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The efficacy of electrical cardioversion of long-standing persistent or permanent atrial fibrillation in cardiac resynchronization therapy recipients

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Background: Atrial fibrillation (AF) and heart failure (HF) often co-exist and influence each other. The presence of AF is often regarded as a marker of HF severity. Moreover, AF in cardiac resynchronization therapy (CRT) recipients hinders the CRT effectiveness in HF treatment by the reduction of the percentage of biventricular paced beats (BiVp%). Sinus rhythm (SR) restoration makes CRT more effective in HF treatment which may protect AF recurrence.

Purpose: To establish the effectiveness of electrical external cardioversion (EEC) in CRT patients with long-standing persistent AF or permanent, pre-treated with amiodarone.

Methods: The population of the study comprised of the Pilot-CRAfT study participants (NCT01850277), that is patients with CRT, long-standing persistent or considered as permanent AF and BiVp ≤ 95% who were randomly assigned to the "rhythm control" or the "rate control" strategy. The inclusion criteria included an AF paroxysm lasting at least 6 months. Both treatment arms received amiodarone beginning with the loading dose. Subsequently, patients assigned to the rhythm control strategy underwent electrical cardioversion. Rate control strategy included pharmacotherapy and atrioventricular node ablation, as needed. The follow up visit was performed 3 months after the enrolment visit. The EEC effectiveness, an AF recurrence within the 3 month period, BiVp% changes, the EEC parameters and the EEC related complications were analysed.

Results: Out of 48 participants enrolled in the Pilot-CRAfT study, 25 patients were assigned to the rhythm control arm. The mean age of the rhythm control arm patients was 69,5 years , the mean left ventricular ejection fraction was 30,6% , the mean left atrium diameter was 53 mm and the median duration of persistent AF was 16 months. SR was obtained in 12 out of 20 (60%) patients who underwent the EEC . On the 3 month visit 8 patients remained in SR (40%). In patients with an AF paroxysm lasting less than 1 year the success rate was 100% vs 50% in the AF lasting 1 year at least (p = 0,11). After 3 months, SR remained in 100% vs 25% of patients, respectively (p =0,015.). The effectiveness of anterior-posterior EEC electrodes placement was 20% and it was 71% for the anterior-lateral patch location . The EEC resulted in significant BiVp% rise - also in the whole intention-to-treat (ITT) group: 88,58% before the EEC vs 96,68% after the EEC (p = 0,002). No severe adverse events of the EEC were observed.

Conclusions: The electrical cardioversion of persistent atrial fibrillation lasting more than 6 months in patients with severe HF and treated with CRT is characterised by modest success rate, even after the amiodarone pre-treatment. However, the ECC ensures significant rise in BiVp% close to 97%, even in the whole EEC group based on the ITT principle. The AF paroxysm duration <1 year and the anterior-posterior patch placement may ensure better EEC efficacy in this group of patients.