EP CASE REPORT

Underdiagnosis of phrenic nerve palsy caused by cryoballoon ablation for atrial fibrillation with upright position chest radiography: usefulness of supine position dynamic chest radiography

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A 77-year-old male patient with symptomatic drug-refractory paroxysmal atrial fibrillation underwent pulmonary vein (PV) isolation using a 28 mm 4th-generation cryoballoon.[1] To minimize the risk of phrenic nerve palsy (PNP),[2] we routinely perform constant pacing to capture the diaphragm using electrodes at the high lateral right atrium during the cryoablation of right-sided PVs and immediate termination of cryoablation by 'double-stop' technique upon reduced diaphragmatic motion. In this patient, the right superior PV was isolated in 22 s, and as soon as the weakened diaphragmatic motion was detected at 112 s, cryoablation was terminated. Right PNP was confirmed using fluoroscopy. After that, cryoablation was performed in the order of left superior PV and left inferior PV. First-pass isolation of PVs was performed, and the entrance and exit blocks were confirmed. PNP was followed by dynamic chest radiography (DCR) in the upright and supine positions using a dynamic flat-panel detector imaging system (Konica Minolta Inc., Tokyo, Japan). Details of the system have been described elsewhere.[3] The day after catheter ablation, DCR in upright position showed a good range of motion (*Figure 1A and B*, Supplementary material online, *Movie*), but in supine position decreased and dyssynchronous motion of the right diaphragm was observed (*Figure 1C–E*, Supplementary material online, *Movie*). The highest point of the diagram and the apex of the lung are automatically set and tracked using the template-matching technique throughout the respiratory phase (right; pink, left; green) (*Figure 1E and F*). The position of diaphragm in the rest expiratory phase was defined as the baseline position. PNP was detectable with supine position but not in upright position, possibly due to the passive effect of gravity and active tonic contraction of abdominal muscles. After 7 months, complete recovery of the diaphragmatic motion and synchronization was confirmed with DCR in the supine position (*Figure 1F*). Bilateral diaphragmatic synchronization was felt to be a better marker of PNP recovery as the diaphragmatic excursion distance depends on the depth of breathing. DCR effectively showed the timing and distance of the diaphragmatic motion and is a useful tool for observing the recovery course of PNP.

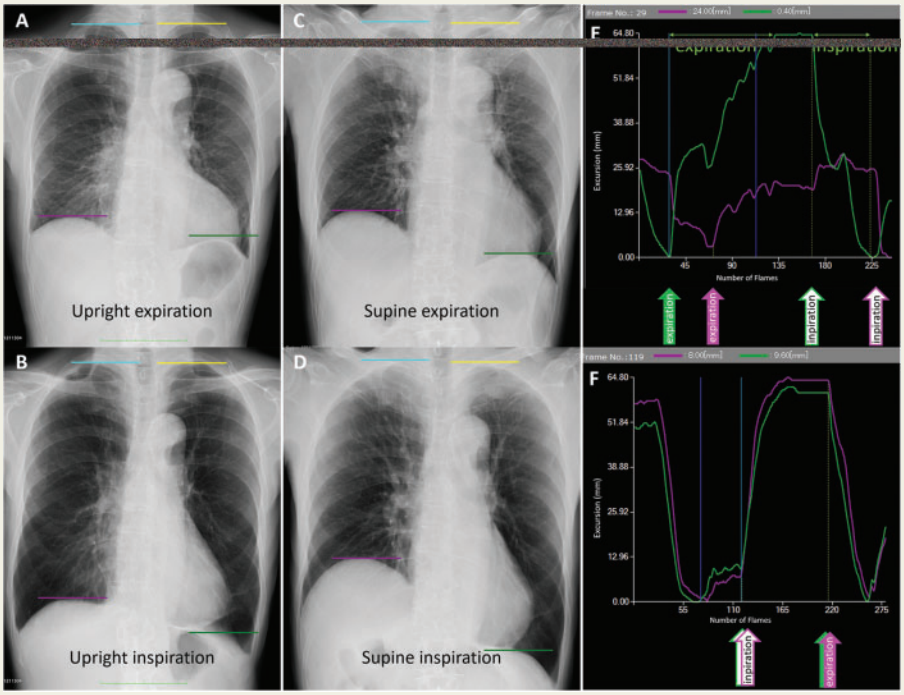

Figure 1 Dynamic chest radiography and motion of diaphragm

Supplementary material

Supplementary material is available at *Europace* online.

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Conflict of interest: none declared.

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