



Determining the mechanism of myocardial injury and role of coronary disease in type 2 Myocardial Infarction: DEMAND-MI

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Background

Type 2 myocardial infarction occurs due to myocardial oxygen supply or demand imbalance, without evidence of atherothrombosis, often in the context of another illness. Type 2 myocardial infarction is common and associated with poor clinical outcomes. To date, there is no prospective mechanistic evidence to support the diagnosis and guide management.

Methods

DEMAND-MI (NCT03338504) is a prospective observational study that aimed to determine the mechanism of myocardial injury and role of atherosclerotic coronary disease in type 2 myocardial infarction. Consecutive patients with a clinical diagnosis of type 2 myocardial infarction were screened. We excluded elective presentations, those with renal failure, hepatic failure or frailty.

Participants underwent invasive or CT coronary angiography and cardiac MRI. Or echocardiography. The primary outcome was the prevalence of atherosclerotic coronary disease. Secondary outcomes included the pattern of myocardial injury. All diagnoses were adjudicated in line with the Fourth Universal Definition of Myocardial Infarction.

Results

In 100 patients with a provisional diagnosis of type 2 MI (65 [55-74] years, 57% women), cardiac imaging identified plaque rupture or thrombosis (type 1 or 4b MI) in five patients, and acute myocardial injury in two patients.

In those with type 2 MI, the prevalence of coronary artery disease was 68% (63/93), which was obstructive in 30% (28/93). Infarct-pattern late gadolinium enhancement or regional wall motion abnormalities were observed in 42% (39/93) and left ventricular systolic dysfunction identified in 34% (32/93). Just ten patients had normal cardiac imaging.

Coronary artery disease and left ventricular systolic dysfunction were previously unrecognized in 60% (38/63) and 84% (27/32), respectively, with only 33% (21/63) and 19% (6/32) on evidence-based treatment.

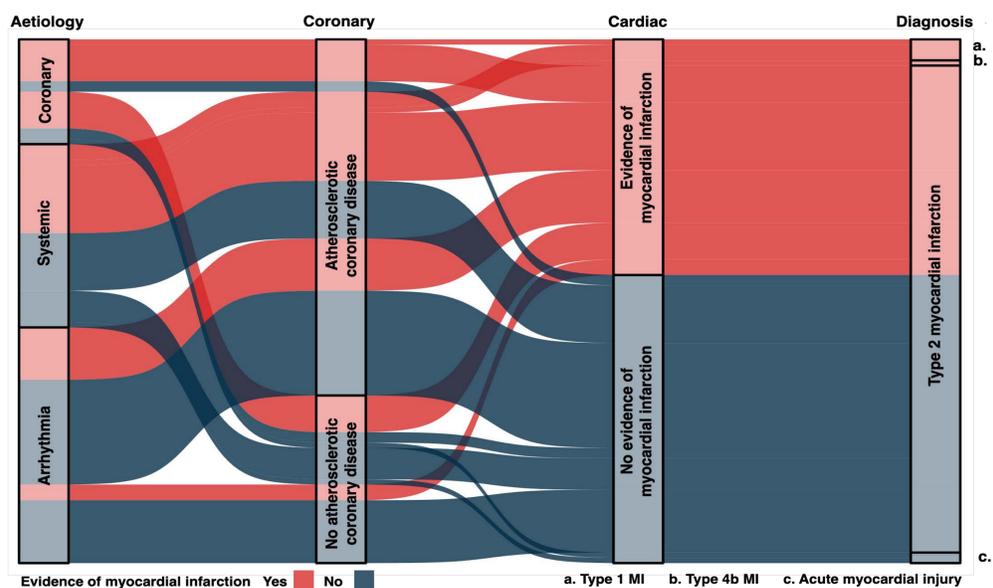


Figure 1. Alluvial plot illustrating the aetiology of supply-demand imbalance, coronary and cardiac imaging findings and the final adjudicated diagnosis

