CLINICAL VIGNETTE

Cryoablation of pulmonary veins for the treatment of paroxysmal atrial fibrillation coexisting with isolated persistent left superior vena cava

Małgorzata Peregud-Pogorzelska, Małgorzata Zielska, Marcin Zakrzewski, Radosław Kiedrowicz, Maciej Wielusiński, Jarosław Kaźmierczak

Department of Cardiology, Pomeranian Medical University, Szczecin, Poland

Persistent left superior vena cava (PLSVC) is a congenital anomaly of the thoracic venous system found in 0.3%–2% of the general population [1, 2]. In approx. 0.1% of cases, it coexists with the absence of the right superior vena cava (RSVC; isolated PLSVC [IPLSVC]). In 90% of cases PLVSC drains to the right atrium through a dilated coronary sinus (CS) [2, 3]. PLVSC is a potential factor triggering atrial fibrillation (AF) [1, 4]. We report two cases of patients with IPLSVC who underwent pulmonary vein (PV) electrical isolation (PVI) using cryoablation. **Case 1** was a 62-year-old man with paroxysmal AF, with typical topography of PVs on computed tomography (CT). Transthoracic echocardiography (TTE) revealed a dilated CS. Intraoperative angiography showed PLVSC draining into the CS (Fig. 1A) and no RSVC (Fig. 1B). Because of difficulties with the transseptal puncture (TSP), cardiac tamponade occurred but was successfully treated with pericardiocentesis. During a second procedure TSP was done under transoesophageal echocardiography (TEE) guidance. **Case 2** was a 69-year-old woman after surgical repair of atrial septal defect type II 20 years earlier, without right superior PV and RSVC (Fig. 1C) on CT. Intraoperative imaging also showed IPLSVC draining into a dilated CS. TSP was done under TEE guidance. A circular mapping catheter was used to confirm complete PVI. In both patients a 28-mm cryoballoon catheter was used and the temperatures were up to –59°C. Because of the absence of the RSVC, cryoablations of right PVs were performed without stimulation of the right phrenic nerve (PN), and only the respiratory movements of the diaphragm were monitored. After 12- and nine-month follow-up, respectively, patients were free from AF. The presence of IPLSVC increases the risk of complications during left atrial (LA) ablations. The absence of the RSVC creates problems with TSP because it is impossible to position a transseptal needle in the RSVC for a safe movement down into the fossa ovalis, and TSP should be performed with TEE or intracardiac echocardiography guidance [1, 4]. The stimulation of the right PN is also impossible. To reduce the risk of PN palsy, the cryoablation of right PVs should be performed while carefully monitoring the respiratory movements of the diaphragm. This is the only possible solution because, for example, monitoring of diaphragmatic compound motor action potential requires pacing of the PN through a catheter placed in the RSVC [5]. PLVSC should always be suspected when a dilated CS is detected on TTE [2]. Nevertheless, when IPLVSC is suspected, magnetic resonance imaging or CT are recommended. PLSVC may be a source of ectopic activity triggering AF, and then the ablative strategy should include PLSVC isolation [1, 4]. PLSVC isolation could be complicated by the left PN palsy. Sometimes multiple ablation procedures are necessary because there may be an electrical connection between PLSVC and the LA or the left superior PV; thus, even if PVI is completed, AF may be triggered by a PLSVC focus or ectopies resulting from PV, which may be conducted to the LA through the left superior vena cava and CS [2, 4]. In our patients, although PLVSC was not isolated, AF recurrence was not observed in long-term follow-up.

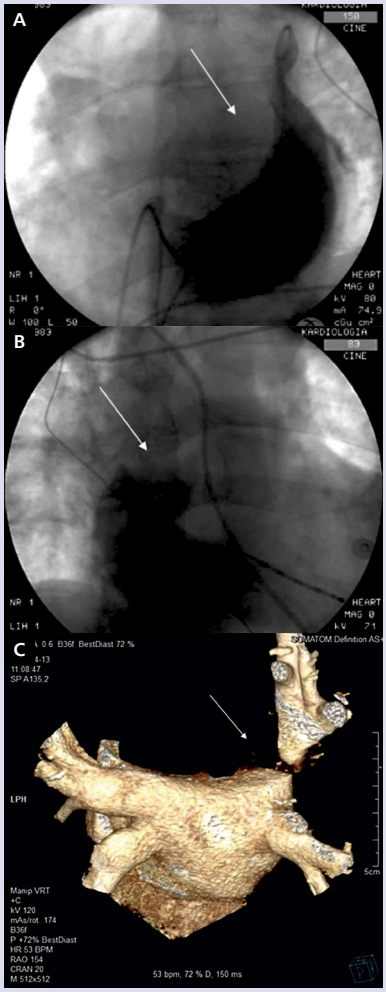

Figure 1. Angiography images: **A.** Persistent left superior vena cava draining into the dilated coronary sinus (arrow); **B.** Absence of the right superior vena cava (arrow); **C.** Absence of the right superior pulmonary vein (arrow)

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Address for correspondence:
Prof. Jarosław Kaźmierczak, Department of Cardiology, Pomeranian Medical University, al. Powstańców Wielkopolskich 72, 70–111 Szczecin, Poland, e-mail: jar.kazmierczak@o2.pl

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