Impact of breast cancer treatment on the development of low voltage areas in patients receiving left atrial catheter ablation

Naotaka Hashiguchi  
Niklas Schenker  
Laura Rottner  
Bruno Reissmann  
Andreas Rillig  
Tilman Maurer  
Christine Lemes  
Karl-Heinz Kuck  
Feifan Ouyang  
Shibu Mathew

**Introduction**: Catheter ablation is an effective treatment option for patients with atrial fibrillation (AF). Extensive left atrial (LA) scars, frequently seen in patients with persistent AF, can limit its efficacy. Radiation for breast cancer treatment is known to have serious long-term effects (e.g. fibrosis) on the targeted tissue. At the same time, chemotherapy often leads to organ dysfunction, depending on the used cytostatic agent. With this study, we sought to examine the effects of radiation and chemotherapy on the electroanatomic features of the LA in patients who received catheter ablation for left atrial arrhythmias and underwent radiation and/or chemotherapy prior to the procedure.

**Methods**: In this single center study, we compared 38 patients (mean age 68.4±7.1 years) who underwent catheter ablation for left atrial arrhythmia and had a previous diagnosis of breast cancer with 38 patients (mean age 65.4±7.3 years) without breast cancer who formed our control group. LA scar area, as well as its distribution was measured during the electrophysiological (EP) study and graded according to the Utah classification.

**Result**: The existence of any LA scarring did not differ significantly between both groups (71.1% vs. 76.3%, p=0.602). LA scar area (excluding pulmonary vein area) was 13.8±13.0cm² in the breast cancer group compared to 12.6±14.9cm² in the control group (p=0.717). The distribution of the scar area revealed no significant difference between both groups. However, an involvement of the anterior wall was common (65.8% vs. 73.7%, p=0.454). We further investigated whether the location of breast cancer had an impact on the LA scar development of the patients in our study cohort. Here we found no significant difference in the amount of LA scarring when comparing patients with left-sided breast cancer to patients with right-sided breast cancer (66.7% vs. 73.9%, p=0.722). In a sub-analysis, patients with breast cancer and persistent AF showed a trend towards greater LA scar areas (mean LA scar area (%): 14.1±11.8 cm² vs. 11.6±13.3 cm², p=0.497, median LA scar area (%): 14.5 vs. 6.9, p=0.383) in comparison to patients of the control group whilst presenting with similar LA volumes (107.7±24.5cm³ vs. 110.9±28.8 cm³, p=0.680). The patient's age (HR: 1.26, 95%CI: 1.07-1.56, p=0.012) and LA volume index (HR: 1.12, 95%CI: 1.03-1.24, p=0.012) were independent predictors for greater LA scarring we could identify. Neither former radiotherapy, nor chemotherapy showed a positive correlation with a more extensive LA scar.
Conclusion: Thoracic irradiation and chemotherapy for breast cancer did not lead to an increase in LA scar area or a changed distribution of LA scarring. A trend towards greater LA scar areas was seen in patients with breast cancer and persistent AF. The patient’s age and LA volume index were identified as an independent predictor for LA scar development.