

DUAL CHAMBER PACE MAKER IMPLANTATION THROUGH A PERSISTENT LEFT SUPERIOR VENA CAVA: CASE REPORT

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Summary

Persistent left superior vena cava is an anomaly of the systemic venous return occurring in 0, 5% of the general population and in 3 to 10% if congenital heart disease is associated.

We report a case of persistent left superior vena cava (LSVC) incidentally recognized during a dual chamber pace maker implantation.

We describe the manner in which we dealt with this problem and we also propose a plan of management to be applied when faced with persistent LSVC during the introduction of a transvenous electrode.

Although the technical difficulties associated, persistent LSVC, does not prevent successful placement of central venous lines or device implantation.

INTRODUCTION

Persistent left superior vena cava is an anomaly of the systemic venous return occurring in 0, 5% of the general population and in 3 to 10% if congenital heart disease is associated. It usually remains asymptomatic and is an unexpected finding during pacing lead implantation.

CASE REPORT

A 35 year old man, caucasien, suffering from syncope was admitted to our department in March 2009. Baseline ECG (fig1) revealed an alternating bundle branch block. We decided to treat the patient in emergency with a permanent endocardial dual chamber pace maker (indication class I level C) [1]. At operation, we have used for the right ventricle a bipolar active fixation electrode. This lead was introduced via the left cephalic vein into the left subclaviar vein. Under fluoroscopic control, it was found that the course taken by the electrode was through a persistent left superior vena cava draining into the coronary sinus. A subclavian venography was performed confirming the presence of an anomalous left superior vena cava draining into the coronary sinus. The electrode was again introduced via the left superior vena cava and the coronary sinus into the right atrium.

Advancement of right ventricular lead through the tricuspid annulus was technically challenging due to acute angle between coronary sinus ostia and right atrium. By further manoeuvring and after the formation of a loop in the right atrium, the electrode tip was advanced to the right ventricular and fixed in the position of pulmonary infundibulum. As satisfactory pacing was obtained with a threshold of 0, 7V for stimulation and 19 mV for detection, it was decided to leave the leads in this position for permanent pacing (fig 2). The second lead was introduced in the right atrium and fixed to its lateral wall. ECG and chest radiography performed after implantation was satisfactory (fig 3). Echocardiography was performed after the implantation of the Pace Maker to confirm the diagnosis of a persistent left superior vena cava and to search an associated congenital heart disease. Echocardiography showed the presence of a marked dilated coronary sinus (fig 4), demonstrated the presence of LSVC to the left of the aorta and confirmed the presence of the electrode in the right ventricular and in the coronary sinus (fig 5). The diagnosis of persistent left superior vena cava associated with a right superior vena cava was confirmed by a simple contrast injection into the left antecubital vein and the right antecubital vein (fig 6 and fig 7).



Fig 1: the initial ECG (left) demonstrates normal sinus rhythm with left bundle branch block alternating with a right bundle branch block. An ECG obtained one day later (right) demonstrates a right bundle branch block

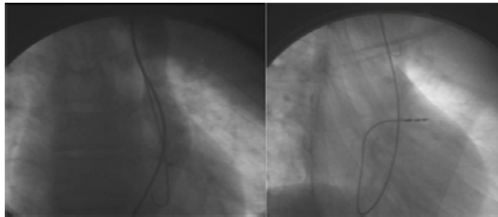


Fig 2: Anteroposterior view Venography detecting a left superior vena cava, Fluoroscopic image in RAO view showing ventricular pacing lead traversing left superior vena cava, coronary sinus and entering the right ventricular after the formation of a loop in the right atrium

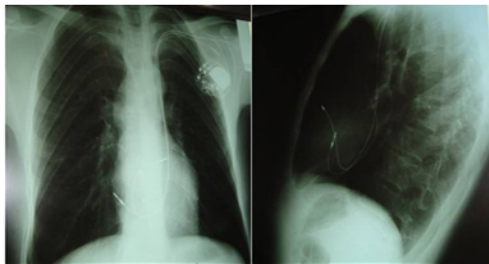


Fig. 3: Poster anterior chest radiograph showing the transvenous electrode tip in the right ventricle after traversing a left superior vena cava and the coronary sinus with the formation of a loop in the right atrium,
Lateral chest radiograph showing the unusual course taken by the electrode which traverses the left superior vena cava, coronary sinus, and right atrium to reach the right ventricle

