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Case Study
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Inadvertent Malposition of Temporary Pacing Lead in the Left Ventricle during Emergent Percutaneous Coronary Intervention: Passed Through the Patent Foramen Ovale

Bong Gun Song* and Hyun Chul Jo

Department of Medicine, Seongnam Citizens Medical Center, JO HYUN CHUL Heart Clinic and Internal Medicine, Republic of Korea

Abstract

The inadvertent malposition of a temporary pacemaker lead in the left ventricle through patent foramen ovale is rare. A case of a man with hypertension and diabetes mellitus presented with sudden onset of retrosternal chest pain. His ECG showed ST-segment elevation and T-wave inversion in leads II, III, and a VF. Coronary angiography was immediately performed. Before right coronary artery intervention, prophylactic temporary pacemaker was inserted. After percutaneous coronary intervention was performed for the RCA, Two-dimensional transthoracic echocardiography showed the pacemaker lead passed though patent foramen ovale and placed on the mid inferior septum on left ventricle.

Keywords: Malposition; Temporary pacemaker; Patent foramen ovale; Percutaneous coronary intervention

Introduction

Malposition of pacemaker lead in the left ventricle is an unusual complication [1]. The temporary cardiac pacing may be required in acute myocardial infarction setting for the occurrence of Atrioventricular (AV) block during Percutaneous Coronary Intervention (PCI) [2,3]. Inferior ST- Elevation Myocardial Infarction (STEMI) is especially prone for AV blocks, because of the blood supply to AV nodal tissues and the inferoposterior surface of the heart share the same arterial territory. Apical septum in Right Ventricle (RV) is usual site for pacing lead and we could check it by using by not only the characteristics of pacing rhythm but also fluoroscopic cardiac anatomy. However, there have been some case reports about inadvertent malposition of transvenous pacing lead in the Left Ventricle (LV) [4-15]. In this report, we describe the malpositioning of temporary pacemaker lead on LV septum, passed through Patent Foramen Ovale (PFO), detected by Trans Thoracic Echocardiography (TTE) after PCI.

Case Presentation

A 72-year-old man with hypertension and diabetes mellitus had a sudden onset of substernal chest pain a day before he came to the hospital. Findings on the physical examination were unremarkable. Vital signs were as follows: Temperature 36.6'C, heart rate 76 beats/min, respiratory rate 22 breaths/min, blood pressure 95/52 mmHg, and oxygen saturation 100% on room air.

His electrocardiogram showed ST-segment elevation and T wave inversion in leads II, III, and a VF. Laboratory evaluation revealed following: CK-MB 113.1 ng/ml; TnI above 22.78; BNP 558.4 pg/ml. A heparin bolus (60 U/kg), aspirin 300 mg and ticagrelor 180 mg were given.

Emergent coronary angiography was immediately performed and revealed a total occlusion in the middle of Right Coronary Artery (RCA). Before RCA intervention, prophylactic temporary pacemaker was inserted *via* right femoral vein approach for the AV block during the procedure. With the help of fluoroscopic images, a pacing lead was advanced until it reached RA. Then, the pacing catheter was passed smoothly to the ventricle without any resistance (Figure 1). PCI was performed for the RCA, and coronary blood flow recovered completely. The patient was moved to Coronary Care Unit (CCU) immediately after PCI. The patient was stable without any symptom. Surface ECG at CCU showed normal sinus rhythm with coincidental two pacing beats with Right Bundle-Branch Block (RBBB) morphology and early pre cordial transition (Figure 2).

