Are occult phrenic nerve injuries occurred after the cryoballoon ablation?

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Introduction: Background: Phrenic nerve injury (PNI) is the most frequent complication in cryoballoon-based pulmonary vein isolation ablation (CB-PVI). However, there is no standardized way to avoid PNI. Purpose: Our purpose is to verify whether a drop in amplitude of diaphragmatic compound motor action potentials (CMAP) is optimal to prevent PNI, using routine respiratory function tests before and after CB-PVI.

Methods: In consecutive 97 atrial fibrillation patients (male gender, 54%; age, 67.4±10.2 years; paroxysmal AF, 93%; CHADS2 score, 1.20±1.06; body mass index 23.1±3.65), who underwent CB-PVI, routine respiratory function tests were taken on the day before and following the CB-PVI. All the patients were treated with second generation 28-mm CB in conscious sedation with dexmedetomidine and fentanyl. Noninvasive positive pressure ventilation was used for respiratory supports during procedures. Phrenic nerve was stimulated at superior vena cava with 10 volts and 1.0 msec pulse during CB-PVI of right pulmonary veins. The freezing cycle was immediately terminated in case of 30% drop in amplitude of CMAP.

Result: All the 4 pulmonary veins were successfully isolated but 1 of touch-up for PVI, 7 of supra vena cava isolation and 20 of cavotricuspid isthmus linear ablations with radiofrequency catheter were added. The 30% drop in amplitude of CMAP was observed just in 1 patient (1%), in whom vital capacity (VC) was 15% decreased on the following day. In the other 96 patients without more than 30% drop in amplitude of CMAP, significant VC decreases were not observed (from 3.1±0.88L to 3.0±0.88L, ns).

Conclusion: A drop in amplitude of CMAP during CB-PVI with 10 volts and 1.0 msec pulse was a good indicator to prevent PNI, but not perfect one.