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Transient left septal fascicular block in a patient with stable effort angina and critical proximal obstruction of left anterior descending coronary artery

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Abstract

Several publications from our group and others have shown that a main cause of middle fiber block or left septal fascicular block of the left bundle of His is proximal obstruction of the left anterior descending coronary artery, before its first septal perforator branch, since this fascicle is the only one of the three fascicles irrigated exclusively by this artery. We present a case in which the phenomenon occurred transiently, causing prominent anterior QRS forces, confirmed by coronary angiography.

Keywords: Left septal fascicular block; left anterior fascicular block; left bifascicular block; proximal obstruction of the left anterior descending coronary artery.

Case report

A 56-year-old Caucasian male presented to our hospital with exercise induced - oppressive precordial pain of recent onset (20 days) without irradiation- and of short duration (stable angina).

Personal history: smoker since adolescence.

Family history: his father died of fulminant myocardial infarction at 42 years of age.

Physical examination: nothing worthy of note.

The patient brought a previous ECG (Figure 1) performed 30 days earlier, prior to the preoperative evaluation of ophthalmologic surgery for pterygium; it showed a left anterior fascicular block (LAFB) pattern.

We requested another ECG (Figure 2) which revealed qRs pattern with very tall R wave (≥15 mm) and prominent anterior QRS forces (PAFs) associated with an atypical LAFB pattern: extreme left SÂQRS deviation without initial q in the lateral leads I, aVL and V_5-V_6, suggestive of absence of the first septal vector of ventricular activation.

As transient PAFs were not previously present in the patient with symptoms suggestive of coronary artery disease, critical proximal obstruction of the left anterior descending coronary artery (LAD) should be considered. Immediate coronary angiography was proposed and was agreed by the patient.

Figure 3 shows the LAD obstruction in coronary angiography.

Discussion

In the present case, there is a striking increase of the R-wave amplitude (prominent anterior forces) in leads V_1-V_2 associated with the appearance of q waves in V_2-V_3, and disappearance of the initial q waves in the lateral leads I, aVL and V_5-V_6, suggesting absence of the first septal vector, dependent on the left septal fascicle of the left bundle

branch (LBB). This case contributes to the understanding of left septal fascicular block (LSFB) by showing these typical ECG features, and also by a clear shift of the QRS axis in the frontal plane in a patient with pre-existing LAFB. The first ECG in our patient showed only the LAFB pattern. The second one performed after symptoms of stable angina showed a greater QRS axis deviation to the left.

The ECG criteria for LSFB have been discussed previously in the literature [1-3]. It is clear that the ECG findings may differ from case to case because of other concomitant conduction disorders, variation in the anatomy of the fascicles of the LBB and underlying structural heart disease. In the present case, practically all the ECG criteria proposed by our group in 2011 were fulfilled, including the R-wave voltage in V1 (≥5 mm) and V2 (>15 mm), S wave depth in V1 (<5 mm), R/S ratio in V2 > 2, and absence of q waves in V5, V6 and I [1]. The criteria from the Brazilian guidelines require R-wave height of ≥15 mm in V1 or V2 and V3, which is not fulfilled in this case [2, 4]. After percutaneous coronary intervention (PCI), the left bifascicular block (LSFB+LAFB) disappeared (Figure 4).

In the acute phase, a left bifascicular block (LAFB + LSFB) is observed. Consequently, the initial 10-20 ms activation of the LV is exclusively dependent on the unblocked LPF, whose activation is directed slightly backwards and to the left, justifying the small initial q in the right precordial leads. Next, the stimulus must activate the anterolateral blocked wall through the so-called “Rosenbaum transition zone” in the LV free wall, which strongly displaces the QRS forces forward and leftward (Figure 5). Finally, the basal portions of both ventricles are activated from the bottom to the top and left or right. When successful treatment occurs, both fascicular blocks (LAFB + LSFB) disappear.

