Editorial commentary on: “Real-life experience with a new anticoagulation regimen for patients undergoing left-sided ablation procedures” by Charles Dussault et al.

Intra-procedural anticoagulation protocols for left-sided cardiac ablations: Striking a balance between risk and benefit

Unfractionated heparin is universally utilized as the procedural anticoagulant of choice and it is administered prior to or immediately following transseptal access with a typical target activated clotting time (ACT) 300–400 seconds as outlined also in the 2012 HRS/EHRA/ECAS Expert Consensus Statement on Catheter and Surgical Ablation of Atrial Fibrillation [7]. However, the details on how to achieve therapeutic anticoagulation are not outlined in this statement and practice variations exist among providers with regards to the initial heparin bolus, rate of infusion, and frequency of ACT monitoring.

Against this background, Dussault et al. report on the comparison of two different heparinization protocols in patients undergoing left-sided cardiac ablation procedures [8]. This is a single-center prospective analysis of 145 consecutive patients undergoing various left-sided ablations (AF or flutter ablation in 105 patients) for which they received either a 100 U/kg unfractionated heparin bolus followed by 10 U/kg/hr infusion (n = 34 patients) or a 200 U/kg bolus followed by 20 U/kg/hr infusion (n = 111 patients) with a target ACT 300–400 seconds. Heparin was administered prior to transseptal access or immediately after arterial access. Patients who were taking warfarin and had an INR >2 were excluded from this study. The target ACT was achieved significantly faster in the higher dosage group. Patients in the 200 U/kg bolus group achieved ACT >300 sec in a mean of 15.25 minutes whereas the 100 U/kg group achieved target ACT in 51.23 minutes (p < 0.0001). Also, more patients in the higher dosage group had an ACT within therapeutic range in the first two ACT measurements, while there was no difference in the proportion of patients with supratherapeutic ACTs (>450 sec) between the two groups. The initial ACTs were similar across the different weight quartiles and in both groups. In an analysis of 30-day complication rates, there were no differences between the two dosage regimens. In the 200 U/kg bolus group, there were 3 pericardial effusions (all requiring urgent or elective pericardiocentesis), 4 groin hematomas and 1 death of unknown etiology, while in the 100 U/kg group one patient had pericardial effusion requiring drainage and 1 patient had access-related bleeding.

This study is attempting to address a clinically important question in an area with limited evidence. Procedural anticoagulation protocols are based largely on expert opinion and there is limited evidence on the comparative effectiveness and safety of different protocols. The lack of specific recommendations on anticoagulation regimens in the Expert Consensus document
from 2012 is indicative of the sparsity of evidence [7]. Potential advantages of achieving faster therapeutic anticoagulation are a lowered risk of thrombus formation, though this risk may be mitigated by taking extra caution to start application of ablation lesions only after the ACT has reached therapeutic levels. With a conservative heparin bolus regimen, this may lead to slightly prolonged procedures as additional heparin boluses may be necessary to achieve therapeutic levels. Indeed, the lower dosage group required a mean of 5754 units of additional heparin boluses versus 1122 units in the higher dosage group. Patients in the 100 U/kg bolus group spent on average 35 minutes longer with subtherapeutic ACTs compared to the 200 U/kg bolus group. This may increase the incidence of spontaneous echo contrast and formation of catheter-related thrombus [9]. However, more recent data from the era of open-irrigated tip catheters has suggested that AF ablation with lower ACTs (on average < 210 sec) can be safe with the use of pre-procedure transesophageal echocardiography and single transseptal puncture [10]. It should be recognized that the use of higher heparin loading doses may come with a risk. While no difference was observed in the 2 groups in the number of bleeding complications, among the 111 patients of the higher dosage group there were 3 patients with pericardial effusions requiring pericardiocentesis (including one with tamponade) and 4 patients with groin hematomas requiring blood transfusion or prolongation of their hospital stay. Notably, among patients with a hemorrhagic complication in this group, the mean initial ACT was 397.33 sec suggesting that there exists a potential for overshooting with a higher initial heparin bolus which is not inconsequential.

Certain aspects of the Dussault et al. study should be considered when interpreting the data with regards to their applicability to current real world practice. Patients with therapeutic INR>2 were excluded from this study. However, performing AF ablation with uninterrupted anticoagulation has been shown to be safe both with warfarin and direct oral anticoagulants [11,12]. This is of particular importance considering the impact of the baseline INR on the dosage of unfractionated heparin required to achieve therapeutic levels. The initial heparin bolus required to yield ACT >300 sec can be significantly lower in patients with INR>2 [13]. Similarly, the required initial heparin bolus may differ among patients undergoing ablation while on a direct oral anticoagulant [14]. The present study included a heterogeneous mix of AF/flutter, supraventricular tachycardia, and ventricular ablations, but it is unknown whether the results can be applied to each one of these procedures separately. Finally, as acknowledged by the authors, the small sample size renders the study underpowered to detect differences in relatively infrequent clinical events, such as major bleeding and cerebrovascular events.

Several other questions remain. When is the best time to administer heparin (before or immediately after the transseptal puncture)? What is the optimal ACT target for different left-sided ablation procedures? How often does the ACT need to be monitored? What is the optimal anticoagulation regimen in patients who undergo ablation while therapeutically anticoagulated with a direct oral anticoagulant? Beyond procedural anticoagulation, what is the optimal regimen for thromboembolic prophylaxis post-ablation? While substantial evidence is available for post-procedural anticoagulation in AF ablation [15], this is not the case for ventricular ablations.

This study provides useful information towards a better understanding of the safety and effectiveness of a commonly utilized practice for which there is otherwise limited data. Continued and systematic evaluation of procedural anticoagulation protocols in larger and randomized studies is necessary in order to enrich the evidence platform of the ablative management of cardiac arrhythmias.

Conflicts of interest
None.

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