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Letter to the Editor

Predictors of ventricular dysfunction and coronary artery disease in Iranian patients with left bundle branch block

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Abstract

Patients with coronary artery disease (CAD) and concomitant left bundle branch block (LBBB) have increased cardiovascular mortality rates in comparison with those with CAD but without LBBB. In patients with LBBB, therefore, the delineation of the presence and severity of CAD may be helpful in providing prognostic information. In this cross-sectional study 219 patients with LBBB and suspected CAD that underwent coronary angiography, assessed for having CAD and left ventricular (LV) dysfunction. CAD was present in 124 (56.3%) patients and left ventricular ejection fraction <50% was seen in 147 (67.1%) patients. Advanced age ($p=0.001$), male gender ($p=0.027$, OR=1.94), history of chest pain ($p=0.015$, OR=2.08) and LVEF <50% ($p=0.026$, OR=3.04) were predictors of CAD and older age ($p=0.004$), male gender ($p=0.017$, OR=2.11), history of diabetes mellitus ($p=0.043$, OR=1.45) and angiographically documented CAD ($p=0.001$, OR=3.41) were predictors of LV dysfunction.

Keywords: Left bundle branch block; Coronary artery disease; Coronary angiography

1. Introduction

Left bundle branch block (LBBB) is a relatively uncommon electrocardiographic (ECG) finding. The causes of LBBB are varied. Systemic hypertension and coronary artery disease are the most common causes of LBBB. Cardiomyopathy, valvular heart disease and several other less common causes have been described [1].

Previous studies have shown that subjects with CAD and concomitant LBBB have increased cardiovascular mortality rates in comparison with those with CAD but without LBBB [2–4]. In patients with LBBB, therefore, the delineation of the presence and severity of CAD may be helpful in providing prognostic information and in guiding the therapy. The identification of CAD in the setting of LBBB is difficult or impossible using electrocardiographic, echocardiographic, or scintigraphic techniques [5,6], and as a result, coronary angiography is usually required in these patients to provide definitive diagnoses.

We hypothesized that certain clinical or demographic characteristics might help to predict the likelihood of CAD in patients with LBBB. This study was performed to test this hypothesis.

2. Materials and methods

In this cross-sectional study, we studied 219 consecutive patients with complete LBBB pattern in electrocardiography who were admitted to our heart center (Madani Heart Hospital in Tabriz-Iran) with chest pain syndrome or scintigraphic and echocardiographic findings of suspected CAD and underwent coronary angiography from May 2004 to September 2006. The criteria set by the Criteria Committee of the New York Heart Association were used to interpret LBBB [7].

Technique for coronary angiography was in accordance with Judkins method. Left ventricle (LV) systolic function was assessed by transthoracic echocardiography and was

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considered decreased if the ejection fraction (EF) was <50%. Selective coronary angiography was performed in multiple projections; the presence of CAD was defined as ≥70% luminal diameter narrowing of a major epicardial artery or ≥50% narrowing of the left main coronary artery.

Statistical analysis was performed by using SPSS for windows v.13.0 package (SPSS Inc; Chicago, IL). Comparing of continuous variables between the two study groups was done by 'independent samples *t*-test'. Categorical variables were analyzed by Chi-square or Fisher's exact test as appropriate. A p value < or =0.05 was considered to be significant.

3. Results and discussion

We studied 219 patients (56.7% men and 42.9% women), with mean age of 57±14.7 years. Patients referred for coronary angiography due to chest pain syndrome (68.9%) or because of heart failure (31.1%); 47(21.5%) patients had history of myocardial infarction.

Clinical and demographic characteristics according to the presence or absence of CAD are listed in Table 1. Compared with the patients without CAD, the patients with CAD were older; more likely to be men and more likely to have a left ventricular ejection fraction <50%.

Background variables and risk factors in patients with LV ejection fraction (EF) ≥50% and EF<50% and the extent and severity of CAD according to LV systolic function are shown in Table 2. Patients with diabetes mellitus type 2 and concomitant LBBB have advanced LV dysfunction. LV systolic function was depressed in 147 patients (67.1%).

Mean LVEF was lower in LBBB patients who had CAD, and LBBB patients with LVEF≥50%, had higher rates of normal coronary arteries (Table 2).