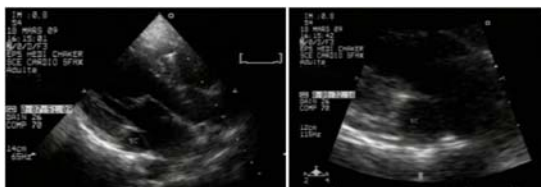


Fig 4: Transthoracic echocardiography (TTE): an image obtained from the parasternal long axis view note the presence of a large coronary sinus



Fig 5: Two-dimensional echocardiogram obtained from an apical four chamber view showing the pathway of the electrode from the coronary sinus to the right atrium and the right ventricle

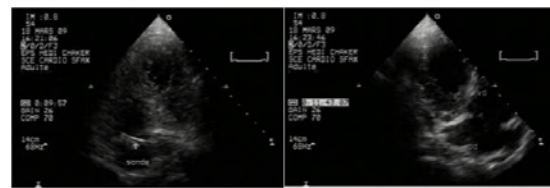


Fig 6: Agitated saline (creating air-filled micro bubbles by shaking saline solution in a syringe), used for a contrast agent was injected through the left catheter. The coronary sinus (SC), the right atrium (RA), and the right ventricle were visualized. This examination confirmed an anomaly of the venous return, consistent with a persistent left superior vena cava (PLSVC) entering the coronary sinus.



Fig 7: Agitated saline was injected through the right catheter. The right atrium (RA) and the right ventricle (RV) were visualized directly. This examination confirmed the presence of a right superior vena cava associated to the left vena cava.

DISCUSSION

The persistence of the left superior vena cava (PLSVC) is a congenital anomaly resulting from failure of degeneration of the left cardinal vein.

PLSVC is the most frequent variation in the thoracic venous system (the prevalence is 0,5% of the general population and 3 to 10% if a congenital heart disease is associated). However, an absent right superior vena cava (RSVC) is very unusual (approximately 0.1%).

Zerbe et al [1] reported 4 patients of 661 with PLSVC whereas Biffi and his colleagues [2] reported 6 of 1250 patients with this anatomical variant.

During a device implantation, the possibility of a PLSVC should be kept in mind whenever a guiding wire takes a left downward course.

The presence of a persistent left superior vena cava makes transvenous leads implantation challenging or even impossible in some cases. We propose that the following steps should be taken when the operator is faced to anomaly during endocardial pace maker.

When using the left-sided approach: Perform venography to demonstrate the presence or absence of a venous connection to the right side and a right SVC [3]. In approximately 75% of these cases there is hypoplasia or agenesis of the left innominate vein, and therefore there is no connection to the right side [4]. Advance the electrode through the coronary sinus into the right atrium and, by manipulating it, again determine the presence of a right SVC entering the right atrium [5]. Try to manipulate the tip of the electrode into the apex of the right ventricle. This step can be achieved only with the aid of a loop in the right atrium. Satisfactory threshold measurement is the evidence for good lodgment of the tip [1]. If repeated attempts at entry into the right ventricle fail, and a right SVC was previously demonstrated, the left-sided approach should be abandoned and a formal right-sided approach adopted [2]. If entry to the right ventricle was not achieved and a right SVC is absent, the only remaining possibility is an epicardial implantation.

CONCLUSION

In the era of increasing device implantation, cardiologists should be aware of the possibility of persistent LSVC when a guide wire or catheter takes an unusual left sided course crossing to the right at the level of the coronary sinus.

Although the technical difficulties associated, persistent LSVC, in general does not prevent successful placement of central venous lines or device implantation.

-Patient Consent section : "Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal."

-A competing interests section : The authors declare that they have no competing interests.

-Authors' Contributions section : L L, L A, S K, S K analyzed and interpreted the patient data and treat it. All authors were major contributors in writing the manuscript. All authors read and approved the final manuscript."

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