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Oral anticoagulation during atrial fibrillation ablation: Facts and controversies

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ABSTRACT

On the background of population ageing atrial fibrillation (AF) has reached epidemic dimensions in developed countries. This condition is associated with major cardiovascular morbidity and mortality mainly due to its thrombo-embolic and heart failure related complications. Left atrial (LA) catheter ablation has emerged as a suitable alternative to antiarrhythmic drugs for sinus rhythm maintenance at least for paroxysmal atrial fibrillation in the settings of no/mild LA dilatation. Chronic oral anticoagulation (OAC) is helpful to prevent AF thromboembolic complications in high-risk patients. OAC is also protective around ablation procedures in patients with or without an indication for long-term OAC therapy, emphasizing a slight increase in periprocedural risk of stroke. Due to the potential catastrophic hemorrhagic complications during trans-septal LA instrumentation, traditional approach on LA ablations involved warfarin discontinuation with periprocedural heparin bridging. Recent observational data suggests that radiofrequency (RF) catheter ablation of AF under therapeutic OAC (mainly vitamin K antagonists [VKA]) may reduce the periprocedural risk of complications, mainly thromboembolic events (possibly including silent strokes). Uninterrupted OAC has been acknowledged as an alternative to heparin bridging by the recently published consensus and guidelines update on AF ablation. Currently the recommended therapeutic level of OAC during ablation is low (such as an INR of 2–2.5). In the general AF settings new OAC (NOAC) have shown non-inferiority compared to VKA for stroke prevention, with better safety. Rapidly acting NOAC seems a tempting alternative to VKA at least for the patients taken off OAC before the ablation, possibly avoiding any post-procedural heparin bridging. However, limited experience with periprocedural use of NOAC (mainly dabigatran) suggests an increased risk of bleeding or thromboembolic complications compared with VKA.

Abbreviations: AF, atrial fibrillation; cW, continuous warfarin; dOAC, discontinued warfarin; LA, left atrium; NOAC, new oral anticoagulants; OAC, oral anticoagulation; RF, radiofrequency; VKA, vitamin K antagonists

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Contents

1. Introduction

Atrial fibrillation (AF) is the most common arrhythmia, reaching epidemic dimensions in the developed world due to population ageing, with an overall prevalence of approximately 1.5–2% [1–3]. The arrhythmia is associated with a significant increase in mortality, morbidity and hospitalization mainly due its thromboembolic complications and uncontrolled ventricular rate, with a five-fold risk of stroke and a three-fold incidence of congestive heart failure [4]. The two principal targets of therapy are the prevention of stroke and the alleviation of symptoms through rhythm or rate control. To accomplish the former, most patients with AF will require an oral anticoagulant (OAC). Left atrial (LA) catheter ablation has emerged as a rhythm-control alternative to antiarrhythmic drugs (AAD). Catheter ablation procedures are indicated for patients with medically refractory/recurrent, symptomatic AF. Recent consensus and guideline update assigned it a class IA indication for first-line treatment in selected patients with paroxysmal AF and no/minimal structural heart disease [5–7]. These procedures comprise ablation in the systemic circulation, often with conversion from AF to sinus rhythm and are associated with a significant risk of thromboembolism. Strategies have been developed to reduce the risk of intra-procedural stroke, like real-time detection of the newly formed thrombi (transesophageal or intracardiac echocardiography) or thrombus prevention (irrigated tip catheters, aggressive anticoagulation). However, under the settings of heavy anticoagulation, inadvertent transseptal puncture, pericardial effusions as well as LA perforations are potentially catastrophic complications.

2. Thromboembolic risk during atrial fibrillation ablation

During LA catheterization, catheter manipulation can result in dislodgement of the previously formed thrombus. Pre-ablation transesophageal echocardiography can detect LA/LAA definitive thrombi as well as pre-thrombosis states (sludge) [8] and prevent this type of embolism, many centers performing it routinely prior to ablation. However the risk seems significant and warrants this pre-procedural screening only in patients with non-paroxysmal AF as well as in patients with paroxysmal AF and high or intermediate $CHADS_2$ score (>/=1), especially if they are in AF at the time of procedure [9,10]. Predictors of sludge/thrombus are $CHADS_2$ score >/=1, dilated LA (>45 mm transverse diameter?) and/or depressed LA function (reduced LAA empting velocities) and previous CHF/ LV dysfunction (LVEF<35%) [9,10]. The occurrence of a clot/sludge in low risk patients ($CHADS_2$ 0) is rare (<1%), indicating a relative safety of atrial fibrillation ablation in this subset of patients [10]. The role of spontaneous echo-contrast is less clear. Although its incidence parallels $CHADS_2$ score it still can be found in approximately one quarter of low risk patients ($CHADS_2$=0 and normal LVEF) [10]. During radiofrequency (RF) ablation embolism to the cerebral circulation or less commonly to the limbs or other organs may be produced by charing (hard coagulum produced by tissue heating, denaturation, and aggregation on the tissue or catheter surface) and/or thrombus formation [11]. The risk of stroke due to charing and/or thrombus formation is also higher in patients with previous cerebrovascular events or higher than 2 $CHADS_2$ score [12]. Overall the risk of a thromboembolic complication during atrial fibrillation ablation ranges from 0.5 to 5.0% with stroke occurrence of 0.23% and transient ischemic attack (TIA) of 0.71% [11–13]. Cerebral emboli result usually in transient neurological deficits (which resolve typically in less than 1 month) and less commonly produce permanent neurological sequels [13]. However, silent periprocedural cerebral thromboembolism detected on MRI seems to be much more common (more than 14%!), especially when activated clotting time (ACT) is lower than 250 s and/or when electrical/pharmacological cardioversion is performed during procedure [14]. Silent cerebral embolism is also significantly more frequent during non-irrigated tip RF ablations then during open-irrigated tip RF ablations or during cryoballoon ablations [15,16]. High flow perfusion with heparinized saline of the transseptal sheaths [17] as well as their withdrawal in the right atrium during ablation (a very popular approach into the electrophysiologists community) might reduce the risk of thrombus formation and therefore the risk of cerebral embolism, although the latter was never investigated.

3. Hemorrhagic risk during atrial fibrillation ablation

In order to minimize the embolic risk and in accordance with current guidelines anticoagulants or antiplatelet agents are