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The lipid paradox in patients with non-ST elevation and ST elevation myocardial infarction and percutaneous coronary intervention

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Background/Introduction: Elevated levels of low-density lipoprotein (LDL-C) and triglycerides (TG) are well-described risk factors for the development of acute myocardial infarction (MI). Despite these well-established associations, previous studies have described the existence of a "lipid paradox" in acute MI patients – Patients paradoxically have worse outcomes despite having lower LDL-C and TG levels.

Purpose: We conducted this study to clarify the relationship of the lipid paradox and clinical outcomes amongst non-ST elevation (NSTEMI) and ST elevation MI (STEMI) patients in patients who have had percutaneous coronary intervention.

Methods: We included all acute MI patients reported to the Singapore Myocardial Infarction Registry from 2007 to 2013 who have had percutaneous coronary intervention. This information was linked to the national claims database to obtain the final discharge diagnosis for re-hospitalization outcomes. Exposure of interest was the lipid profile obtained within 72 hours of the acute MI (LDL-C, TG; Total cholesterol [TC]; high-density lipoprotein [HDL-C]). Primary outcomes were all-cause mortality during hospitalization, within 30-days and within 1-year. Secondary outcomes were re-hospitalization within 1-year for heart failure, stroke and MI.

Results: There were 8988 NSTEMI and 12453 STEMI cases available for analysis (n=21441). The NSTEMI patients were older (60.3 years vs 57.6 years, $p<0.001$) and more likely to be female (15.1% vs 22.6%, $p<0.001$). In the NSTEMI subgroup, a lower LDL-C was paradoxically associated with better outcomes for death during hospitalization, death within 30 days from MI onset and death within 1 year from MI onset (all $p<0.001$) across the various LDL-C levels. Adjustment for demographic variables, co-morbidities and MI characteristics eliminated this paradox. However, in the STEMI subgroup, the lipid paradox for LDL-C persisted for all primary outcome endpoints after adjustment. In the STEMI patients, a lower HDL-C also appeared to be protective. An elevated TG level did not appear to be protective in both NSTEMI and STEMI patients after adjustment.

Conclusion(s): An elevated LDL-C appears to be a protective prognostic marker in STEMI but not NSTEMI patients who have undergone percutaneous coronary intervention. This difference may be due to differing underlying pathophysiological mechanisms between the 2 populations.