The prognostic impact of fibroblast growth factor-23 on cardiovascular death after cardiac surgery

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Background: Fibroblast growth factor 23 (FGF-23) participates in phosphate and vitamin D metabolism and proved to be associated with an increased risk for fatal events in individuals presenting with cardiovascular disease. In the era of personalized medicine and individualized prognostication, the identification of novel risk markers seems of major importance in terms of state-of-the-art patient care. Since data on the prognostic potential of FGF-23 in individuals undergoing cardiac valve and/or coronary artery bypass graft (CABG) surgery remain scarce, we aimed to investigate the impact of FGF-23 on cardiovascular (CV) death in an unselected patient population after cardiac surgery.

Methods: Within the present investigation, patients undergoing elective cardiac valve and/or CABG surgery were prospectively enrolled at the Department of Cardiac Surgery of our Medical University. Preoperative blood values were assessed immediately before the surgical intervention. FGF-23 concentrations were measured via FGF Quantikine ELISA Kit (R&D Systems, Minneapolis, USA). Patients were followed prospectively until the primary study endpoint (CV death) was reached. Cox regression models were calculated and adjusted for age, sex, diabetes, heart failure, body mass index, prior myocardial infarction, hypertension and coronary artery disease.

Results: In total, 462 patients were included in the present analysis and followed over a median of 3.9 years. During follow-up 67 (14.5%) patients died. The patients' median age was 70 years (interquartile range [IQR] 60 to 75) and 133 (28.8%) were female. The median FGF level in the entire study population was 1.9 pmol/L (IQR 1.2 to 3.5). After stratification into tertiles (T) of FGF-23 (median FGF-23 T1: 0.95 pmol/L [IQR 0.65 to 1.19], T2: 1.93 pmol/L [IQR 1.64 to 2.28] T3: 4.80 pmol/L [IQR 3.54 to 8.09]), patients in the highest FGF-23 tertile had highest rates of CV death (T1: 4.8%, T2: 6.8%, T3: 19.1%; P-logrank <0.001; Figure A). Moreover, there was a strong association between FGF-23 and CV death (Adj. hazard ratio for 1-unit increase in standardized log-transformed biomarker 1.44, 95% CI: 1.19 to 1.75; P-value <0.001). The risk of CV death increased within higher tertiles of FGF-23 (T3: adj. HR 3.59 [95% CI 1.48–8.71], P-value= 0.005) (T1 was chosen as reference). FGF23 also showed good discriminatory performance (area under the curve [AUC] 0.69, 95% CI 0.61–0.77).

Conclusion: FGF-23 proved to be a strong and independent predictor for CV death in individuals undergoing elective cardiac valve and/or CABG surgery. This biomarker may provide improved risk assessment and fosters individualized patient care in this highly vulnerable patient population in the era of personalized medicine.

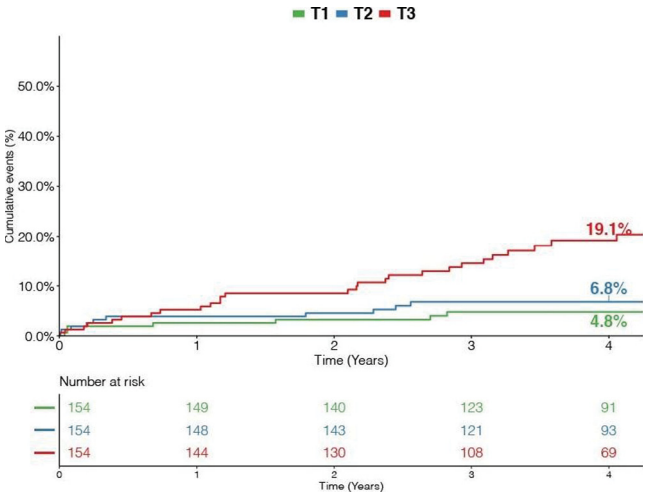

Figure 1. Kaplan Meier curves

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