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PREVALENCE OF LEFT BUNDLE BRANCH BLOCK IN WOMEN WITH ISCHEMIC HEART DISEASE

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SUMMARY

The controversy about the sex distribution in Left Bundle Branch Block (LBBB) led us to study what occurred in 56 hospitalized patients affected by LBBB and ischemic heart disease (IHD). In the group of acute myocardial infarction (AMI), 26 patients, with a high incidence of pump faiture (73%) and a mortality of 35%, the male/female (M/F) ratio was clearly reduced in relation to the global AMI M/F ratio (1.9:1 against 3.5:1). In the group without AMI, there was a female predominance and, namely in cases with unstable angina, the M/F ratio was reversed (1:2 against 2:1 in the general group with unstable angina). Hypertension did not seem responsible for the absence of male prevalence in patients with IHD. The reasons of this phenomenon — the *relative* female prevalence of LBBB in patients with AMI, and the absolute female predominance in cases without AMI — seem to be obscure at the moment. It is possible that, for the majority of patients with IHD and LBBB, LBBB does not have a simple etiology. The hypothesis of the coexistence of IHD with a *primary* degenerative disease of the conduction system is admitted.

It is generally accepted that atrio-ventricular (A-V) and intraventricular conduction defects are more frequent in men.

However, it was recently reported that Left Bundle Branch Block (LBBB) could be an exception to the male predominance in conduction defects. [1, 2] Our observations in Portugal lead us to the same conclusion. [3, 4]

In this view, we have studied what occurred in a hospital population affected by LBBB and admitted with various clinical manifestations or complications of ischemic heart disease.

MATERIAL AND METHODS

In the period between 1969 and 1976, 56 patients ranging from 47 to 84 years of age (mean 65), 28 being males (with mean age of 64) and 28 females (with mean age of 66), all with LBBB and ischemic heart disease, were admitted either into the Coronary Care Unit or into the general wards of our department.

The diagnosis of ischemic heart disease was made before a history of angina pectoris and/or the past or present evidence of a proven myocardial infarction.

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The diagnosis of LBBB was based on the following electrocardiographic findings: 1) QRS interval equal or superior to 120 msec; 2) broad *R* waves or *M* pattern in leads I and V6; 3) intrinsicoid deflection superior to 70 msec in lead V6.

From the group of 56 patients, 26 were admitted with acute myocardial infarction (AMI), 12 because of unstable angina, diagnosed according to the criteria of the World Health Organization (WHO, 1971), 5 for acute pulmonary oedema, 5 with tachydysrhythmimas, 4 with congestive heart failure, and 4 by other causes (acute pericarditis, acute pneumonia, Adams-Stokes episodes, and pulmonary embolism).

All the cases in which LBBB first occurred *during* acute pulmonary oedema or *after* the appearance of cardiogenic shock have been excluded.

In 15 patients, 6 males and 9 females, it coexisted a history of arterial hypertension, 5 being admitted with AMI (2 men and 3 women), 4 with unstable angina (2 males and 2 females), and 6 with other features.

LBBB was considered to be *pre-existent* whenever it was present in tracings prior to admission. By *acquired* LBBB we mean: a) its appearance after admission; b) its stable presence in all the tracings recorded at the hospital, whenever electrocardiograms taken within four months prior to admission did not show LBBB. LBBB was classified as *indetermined* whenever electrocardiographic recordings prior to admission were missing and LBBB was present in all the tracings obtained at the hospital.

RESULTS

The results obtained are summarized in tables 1, 2 and 3.

1 — In the group of 26 patients admitted with AMI (patients admitted into the Coronary Care Unit), the mean age of males was 66 years and that of females was 70 years; this difference, however, is not significant. The incidence of pump failure (see table 3), evaluated from the classes of Killip,[5] was high, about 73% (19/26 patients), and reflected mainly the high incidence of acute pulmonary oedema. Global mortality (considering in-hospital mortality within four weeks) was 35%, but the average was 42% in the sub-group of AMI with LBBB and pump failure (classes II, III and IV). As the causes of death in patients of classes I and II, we found: one case of myocardial rupture (in a patients of class I); one case of early asystole (after six hours of infarct evolution); one case of paroxysmal complete A-V block; two cases of late sudden death (after the first week), due, in one case, to asystole, and not being documented in the other; one case of pulmonary embolism. In five patients, all with evidence of pump failure, we found major A-V conduction disturbances: second degree A-V block in one case, and complete A-V block in four others; three patients died (two with cardiogenic shock and the third with asystole); the survivors did not need permanent pacing (transient complete A-V block).

