Catheter ablation of atrial fibrillation

Summary

Catheter ablation and stroke prevention with anticoagulation or other alternatives have evolved into an established therapy for atrial fibrillation (AF). Although atrial anatomy has an important pathophysiologic role, its relationship with relevant AF outcomes like thromboembolic events (TE) and long-term rhythm stability after AF ablation have not been adequately examined yet.

The aim of this thesis is to elaborate the significance of atrial anatomy and ablation outcomes in the following cases: (1) the relation of left atrial appendage (LAA) and the TEs in patients not well described by the common clinical risk scores, (2) the characterstics of left atrial (LA) remodeling in AF patients, (3) the effect of these changes on ablation outcomes, (4) the relationship of LA remodeling with LV diastolic dysfunction, plasma markers and LA low-voltage areas as surrogates of AF substrate (**Chapter 1**).

We found that AF recurrence and a higher LAA takeoff are associated with an increased TE risk after ablation, probably due to a tachycardia-mediated thrombogenic flow that was also seen in AF patients with low CHA_2DS_2-VASc score and higher LAA takeoff (**Chapters 2-3**). On the contrary, peri-procedural TEs were found to be associated with a chicken-wing LAA morphology due to an LAA reservoir function. These findings may have implications for an appropriate clinical or anticoagulation therapy of these patients and deserve further evaluation (**Chapter 4**).

In order to describe LA remodeling, we developed a new index of asymmetry (ASI) and compared LA anatomy of AF patients with healthy individuals. We found that LA remodeling involves both size and symmetry changes, which are related to AF-type and recurrences after AF ablation. We have shown that asymmetry increases as the LA expands, but this is diminished in patients with already asymmetric dilated atria, such as in persistent AF (**Chapters 5**). We found that the transversal LA diameter is the best single-linear predictor, comparable to LA volume and stronger than the commonly used echocardiographic diameter (**Chapter 6**). Moreover, we have shown that although LA volume is the best predictor of success for paroxysmal AF patients, in patients with persistent AF, asymmetry (ASI) is the most significant predictor (**Chapter 7**). We also found that LA symmetry changes are associated with LA dilatation, diastolic dysfunction and higher levels of high-sensitive Interleukin-6 (**Chapters 8-9**). Finally, we found that wall-deformation correlates with the extent of low-voltage areas (**Chapter 10**).

Taken together, these findings point out the importance of atrial anatomy in AF patients and the need for patient-specific anatomical information. The results presented here may pave the way for improved patient-tailored therapy of AF patients or prompt further studies that will elaborate the implications of this thesis.