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Abstract of the PhD thesis

Atrial fibrillation in patients with acute myocardial infarction and post-cardiac surgery

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Introduction

Despite important progresses in the diagnosis and management of ischemic heart disease (IHD), IHD remains the most important mortality cause in the industrialized world. The mechanisms behind its complications, as well as the best preventive or curative treatment strategies are largely unknown, particularly in patients' subsets such as those with obesity, chronic kidney disease (CKD) or chronic obstructive pulmonary disease (COPD). Atrial fibrillation (AF) is an important cause of morbidity and mortality in IHD patients. Its incidence continues to grow in the general population, justifying all efforts towards a better clarification of subsequent mechanisms, predictors, and risk factors. The main purpose of this thesis was to identify AF predictors and underlying pathophysiological mechanisms in patients with ST-segment elevation myocardial infarction (STEMI) and post-coronary artery bypass graft (CABG) surgery. Additionally, we have assessed the in-hospital post-STEMI evolution in specific patients' subsets (i.e., obese, CKD, and COPD patients).

Materials and Methods

Four studies were included in this thesis, involving two patients categories: patients with STEMI treated by primary percutaneous coronary intervention (pPCI) and patients with CABG. We have conducted an observational retrospective study on STEMI patients and an observational prospective study on patients treated by CABG surgery. All studies were conducted according to the Helsinki Declaration and were approved by the local Ethics Committees.

Results

From 401 STEMI patients, 11.2% presented STEMI-related AF. AF patients had more frequently COPD (OR 5.2; IC95% 2.3-11.6; $p < 0.001$) and CKD (OR 19.2; IC95% 9.2-40.2; $p < 0.0001$). In multiple regression analysis, CKD remained an independent

predictor for STEMI-related AF (OR 16.9; IC95% 7.1-40.4; $p < 0.0001$). In the second study, postoperative AF was noted in 36.7% of the 30 studied post-CABG patients. AF patients were older ($p=0.04$), had higher CHA₂DS₂-VASc scores ($p=0.03$), SDNN and RMSSD index values (both $p=0.03$). Right atrial appendage samples from patients with AF had more frequently fatty infiltration ($p=0.02$). There was also a positive correlation between atrial depolarization duration and IL-1b ($r=1.00$; $p=0.01$), IL-6 ($r=0.98$; $p<0.01$), and VEGF ($r=0.98$; $p<0.01$) levels. In the third study, body weight data were analyzed in 322 STEMI patients; 23.3% had normal body weight, 45.7% were overweight, and 31.0% were obese. Body mass index significantly correlated with systolic blood pressure ($r=0.15$, $p<0.01$), glycemia ($r=0.18$, $p<0.001$), total cholesterol ($r=0.18$, $p<0.01$), and triglycerides ($r=0.34$, $p<0.001$), and was an independent predictor of anterior STEMI ($r=-0.16$, $p=0.04$). In the fourth study, from the total cohort of 418 STEMI patients, 7.42% had COPD. COPD patients were older ($p=0.02$), had lower SYNTAX I score ($p=0.02$), higher Killip class on admission ($p<0.001$) and more often required inotropes (OR 4.52; IC95% 2.03-10.08; $p<0.001$) and diuretics (OR 3.02; IC95% 1.43-6.37; $p<0.01$) during hospital stay. In-hospital mortality was higher in COPD patients (19.4% vs. 5.4%; OR 4.18; IC95% 1.55-11.30; $p<0.01$). In multiple regression analysis, after adjustment for *beta*-blocker therapy, COPD was no longer an independent predictor of mortality.

Discussions and Conclusions

Atrial fibrillation represents one of the most frequent complications in STEMI patients and CKD is associated with increased risk for AF onset in STEMI patients treated by pPCI. The AF incidence also continues to be very high following CABG surgery. In these patients, there is a pre-existing atrial structural, electrical, and autonomic nervous system remodeling. In STEMI patients, obesity is not necessarily associated with a worse prognosis. This might be at least partially explained by the lower incidence of anterior STEMI in obese patients. Finally, we demonstrate that COPD patients with STEMI treated by pPCI have a higher likelihood of hemodynamic complications during hospital stay and higher mortality rate compared with non-COPD patients. This higher mortality rate seems to be due to the lower rate of *beta*-blockers usage in these patients.