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Accepting our own limitations: Perhaps technology can do better

Successful catheter ablation is dependent on several factors, including patient specific characteristics, anatomical location of the ablation site, technology and equipment being utilized, as well as operator skill set and experience. In an ideal situation, the ablation procedure is performed with 100% success, no long term recurrence, and no patient complications. Of the above mentioned properties, some of them are modifiable, whereby others are not. Of the modifiable factors, the use of increasingly sophisticated technology may improve ablation outcomes [1], at the expense of increasing the cost of the procedure. One of these technologies is contact force sensing catheters, which has been studied extensively in regards to atrial ablation in the context of patients with atrial fibrillation [2]. However, the utility of contact force catheters in ablation of other arrhythmia contexts such as WPW and AVNRT where the success rates with the conventional techniques are generally quite good is less clear and not well described in the published literature.

In this issue of *Indian Pacing and Electrophysiology*, Choo et al. describe catheter-tissue contact force on several locations on both the tricuspid and mitral annulus. The locations chosen for assessment are frequent sites of accessory pathway location and therefore potential ablation sites. The authors collected data from 42 patients undergoing catheter ablation whose left atrial diameter was less than 4.5 cm. Operators, who were blinded to the catheter measured contact force, also used a number of characteristics (including perceived tactile force, electrogram amplitude, and impedance) to provide a subjective assessment of contact force. The authors then compared the perceived contact force with the measured contact force at all the pre-specified tricuspid and mitral annular sites.

Interestingly, the authors found that contact force was consistently lower on locations on the tricuspid annulus than the mitral annulus (6.1 g ± 0.9 g vs. 9.8 g ± 0.9 g, $p = 0.0036$). They postulated that this observation may be partly responsible for the lower long term success rate of right sided accessory pathway ablation as compared to left sided accessory pathway ablation [3]. Even more interesting however, is that mean contact force at different sites on the mitral and tricuspid annulus were similar despite having experienced operators quantify the perceived contact as good, moderate, or poor (mitral: 9.9 g, 9.3 g, 9.7 g, $p = 0.959$; tricuspid: 6.5 g, 4.9 g, 6.9 g, $p = 0.671$).

What do these observations mean for the clinical practitioner? Successful catheter ablation relies on creating a durable lesion which is dependent on several modifiable factors including power, stability, time and catheter tissue contact force to name the key ones [4]. If perceived contact force does not correlate with measured contact force in ablation sites that have documented low contact force, it behooves us to accept and implement new technologies that have the capacity to improve ablation lesion formation in these locations, thereby potentially increasing long term successful catheter ablation results.

These results do not as yet indicate a need to change current practise but are indeed thought provoking. When performing a procedure without the use of contact force sensing catheters, can an operator reliably determine the contact force they are applying? Does an "average" or low volume operator benefit more from the technology than an experienced one? Are there individual anatomical sites where operator perceived contact is reliable? These and other questions notwithstanding, these data suggest that the use of contact force catheters may allow the operator to improve catheter positioning prior to delivering current, possibly limiting the number of lesions necessary and ultimately decreasing recurrence rates.

It remains to be seen whether this technology which adds expense to the procedure will result in meaningful improvement in success rates for accessory pathway ablation. Regardless and contrary to what is intuitive, even experienced operators may be unaware when they are not achieving good contact, a critical prerequisite for a durable lesion.

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