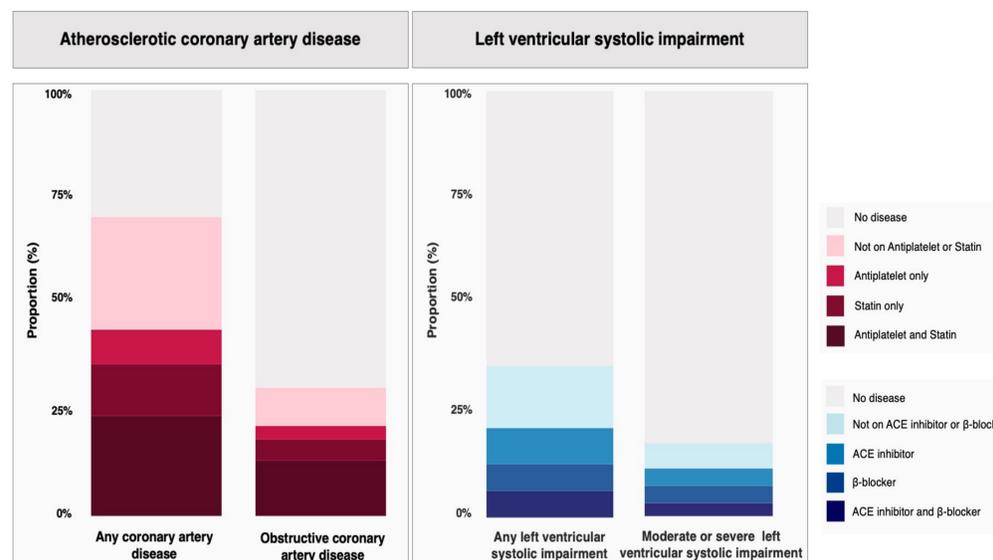
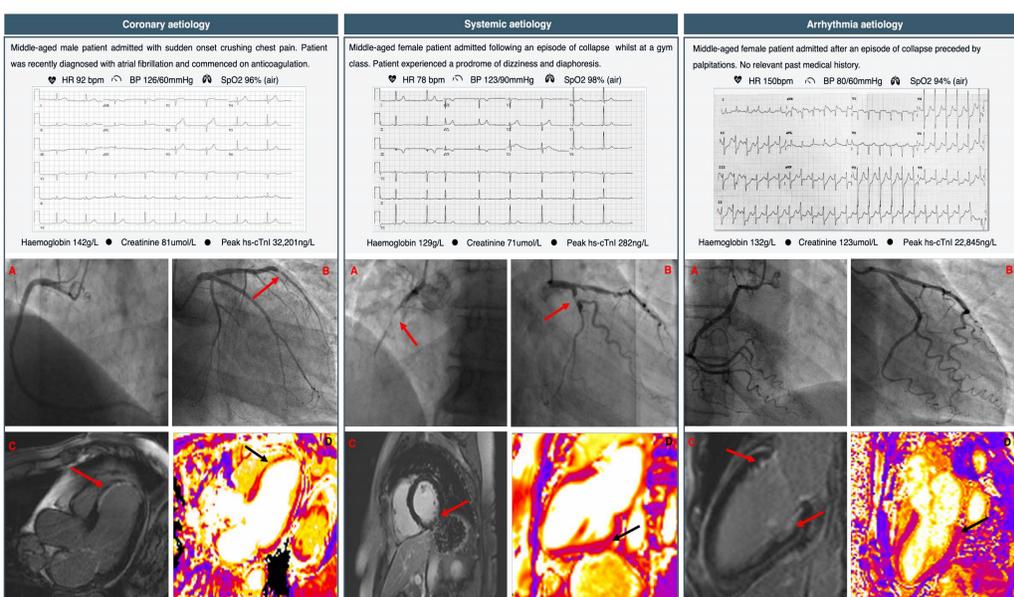


Figure 2. Prior treatment in patients with coronary artery disease and left ventricular systolic impairment identified on coronary and cardiac imaging



Conclusion

In the first prospective study to undertake systematic cardiac imaging in patients with type 2 myocardial infarction cardiac imaging led to reclassification of the diagnosis in seven in a hundred patients.

In those with confirmed type 2 myocardial infarction, two-thirds had coronary artery disease and one-third had evidence of ventricular impairment. These were previously unrecognized and untreated in the majority, identifying opportunities for evidence-based treatments. Fewer than half of patients had myocardial scar or regional wall motion abnormality on imaging, with important implications for the Universal Definition.

