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Understanding and Managing Right Bundle Branch Block

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Understanding and Managing Right Bundle Branch Block

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Case Presentation
EKG Interpretation
Mechanism for EKG Abnormalities
Discussion
Clinical Course
Take-Home Points
References

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CASE PRESENTATION

An asymptomatic 45-year-old gentleman with no significant past medical history presented to his primary care physician's (PCP) office for a pre-employment exam. He had normal vitals. An electrocardiogram (EKG) was obtained with findings identical to those in Figure 1.

Questions:

1. Describe the EKG?
2. What is the best next step?

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EKG INTERPRETATION

The EKG shows normal sinus rhythm with prolonged QRS duration (>120 msec). It also shows rsR' pattern in leads V1-V3 with ST depressions and/or T wave inversions in the same leads (red ovals). The S waves in the lateral leads (V5, V6, I and aVL) are ≥40 msec wide (blue ovals). There is normal time to peak R wave in leads V5 and V6 but >50 msec in V1. Hence, this EKG meets criteria for right bundle branch block (RBBB) as listed in Table 1.

TABLE 1. Diagnostic Criteria for RBBB.[1]

Complete Right Bundle Branch Block
QRS duration ≥120 msec
rsr', rsR', or rSR', patterns in leads V1 and V2
S waves in leads I and V6 ≥40 msec wide
Normal time to peak R wave in leads V5 and V6 but >50 msec in V1

FIGURE 1. 12-lead electrocardiogram

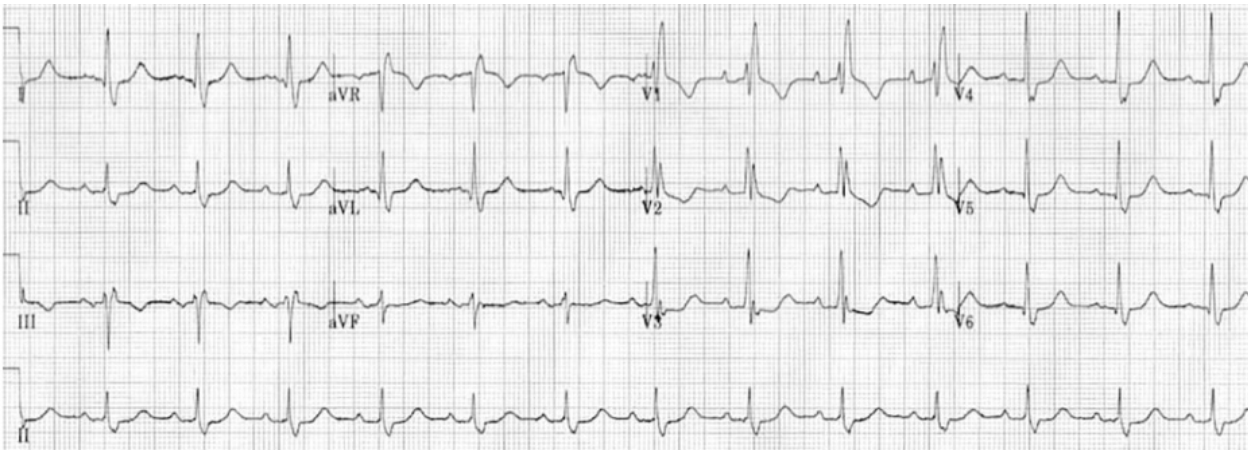


Figure 2. Annotated 12-lead electrocardiogram

MECHANISM FOR EKG ABNORMALITIES

The activation of the septum and right ventricle (RV) anterior free wall are delayed due to a delay in the proximal right bundle branch system. This occurs because the activation of the right side of the septum is initiated only after the slow transeptal spread of activation from the left septal surface. This results in depolarization of much of the left ventricle (LV) prior to depolarization of the RV. Hence, the late RV forces are not cancelled by the LV activation and generate increased anterior and rightward voltage observed in the latter half of the QRS in complete RBBB. Discordant ST-T wave patterns are generated due to recovery forces that are directed away from the right and towards the earlier activated LV resulting in inverted T waves in the right precordial leads and positive ones in the left precordial leads.[2]

