



## Case Report

# Close Proximity of Left Anterior Descending Artery to the Right Ventricular Lead Apparently Implanted into the Mid-septum

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### Abstract

Right ventricular (RV) mid-septal pacing should have fewer negative effects on left ventricular function compared to apical pacing. However, targeting the mid-septum may be technically challenging since it is usually done with two-dimensional fluoroscopy. The rotation of the heart and various shapes of the RV make it difficult to assess, whether the lead is really anchored in the septum. Many leads, apparently anchored in the septum, are in fact anchored in the anterior wall or anteroseptal groove, and some can get anchored in close proximity to the left anterior descending artery (LAD). We report three cases from our series of 51 patients, in whom the RV lead thought to be implanted in the mid-septum was in fact anchored in close proximity of LAD when assessed using computed tomography.

**Key Words:** pacing, septal, fluoroscopy, implantation

### Introduction

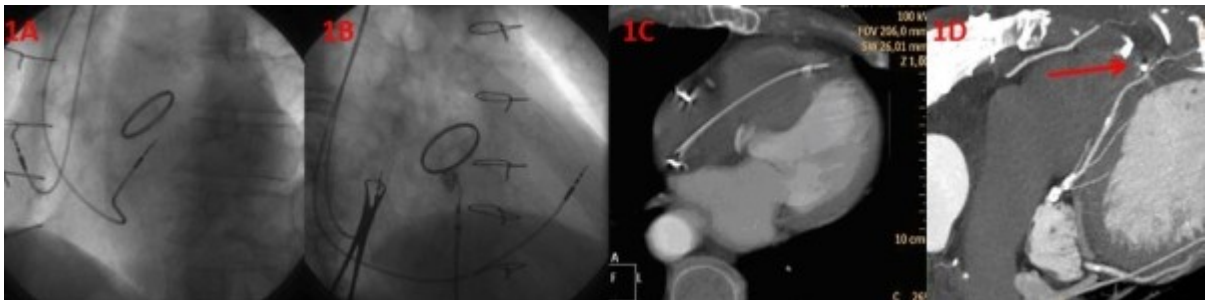
Pacing the interventricular septum is supposed to produce fewer undesirable effects on left ventricular function. Hence, mid-septal pacing should be preferred over pacing from the right ventricular (RV) apex. The most frequently used method for placing the pacing leads in the mid-septum is by fluoroscopic imaging. An RV lead in the 40° left anterior oblique (LAO40) fluoroscopic view should have a typical orientation, i.e. it should be facing the spine with the angle between the horizontal plane and the lead being between 0 and 60° [1]. We have recently shown that many leads, which fulfill these LAO40 criteria, are in fact anchored outside the septum, either in the anterior wall or anteroseptal groove [2]. In our series of 51 patients, in whom the correct location of the RV lead was assessed using cardiac computed tomography (CT), only 21 (41.2%) patients had leads correctly anchored to the mid-septum. In the remaining 30 (58.8%), leads were in fact anchored to the anterior wall or anteroseptal groove [2]. Moreover, in a detailed analysis of this patient group we found that three patients had the tip of the lead in close proximity (almost touching) to the LAD. Close proximity was defined as a distance between the tip of the lead and the LAD of less than 5 mm. These three patients are the subjects of this report.

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## Case Reports

### *Patient No. 1*

A 78-year-old man had an indication for permanent pacemaker due to a high-degree AV block. Three years prior, he had undergone an aortic valve replacement, mitral valve annuloplasty and coronary artery bypass grafting. The implantation was done through the cephalic vein. First, the RV lead (Vitatron ICQ09B) was inserted into the right ventricle through the tricuspid valve in the posteroanterior (PA) projection. After that, the stylet was manually shaped into a J-shaped curve. The lead was then advanced into the pulmonary artery in the PA projection. The stylet was then removed, and a short distal angulation was given to the tip of the stylet. The stylet was then reinserted into the lead and, in LAO40 view, the lead was retracted back into the right ventricle until the LAO40 criterion for mid-septal pacing was met, i.e. the angle between the lead and horizontal plane was between 0-60°. The lead was then fixed in this position. The atrial lead was implanted in the appendage. At the end of the procedure, images of lead positions were saved in LAO40, RAO30 and PA view. At implant the parameters were, an RV threshold of 0.6 V at 0.4 mspulse width and QRS amplitude of 10 mV, and the procedure was uncomplicated. At the 6-week follow-up, the pacing parameters were unchanged. A close analysis of a cardiac CT done at this time showed that the RV lead was almost touching the LAD (**Figure 1A-1D**).



**Figure 1:** A. Appearance of the right ventricular lead in the LAO40 view. The original fluoroscopic position from LAO 40 view; B. Appearance of the right ventricular lead in the RAO30 view. The original fluoroscopic position from RAO 30 view; C. Cardiac CT showing the actual location of the tip of the lead in the anterior wall (anteroseptal groove); D. Spatial relationship and close proximity of the tip of the RV lead to the left anterior descending artery.

### *Patient No. 2*

An 81-year-old woman had an indication for a pacemaker implantation for recurrent syncope due to sick sinus syndrome, with sinus pauses (SA arrest) and paroxysms of atrial fibrillation. Pacemaker implant was performed as described above. An active fixation lead (Siello, Biotronik GmbH) was used and the implantation was completed without complication. The RV threshold at implantation was 0.9 V at 0.4 mspulse width and the QRS amplitude was 11 mV; both parameters were unchanged at the 6-week follow-up. A cardiac CT was done at the 4-week follow-up and revealed RV lead was close to the LAD (**Figure 2A-2D**) as described in the previous patient.

### *Patient No. 3*

An 80-year-old woman had an indication for a pacemaker implantation for a grade 3 AV block. Pacemaker implant was performed as described above using an active fixation RV lead (Vitatron ICQ09B). At implant the RV threshold was 0.6 V at 0.4 mspulse width and QRS amplitude was 20 mV. The implantation was uncomplicated and pacing parameters were unchanged at 6-week follow-up. A close analysis of a cardiac CT done at this time showed that the tip of the RV lead to be less than 5 mm from the LAD.

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