LBBB was acquired in six patients with AMI (being ratedependent — phase 3 — in one), pre-existent in six, and indetermined in the others. Mortality was apparently higher in the cases with acquired LBBB (table 3).

The male/female (M/F) ratio was 1.9: 1 in the AMI group. In the same period (1969-76), in the general population with AMI admitted into the Coronary Care Unit, the mortality evolved from 18% to 9% and the M/F ratio annually ranged between 3:1 and 4:1 (average of 3.5: 1).

Mean age was higher in dying patients (71 years) than in survivors (65 years), but mortality equally affected both sexes (6 males and 3 females).

2 — In the group of 12 patients admitted with unstable angina, two thirds had angina of type III, and the remaining cases angina of type II or IV (WHO, 1971). Only in two patients we found a history of previous myoardial infarction. Mortality was absent. The M/F ratio was 1:2; during the same period (1969-76), in the general group with unstable angina, the M/F ratio was reversed (2:1). [6]

3 — In the other groups, a global female predominance was found (7 men and 11 women). It should be noted that patients admited with acute pulmonary oedema (all females) had a relatively advanced age (mean of 70 years), the reverse being the case of those admitted with paroxysmal tachydysrhythmias (mean of 56 years). Four patients had had myocardial infarction in the past. Two deaths were registered (one case of asystole in a patient with congestive heart failure, and one case of sudden death, not documented, in a patient admitted with recurrent ventricular fibrillation).

4 — In the group of 15 patients with hypertension associated with ischemic heart disease, mean age was 63 years and only three deaths occurred (two patients with AMI and one admitted for ventricular tachydysrhythmias).

5 — LBBB was acquired in about 20% of the cases (table 2), appearing almost always (10/11 cases) in patients with AMI or unstable angina. Only in two cases coexisted hypertension.

Table 1

Results obtained

Causes of Admission	Cases	Men	Women	Mean Age	Hypertension	Deaths
Acute Myocardial infarction	26	17	9	67	5	9
Unstable angina	12	4	8	62	4	—
Acute pulmonary oedema	5	—	5	70	2	—
Tachydysrhythmias	5	3	2	56	2	1
Congestive heart failure	4	2	2	60	1	1
Others	4	2	2	65	1	—
Total	56	28	28	65	15	11

Table 2

Results obtained

LBBB types	AMI	Unstable angina	APO	Tachy	CHF	Other Conditions	Total
Pre-existent	6	3	3	3	2	3	20
Acquired	6	4	1	—	—	—	11
Indetermined	14	5	1	2	2	1	25
Total	26	12	5	5	4	4	56

Annotations: LBBB — left bundle branch block
AMI — acute myocardial infarction
APO — acute pulmonary oedema
Tachy — tachydysrhythmias
CHF — congestive heart failure

Table 3

Acute Myocardial Infarction with LBBB

	Cases	(%)	Deaths	(%)		Cases	Deaths	(%)
Class I:	7	(27%)	1	(14%)	LBBB + PF:	19	8	(42%)
Class II:	9	(35%)	4	(35%)	LBBB pre-ex:	6	1	(30%)
Class III:	8	(30%)	2		LBBB indet:	14	5	
Class IV:	2	(8%)	2	(100%)	LBBB acq:	6	3	(50%)

Annotations: LBBB — left bundle branch block
PF — pump failure
pre-ex — pre-existent
indet — indetermined
acq — acquired

DISCUSSION

1 — In the group of 30 patients admitted with ischemic heart disease but without AMI, the M/F ratio was 1:1.7 (11 men and 19 women), with a mean age of 63 years. Six patients had previous myocardial infarction, and 4 men and 6 women had hypertension.

Complete data about the incidence and prevalence of the different clinical manifestations of ischemic heart disease in Portugal are not available. Therefore, the female predominance observed in this group of patients without AMI cannot be correctly evaluated. However, this fact draws our attention though we should, at least, regard the relative weight of the demographic aspects (namely, the female predominance in elderly people), [7, 8] and the known higher prevalence of stable angina pectoris in old women. [9]

Nevertheless, and considering the sub-group of patients admitted with unstable angina and LBBB, we found an inversion of the M/F ratio regarding the total population with unstable angina. This difference is striking and seems due to the presence of LBBB. In two thirds of the cases, LBBB was possibly (in indetermined cases) or surely pre-existent.