Successive publications from our group [6-11] and others [12] have provided ECG evidence that blockage of the LSF of the LBB is an incontestable reality. Consequently,

the term "hemiblock", unfortunately still the predominant term [13] to denominate the blockages of the LBB fascicles, can be inappropriate according to the new evidence [14], because the LBB is not divided into two but into three fascicles. The presence of LSFB is of great clinical relevance because its electrocardiographic presence in association with coronary artery disease, especially when transient or intermittent, indicates critical obstruction of the LAD before the first septal branch.

Conclusion

We present a case, where the ECG clearly indicated new changes induced by LSFB associated with LAFB. These findings in the clinical scenario of angina pectoris should raise the suspicion of critical stenosis of the proximal LAD before the first septal perforator branch, indicating need for coronary angiography.

Conflicts of interest

None.

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Figure legends

Figure 1 ECG performed on June 2, 2018 as a complement to the preoperative evaluation

ECG diagnosis: sinus rhythm, extreme left axis deviation (SÂQRS -39°), qR pattern in I and aVL, rS in II, III and aVF with SIII> SII. Conclusion: LAFB.

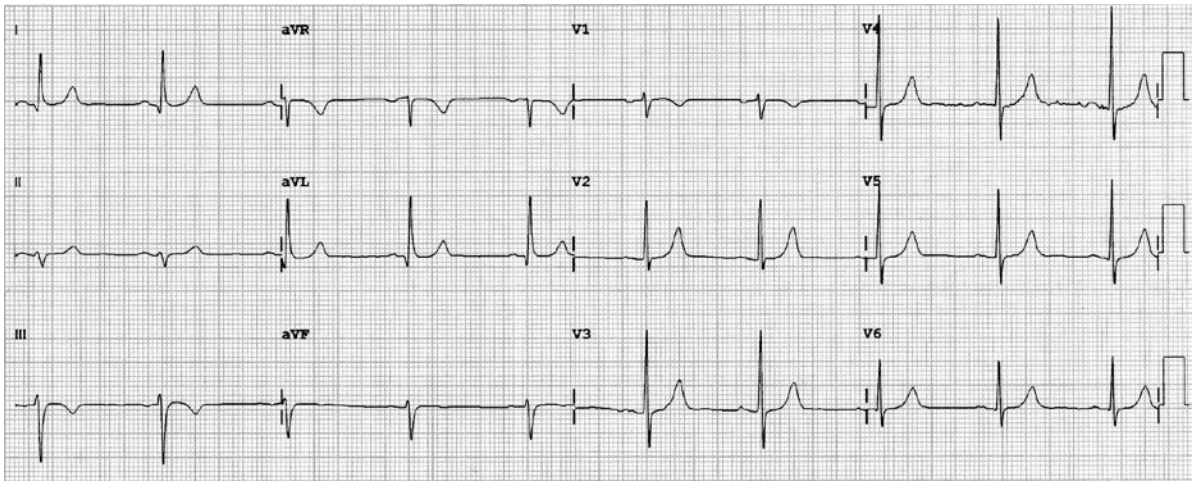

Figure 2 ECG performed on July 5, 2018

ECG diagnosis: sinus rhythm, extreme left axis deviation (SÂQRS -50°) indicating major degree of LAFB, but absence of initial q wave in left leads I, aVL, V_5 and V_6, R wave voltage in V_1 ≥5 mm, R wave of high voltage in V_2 (28 mm!!), R/S ratio in V_2 >2, increasing R-waves in V_1-V_2 and decreasing in V_5-V_6, absence of q wave in the left precordial leads V_5, V_6, I and aVL. The ECG findings represent absence of the first septal vector of the middle $^1/_3$ of the left septal surface, dependent of the left septal fascicle of the left bundle branch.

