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MINOCA: Requirement for Definitive Diagnostic Work-Up

To the Editor,

We applaud the authors of ''Acute ST-Elevation Myocardial Infarction, a Unique Complication of Recreational Nitrous Oxide Use," [1] who reported an interesting case of a young male smoker presenting with acute myocardial infarction (MI) in the context of recreational drug use implicating a causal link between inhaled nitrous oxide and acute coronary syndrome. The authors probe the connection between MI, endothelial dysfunction and plasma homocysteine levels which were elevated acutely and remained elevated but at lower levels following abstinence from nitrous oxide. In this case, we suggest that a unifying mechanism to explain the pathogenesis of the acute MI was not entirely clear. Myocardial infarction with no obstructive coronary atherosclerosis (MINOCA) is recognised in contemporary practice guidelines and multiple distinct causes are possible (Figure 1) [2].

Intravascular imaging of the left anterior descending coronary artery would have been helpful to assess for plaque erosion or subclinical thrombus formation as the sequelae of nitrous oxide induced endothelial dysfunction. Whilst coronary reactivity testing acutely in unstable coronary disease may be withheld on grounds of safety, the possibility of epicardial coronary vasospasm is relevant to consider. In such cases, the angiographic appearances may be sufficient to make the diagnosis. Vasospasm may have been the unifying link between the recreational drug use and abrupt coronary occlusion in a smoker. Epicardial coronary vasospasm is associated with MI, arrhythmias, and sudden death yet is responsive to calcium channel blockers and nitrates [3].

Homocysteine has been implicated in vasospastic disorders [4] and could explain the association between plasma homocysteine and sudden cardiac death which typically occurs without a thrombotic mechanism [5]. However, it should be noted that treatment to reduce plasma homocysteine does not improve cardiovascular outcomes [6]. A trial of nitrous oxide during general anaesthesia showed safety without adverse cardiac events [7].

Finally, the increased propensity to vasospasm in this case may have arisen from abrupt cessation of both diphenhydramine and hyoscine hydrobromide. Both of these agents, when suddenly stopped, may be associated with 'rebound' cholinergic syndromes [8]. Increased susceptibility to cholinergic stimuli is a hallmark of epicardial vasospastic disorders [9]. This fascinating case serves to increase clinical awareness of disorders of coronary artery vasomotion – the investigation of which is the subject of ongoing randomised clinical trials (The BHF CorMicA trial, clinicaltrials.gov NCT03193294) [10].

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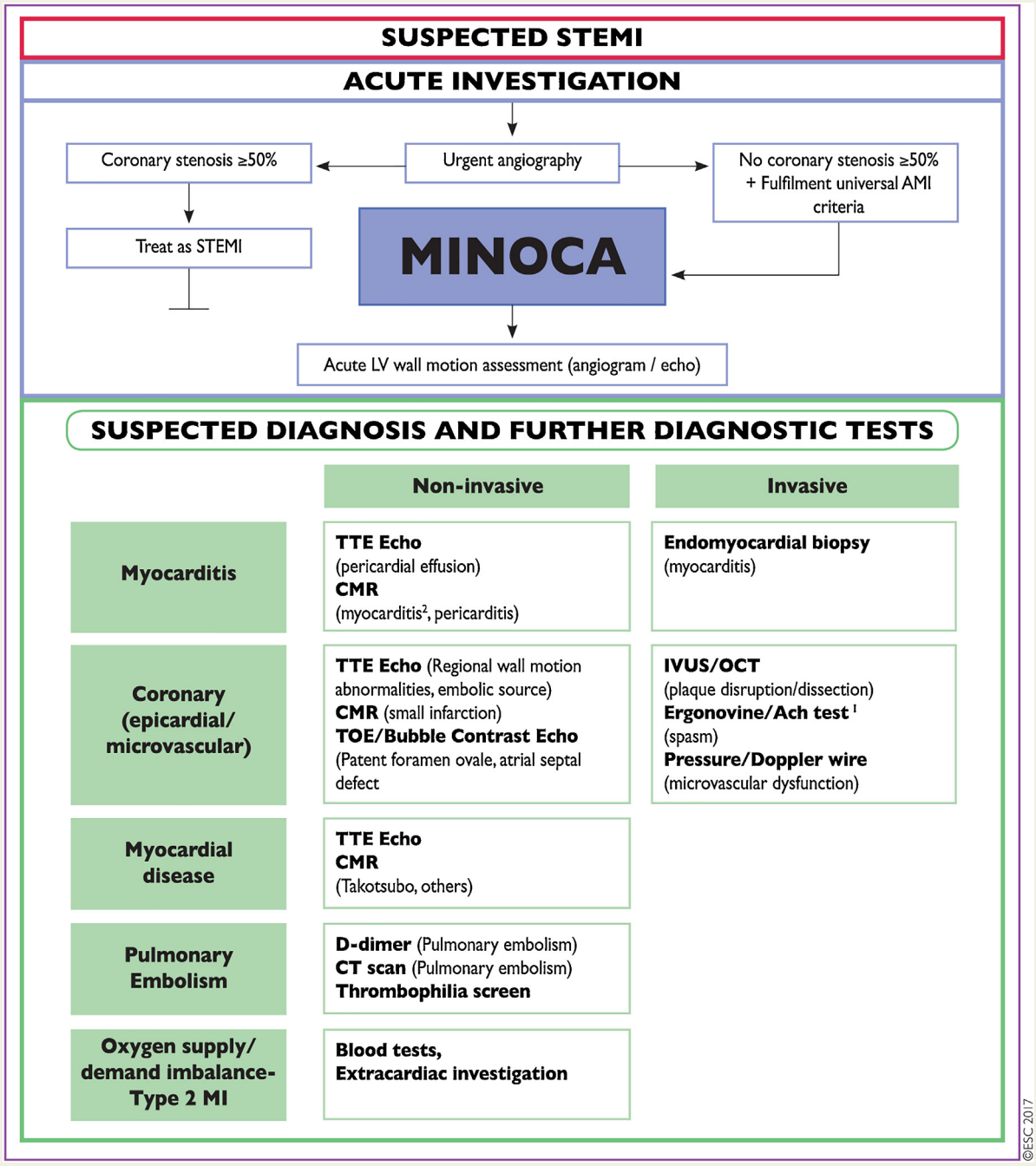

Figure 1 Diagnostic test flow chart in MINOCA (from [2] with permission). CMR, cardiac magnetic resonance; IVUS, intravascular ultrasound; LV, left ventricle; MINOCA, myocardial infarction with non-obstructed coronary arteries; OCT, optical coherence tomography; STEMI, ST segment elevation myocardial infarction; TOE, transoesophageal echocardiography; TTE, transthoracic echocardiography.

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