

Case Report

The Importance of Large First Septal Branches in the Primary PCI of Anterior Myocardial Infarctions

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Keywords

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- Complete AV block
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Abstract

New RBBB or bifascicular block development in acute anterior myocardial infarction (AnMI) is a poor prognostic sign [1]. This is because of the left anterior descending artery (LAD) occlusion before or at the level of the first large septal branch (S1), so the infarction area is large and the risk of complete atrioventricular block (CAVB) is high. In this case report, a patient with AnMI who had a worsening clinical course because of the development of CAVB with a larger infarct area probably due to occlusion of S1 after primary PCI is presented.

ABBREVIATIONS

LAD: Left Anterior Descending Artery; RCA: Right Coronary Artery; CAVB: Complete Atrioventricular Block; LBBB: Left Bundle Branch Block RBBB: Right Bundle Branch Block; LAFB: Left Anterior Fascicular Block LPFB: Left Posterior Fascicular Block S1: First Large Septal Artery PCI: Percutaneous Coronary Intervention; AV: Atrioventricular; CAG: Coronary Angiography ECG: Electrocardiography

INTRODUCTION

In the primary PCI of the LAD, most of the time, large first septal arteries aren't taken into consideration. However, these arteries have an important role in the blood supply of the conduction system of the heart, and in case of occlusion of them after primary PCI of LAD, conduction blocks such as RBBB, LAFB, LPFB (lesser degree), combination of them and CAVB can occur with a larger infarct area.

CASE PRESENTATION

A 75 year-old male patient with chest pain for four hours presented to the emergency department. ECG revealed ST elevations in V1 to V4 derivations with no conduction abnormalities with a diagnosis of acute anterior MI (Figure 1a). Acetylsalicylic acid 300 mg, 600 mg clopidogrel was given. Coronary angiography (CAG) revealed 90% stenosis in the left anterior descending artery (LAD) at the level of the S1 (Figure 2a) and noncritical plaque burden in the other coronary arteries. 100 units /kg of unfractionated heparin were given intravenously and tirofiban infusion was started with an intravenous bolus dose. After a drug-eluting stent was implanted from before to beyond S1 in LAD with achievement of TIMI 3 flow, it was seen that S1 was occluded (Figure 2b). The chest pain disappeared and ECG revealed new RBBB with left anterior fascicular block (LAFB) with ST elevations in V1-V2 that were higher and in V3-V4 that were lower than before stenting (Figure 1b). The patient was

stable and in bifascicular block (RBBB+LAFB) for 2 days in the coronary care unit, however, 3 hours after being taken into the intermediate care unit, CAVB with ventricular asystole developed abruptly. CPR was performed successfully and temporary pacemaker was implanted. Repeated CAG revealed that the stent was open in LAD and S1 was still occluded. During the follow-up, apart from long CAVB episodes sometimes RBBB + left posterior fascicular block (LPFB) (Figure 1c), sometimes alternating left and right bundle branch blocks, an interesting beat to beat alternating LAFB and LBBB (Figure 1d), and later only LPFB were detected in ECG (Figure 1e). All rhythm problems cleared up 5 days later (Figure 1f), temporary pacing was taken out 2 days later and the patient was discharged home on the eleventh day. Echocardiography revealed a large anteroapicoseptal akinesis with a LVEF of 30%. In the follow-up of the patient, the patient had been asymptomatic for 2 months; however, LVEF was 32% at which time an ICD implantation was carried out for primary prevention.

DISCUSSION

The blood supply of the atrioventricular (AV) conduction system is shown in Figure (3). RCA gives AV nodal branch (90% of population) which perfuses the AV node and proximal part of the bundle of His [2]. The distal part of the bundle of His, right bundle branch and the left anterior fascicle are perfused by the septal arteries (especially the large first septals) of LAD. Finally, the proximal part of the left posterior fascicle (LPF) is supplied by the AV nodal artery and septal branches of LAD and the distal part is supplied by both septal branches of the LAD and RCA [2,3].

In the primary PCI of acute MI, various side branches can be occluded. In an acute cardiac event, because of the concern of the complexity of the intervention, much contrast use and possibility of the no-reflow phenomenon, these side branches, even they are

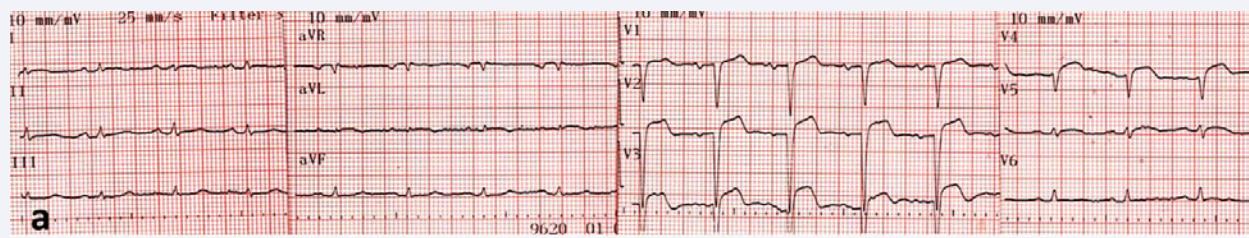


Figure 1a At admission acute anterior MI with ST elevations were seen in V1-V4. No conduction abnormality is seen. Note also that ST elevation is only 0,5 mm in V1.