2 — In the group of 26 cases of AMI with LBBB, we found a clear reduction of the male predominance regarding the total group with AMI. This difference seems to be due to the presence of LBBB. In three fourths of the cases, LBBB was possibly (in indetermined cases) or surely pre-existent. The evolution of AMI associated with LBBB did not differ from what was mentioned before: [10] LBBB worsens the prognosis and the increase in mortality seemed to reflect mainly the higher incidence of pump failure.

3 — The incidence of hypertension in this group with ischemic heart disease (which was about 27%) could eventually contribute to explain the relative female predominance (specially in cases without AMI), considering the claimed etiological role of hypertension in LBBB [11, 12] and the higher incidence of hypertensive disease in old women. [13] The data we obtained exclude this assumption, and still suggest that hypertension did not have, globally, any prognostic influence.

4 — This series is formed, in its majority, by severe cases of ischemic heart disease. Therefore, it is not surprising the coexistence of LBBB, but its presence allows us to suggest, regarding the usually dual pattern of blood supply to the left bundle branch, [14, 15] the likelihood of double or triple vessel disease. However, we do not understand why should LBBB of ischemic origin occur more frequently than it would be expected in the female. Anatomical variants of coronary circulation mostly found in women were not described, and the prevalence of anatomic particularities of the left coronary artery in patients with LBBB still remain to be confirmed. [16, 20]

On the other hand, in our series LBBB was or could be pre-existent (chronic) in up to 80% of the cases. Etiological association of LBBB with ischemic heart disease was only unquestionable (acquired LBBB) in about one fifth of the cases; in the remaining ones, the possibility of an association of pathologies cannot be excluded, after all. A worsened prognosis of AMI in chronic or possibly chronic LBBB suggests an etiopathogenic association between ischemic heart disease and LBBB; however, it does not explain the lesser male predominance in these cases. The association of coronary atherosclerosis with another pathology (but not hypertension) leading to LBBB, will allow us to explain the prevalence of LBBB in women with ischemic heart disease, as long as the associated pathology affects preferably the female patients. One can admit the hypothesis of the coexistence of a *primary* degenerative disease of the conduction system, which affects mainly the left side of the heart and shows particular preference for the female patients.

CONCLUSIONS

1 — In the patients admitted with various clinical manifestations or complications of ischemic heart disease associated with IBBB, it should be pointed out that there is no predominance of male patients. It is note-worthy the prevalence — *relative* in AMI, absolute in cases without AMI — of LBBB in women with ischemic heart disease.

2 — The reasons of this phenomenon seem to be obscure at the moment. It is possible that, for the majority of patients with ischemic heart disease and LBBB, but without hypertension, LBBB does not have a simple etiology.

3 — One can admit the hypothesis of the coexistence of ischemic heart disease with a *primary* degenerative disease of the conduction system, which allow us to explain the prevalence of LBBB in female patients.

RESUMO

A controvérsia àcerca de uma eventual *prevalência feminina do* Bloqueio Completo de Ramo Esquerdo (BCRE) conduziu à análise do que ocorreu com 56 doentes hospitalizados com BCRE e cardiopatia isquémica (CI). No grupo com enfarte agudo do

miocárdio (EAM), com 26 doentes, caracterizado por uma alta incidência de falência mecânica (73%) e uma mortalidade de 35%, a proporção Homem/Mulher (H/M) era claramente inferior à que se registava no grupo global de EAM (1,9:1 contra 3,5:1). No grupo de doentes sem EAM, havia predomínio do sexo feminino e, particularmente, no subgrupo com angina instável a proporção H/M inverteu-se (1:2 contra 2:1 no grupo geral de angina instável). A hipertensão não pareceu responsável pela ausência de prevalência do sexo masculino nos doentes com CI. As razões deste fenómeno — *relativa* prevalência feminina do BCRE nos doentes com EAM e predomínio absoluto do sexo feminino nos casos sem EAM — parecem, de momento, obscuras. É possível que, na maioria dos doentes com CI e BCRE, o BCRE não tenha uma etiologia simples. Admite-se a hipótese de coexistência de CI com uma doença degenerativa *primária* do sistema de condução.

