The prognostic potential of growth differentiation factor-15 on bleeding events and patient outcome after cardiac surgery

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Background: GDF-15 (growth/differentiation factor 15) is induced by myocardial stretch, volume overload, inflammation and oxidative stress. Its expression is tightly linked with cardiovascular events as well as the risk for major bleeding and all-cause mortality.

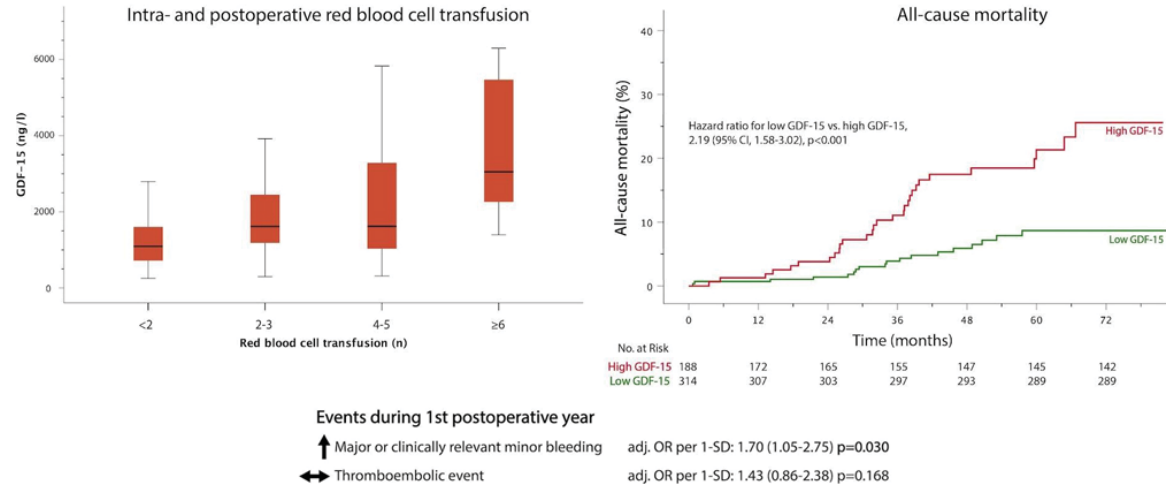
Objective: The objective of the present study was to elucidate the prognostic potential of GDF-15 in patients after cardiac surgery.

Methods: 504 patients undergoing elective cardiac valve and/or coronary artery bypass graft surgery were prospectively enrolled. GDF-15 levels were measured prior surgery to evaluate the impact on bleeding events, thromboembolic events and mortality.

Results: Preoperative GDF-15 was associated with the primary endpoint of intra- and postoperative red blood cell transfusion (for bleeding risk factors adjusted [adj] OR [odds ratio] per 1-SD [standard deviation] of 1.62 [95% CI: 1.31–2.00]; p<0.001) and postoperative atrial fibrillation (for atrial fibrillation risk factors adj. OR per 1-SD of 1.49 [95% CI: 1.22–1.81]; p<0.001). Higher concentrations of GDF-15 were observed in patients reaching the secondary endpoint of major or clinically relevant minor bleeding (for bleeding risk factors adj. OR per 1-SD of 1.70 [95% CI: 1.05–2.75]; p=0.030) during the 1stpostoperative year, but not for thromboembolic events. GDF-15 was a predictor for cardiovascular mortality (for comorbidities adj. HR [hazard ratio] per 1-SD of 1.67 [95% CI: 1.23–2.27]; p=0.001) and all-cause mortality (for comorbidities adj. HR per 1-SD of 1.55 [95% CI: 1.19–2.01]; p=0.001). A combined risk model of GDF-15 and EuroSCORE II outperformed the EuroSCORE II alone for long-term survival (c-index: 0.75 [95% CI: 0.70–0.80], p=0.046; net reclassification improvement: 33.6%, p<0.001).

Conclusion: Preoperative GDF-15 concentration is an independent predictor for intra- and postoperative major bleeding, major bleeding during the first year and for long-term cardiovascular or all-cause mortality after cardiac surgery.

Central illustration: Associations of preoperative GDF-15 levels in cardiac surgery



Central illustration