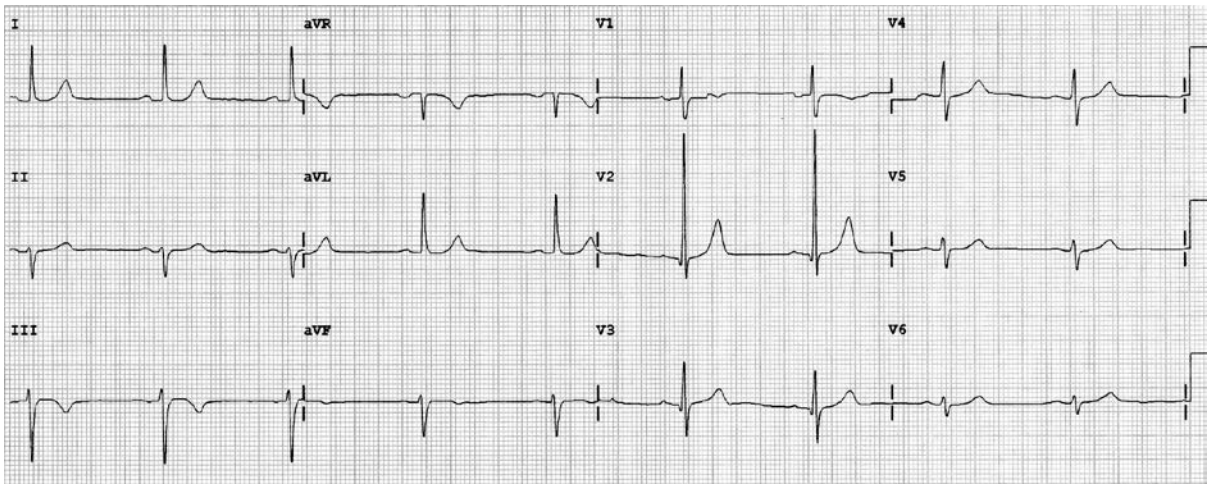

Figure 3 Coronary angiography in the right anterior oblique cranial view

Significant proximal obstruction of LAD (arrows) before the first septal perforator branch (S_1).

