Ablation of a focal left atrial tachycardia via a retrograde approach using remote magnetic navigation

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Case report

A 66-year-old man who had undergone successful ablation of typical atrial flutter subsequently developed a left atrial tachycardia. A trans-septal approach was proposed, but not performed due to risk. He was referred to us with the suggestion that a retrograde procedure could be attempted using a magnetic navigation system (Niobe, Stereotaxis Inc, St Louis, MO, USA) installed in our institution.

We performed multi-slice computed tomography (CT) with three-dimensional reconstruction to allow for use of the CARTO RMT Merge system (Biosense Webster, Diamond Bar, CA, USA). The patient was sedated with diazepam and fentanyl. Heparin was used to maintain the activated clotting time of above 300 s. After placing diagnostic catheters, we approached the left atrium (LA) in a retrograde fashion using a 4 mm tip magnetically enabled ablation catheter (Navistar RMT, Biosense Webster), advancing it to just below the subclavian artery manually. The ablation catheter was then manoeuvred across the aortic and mitral valves using remote magnetic techniques developed while accessing left-sided accessory pathways in a retrograde fashion. Left atrium via the aortic and mitral valves was accessed within 12 min, with 5 min and 24 s of screening. We then performed anatomic and activation mapping of the LA during tachycardia. On assessing the activation map, it was clear that the area of interest was the roof of the LA between the upper pulmonary veins, towards the right (Figure 1). Mapping was concentrated in this area with an adequate map of the area of interest completed within a further 15 min (Figure 2). A complete map of the LA was not deemed necessary. The ‘design-a-line’ facility was used to fill in areas on the CARTO map where points had not been taken. Points on the

Figure 1  Left anterior oblique fluoroscopic view of the site of successful ablation with the catheter positioned in the left atrium roof via the aortic and mitral valves.
design line are transferred to the Niobe system and this then directs the catheter to these positions. One could also use the ‘click and go’ facility for this purpose. The CARTO RMT map obtained was merged with the reconstructed CT image. Features suggested a focal tachycardia, and we ablated at the point of earliest activation using settings of 60°C, 30 W for 60 s. This resulted in slowing (at 8 s) and termination of the arrhythmia (at 12 s) during the first application. Catheter stability was excellent. We were unable to reinduce any atrial arrhythmia even with aggressive pacing and isoproterenol, and after waiting 20 min. Follow-up to date (20 months) has shown no arrhythmia recurrence. Total procedure time was 157 min and total fluoroscopy time was 27 min.

Discussion

Trans-septal puncture is most often used for electrophysiological procedures in the LA. Newer techniques and increased experience have improved the safety of this procedure and reduced some of the risks. Although the success rate of trans-septal puncture is usually above 95%, it occasionally fails, especially when repeat trans-septal puncture is necessary. In some patients, contraindications may also be present. Given the number of patients presenting for percutaneous left atrial ablation, it is therefore important that alternative, non-surgical approaches be found to access the LA.

Standard steerable catheters can be placed retrogradely on the atrial side of the mitral annulus for the ablation of accessory pathways, but further manipulation within the atrium is then difficult. Magnetic navigation can place catheters, despite difficult anatomy and maintain good tissue contact throughout the cardiac and respiratory cycles, without additional risk of perforation. In a recent report, mentioning is made of cannulation in 30 of 30 pulmonary veins in five canines using a retrograde transaortic magnetic-enabled approach. We managed LA access in this patient and were able to successfully ablate an atrial tachycardia, thus moving a further step forward.

Conclusion

Although we would not advocate this approach as a first-line option, this case demonstrates that when trans-septal puncture cannot be undertaken, for whatever reason, alternatives exist. Although this technique proved useful in the ablation of this focal left atrial tachycardia, it is not yet clear whether ablation around the pulmonary vein ostia, using recently available irrigated tip catheters, can be undertaken using this approach.

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References