Cardiac Resynchronization Therapy in Patients with Persistent Left Superior Vena Cava

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Introduction: Persistent left superior vena cava (PLSVC) is one of the most common congenital abnormalities found incidentally during cardiac device implantations. Hereby we report two cases of cardiac resynchronization therapy (CRT) device implantations in patients with PLSVC. The first case was a 48-year-old gentleman who had aortic valve replacement 4 years prior to presenting with complete heart block (CHB). His echocardiogram showed dilated left ventricle (LV) with ejection fraction (EF) of 36%. The second patient was a 57-year-old lady who had CHB with episodes of Torsades de Pointes. LVEF was 35% and her coronary angiogram showed severe ostial left main stem (LMS) disease, calcified left anterior descending (LAD) with severe ostial disease.

Methods: For the first patient, we implanted a CRT-P via standard left deltopectoral approach. During the implantation, after placing an active fixation right ventricular (RV) at the RV apex, we faced difficulties to engage the coronary sinus (CS) via left axillary vein puncture. Venogram was done to visualize the coronary sinus ostium, and this revealed coronary sinus atresia with PLSVC. As the CS drains into the PLSVC, access to the lateral branches of the CS was only possible through this persistent connection. We improvised our approach using peripheral interventional technique and managed to gain access to the lateral wall via the posterior vein. An active fixation lead was used to ensure stability of the LV lead in that particular position. Capture threshold post implantation was stable at 0.6V at 0.5ms. Similarly, for the second patient, she had coronary sinus atresia with PLSVC. We cannulated the left SVC using hydrophilic guidewire via sub-selection catheter, and passed a 4 Fr hydrophilic coated catheter from left SVC to CS. This was then used as support, while another guidewire was inserted then exchanged with coronary sinus selection catheter. Selective coronary sinus tributaries venography was done and lateral vein was selectively intubated with an inner sub-selection catheter. An over-the-wire lead was successfully deployed through the intubated inner sub-selection catheter with a capture threshold of 1.2V at 0.5ms. Lastly, an active-fixation atrial lead was positioned at the right atrial appendage. A CRT-D device was connected and implantation was successfully completed.

Result: Chest radiography post implantation for both patients showed stable leads position and no pneumothorax. At one month follow up, the LV capture threshold and other parameters remained stable.

Conclusion: The transvenous placement of LV pacing lead via PLSVC can be technically challenging. Use of guidewire support, sub-selection catheter and active fixation leads contributed to the success of LV lead implantation in these two cases.