Zero-fluoroscopy ablation of the cavotricuspid isthmus guided by intracardiac echocardiography in patients with typical atrial flutter

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Introduction: In previous studies we have demonstrated the advantages of electrophysiology catheter navigation by intracardiac echocardiography (ICE). In this prospective study we investigated ICE-guided zero-fluoroscopy ablation of the cavotricuspid isthmus (CTI) involving a decapolar diagnostic and an irrigated radiofrequency (RF) ablation catheter in patients with typical atrial flutter (AFL).

Methods and results: Twenty-seven consecutive patients (mean age 73.4±11.6 years, 18 male) with ECG-recordings suggesting ongoing (n=19) or recent CTI-dependent AFL underwent an electrophysiological study (EPS) utilizing solely ICE for catheter navigation. All EPS could be successfully accomplished without the need for fluoroscopy. CTI-dependent AFL was confirmed by entrainment manoeuvre in all patients with ongoing AFL. Mean EPS duration was 44.0±20.3 minutes and mean ablation procedure duration was 22.3±16.4 minutes. RF ablation was applied for 6.3±3.1 minutes (50 Watts, irrigated RF-ablation in all patients). After the last RF application, bidirectional CTI-Block was confirmed by differential pacing in all patients. Echocardiographic parameters such as CTI-length, prominence of the eustachian ridge (ER), and depth of the CTI-pouch on the ablation plane (Figure 1) were assessed to analyse their correlation with EPS- or ablation procedure duration. CTI-pouch was shallower in patients with ablation procedure duration above median (4.9±1.09mm vs. 6.3±0.9mm, p=0.048), suggesting a more laterally ablation plane in these patients, where the CTI musculature is stronger. CTI-length or ER-prominence above the respective median did not correlate with longer EPS duration. However, in some cases with prominent ER inversion of the ablation catheter was needed to achieve contact of catheter-tip to the tissue. An asymptomatic intramural hematoma was diagnosed by ICE after successful ablation in one patient, no other major or minor complications were documented in this study.

Conclusions: Zero-fluoroscopy CTI ablation guided solely by intracardiac echocardiography in patients with CTI-dependent AFL is feasible and safe. ICE visualisation may help to localize the optimal ablation plane, to detect and correct poor tissue contact of the catheter tip and recognise early potential complications during the ablation procedure.

Figure 1. CTI-length = white line; CTI-pouch = red line; Eustachian ridge prominence = blue line. Inversion of the ablation catheter for solid tissue contact at the base of the eustachian ridge is visualized on this echocardiographic plane.