

# Cryoballoon ablation of paroxysmal atrial fibrillation and underlying atrial tachycardia and ectopy arising from a common trigger focus limited to a right inferior pulmonary vein

Krioablacja balonowa napadowego migotania przedsionków i współistniejącego częstoskurczu przedsionkowego oraz ektopii przedsionkowej wywodzących się ze wspólnego ogniska ograniczonego do prawej dolnej żyły płucnej

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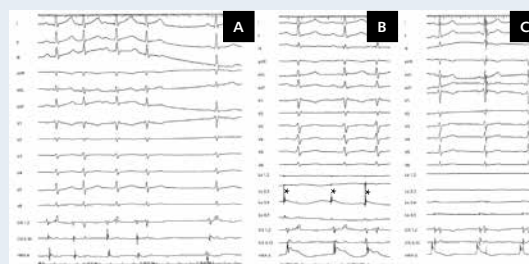
A 69-year-old woman (case 1) and a 36-year-old man (case 2) without comorbidities, normal pulmonary veins (PV) anatomy and atrial, mitral, PV dimensions were referred for cryoballoon ablation of paroxysmal atrial fibrillation (AF). Although atrial tachycardia (AT) and a frequent atrial ectopy (AE) had never been documented, ongoing AT or AE mimicking sinus rhythm (SR) were noticed at admission. An electrophysiological study, in a drug free state, with catheters placed into the coronary sinus, in the right atrium (RA) and His bundle was performed. The positive P wave in lead V<sub>1</sub>, superimposed on the negative T wave and the negative P wave in lead aVL in case 1 (Figs. 1A, B), and similarities in the P wave morphology during AE and SR and negative P waves in lead aVL in case 2 (Figs. 2A–C), suggested PV AT/AE. Activation mapping with a circular catheter within each PV was performed. Right inferior PV (RIPV) depolarisation preceded the onset of the ectopic P wave by 60 ms (Fig. 1A) and 50 ms (Fig. 2B), respectively. During cryoapplication with a 28 mm cryoballoon catheter (Fig. 3), SR was restored (Figs. 1B, 2C). We did not notice PV electrical activity within other PVs during AT/AE and SR. Although a single culprit PV was found, isolation of the remaining PVs was performed. Post-ablation, there was a bidirectional block within all PVs and no AT/AF was induced. No recurrences of any atrial arrhythmias were seen during the 18 month drug free post ablation follow-up. Focal AT/AE is a rare arrhythmia mainly arising from the RA (83%). The most frequent foci within the left atrium (LA) are superior PV ostia. Their origin from RIPV and coexisting AF with a trigger limited to the same PV, while it is commonly associated with multiple triggers from multiple veins (94%), is uncommon. Although AT and AF may be initiated by PV triggers, it is unclear whether in the presented cases there were two independent arrhythmogenic foci within one PV or a single AT/AE focus that resulted in a long-term AF. Many authors have suggested that PV AT and PV AF represent distinct entities. PV foci initiating AF have been identified to be located deep within the PV, in contrast to a more ostial location for AT. PV AT patients have a discrete, in contrast to diffuse, process involving PVs and the LA seen in AF. In PV AT patients without a history of AF following a focal ablation, AF episodes have not been documented during long-term follow-up. A single documented episode of a PV AT/AE indicates that the supposed previous episodes were short lasting and self-terminating, or just initiated AF.



**Figure 3.** Intraoperative view of the inflated cryoballoon catheter (1), advanced in the steerable sheath (3), occluding RIPV ostium confirmed by venography (2). A diagnostic catheter (4) was introduced for phrenic nerve stimulation



**Figure 1. A.** The earliest atrial activity during AT is on the circular catheter placed inside RIPV (asterisks); **B.** After restoration of SR, only far-field atrial signals could be seen with no signs of RIPV activity; LS — circular catheter; CS 1, 2 — distal coronary sinus; CS 9, 10 — proximal coronary sinus; spikes — phrenic nerve capture



**Figure 2. A, B.** The earliest atrial activity during AE is on the circular catheter placed inside RIPV marked by a spike (asterisks); **C.** After cryoapplication, complete elimination of PV potentials could be seen; LS — circular catheter; CS 1, 2 — distal coronary sinus; CS 9, 10 — proximal coronary sinus; HRA d — high right atrium; spikes — phrenic nerve capture

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**Conflict of interest:** none declared