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Is Atrial Fibrillation a Prognosticator in Acute Pulmonary Thromboembolism?

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Atrial fibrillation (AF) is the most common chronic arrhythmia [1], with increasing prevalence. AF has been recognized by ECG for more than 100 years [2] and has been studied mostly in the context of heart failure in 4,473, hypertension in 2,492, coronary artery disease in 1,393, acute myocardial infarction in 875, unstable angina in 152 and acute coronary syndrome in 142 citations in PubMed (February 2, 2008). It has been known since Brill in 1938 that AF was capable of inducing heart failure that can be completely resolved by heart rhythm normalization [3]. Due to an increase in heart rate, which is usually present in AF, it may worsen ischemia in patients with acute coronary syndrome. Thus, it is not surprising that AF has (at least in the short term) prognostic significance in acute myocardial infarction [1, 4] and acute heart failure [5].

On the other hand, the influence of AF upon outcome has been underestimated in aortic dissection (44 references in PubMed) [6]. The relation between AF and pulmonary thromboembolism (PTE) has not been studied so extensively (413 references). AF in PTE may be both the cause/contributing factor (by giving rise to thrombogenesis as well as by hemodynamic effects) and the consequence (by e.g. right atrial distension, stress, hypoxia). The preload that the right heart provides to the left heart seems to be very important for the circulation and survival in PTE. Right atrial booster function is supposed to be crucial in the unfavorable hemodynamic milieu of PTE, but AF removes it. Besides, AF also compromises left atrial function, diminishing left ventricular filling. Thus, it is logical to expect that AF may help in predicting the in-hospital outcome in PTE. Additionally, AF has been characterized usually by a higher ventricular rate that increases myocardial oxygen consumption and shortens the diastole (reducing the myocardial oxygen supply), leading to (worsening of) ischemia.

For the search 'AF + PTE + prognosis' in PubMed, 66 references were found. Among them, for only 1 paper (from 1966) is it obvious from the title that it definitely considers the prognostic value of AF in PTE patients [7]. Thus, the question of our study was: does AF predict the in-hospital outcome in PTE? We analyzed 140 patients with PTE hospitalized from 2003 to 2008; 68.6% were females, aged 63.2 years. In-hospital mortality was 13.6%. AF was found in 15.7% patients. Contrary to our working hypothesis, AF was not related to in-hospital mortality (Fisher test $p > 0.7$). Additionally, no significant correlation between AF and syncope was found. AF is the disease of older patients, as confirmed also in this

study ($p < 0.01$). Patients with AF had a trend toward lower troponin values (Mann-Whitney U test $p = 0.06$), as well as lower fibrinogen, but not D-dimer concentration. The typical ECG sign $S_1Q_3T_3$ was less common in patients with AF. Patients with AF in PTE were less likely to receive fibrinolytic therapy [8].

As a limitation of the study, there were not enough patients in the subgroups 'new onset' and 'previously diagnosed AF' to allow us to do proper subgroup statistics. Also, the potential influence of age could be better studied with more patients and multivariate analysis.

In conclusion, there are two surprises concerning prediction of in-hospital outcome by AF in PTE patients. The first one was that we were not able to show any impact of AF upon in-hospital mortality, although it was expected for seemingly good reasons. The second one was that data on the topic are very scarce, despite the fact that AF is the most common chronic arrhythmia and PTE the most frequently misdiagnosed life-threatening cardiovascular disease.

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