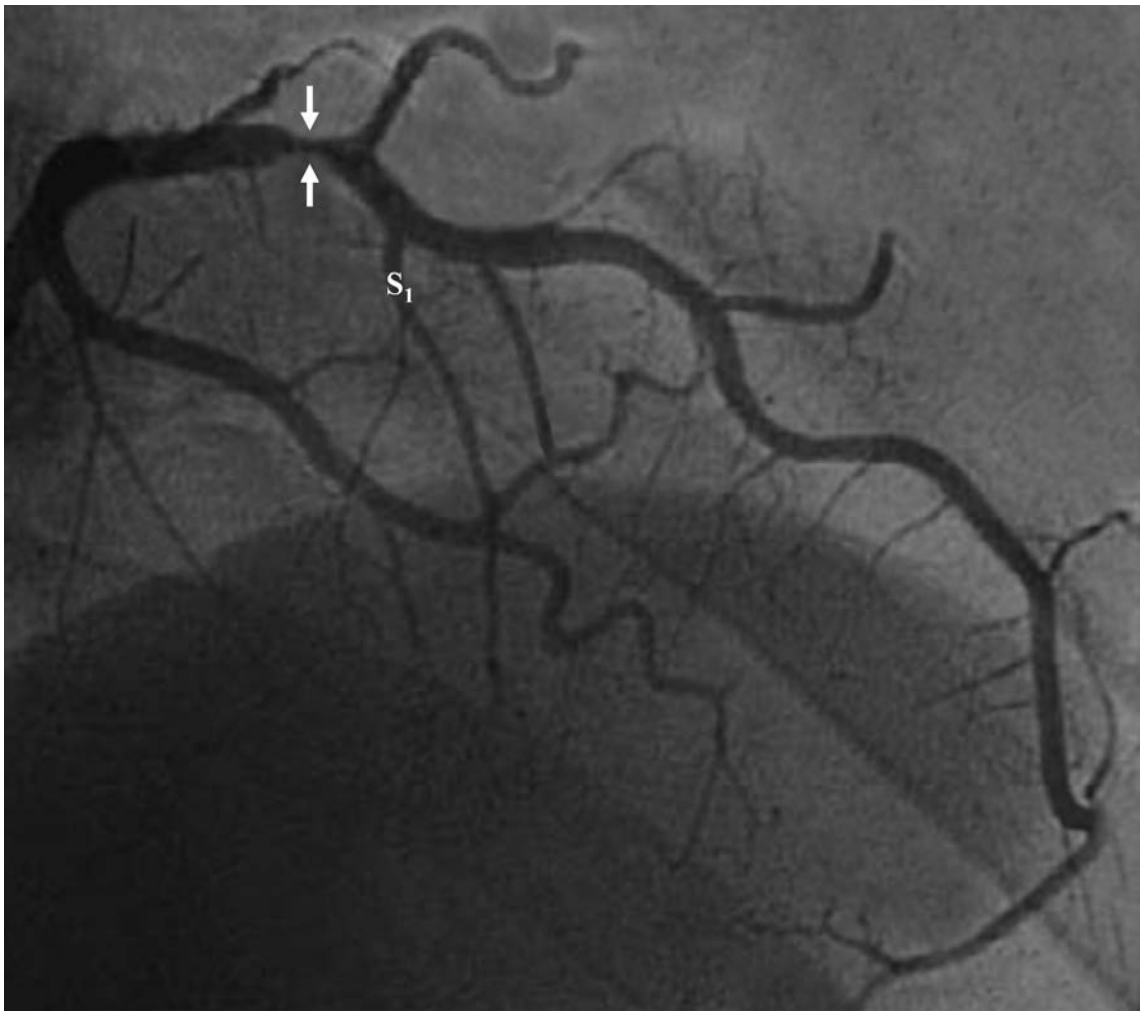

Figure 4 ECG performed post PCI

The left bifascicular block (LAFB+LSFB) disappeared. QRS axis -20° and R wave voltage of V2 <15 mm without embryonic initial q wave. Conclusion: normal ECG.

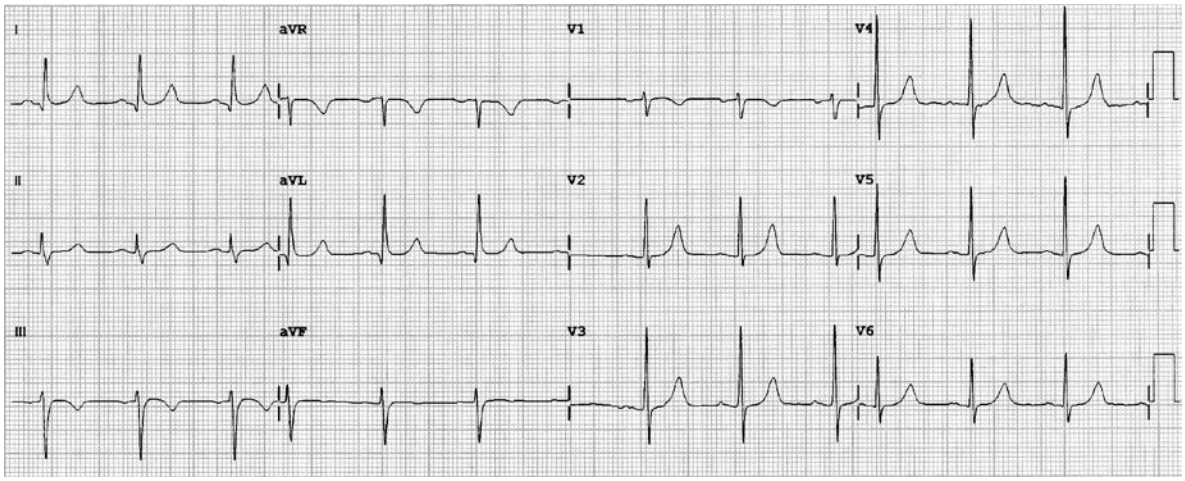

Figure 5 Typical ECG/VCG of LSFB in the horizontal plane

Note the initial embryonic q wave followed by prominent anterior and leftward QRS forces (QRS loop predominantly located in the left anterior quadrant). Finally, it is very important to emphasize the absence of initial q wave in left leads, consequence of absence of 10-20 ms middle left septal surface vector [5], usually directed to front and rightward (≈85% of cases).