Masquerading bundle branch block as a presenting manifestation of complete atrioventricular block that caused syncope

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Abstract
A 59-year-old male patient was admitted with the main complaints of stuffiness and shortness of breath. An ECG from precordial leads on admission showed masquerading bundle branch block. Syncope frequently occurred after admission. During syncope episodes, ECG telemetry showed that the syncope was caused by intermittent complete atrioventricular block, with the longest RR interval lasting for 4.36 s. At the gap of syncope, ECG showed complete right bundle branch block accompanied by alternation of left anterior fascicular block and left posterior fascicular block. The patient was implanted with a dual-chamber permanent pacemaker. Follow-up of 9 months showed no reoccurrence of syncope.

Keywords
Masquerading bundle branch block, syncope

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Introduction
Masquerading bundle branch block (MBBB) is defined as right bundle branch block in the precordial leads with left bundle branch block in the frontal leads and left axis deviation. MBBB is rarely found as an initial presentation of syncope. In this case report, we present a patient with frequent syncope and typical MBBB.
Case report

A 59-year-old male patient was admitted with the main complaint of stuffiness and shortness of breath for the past 2 days. Three years ago, the patient was diagnosed with acute inferoposterior wall myocardial infarction. He underwent stenting in the left circumflex artery and right coronary artery at different times, and was intermittently on medication. An ECG from precordial leads on admission showed MBBB. Leads V1–6 displayed an R shape, but the duration of the QRS complex widened to 0.20 s (Figure 1). Transthoracic echocardiography showed a left ventricular ejection fraction of 46% and decreased inferoposterior wall motion amplitude. After admission, syncope frequently occurred. During syncope episodes, ECG telemetry showed that the syncope was caused by intermittent complete atrioventricular block, with the longest RR interval lasting for 4.36 s. Between syncope episodes, ECG showed complete right bundle branch block (CRBBB), accompanied by alternating left anterior fascicular block (LAFB) and left posterior fascicular block (LPFB, Figure 2). Endocardial electrophysiology showed an extended HV interval (68 ms). Coronary angiography showed multiple vasculopathy and the extent of angiostenosis was 50%–90%. Taken together, these results suggested that the patient had therapeutic indication of a permanent pacemaker. On 30 September 2011, the patient was implanted with a dual-chamber permanent pacemaker (St. Jude Medical Victory DDDR5816). Follow-up at 9 months showed no recurrence of syncope.

Ethical approval for this investigation was obtained from the Research Ethics Committee of Beijing Chaoyang Hospital affiliated to Capital Medical University. The patient, whose identity has been protected, provided permission to publish the features of his case.

Discussion

The appearance of MBBB in this case was right bundle branch block (RBBB) in the right chest leads and left bundle branch block (LBBB) in the left chest leads (Figure 1). Two types of MBBB have been reported.1,2 (1) In the standard type, RBBB occurs in the precordial leads and LBBB occurs in the limb leads. (2) In the precordial type, RBBB occurs in leads V1–3 and LBBB occurs in leads V4–6. The most common pathology associated with this type of ECG is ventricular septal fibrosis and infarction caused by coronary artery disease, and left ventricular hypertrophy induced by chronic hypertension.1,3,4

In our patient, leads V1–2 appeared as an R shape, and the end of the ECG in leads V5–6 displayed a wide S wave (Figure 2). This occurred, regardless of whether sinus rhythm conduction was via the left anterior fascicle (LAF) or left posterior fascicle (LPF), indicating that CRBBB was permanent. The patient had a history of inferoposterior wall myocardial infarction, which may have led to impairment of the LPF. However, the LPF was not complete, and there was no permanent block. When CRBBB appeared together with LAFB, sinus rhythm was conducted as 2:1 via the LPF with identical P-R intervals (0.2 s), which suggested second- or third-degree block of LPFB. When CRBBB appeared together with LPFB, sinus rhythm was conducted as 2:1 via the LAF with varying P-R intervals from 0.18 to 0.40 s. This finding suggested first-, second-, and third-degree block of LAFB. On admission, an ECG from precordial leads showed concurrent block in the left and right bundle branches, a markedly widened duration of the QRS complex, and 1:1 conduction of sinus rhythm. These findings indicated that conduction remained between the atria and the ventricles. When we combined the ECG shapes from the limb leads (QRS in lead I,
QRS in lead aVL, and R in leads II, III, and avF), which were similar to LPFB, this suggested that the impulses were conducted to the ventricles via the LAF. On admission, intracardiac electrophysiology showed a 68-ms HV interval (the precordial ECG is shown in Figure 1 simultaneously), which demonstrated LAF conduction.

**Figure 1. ECG on admission**
The ECG shows sinus rhythm with a ventricular rate of 88 beats/min, P-R interval of 160 ms, and QRS complex duration of 200 ms. Leads V1–3 appear as RBBB and leads V4–6 appear as LBBB, which indicates MBBB.
Figure 2. CRBBB plus LAFB
(a) The QRS complex shows the following. The shapes of R7 and R8 are similar, showing morphology akin to CRBBB plus LAFB. The duration of the QRS complex is 140 ms and the P-R interval is 200 ms. Leads I and avL appear as an Rs shape, leads II, III, and avF appear as an rS shape, leads V1–2 appear as an R shape, and leads V5–6 appear as an Rs shape. (b) The QRS complex shows the following. The shapes of R3, R4, R7, and R8 are similar, showing morphology akin to CRBBB plus LPFB. The duration of the QRS complex is 160 ms. Leads I and avL appear as an rS shape, leads II, III, and avF appear as an R or qR shape, leads V1–2 appear as an R shape, and leads V5–6 appear as an Rs shape. The shape of R1 is similar to that of R1, R3, and R6 in panel A. Because different degrees of LAFB and LPFB existed asynchronously, these shapes were probably caused by varying combinations of degrees of block of LAFB and LPFB.
delay. The QRS shapes of R1, R3, R6 (Figure 2(a)), and R1 (Figure 2(b)) appeared similar, but not completely identical. This could have been the cause of the different combinations of degrees of conduction delay of CRBBB, LPFB, and LAFB.

Previous studies have reported that RBBB is accompanied by a change in the LAFB electrocardiac vector, and ECG in precordial leads shows MBBB. In our case, an ECG also showed similar characteristics to these previous studies. The clinical ECG in patients with trifascicular block not only has several appearances, but also changes intermittently, which is related to the intensity of the block. For patients with syncope episodes, permanent pacemaker implantation should be the first therapeutic consideration.

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None

Authors’ contributions

Zhenyu Jiao was involved the study design, data collection, and analysis, and wrote the manuscript. Xingpeng Liu was also involved in the study design and approved the final version of the manuscript. Ying Tian and Xinchun Yang participated in the patient’s interventional examination and treatment.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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