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STABLE ANGINA; THE FREQUENCY OF CORONARY ARTERY STENOSIS AMONG PATIENTS HAVING LEFT BUNDLE BRANCH BLOCK.

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ABSTRACT... Objective: To see the frequency of coronary artery stenosis in the patients of stable angina having left bundle branch block, and to see the effects of gender and age on this correlation. **Design:** Experimental case series. **Setting:** Bahawal Victoria Hospital, Bahawalpur. **Period:** June 2006 to May 2008. **Methods:** One hundred and forty one (141) patients of Stable Angina presenting with atypical chest pain, both male and female of 30—70 years age, positive for LBBB and with normal Cardio-Thoracic Ratio, normal echocardiography and negative for conventional risk factors and family history of Coronary Artery Disease were taken. All patients were angiographed. **Results:** A total of 141 patients were investigated through coronary angiogram to see the frequency of coronary artery stenosis in these patients. Ninety five (67.4%) patients proved to have coronary artery stenosis. The male patients showed higher frequency (87.4%) of harboring coronary vessel blockade as compared to that (35.2%) in females (P value <0.0005). There was no relation between age and the frequency of coronary stenosis (P value >0.05). **Conclusions:** There is significant difference (P value <0.0005) in coronary artery stenosis among men and women having LBBB.

Key words: Coronary Artery Disease, Electrocardiogram, Left Bundle Branch Block, Coronary Angiograms.

INTRODUCTION

Coronary Artery Disease (CAD) is a global problem¹, especially of the industrialized societies² and it remains the single biggest cause of mortality accounting for 16.7 millions deaths³ equivalent to the population of the state of Florida—every year⁴. Indeed, the projections by the World Health Organization suggest that CAD deaths will reach a terrifying total of 25 million per year by 2020⁵. Acute Coronary Syndromes (ACS) account for more than 1.5 million hospital admissions annually in the United States of America (USA) alone⁶. In the developing world, recent analyses have clearly pointed out that CAD and CAD-related mortality have raised^{7,8,9}. In India, diseases

of vascular system were found to be the leading cause of mortality, accounting for 32% of all deaths¹⁰. Similarly, in Pakistan, CAD causes more than 100,000 deaths (12% of total deaths) annually¹¹.

The economic impact of CAD is devastating. In USA the annual cost of treatment of CAD was more than 350

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billion US Dollars, about 4% of GDP in 2000¹². Comparable situation can be speculated in the poor developing countries like India where it causes the estimated loss of 1.27% of GDP¹³. Recently, large efforts have been focused on finding means to improve the quality of care being given to the patients of CAD in an attempt to improve the outcome¹⁴. The Left Bundle Branch Block (LBBB) is an electrocardiographic finding in CAD, hypertension, cardiomyopathy, idiopathic fibrosis of the heart, severe left ventricular hypertrophy, heart failure, drugs i.e. Quinidine therapy, Levi's and Lenegre's disease, aortic valvular disease, valve replacement surgery, right ventricular pacing, rheumatic heart disease, disease of specialized conduction tissues, certain congenital conduction tissue anomalies and accessory conduction pathways. LBBB can be rate-related, as seen in ventricular tachycardia, supra-ventricular tachycardia and occasionally in bradycardia, and is rarely seen in healthy subjects^{15,16}. The complete LBBB indicates organic heart disease¹⁷.

As we are currently going through a CAD epidemic in Pakistan, with rough estimates suggesting 1 out of 4 adults suffering from this disease¹⁸, we must be accurate in our ways and means to diagnose and manage it. Electrocardiography is most widely used as a first line diagnostic tool¹⁹ and the LBBB is mostly blamed for serious organic insult to the myocardium especially in the presence of AMI or otherwise. We conducted this study to see the relationship between the LBBB and the coronary artery stenosis, and the effects of gender and age on such relationship.

PATIENTS AND METHODS

Study Design and Duration

Study design was experimental case series. The study was conducted at Department of Cardiology, Bahawal Victoria Hospital, Bahawalpur. The study was completed in about 2 years (From June 2006 to May 2008).

Sample

A sample of 141 (hundred and forty one) patients of stable angina, presenting with atypical chest pain, 30 to

70 years of age, having LBBB (criteria of the LBBB (15, 16, 17): QRS duration more than or equal to 0.12 seconds, VAT more than or equal to 0.09 seconds, Secondary T wave changes and the morphology (22); ST-segment elevation and its concordance or discordance, ST-segment depression, presence of Q waves in two consecutive precordial leads or in two limb leads, R-wave regression from leads V1 to V4, QS pattern from leads V1 to V4, sign of Cabrera, sign of Chapman, and left-axis deviation), having normal Cardiothoracic Ratio (CTR) and normal echocardiography, undergoing angiography was taken using Non Probability Convenience Sampling Technique. patients having any one or more of the major risk factors (DM, Hypertension, Dyslipidemia, Tobacco smoking and positive family history of CAD in first degree relatives of <40 years of age, having any past history consistent with AMI, having contraindications for angiogram (24) and those patients for whose angiography the cardiologist's comments differed.

