Should we be considering gold-tipped ablation electrodes?

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Received 10 March 2009; accepted after revision 12 March 2009

This editorial refers to ‘In vitro comparison of platinum–iridium and gold tip electrodes: lesion depth in 4 mm, 8 mm, and irrigated-tip radiofrequency ablation catheters’ by M. Linhart et al., on page 565

During the past two decades, radiofrequency (RF) catheter ablation has transitioned from being a highly experimental and unproven procedure to its current role as first line therapy for the treatment of most types of cardiac arrhythmias. It is truly remarkable that catheter ablation of atrioventricular (AV) nodal re-entrant tachycardia, accessory pathways, typical atrial flutter, idiopathic ventricular tachycardia (VT), and the AV junction can be accomplished safely and with an efficacy well in excess of 90%. Perhaps the two most notable exceptions are catheter ablation of atrial fibrillation (AF) and catheter ablation of VT in patients with structural heart disease. Although catheter ablation has made progress in the treatment of these two arrhythmias, further advancements are needed both in ablation techniques and ablation technology. It is within this framework that we should consider the results of a study examining the size of ablation lesions created using gold-tipped ablation electrodes.

Linhart et al.¹ report the results of an in vitro study comparing the lesion characteristics of RF ablation lesions created with newly developed gold-tipped 4 and 8 mm ablation catheters in both an irrigated and non-irrigated configuration with RF ablation lesions created with standard platinum–iridium (Pt)-tipped ablation catheters. The authors sought to test the hypothesis that gold-tipped catheters would create larger lesions because of their nearly four-fold increased thermal conductivity of gold when compared with Pt. The study was performed on tissue samples of porcine endomyocardium and liver. The ablation tip was positioned perpendicularly on the tissue surface with constant contact pressure. Lesion depth, energy and temperature delivery parameters, and the frequency of popping were compared. The results of this study revealed that gold-tipped electrode catheters produced deeper lesions when compared with Pt-tipped electrodes. Lesion depth was increased by more than 30% with the use of a gold-tipped electrode. These larger lesions correlated with an increased amount of energy delivery. Of particular note, however, is the finding that no difference in lesion depth was observed between gold and Pt-tipped irrigated ablation catheters.

The results of this study are a welcome addition to the literature and to the ongoing efforts to develop new ablation techniques and tools that may be of value of increasing the efficacy and also the safety of catheter ablation of AF and VT in patients with structural heart disease. It is striking that simply by using gold for ablation electrode when compared with Pt that a more than 30% increase in lesion depth can be achieved. Perhaps, the only down side to this approach is the small increment in the cost of ablation catheter. But the real question of the day concerns whether the use of gold-tipped ablation catheters is likely to improve the outcomes of catheter ablation of standard arrhythmias such as AV nodal re-entrant tachycardia, atrial flutter, idiopathic V, and those involving an accessory pathway. Although it is possible that the use of gold-tipped ablation electrodes may increase success rates, I suspect that this is not the case. My sentiment reflects the fact that highly experienced operators currently achieve success rates approaching 100% for these arrhythmias. And when failure occurs it usually results from difficulty with mapping or concern that more aggressive ablation attempts may result in a complication. Another equally important question is whether the use of gold-tipped ablation catheters will improve the outcomes of catheter ablation of AF and/or VT in patients with structural heart disease. Although this is possible, I also doubt this is the case. This reflects the fact that irrigated ablation catheters have now become the standard ablation tool for ablation of these more complex arrhythmias. The finding by Linhart et al. that lesion size is not impacted by the use of gold vs. Pt when an irrigated ablation catheter is employed suggests that gold is unlikely to be the answer. But at the end of the day, it is through prospective randomized clinical trials that these important questions can be answered. I speak for the electrophysiology community when I urge these investigators to take the next step and carry out such a prospective clinical trial.

Conflict of interest: none declared.

Reference