Long term follow up MRI angiographies before and after pulmonary vein isolation using a cryo balloon

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Introduction: Pulmonary vein (PV) isolation is the therapy of choice for trigger elimination in atrial fibrillation (AF). In up to 2 percent of cases relevant PV stenosis were reported after segmental radiofrequency (RF) ablation. The effect of cryo isolation (CI) of the PV ostia and antrum with a balloon with large tissue contact areas has not been investigated.

Methods: We examined 109 consecutive patients (pt) (mean age 59±10 y, range 24 – 81 y) who underwent CI of the PVs with the Arctic front cryo balloon (Cryocath Canada) for symptomatic, treatment refractory AF from August 2005 and completed a follow up of at least 6 months. All pts underwent MRI imaging of the PVs before and 3 and 12 months after ablation. In 6 cases CT scans were used because of implanted pacemakers. A mean of 2.4±0.7 cryo impulses of 6 minutes duration were applied per vein during the ablation.

Results: 97 pt underwent 3 month follow up MRI. In 2 cases (2.1%) asymptomatic stenosis of the left lower PV of 50% were described. In the first case the stenosis was probably caused by mechanical alteration with the guide wire and the tip of the catheter. In the area of balloon-tissue-contact no changes in the vessel lumen could be seen. No progression of this stenosis was seen in the 12 months follow up. The second pt underwent two more interventions using RF energy with substrate modification after the initial CI because of symptomatic AF recurrence. In a third pt an asymptomatic 80% stenosis of the left lower PV after earlier segmental PV isolations using RF energy was detected in the MRI before CI. Reisolation of this PV with the cryo balloon did not cause any progression of this lesion in the long term follow up. Of the 79 pt with 12 months follow up 51 (64.6%) underwent control MRI or CT. No new stenosis could be detected.

Conclusion: CI of the PVs using the Arctic front cryo balloon is a safe and effective treatment for AF. Large contact areas between balloon and PV and antrum tissue and temperature as low as - 75 °C cause no detectable PV shrinking compared to RF application. Mechanical alterations of the vein intima with the catheter tip and combinations of different energy sources should be avoided.