EP CASE REPORT

Cryoballoon dysfunction indicated by abrupt temperature drop during atrial fibrillation ablation

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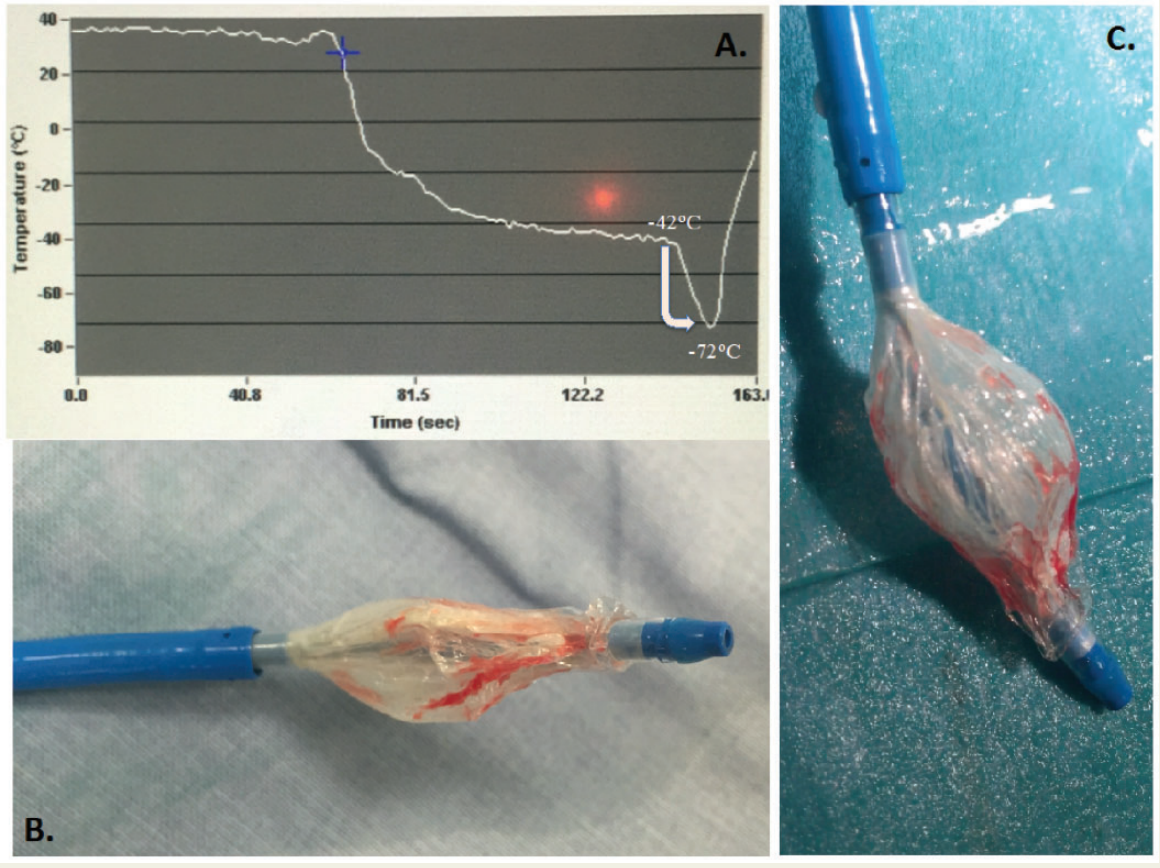
Pulmonary vein (PV) isolation remains the cornerstone of atrial fibrillation (AF) ablation. Cryoballoon ablation is shown to be non-inferior to radiofrequency ablation in terms of efficacy and safety among paroxysmal AF patients.[1] In this case, we report an intraprocedural adverse event encountered during cryoballoon ablation.

A 46-year-old male patient with symptomatic, paroxysmal AF underwent cryoballoon ablation. Following successful isolation of other PVs, a cryolesion was delivered at the right inferior PV. Initially, the recorded temperature fell at −42°C after 50 s. However, a second abrupt and rapid temperature decline was noted unexpectedly, reaching −72°C within the next 7 s (*Figure 1*). Ablation was terminated, but despite balloon deflation, retraction of the cryocatheter (Arctic Front Advance™) within the sheath was not feasible. The dysfunction persisted despite subsequent cycles of inflation and deflation aiming to allow appropriate balloon unwrapping. Following deflation, the cryoballoon catheter and the sheath were carefully retracted *en bloc* to the right atrium, and the procedure was terminated. Visual inspection



demonstrated a kink in the shaft within the balloon. Furthermore, the inflated cryoballoon was partially inflated without presenting its usual spherical shape (*Figure 1*). The patient's in-hospital course remained uneventful.

The device was returned to the manufacturing company. Based on the analysis results, the returned product failed performance testing due to the balloon's inability to unwrap and a guide wire lumen kink. When connected to the console, the balloon could not be inflated to its fully inflated state during ablation, due to a safety notice indicating the detection of a compromised outer vacuum. Furthermore, when the catheter was subjected to pressure testing, a leak in the inner balloon was revealed at its distal attachment with the catheter tip.

Previous reports with an older catheter and console software version have described a very rare failure of the outer balloon safety feature to detect pressure increase due to refrigerant gas leak from the inner balloon, thus preventing automatic termination of gas injection. In those cases, the operators also noticed a sudden drop in the temperature and an increase in the balloon fluoroscopic size (contrary to our report where the balloon displayed reduction in its size due to its inability to fully inflate).[2]

A sudden significant drop in the monitored temperature should raise suspicion for this technical failure, necessitating termination of the procedure and meticulous removal of the system from the left atrium. Regarding clinical sequelae of this complication, the outer balloon prevents gas leaking in the blood circulation, but proper unwrapping of the balloon may be impaired, thus withstanding retraction of the cryocatheter within the sheath. Vigilance of the electrophysiological community for identification and reporting of similar cases is recommended.

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References

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