Comorbidities of Chronic Complete Right Bundle Branch Block and Correlations With Coronary Angiographic Findings

Ahmad Arham, MD, Ravindra Bhardwaj, MD, MPH, Abnash Jain, MD,
Imran Dar, MD, Sumesh Jain, MD, Bradford Warden, MD,
Wissam Gharib, MD and Walid Gharib, MD

ABSTRACT

Background: This is a prospective, observational review of medical records to investigate the associated comorbidities and angiographic anatomy in patients with chronic right bundle branch block (RBBB).

Methods: The analyses of 32,345 consecutive electrocardiograms (EKGs) between October 2010 and January 2012 revealed 583 patients with RBBB. The common comorbidities associated with RBBB were hypertension (82%), diabetes (42%), coronary artery disease (CAD) (44%), valvular heart disease (aortic—16% and mitral—17%) and pulmonary disease (33%). Demographic data including age, sex, EKG and associated comorbidities were analyzed from the medical records. Coronary angiograms within 6 months of EKG in patients with RBBB were available for 184 patients and were accordingly analyzed for significant obstructive CAD.

Results: In all, 33 patients had single-vessel disease, 52 patients had 2-vessel disease, and 87 patients had multivessel disease whereas 12 patients had no significant disease. Left anterior descending artery was the most frequent vessel involved (72%) followed by left circumflex (58%) and right coronary artery (53%).

Conclusions: In conclusion, in chronic RBBB, wherever the angiograms were available, CAD predominantly involved left anterior descending artery. Most common associated comorbidities in chronic RBBB were systemic hypertension and CAD.

Key Indexing Terms: Right bundle branch block; Angiogram; Electrocardiogram. **[Am J Med Sci 2016;351(1):97–100.]**

INTRODUCTION

Right bundle branch block (RBBB) is an electrocardiographic diagnosis resulting from a block or delay in conduction of cardiac impulse through the right branch of the bundle of His. This branch receives most of its blood supply from the septal vessels coming off the left anterior descending coronary artery, particularly in its initial course. However, in most patients, collateral supply is available from either the right or left circumflex coronary systems.[1] The concept of a bundle branch block on electrocardiogram (EKG) has been present for more than a century in medical literature, dating back to Eppinger and Rothberger.[2] This is a retrospective study of patients with a baseline complete RBBB, evaluating the associated comorbidities and the correlating coronary anatomy via selective coronary angiography.

MATERIALS AND METHODS

To identify an RBBB on EKG, the definition set by the task force from the American Heart Association, the American College of Cardiology and the Heart Rhythm Society[3] was followed:

1. QRS duration greater than or equal to 120 ms in adults.
2. Rsr', rsR' or rSR' in leads V1 or V2. The R' or r' deflection is usually wider than the initial R wave. In some patients, a wide and often notched R wave pattern may be seen in lead V1 or V2 or both.
3. S wave of greater duration than that of R wave or greater than 40 ms in leads I and V6 in adults.
4. Normal R peak time in leads V5 and V6 but greater than 50 ms in lead V1 (associated with the R' wave).

The analysis of 32,345 consecutive EKGs between October 2010 and January 2012 revealed 583 patients with RBBB. History, physical examination, associated comorbidities for coronary artery disease (CAD), echocardiograms, and the available hemodynamic studies were followed in these patients, including left heart catheterization, selective cineangiography of coronary arteries, and left ventriculography in 184 of these patients. Techniques for coronary angiography were in accordance with those of Sones and Shirey[4] or Judkins.[5] Each x-ray film was reviewed by 2 observers, with particular attention to the details of calibers of coronary arteries, the degree of narrowing, the smallest

opacified arteries, the extent of collaterals, and possible artifacts. Coronary artery obstruction was measured at the maximal luminal diameter narrowing observed on the cine film. A lesion in the coronary artery was considered to be of significance if there was >50% narrowing of the internal diameter. Subtotal occlusion was defined as lesion with 50–95% stenosis and total occlusion was defined as a lesion with 95–100% stenosis. Significant CAD was noted in left main coronary artery (LM), left anterior descending (LAD), left circumflex, and right coronary artery (RCA). Chronic lung disease was diagnosed by pulmonary hypertension (HTN). Pulmonary HTN was diagnosed by right heart pressure (mean pulmonary pressure >25 mmHg) when there was no left heart disease (Figure).