Data Collection and Analysis

The data was collected on a preformed questionnaire by the investigators. All the Electrocardiograms were taken on the same ECG machine and read by two different cardiologists. All the Echocardiograms, chest X-Rays and Coronary Angiograms were studied by two observers to minimize the bias. All the data was analyzed manually. Means, frequencies and other similar parameters were obtained with the help of a calculator. Chi Square Test was applied to calculate the P value. The P value of <0.05 was taken as statistically significant.

DEFINITIONS

Typical Chest Pain

The classic description includes crushing, pressure-like chest discomfort with radiation to the arm, neck, or jaw. The patient may also experience diaphoresis, nausea, vomiting, or shortness of breath²¹. Most commonly, the discomfort is noted in the left anterior part of the chest or in the substernal region. Chest pain generally lasts for

several minutes.

Atypical Chest Pain

Atypical presentation can be described as chest tightness, heaviness, "chest ache", sharp or stabbing, dull, pressure-like or burning discomfort, not amounting to the features of typical chest pain²¹.

Cardio-Thoracic Ratio: The Cardio-Thoracic Ratio (CTR) is widely used but is a crude method of measurement of the size of heart. Normally the transverse diameter of the heart is less than half the internal diameter of the chest in adults on Plain X-ray chest PA view²³.

Stable Angina Pectoris: Stable Angina Pectoris is the clinical entity characterized by typical ischemic chest pain or discomfort, lasting only for 2-10 minutes, precipitated by exercise, cold weather, or emotional stress, relieved by rest or Nitroglycerin, and may also be associated with fourth heart sound, or murmur of papillary muscle dysfunction during pain²⁰.

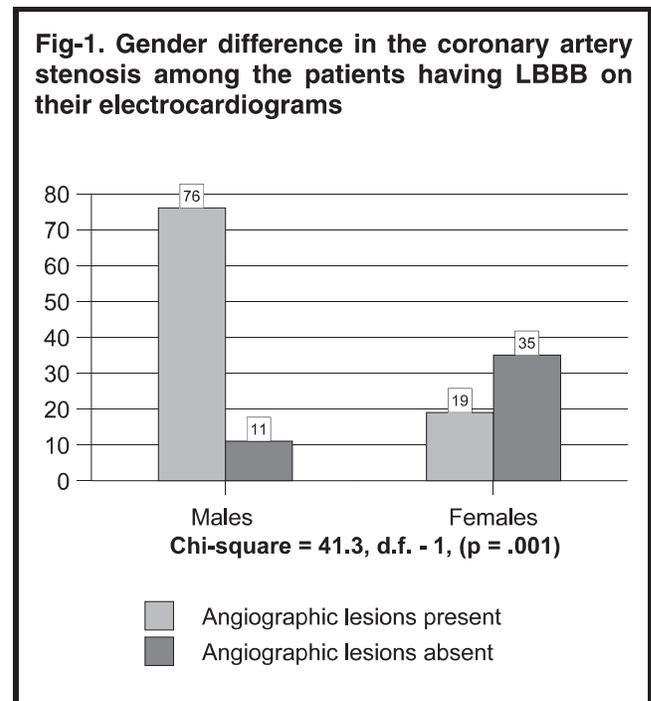
RESULTS

In this study, a total of 141 (hundred and forty one) patients having LBBB on their electrocardiograms were investigated through coronary angiogram to see the frequency of coronary vessel blockade in these patients. The demographic picture of the study population has been shown in Table-I.

Table-I. Demographic picture of the study population	
Demographic features	Attributes
Age	Mean: 53years Range: 32-68 years <50 years : 68 (48.2%) >50 years : 73 (51.8%)
Gender	Males: 87 (67.4%) Females: 54 (32.6%)
Rural / Urban	Rural: 93 (65.9%) Urban: 48 (34.1%)
Occupation	Business: 52 (36.9%) Govt. Service: 36 (25.5%) Farmer: 21 (14.9%) Labour: 13 (9.2%) Miscellaneous: 19 (13.5%)

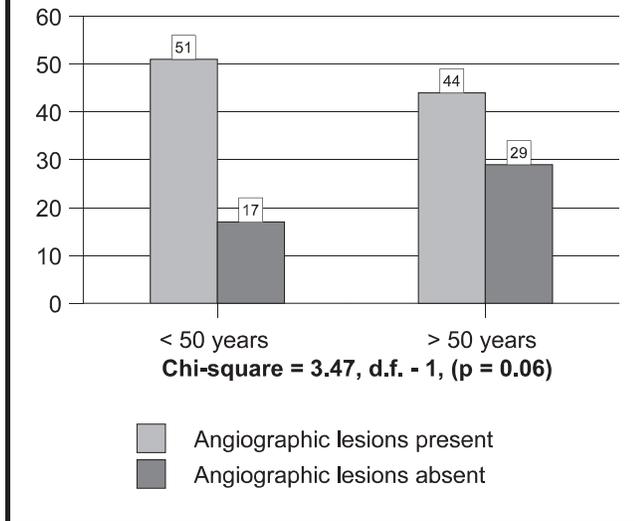
Average age of males and females was similar. All the females included in the study were married, most of them were multipara. Ninety five (67.4%) patients having LBBB proved to have some degree of coronary artery disease, as shown by their angiograms. The male patients with LBBB shown higher frequency (87.4%) of harboring coronary vessel blockade than females (35.2%).

