

Challenges in Clinical Electrocardiography

Unusual Electrocardiographic Findings in an Elderly Patient With Syncope

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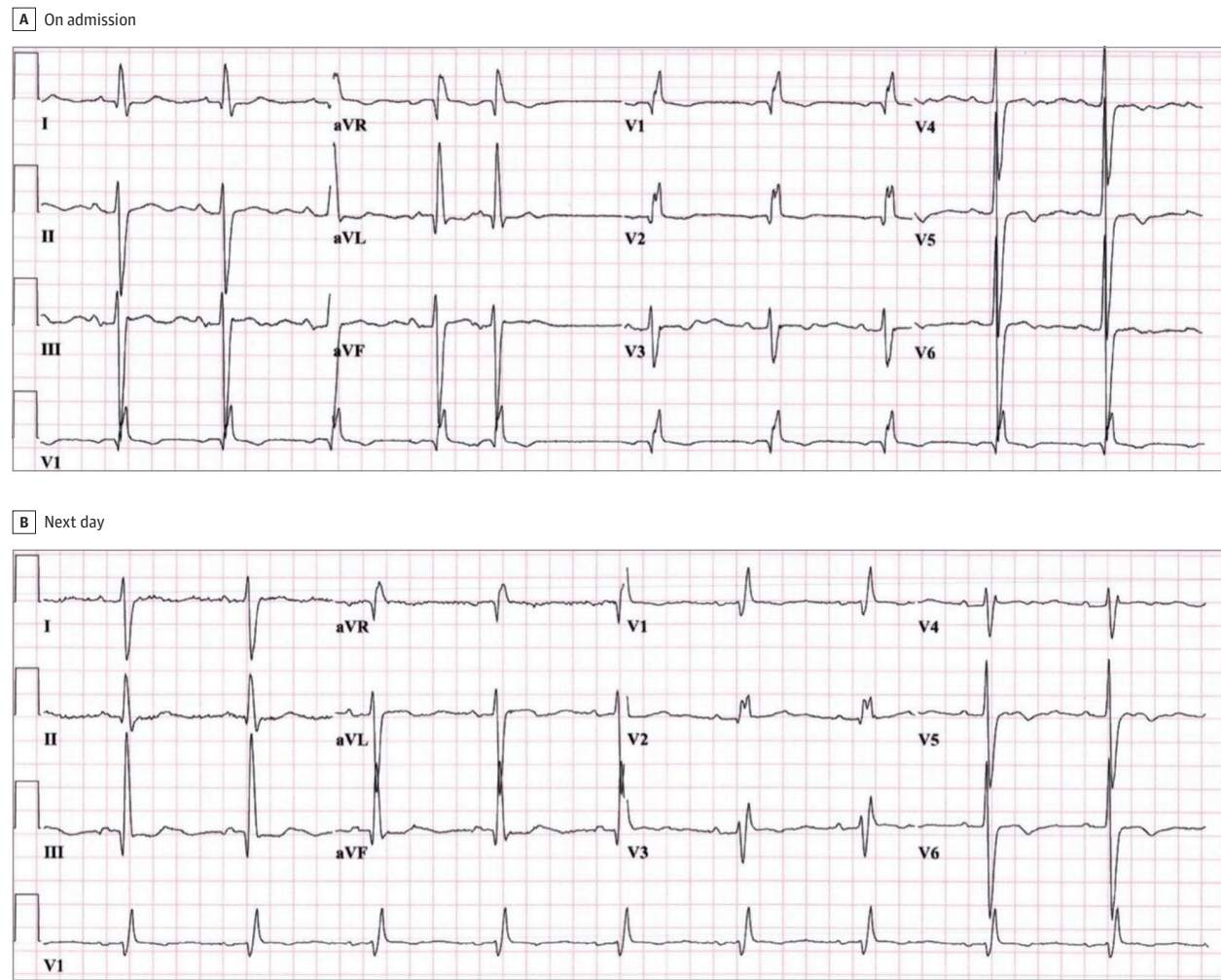
Case Presentation

A patient in their 80s with a history of hypertension controlled with Dyazide presented to the emergency department with 1 episode of syncope. The patient reported a weird sensation of feeling hot and light-headed and felt they should lie down but suddenly awoke on the floor with considerable head and left shoulder pain. The patient also had a few near-fainting spells in the week prior to this index syncopal event. In the emergency department, the patient's vital signs were stable without considerable orthostatic changes in blood pressure and

heart rate. Results of laboratory tests, including serum electrolyte levels and cardiac enzymes, were normal. Cranial computed tomographic findings revealed no acute pathologic changes, and echocardiogram findings showed mild concentric left ventricular hypertrophy with preserved left ventricular systolic function. Two 12-lead electrocardiograms (ECGs) obtained on arrival to the emergency department and the day following admission are shown in the **Figure**.