DISCUSSION

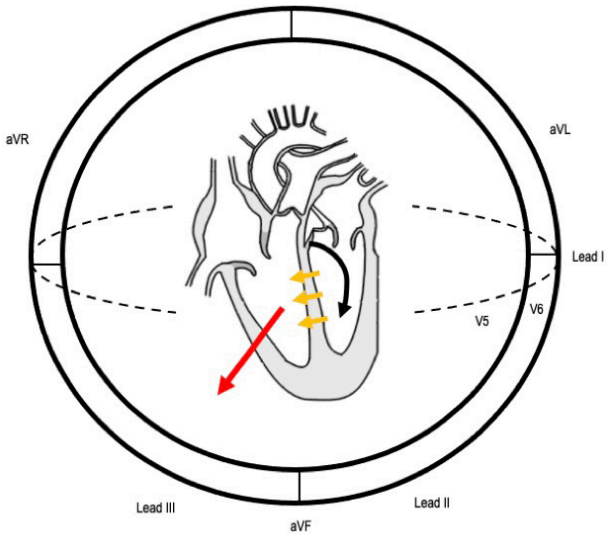
RBBB presents a notable cardiac conduction abnormality characterized by delayed electrical impulse transmission through the right bundle branch of the heart's conduction system, resulting in delayed depolarization of the right ventricle and affecting the normal sequence of ventricular activation. The incidence of right bundle branch block typically increases with age, with up to 11.3% of people by age 80. There is no significant association with cardiac disease, ischemic heart disease or cardiac risk factors.[4]

This condition can stem from various underlying factors, including structural heart diseases such as pulmonary hypertension, congenital heart defects, myocardial infarction, and cardiomyopathies, as well as non-cardiac conditions like pulmonary embolism and chronic obstructive pulmonary disease (COPD). It can

FIGURE 1. 12-lead electrocardiogram

Sequence of conduction in RBBB:

1. Left ventrical activation via the left bundle (black arrow) occurs normally
2. Septal depolarisation (yellow arrows) is thus unaffected, producing a normal early QRS complex.
3. Activation of the RV originates across the septum. The resultant depolarisation vector (red arrow) produces delayed R waves in leads V1-3, and S waves in lateral leads.



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also occur iatrogenically from certain common cardiac procedures, such as right heart catheterization.[5]
RBBB is typically asymptomatic and often discovered incidentally on EKGs, with the finding itself not causing any signs or symptoms. However, on physical examination, patients may exhibit a split second heart sound.[6] In some cases, RBBB may manifest with symptoms such as palpitations, dizziness, or syncope, especially in the presence of other concurrent cardiac conduction abnormalities. Differential diagnoses include incomplete right bundle branch block, ventricular tachycardia, and Brugada syndrome, each necessitating careful evaluation to distinguish from RBBB. Management strategies for RBBB primarily aim at addressing underlying causes if identifiable and monitoring for complications. Asymptomatic isolated RBBB often requires no ischemic evaluation or specific treatment. However, symptomatic cases or those with associated cardiac conduction abnormalities may necessitate further testing, pharmacological therapy, device implantation (e.g., pacemaker), or surgical intervention.[7]
It is noteworthy that RBBB's presence can have varying prognostic implications, with increased mortality risk observed in individuals with pre-existing cardiovascular disease, particularly in the context of acute myocardial infarction or heart failure. Hence, close monitoring and appropriate management are essential for optimizing outcomes in patients with RBBB.[8]

CLINICAL COURSE

The patient was referred to cardiology for the finding of new RBBB. A thorough history and physical examination did not reveal any concern for a specific etiology for the new RBBB. An echocardiogram was ordered to rule out structural abnormalities of the heart. The echocardiogram was essentially normal, and the patient was counseled and reassured and recommended to continue routine follow-up with his PCP.

TAKE-HOME POINTS

• Typically, asymptomatic isolated RBBB does not require specific treatment. Monitoring for any changes or development of symptoms may be recommended.
• RBBB associated with symptoms such as palpitations, dizziness, or syncope, especially in the presence of other concurrent cardiac condition abnormalities, warrants further cardiac evaluation.
• A routine echocardiogram is a reasonable next step to rule out structural abnormalities in asymptomatic patients with a new RBBB.

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