CASE REPORT

Coronary Sinus Draining into the Left Subclavian Vein through a Persistent Left Superior Vena Cava

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Abstract

A persistent left superior vena cava (PLSVC) is formed by the remains of the oblique vein of the left atrium, which is not completely degenerated during embryonic development. The incidence is approximately 0.3% in the general population. Approximately 80-92% of PLSVCs drain into the right atrium through the coronary sinus. This report describes a rare case of PLSVC in which the coronary sinus (CS) did not open into the right atrium, but rather drained into the left subclavian vein through the PLSVC.

Key words: persistent left superior vena cava, vascular malformation


Introduction

A persistent left superior vena cava (PLSVC) is formed by the remains of the oblique vein of the left atrium, which is not completely degenerated during embryonic development. Although PLSVC represents the most common congenital venous anomaly of the thoracic systemic venous return, the incidence is only approximately 0.3% in the general population (1, 2). Approximately 80-92% of PLSVCs drain into the right atrium through the coronary sinus [CS (3-5)]. This report describes a rare case of PLSVC in which the CS did not open into the right atrium, but rather drained into the left subclavian vein through the PLSVC.

Case Report

A 50-year-old man suffered from repeated paroxysmal heart palpitations with no significant triggers occasionally accompanied by dizziness over the past nine years. The duration of each palpitation episode was several seconds at the shortest to approximately three hours at the longest, and all episodes were self-terminating. An electrocardiogram showed atrial tachycardia (Fig. 1) several times; however, a physical examination, including an ultrasonic cardiogram, did not detect anything abnormal. The patient was clinically diagnosed with idiopathic atrial tachycardia. In hope of confirming the diagnosis and determining future treatment, an intracardiac electrophysiological study was performed under localized anesthesia.

A sheath was successfully built by puncturing the left subclavian vein under localized anesthesia with 1% lidocaine, and a level-10 CS electrode was successfully sent to the right atrium. A repeated search for the CS ostium was unsuccessful. Subsequently, electrodes were sent successively through the right internal jugular and right femoral veins; however, the CS ostium was not found. A sheath was successfully built by puncturing the left femoral artery. The catheter for coronary angiography was sent to the ostium of the left coronary artery to perform coronary angiography. Delayed development showed obvious expansion and tortuosity of the CS, which was not opened to the right atrium, but rather drained into the left subclavian vein through the PLSVC (Fig. 2). Electrodes were placed at the right atrium, His bundle and right ventricle. An intracardiac electrophysiological study did not show the double-route sign of the atroventricular node or accessory atroventricular pathway. Repeated atrial stimulation, including stimulation following an intravenous drip of isoprenaline, only triggered atrial tachycardia that lasted for several seconds. The P' of the triggered atrial tachycardia had a form consistent with that of the spontaneous atrial tachycardia. However, it had poor...
In the middle and later stages of embryonic development, following anastomosis of the left and right anterior cardinal veins, the left anterior cardinal vein degenerates to the oblique ligament of the left atrium. However, due to maldevelopment of the anastomosis of the left and right anterior cardinal veins, approximately 0.3% of the general population develops a PLSVC from the left anterior cardinal vein. According to the different regions of the heart to which they connect, PLSVCs are generally divided into three types. Type I drains into the CS and is the most common type, accounting for 80% to 92% of cases (3-5). Type II drains into the left atrium, and type III links to the pulmonary vein. In this case, the PLSVC linked to the CS; therefore, it appears that it should be classified as a type I malformation. However, in this case, the blood did not drain into the CS through the PLSVC, but rather into the PLSVC through the CS. We believe that this case should not be included in any of the three above-described types.

In this case, there was CS atresia, and the blood of the CS drained into the left subclavian vein through the PLSVC and then back to the right atrium. Some types of CS atresia have been previously reported (6-9). Very rarely, a communication between the CS and right atrium is absent, and the CS is drained via a PLSVC into the left subclavian vein. To our knowledge, such congenital venous anomalies have not been previously reported in any publication. In a similar case reported by Stevenhagen and colleagues (8), the CS drained into the innominate vein through the PLSVC.

In patients with this disorder, although the CS drainage is not normal, the cardiac venous blood finally backs into the right atrium through the superior vena cava and does not cause hemodynamic disorders; therefore, no surgical correction is necessary.

Some researchers believe that PLSVCs have muscular sleeve-like atrial muscles and an electric potential similar to that of the pulmonary vein, which has a relatively high level of automaticity and may cause several types of atrial arrhythmias (10, 11). The patient in this case study had experienced repeated palpitations for several years, and atrial tachycardia was diagnosed on an electrocardiogram examination (Fig. 1). The atrial P' wave exhibited very small positive waves and large negative waves in the II, III and aVF leads, where the I lead demonstrated a near equipotential line, the avL lead showed a low-amplitude forward wave and the P' wave of the V1 lead displayed a near equipotential line in the first half and a low-amplitude forward wave in the second half, which suggested that the atrial tachycardia originated from the coronary sinus. Considering that there was no CS ostium in the right atrium, and the CS venous and PLSVC exhibited obvious expansion and tortuosity, surgery to treat the atrial septal puncture was very difficult and highly risky. Since the duration of the atrial tachycardia triggered by the intracardiac electrophysiological stimulation was very short and exhibited feeble repeatability, ablation therapy was not prescribed at the time. Drug prophylaxis was administered to prevent the repeated atrial tachycardia, including 80 mg tid of verapamil. Mild and bearable palpitations occasionally occurred, lasting from several seconds to several minutes, during the follow-up period of nearly 10 months.

The authors state that they have no Conflict of Interest (COI).
References


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