Questions: What is the cause of the patient's syncope? What would you do next?

Figure. 12-Lead Electrocardiogram (ECG) Findings in an Elderly Patient With Syncope



A, On admission to the emergency department, the patient's ECG showed a sinus rhythm with right bundle-branch block and left anterior fascicular block with a PR interval of 204 milliseconds. B, The following day, the patient's ECG

showed a sinus rhythm with right bundle-branch block and left posterior fascicular block with a PR interval of 210 milliseconds.

Interpretation and Clinical Course

The ECG in Figure, A (ie, on arrival to the emergency department) shows a sinus rhythm with right bundle-branch block (RBBB); a QRS axis deviation to -72° , suggesting left anterior fascicular block (LAFB); a PR interval of 204 milliseconds; and a premature atrial complex at a rate of 64 beats per minute. The major diagnostic criteria of LAFB include (1) a mean QRS axis deviation to -45° or greater and (2) a qR pattern in leads I or aVL and an rS pattern in leads II and III. However, the ECG shown in Figure, B (ie, on day following admission) shows RBBB with a right axis deviation to $+124^\circ$ and a PR interval of 210 milliseconds at a rate of 58 beats per minute. The first impression of such a sharp change in QRS axis from -72° to $+124^\circ$ was that the left and right arm leads were reversed. Careful review of the ECG in Figure, B excludes this most common lead placement error because of the lack of 2 key clues associated with reversal of arm leads: inversion of the QRS complex and P and T waves in lead I, and switching places between leads aVL and aVR. Instead, the ECG features in Figure, B are consistent with left posterior fascicular block (LPFB): right axis deviation greater than 90° , rS complexes in leads I and aVL, and qR complexes in the inferior leads. In other words, the patient had RBBB with LAFB one day and RBBB with LPFB another day.

The patient subsequently underwent implantation of a dual-chamber permanent pacemaker. The patient did not experience any episodes of presyncope or syncope during outpatient follow-up for 2 years after the pacemaker implantation.

Discussion

Because the patient was taking Dyazide, which contains the diuretics hydrochlorothiazide and triamterene, for treatment of hypertension, the differential diagnosis of syncope in this elderly patient should include orthostatic hypotension as a potential cause. However, this diagnosis is not supported because the patient had long-term use of Dyazide but experienced frequent presyncopal or syncopal episodes only within a short time frame without considerable orthostatic hypotension on physical examination.

The striking finding pointing to the cause of syncope is a change from LAFB to LPFB in the setting of RBBB. Right bundle-branch block with stable LAFB on ECG without clinical symptoms is a relatively common type of bifascicular block in adults (1%-1.5%),¹ of which only a small percentage of people will develop clinically significant atri-

ventricular (AV) block at a rate of 1% to 2% per year.^{2,3} However, changing between LAFB and LPFB in the presence of preexisting RBBB, a form of trifascicular block,^{4,5} suggests a rare situation in which permanent conduction block in the right bundle branch is accompanied by intermittent block between 2 fascicles of the left bundle branch. From a mechanistic point of view, trifascicular block indicates His-Purkinje system diseases involving both right and left bundle branches that often herald the development of high-degree or complete AV block. Low-intensity exercise could immediately result in AV block in these patients.⁶ According to the recent European Society of Cardiology guidelines on cardiac pacing and cardiac resynchronization therapy, pacemaker implantation is recommended as a class I indication (level C) for patients with trifascicular block with or without symptoms.⁵ It should be emphasized that an electrophysiology study to determine if the patient requires pacemaker implantation under this situation is not necessary.

Of note, trifascicular block is commonly misconstrued as bifascicular block with a long PR interval. However, that only implies infranodal disease with a long conduction delay in the AV node. Patients with bifascicular block may have concomitant AV conduction delay, but this, by itself, does not equate trifascicular block, a term which connotes disease in all 3 fascicles. The present patient had trifascicular block along with a long AV delay.

In summary, this case illustrates rare but urgent ECG features manifesting as RBBB together with a change between LAFB and LPFB, which indicates an infra-Hisian disease. It is important for physicians to recognize these ECG changes, and a pacemaker should be implanted as soon as possible, particularly for a patient who presents with syncope.

Take-home Points

- A change between LAFB and LPFB in the presence of RBBB (ie, true trifascicular block) is an unusual ECG finding that indicates an infra-Hisian disease involving both left and right bundle branches.
- Pacemaker implantation is indicated in patients with trifascicular block without a requirement of an electrophysiology study.
- The reversal of arm leads on another ECG in a patient with preexisting RBBB and LAFB can be mistakenly diagnosed as a trifascicular block and may lead to an inappropriate surgical procedure for a pacemaker.

ARTICLE INFORMATION

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