RESULTS

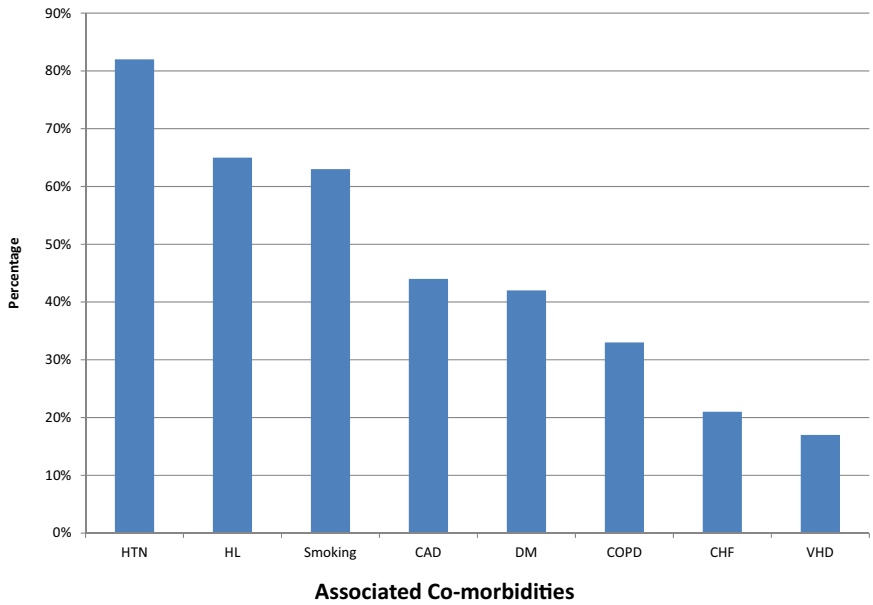
A total of 583 patients with RBBB were evaluated: 377 (65%) were men, 206 (35%) were women and mean age was 69.5 years. The most commonly associated comorbid condition was HTN (82%) followed by CAD (44%). Diabetes (42%), smoking (63%) and pulmonary HTN (33%) were also common. Most (85%) patients had a sinus mechanism on EKG followed by atrial fibrillation or flutter (14%). Regarding the frontal axis of QRS, it was seen to be normal in 57% of the patients, left axis >30° in 33%, and right axis more than 90° in 10%. Aortic and mitral valvular diseases were present with similar frequencies (16%–17%) (Table 1).

Among the cineangiographies of 184 patients, multivessel distribution of CAD was noted to be common; 87 patients (47.3%) had 3 or more vessels involved. The left anterior descending coronary artery was most commonly involved (72%), followed by left circumflex (58%) and RCA (53%). Left main was involved in 29% of patients (Table 2).

DISCUSSION

A finding of a left bundle branch block (LBBB) on EKG always sparks some concern; it can be ominous depending on the clinical presentation, with many studies showing increased mortality in patients with CAD and an underlying LBBB as compared with no bundle branch block.[6,7] However, interestingly upon further evaluation, up to 60% patients with a baseline LBBB could have no occlusive disease.[8] In our case series, the major etiology of LBBB was CAD, closely followed by HTN and sclerodegenerative process associated with cardiomyopathy.[9]

It is a common, perhaps altruistic, belief that RBBB is an isolated EKG phenomenon, not associated with cardiovascular disease. However, this view has been largely proven wrong, and its association with diseases (cardiac and noncardiac) is now well established. In patients with systolic heart failure, RBBB is associated with a significantly increased long-term (4-year) mortality risk compared with a non-BBB or LBBB pattern on baseline EKG; increased mortality risk is more pronounced in patients with a lower left ventricular ejection fraction.[10] Incidence of RBBB, similar to other conduction defects increases with age.[11] In a prospective study of 855 men with 30 years follow-up, the prevalence in subjects at age 50 was 0.8% and by age 80 it increased to 11.3%.



*HTN=hypertension, HL=hyperlipidemia, CAD=coronary artery disease, DM=diabetes mellitus, COPD=chronic obstructive pulmonary disease, CHF=congestive heart failure, VHD=valvular heart disease

FIGURE. Associated comorbidities of right bundle branch block.