

Catheter ablation of atrial fibrillation: three-dimensional transesophageal echocardiography provides an excellent overview over the pulmonary vein anatomy

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Catheter ablation has become the first line of therapy in patients with symptomatic, recurrent, drug-refractory atrial fibrillation (AF). However, it is still challenging because of the high degree of variability of the pulmonary vein (PV) anatomy. Therefore, 3-D imaging systems (CT and MRI) are frequently used prior to an ablation procedure. Alternatively, 3-D transesophageal echocardiography (TEE) provides an excellent overview over the individual left atrial morphology without some of the limitations associated with other imaging techniques.

Methods: In 24 patients, 3-D TEE was performed immediately prior to an ablation procedure (paroxysmal AF: 12 patients, persistent AF: 12 patients). The images were available throughout the ablation procedure. Two different ablation strategies were used. In patients with paroxysmal AF, the cryoablation technique was used (Arctic Front Balloon, CryoCath Technologies). In the other patients, a circumferential pulmonary vein ablation was performed using the CARTO system (Biosense Webster). The PV isolation was verified using a circular mapping catheter in all cases.

Results: A 3-D TEE could be performed successfully in all patients and all PV ostia could be evaluated. The image quality was excellent and several variations of the PV anatomy could be visualized precisely (e.g. common PV ostia, accessory PVs, varying diameter of the left atrial appendage and its distance to the left superior PV). The image quality was good even if AF with rapid ventricular response was present during the examination. The TEE findings correlated well with the PV angiographies performed during the ablation procedures. All ablation procedures could be performed successfully (mean number of completely isolated PVs: 3.8 ± 0.2 (cryo group), 3.6 ± 0.4 (Carto group)). At 6-month follow up, 71 % of all patients were free from an arrhythmia recurrence (cryo group: 8/12 patients (67 %), Carto group: 9/12 patients (75 %)). There were no major complications.

Conclusions: Three-dimensional TEE overcomes most of the limitations of other imaging techniques (CT/MRI) currently used for evaluation of the PV anatomy (such as radiation exposure and inappropriate image quality in the presence of AF). A TEE should be performed prior to an AF ablation procedure to rule out the presence of a left atrial thrombus in all patients anyway. Thus, a 3-D TEE does not result in additional patient discomfort or cost and is less time-consuming than other techniques. Therefore, AF ablation procedures can be performed safely and effectively based on prior 3-D TEE imaging.