Table 1
Background variables and risk factors in LBBB patients with and without coronary artery disease (CAD)

	With CAD n=95	Without CAD n=124	p value	Odd's ratio (95% CI)
Age (year)	61±11.5	50.6±.16.9	0.001	–
Sex (male)	64 (67.4%)	60 (48.4%)	0.027	1.94 (1.12–3.38)
HTN	46 (48.4%)	67 (54.0%)	0.762	1.13 (0.65–1.95)
DM	18 (17.6%)	36 (29.1%)	0.325	1.45 (0.11–2.15)
HLP	31 (32.6%)	52 (41.9%)	0.318	1.34 (0.16–2.36)
FH	4 (4.8%)	5 (3.7%)	0.950	0.15 (0.20–2.89)
Smoking	16 (19.3%)	41 (30.1%)	0.105	1.81 (0.94–3.48)
Chest pain	40 (48.2)	42 (30.9%)	0.015	2.08 (1.18–4.76)
DOE	22 (36.5%)	86 (63.2%)	0.0001	4.16 (2.62–8.69)
EF<50%	76 (80%)	71 (57.3%)	0.026	3.04 (1.68–5.50)
LVEDP≥16 (mm Hg)	19 (26%)	36 (29.5%)	0.120	1.19 (0.62–2.28)

Values are shown as mean−±SD or number (percent).
LBBB: Left bundle branch block; HTN: hypertension; DM: diabetes mellitus; HLP: hyperlipidemia; FH: familial history; DOE: dyspnea on exertion; LVEDP: left ventricle end-diastolic pressure.

Table 2
Background variables and risk factors in LBBB patients with ejection fraction (EF)≥50% and EF<50%

	EF≥50% n=72	EF<50% n=147	p value	Odd's ratio (95% CI)
Age (year)	52.6±14.8	58.9±14.3	0.004	
Sex (male)	31 (44.9%)	93 (63.3%)	0.017	2.11 (1.18–3.11)
HTN	36 (52.2%)	77 (52.4%)	0.997	0.99(0.56–1.76)
DM	11 (15.9%)	43 (29.3%)	0.043	1.45 (0.11–1.85)
Smoking	15 (21.7%)	42 (28.6%)	0.370	1.44 (0.13–2.82)
HLP	26 (%37.7)	57 (38.8%)	0.991	1.05 (0.58–1.89)
CAD	27 (37.5%)	97 (65.6%)	0.001	3.41 (1.88–6.21)
One VD	7 (10.1%)	32 (21.8%)	0.080	2.46 (1.03–5.92)
Two VD	11 (15.3%)	37 (25.2%)	0.110	1.98 (0.92–4.21)
Three VD	8 (11.6%)	27 (18.4%)	0.288	1.12 (0.14–4.0)
LM and 3-VD	9 (12.5%)	28 (19%)	0.281	1.71 (0.89–3.29)
LVEDP≥16 (mm Hg)	39 (63.9%)	100 (75.2%)	0.149	1.71 (0.89–3.29)

Values are shown as mean−±SD or number(percent).
LBBB: Left bundle branch block; HTN: hypertension; DM: diabetes mellitus; HLP: hyperlipidemia; FH: familial history; DOE: dyspnea on exertion; LVEDP: left ventricle end-diastolic pressure; VD: vessel disease.

Patients with left bundle branch block (LBBB) and concomitant coronary artery disease (CAD) have a worse prognosis than those with LBBB without CAD [2–4].

In addition, subjects with CAD and concomitant LBBB have a higher cardiovascular mortality than those with a similar extent of CAD but without LBBB [2]. Non-invasive diagnosis of CAD in patients with left ventricular dysfunction and LBBB remains challenging, and patients are often referred for coronary angiography to determine the presence and severity of CAD.

In this study we prospectively analyzed the extent of CAD in 219 patients with LBBB referred for coronary angiography. In our study only 16.9% of patients had left main or three vessel CAD, this was 13% in the study of Nguyen et al. [8] and about 17% in the study of Abrol et al. [9]. Of the 72 patients with normal LV function, only 9 (12.5%) patients had left main or three vessel diseases, and of the 147 patients with depressed LV function, only 28 (19%, p=0.28) had left main or three vessel disease. Similar to the study of Nguyen et al. [8], our data showed that most of these patients with depressed LV function did not have left main or 3-vessel CAD.

In our study; advanced age, male gender, history of chest pain and LVEF<50% were predictors of CAD. Dyspnea on exertion was a more common complaint of patients without CAD and considering the preserved LV function in most of these patients it may indicate to higher prevalence of diastolic LV dysfunction in this group of patients. An elevated left ventricular end diastolic pressure in 63.8% of patients with LVEF≥50% supports this hypothesis.

Compared with 72 patients with EF≥50%, the 147 patients with EF<50% were older; more likely to be men; more likely to have diabetes and coronary artery disease.

We concluded that certain clinical and demographic characteristics may help to differentiate LBBB patients with concomitant CAD and LV dysfunction from the others.

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