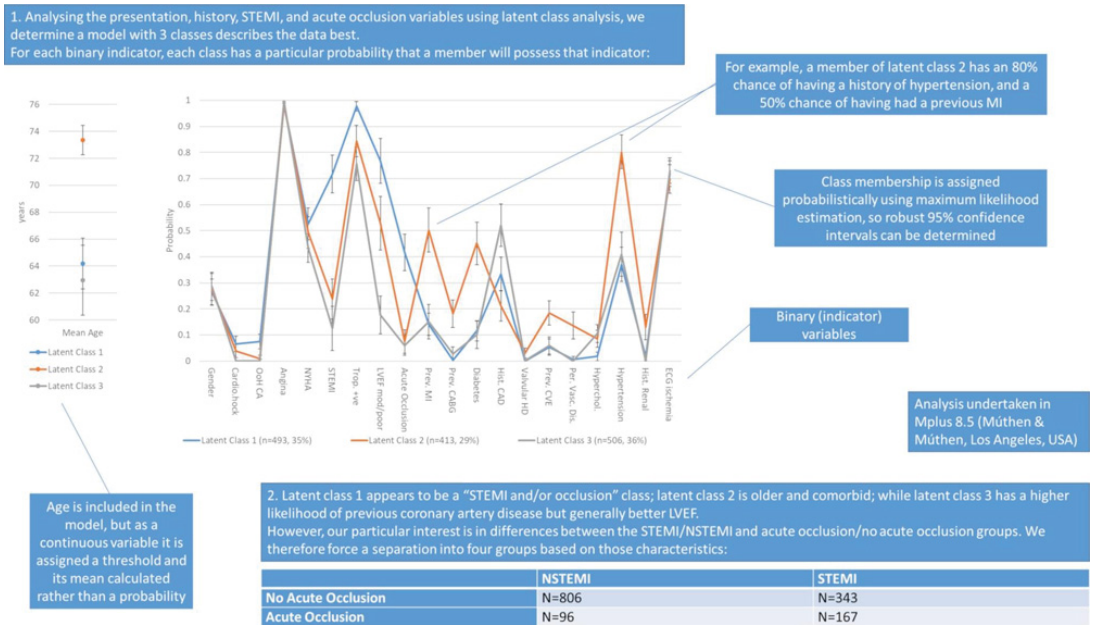
Introduction: Treatment urgency of myocardial infarction (MI) is currently stratified by ST elevation (STEMI) or lack of ST elevation (NSTEMI) on the electrocardiogram. This categorisation arose from the theory that ST elevation indicated total acute coronary artery occlusion (1). However, one-quarter of all NSTEMI have acute occlusion, have a higher mortality and are potentially missed by this strategy (2).

Purpose: The study purpose is to identify clinical features that could help distinguish an occlusive MI from non-occlusive MI.

Methods: The prospectively British Cardiovascular Intervention Society (BCIS) data set was collected from patients undergoing primary cutaneous intervention (dataset) was analysed from the years 2015 to 2019. Data collected included presentation characteristics, co-morbidities, treatments and outcomes. We further undertook latent class analysis, to determine whether distinct patterns of presentation and history are associated with acutely occluded NSTEMI. This methodology proceeds through segmentation of a dataset into clusters ("classes") based on case similarities for the set of variables or "indicators" of interest; the classes are then statistically analysed to evaluate the differences between them.

Results: A total of 2025 patients underwent percutaneous coronary intervention (PCI) between 2015 and 2019. Of these, 1412 underwent PCI for MI, 510 had a STEMI, and 263 had occlusive MI on angiogram. STEMI patients tended to be younger (66 vs 67; p=0.045), in shock (6.1% vs 1.9%; p<0.001), have cardiac arrest (5.7% vs 1.2%; p<0.001), less co-morbidities, increased left ventricular ejection fraction (LVEF) (<30% 11.8% vs 4.7%; p<0.001, increased short-term mortality (3.5% vs 0.7%; p<0.001) and increased emergency PCI (55.9% vs 6.9%; p<0.001) and thrombolysis (32.7% vs 2.5%; p<0.001),. Occlusive MI patients tended to have ST elevation (63.5% vs 29.9%: p<0.001), cardiogenic shock (9.1% vs 2.1%; p<0.001) cardiac arrest (5.3% vs 2.3%; p=0.007), less co-morbidities but no difference in cerebrovascular disease, increased acute mortality (4.2% vs 1.1%; p<0.001) severe LVEF (11.8% vs 6.2%; p<0.001) and increased emergency PCI (70.3% vs 14.1%; p<0.001), With latent class analysis, while clusters of similar patients are observed in the dataset, we determined that the variables captured by BCIS do not usefully indicate an acutely occluded MI compared to non-occlusive MI (Figure 1).

Conclusion: Features between occlusive MI and STEMI are broadly very similar. However, unlike STEMI/NSTEMI, there was no difference in age and risk of cerebrovascular disease in the occlusive MI/non-occlusive MI group. This could indicate occlusion MI occurs in higher numbers in elderly and frail patients and may be frequently missed, possibly from greater collateralisation. There is no reliable characteristic for identifying occlusive between non-occlusive MI. Improved methods are needed for the identification of occlusive MI patients.



Step 1 of latent class analysis