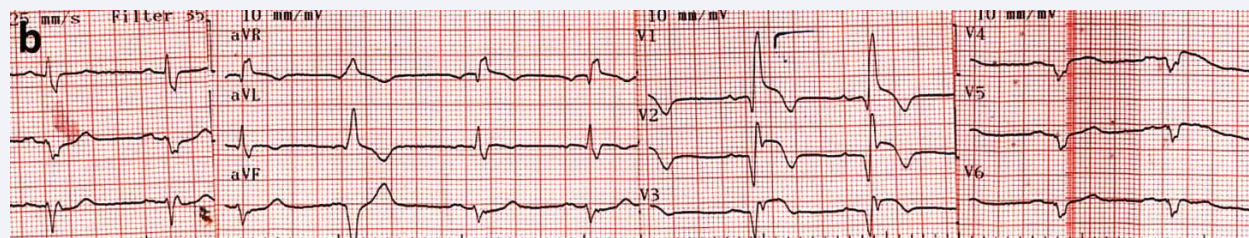


Figure 1b After stenting, bifascicular block (RBBB-LAFB) developed. Note that ST elevations in V1 and V2 are now higher than in the admission ECG due to S1 occlusion. LAFB: Left anterior fascicular block, S1: First large septal artery.

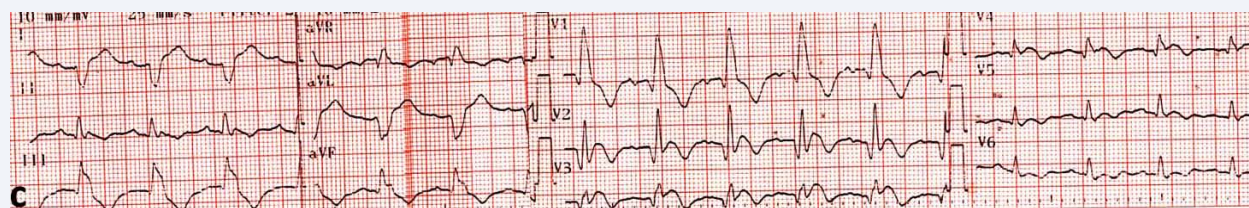


Figure 1c Ventricular asystole with CAVB sometimes returned to bifascicular block (RBBB-LPFB). LPFB: Left posterior fascicular block.

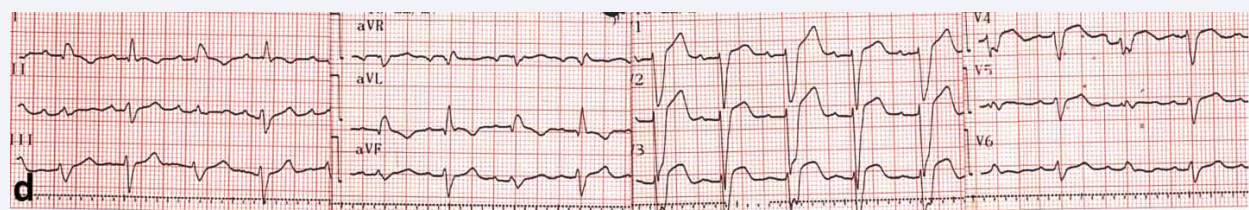


Figure 1d An interesting beat to beat alternating LBBB and LAFB. LAFB: Left anterior fascicular block.

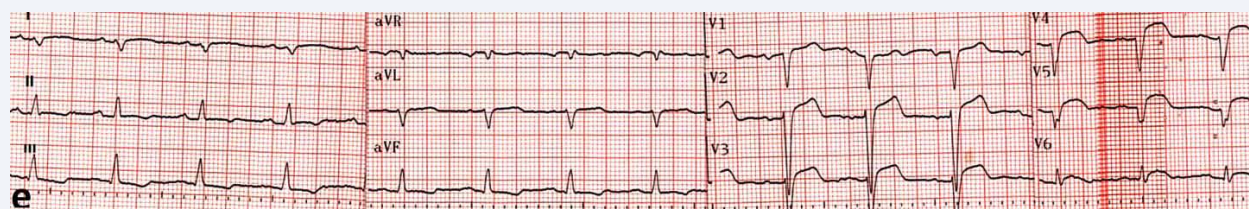


Figure 1e Only, LFPB was seen after four days of asystole. LFPB: Left posterior fascicular block.

large, aren't taken into account many times. One of the side branches is the first large septal branch (S1) as in this case. As shown in the Figure (3) and described above, S1 supplies blood to RBB, left anterior fasciculus. In this case, because S1 was not cared before and after stenting, bifascicular block and later, CAVB and asystole occurred.