TTE performed 4-h later after PCI. The TTE showed preserved systolic function (Ejection

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Correspondence:
Bong Gun Song, Department of Medicine, Division of Cardiology, Seongnam Citizens Medical Center, Republic of Korea, Tel: +82-317387983; Fax: +82-317387288; E-mail: aerok111@hanmail.net

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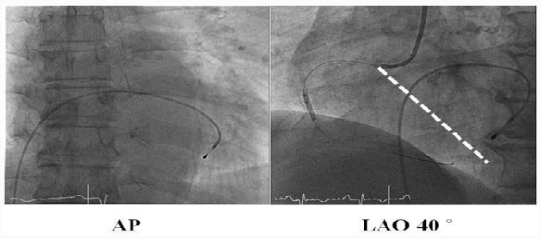

Figure 1: Fluoroscopic images during the PCI. The white oblique dotted line indicates the direction of inteventricular septum.
AP: Anteroposterior; LAO: left anterior oblique

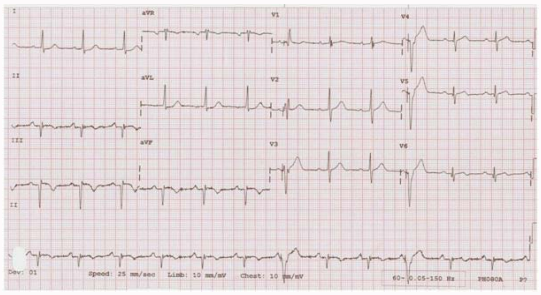

Figure 2: 12-Leads surface ECG shows the pacing beats was RBBB pattern with superior axis.

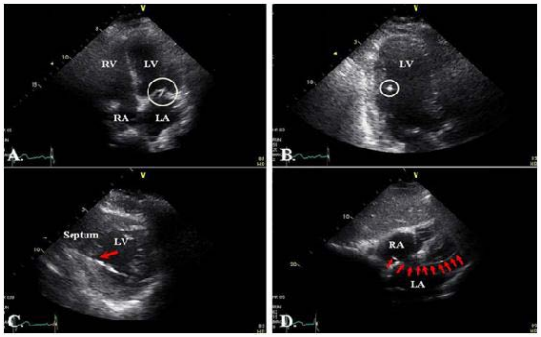

Figure 3: Two-Dimensional transthoracic echocardiography images show the pacing wire passed through interatrial septum and located on apical inferior septum in LV. A) Apical four chamber view; B) apical three-chamber view; C) parasternal short-axis view; D) subxiphoid view.
LV: Left Ventricle

Fraction (EF) =50%) with infero-posterior a kinesis on LV.

On the two-chamber/four-chamber views, the pacemaker lead tip was located apical inferior septum in LV (Figure 3), passed though the incidental PFO (Figure 4). Finally, the temporary pacemaker lead was removed with the guidance of TTE.

Discussion

In this case, the physician didn't have focus on the adequate pacemaker lead site during the coronary intervention procedure. This is a unique case that temporary pacemaker lead tip was crossed the PFO and located on LV septum and suggests that pacing rhythm on surface ECG and fluoroscopic images are important to guide proper lead position. Fortunately, we found RBBB morphology on surface ECG by chance at CCU. Follow-up TTE confirmed the pacemaker lead was on the LV septum and we removed it.

We usually establish temporary pacemaker before emergency PCI for acute inferior MI against AV block [2,3]. Mostly, the pacing wire

Figure 4: Two-Dimensional transthoracic echocardiography images suggest the evidence of PFO without shunt flow. The white arrows indicate the site of PFO.
PFO: Patent Foramen Ovale

tip locates on RV apex only with catheter manipulation without any difficulty. In rare cases, the lead cross interatrial septum and locate on LV pass through mitral valve. If there is a PFO or ASD, the lead tip can pass through the interatrial septum easily like this case. As a standpoint of interventional cardiologists, coronary intervention is the most important procedure. So they didn't care about the adequate site of adequate pacemaker lead site during the procedure.

There have been several complications related with the pacemaker leads unintentionally located on LV, such as, thromboembolic stroke and ventricular perforation [4-14]. Lead malposition in the LV should be prevented by a high index of suspicion at implant. Consequently, we should at least check the pacemaker catheter tip site during procedure with the guidance of pacing ECG and fluoroscopic images. First of all, if the pacing site is RV, the pacing QRS on V_1 is usually LBBB pattern, the other way, if it is LV, the pacing QRS on V_1 is usually RBBB pattern. Fluoroscopic image is another important method to check the lead site. If we could find the ostium of RCA, we could differentiate inter ventricular septum with LAO view.

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