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The Effects of Hydrogen Gas Inhalation on Adverse Left Ventricular Remodeling After Percutaneous Coronary Intervention for ST-Elevated Myocardial Infarction – First Pilot Study in Humans

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Abstract

Background: Hydrogen gas inhalation (HI) reduced infarct size and mitigated adverse left ventricular (LV) remodeling in a rat model of acute myocardial infarction (AMI). We designed a prospective, open-label, rater-blinded clinical pilot study in patients experiencing ST-elevated MI (STEMI). **Methods and Results:** The 20 patients with an initial diagnosis of STEMI were assigned to either an HI group (1.3% H₂ with 26% oxygen) or a control group (26% oxygen). There were no HI-related severe adverse events. In the full analysis set, the cardiac salvage index as evaluated using cardiac magnetic resonance imaging at 7 days after primary percutaneous coronary intervention (PCI), showed no significant between-group difference (HI: 50.0±24.3%; control: 60.1±20.1%; P=0.43). However, the improvement from day 7 in the HI group was numerically greater than that in the control group in some of the surrogate outcomes at 6-month follow-up, including the LV stroke volume index (HI: 9.2±7.1 mL/m²; control: -1.4±7.2 mL/m²; P=0.03) and the LV ejection fraction (HI: 11.0%±9.3%; control: 1.7%±8.3%; P=0.11).

Conclusions: The first clinical study has shown that HI during PCI is feasible and safe and may also promote LV reverse remodeling at 6 months after STEMI. The study was not powered to test efficacy and a further large-scale trial is warranted. (Clinical trials registration: UMIN00006825).

Keywords: Cardiac magnetic resonance imaging; Hydrogen gas; Left ventricular remodeling; Myocardial infarction.

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