The statistical analysis has pointed out that the gender difference in the angiographic abnormalities is highly significant statistically (P value 0.001), as shown in Figure No.1.



Two age groups i.e., a younger (below 50 years) and a relatively older (above 50 years) groups were made. The younger age group comprised of 68 (48.2%) and the relatively older age group comprised of 73 (51.8%) patients. The comparison between the age groups showed that the age alone does not affect the angiographic findings significantly (P value 0.06) as given in Figure No.2.

Fig-2. Age difference in the coronary artery stenosis among the patients having LBBB on their electrocardiograms



DISCUSSION

This is first study, as far our knowledge, looking at frequency and gender difference of coronary artery stenosis in patients of stable angina having LBBB. Because CAD is the number one killer in developed countries, with a lifetime prevalence of up to 50% in the American population¹⁴, substantial medical literature has been dedicated to study the outcome of this dreadful disease. Arbustini and colleagues²⁵ found coronary thrombi in 98% of the patients dying of clinically documented AMI, 75 % of which were cause due to plaque rupture and 25% due to plaque erosion. They found gender differences in the cause of coronary thrombi that lead to acute myocardial infarcts, showing that 37% of thrombi in women were caused by erosion compared with only 18% in men. Women, who have ACS, present more frequently with atypical symptoms, and the ECG is less reliable as a first line diagnostic tool¹⁹. Women present more frequently with non-ST segment elevation ACS, whereas men more often have ACS with ST segment elevation.

The reason behind all this may be due to the difference and the severity of the pathological lesion, and possibly the electrophysiology may be different^{26,27}. Furthermore

the incidence of silent angina is higher among women as compared to men²⁸. Herman et al. proposed six major theories to explain the paradox of "angina" and normal coronary arteries²⁹. Psychosomatic cause may be found in certain cases, but does not explain the objective evidence of myocardial dysfunction such as ST-segment changes, lactate production and increases in LVEDP with exercise stress. Spasm has been well documented in several cases of variant angina but has not been observed to any degree in the multiple cases of angina with normal coronary arteries that have undergone arteriography. Spasm is more common in females²⁸. Oxyhaemoglobin dissociation or blood oxygen release rate can be responsible. Misinterpretation of coronary angiograms is sometimes the problem. Secondary branch coronary occlusions can be missed³⁰.

Occlusion of the feeding vessels to the Left Bundle Branch (LBB) can go silent and asymptomatic and can be a matter of special consideration. Furthermore, necropsystudies³¹ have documented the occurrence of MI in the absence of atherosclerotic occlusion. On the other hand small vessel disease can certainly be missed at angiography³² and may actually need further sophisticated tools to be assessed. Patients with hypertrophic or congestive cardiomyopathy can have the ischemic-type of chest pain along with electrocardiographic abnormalities and have normal coronary angiograms³³. Other considerations are cropping up as in several case reports of transmural MI during pregnancy, with normal coronary angiograms three to four months later³⁴. During pregnancy the various infections are common in our part of the world³⁵, which may cause focal myocardial abnormalities, some of them can go un-noticed or the patient may not be able to recall them (recall bias). Peripartum cardiomyopathy, from which the patients usually recover, may also be missed in the same fashion³⁴. Some patients have altered cardiac pain perception as a result of prior thoracic and pericardial surgery, stroke, spinal cord injury, and degenerative neurological diseases and silent ischemia does occur in such patients²¹. This phenomenon is most common among elderly patients²¹.

In summary, all of our female patients were married

having 3-4 children on the average. Silent ischemia, zonal or focal involvement in the feeder vessels to the LBB could possibly be higher in women. Thus, the gender difference of angiographic lesions in the patients having LBBB may be attributed to the differences in etiology/etiopathology in women as compared to men. The left bundle branch block is a benign ECG finding if it is found alone. A 10 year follow-up study¹⁵ of healthy aviators with bundle branch block has revealed no incidence of complete atrioventricular block, syncope, or sudden death.

CONCLUSIONS

The study concluded that gender affects significantly the angiographic findings among the patients with the LBBB. Females were found to have the LBBB with normal coronary angiograms more often than males. So labeling all the patients with LBBB as CAD looks to be misleading. We emphasize that all the patients should be thoroughly evaluated and appropriately investigated.

(List of Abbreviations: ACS: Acute Coronary Syndrome, BVH: Bahawal Victoria Hospital, CAD: Coronary Artery Disease, CTR: Cardio-thoracic Ratio, DM: Diabetes Mellitus, ECG: Electrocardiography, GDP: Gross Domestic Product, LBB: Left Bundle Branch, LBBB: Left Bundle Branch Block, LVEPD: Left Ventricular End Diastolic Pressure, MIC: Multan Institute of Cardiology, USA: United States of America, VAT: Ventricular Activation Time.)

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