REFERENCES

1. OSTRANDER JR LD, BRANDT RL, KJELSBERG MO, EPSTEIN FH: Electrocardiographic findings among the adult population of a total natural community, Tecumseh, Michigan. *Circulation* 31: 888, 1965.
2. KULBERTUS HE, DE LEVAL-RUTTEN F, DUBOIS M, PETIT JM: Sudden death in subjects with intraventricular conduction defects. In: Sudden Death. Ed. HE Kulbertus and HJJ Wellens. The Hague, Martinus Nijhoff Publishers, p. 379, 1980.
3. BORDALO ADB, LAUREANO SANTOS A, LONGO A, CRUZ JR, DIAS FERNANDES AJ, SOARES-COSTA JTS, RIBEIRO C: Bloc de branche gauche complet: corrélations vecto-mécanocardiographiques (paper presented at the III Colloque Francophone de Vecto-cardiographie, Lyon, 1979). *Arch. Mal. Coeur* (accepted for publication).
4. BORDALO ADB, BORDALO E SÁ AL, FERREIRA RJ, RIBEIRO C: Left bundle branch block revisited from the etiological viewpoint (paper presented at the 7th International Congress on Electrocardiology, Lisbon, 1980). In *Proceedings of the 7th International Congress on Electrocardiology* (in press).
5. KILLIP T III, KIMBALL JT, GRAY BB: Treatment of myocardial infarction in a coronary care unit: a two years experience with 250 patients. *Am J Cardiol* 20: 457, 1967.
6. COSTA-SILVA LA, SOARES-COSTA JT, LAUREANO SANTOS A, PAZ-MONTEIRO A, SOARES-COSTA TJB, COSTA-FERREIRA JM, RODRIGUES-CRUZ J: Angina Instável: evolução de 62 casos internados na UTIC. *O Médico* 86: 281, 1978.
7. INE (Instituto Nacional de Estatística): 11.° Recenseamento da População — 1970. Estimativa a vinte por cento. Ist vol., 1973.
8. INE (Instituto Nacional de Estatística): Estudos 54: crescimento regional da população portuguesa — estimativas intercensitárias 1941-77. 1979.
9. JULIAN DG: Angina Pectoris. Edinburgh, Churchill Livingstone, p. 21, 1977.
10. LIE KI, WELLENS HJ, SCHUILENBURG RM: Bundle branch block and acute myocardial infarction. In: The Conduction System of the Heart: structure, function and clinical implications. Ed. HJJ Wellens, KI Lie and MJ Janse. Leiden, H. E. Stenfert Kroese B. V., p. 662, 1976.
11. JOHNSON RP, MESSER AL, SHREENIVAS AL, WHITE PD: Prognosis in bundle branch block: II. Factors influencing the survival period in left bundle branch block. *Am Heart J* 41: 225, 1951.
12. SCOTT RC: Left bundle branch block — a clinical assessment. Part I. *Am Heart J* 70: 535, 1965.
13. LEW EA: High blood pressure, other risk factors and longevity: the insurance viewpoint. In: Hypertension Manual. Ist edition. Ed. JH Laragh. New York, N. Y., Yorke Medical Books, p. 43, 1974.
14. FRINK RJ, JAMES TN: Normal blood supply to the human His bundle and proximal bundle branches. *Circulation* 47:8, 1973.
15. DEMOULIN JC, ROSSI L: Vascularisation artérielle du système tawarien. (unpublished data).
16. LEWIS CM, DAGENAIS GR, FRIESINGER GC, ROSS RS: Coronary arteriographic appearances in patients with left bundle branch block. *Circulation* 41: 299. 1970.
17. HAFT JI, HERMAN HV, GORLIN R: Left bundle-branch block. Etiologic, hemodynamic and ventriculographic considerations. *Circulation* 43: 279, 1971.

18. WAREMBOURG H, PAUCHANT M, BERTRAND M, DUCLOUX G, CARRE A, VERMEERSCH M, KETELERS JY, DELOMEZ M, DELBECQUE H: Bloc complet de branche gauche et coronarographie (à propos de 9 observations). *Lille Médical* 17: 694, 1972.
19. DE MOTS H, ROSCH J, RAHIMTOOLA SH: Coronary artery anatomy in left bundle branch block. *Circulation* 48: 605, 1973.
20. HERBERT WH: Left bundle branch block and coronary artery disease. *J Electrocardiol* 8: 317, 1975.
WHO: The prodromal symptoms of myocardial infarction and sudden death. Ed. Regional Office for Europe. Copenhague, 1971.

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