According to the "Open perforators hypothesis" proposed by Voci et al. [5], not only the recanalization of the LAD artery, but also the patency of septal perforators could have a positive prognostic impact after anterior myocardial infarctions, because septal perforators bridge the LAD and the microcirculation. In light of these data, I believe that if a guidewire had been placed in S1 before LAD stenting for prevention and balloon angioplasty

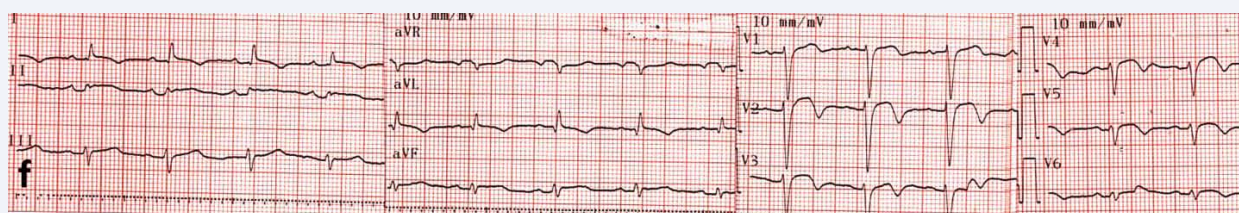


Figure 1f No conduction abnormality was seen after five days of asystole.

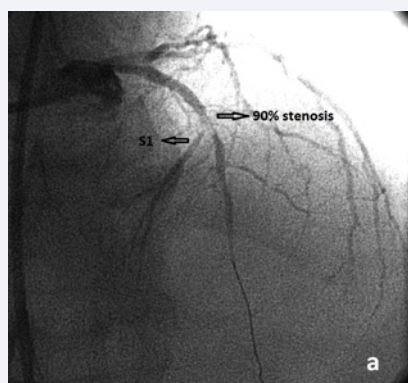


Figure 2a At admission a 90% stenosis at the level of the first large septal (S1) artery was seen.

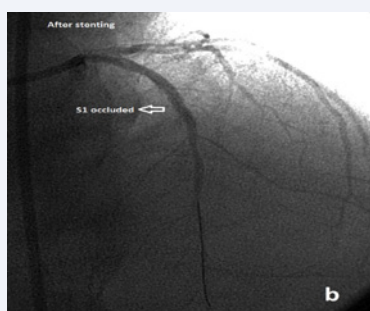


Figure 2b After stenting the LAD, it was seen that the first large septal (S1) artery was occluded.

had been performed to S1 in case of occlusion after stenting, not only complete AV block might haven't occurred, but also the infarct area might have been smaller in this patient.

Perhaps, another important debatable issue is to intervene or not the already occluded S1 seen in the repeated CAG after CAVB development which was in the third day of the acute infarction. I believe that intervention in S1 at this stage might have been perhaps better for early resolution of CAVB in the patient.

In conclusion, in the primary PCI of LAD in acute anterior myocardial infarctions, at any intervention at the vicinity of the first septal large branches, maximum care should be taken to preserve and intervene in these branches if occlusion occurs. Otherwise, not only CAVB might occur but also infarct area might

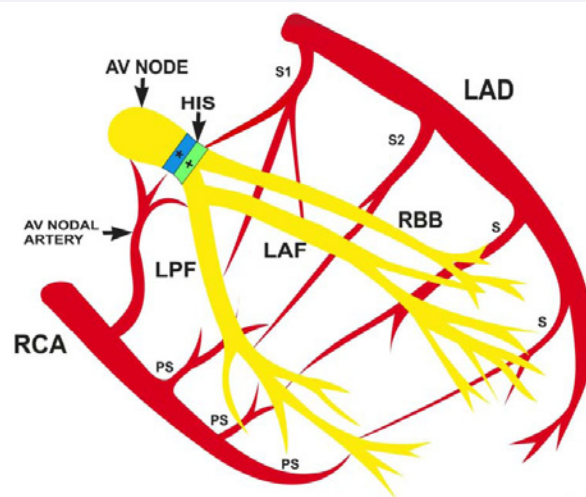


Figure 3 Schematic picture of the blood supply of the AV-conduction system. Note the important role of the septal arteries, especially the large first septal arteries (S1, S2) of the LAD. S1 and/or S2 supplies blood to RBB, LAF, some to LPF and distal part of the bundle of His [2,3]. LAF: Left anterior fascicle. LPF: Left posterior fascicle. *: Proximal part of the bundle of His, +: Distal part of the bundle of His. See text for details.

get larger, which has a worse prognosis with a long hospital stay as in this case.

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