

Original Article

Exercise induced left bundle branch block in isotopic exercise test. Findings and prognostic value[☆]

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ABSTRACT

Introduction: Exercise-induced left bundle branch block (EI-LBBB) is a rare circumstance of unknown significance. The purpose of this paper is to describe the scintigraphic features and the prognostic value of this finding.

Material and methods: We reviewed the features of 1885 patients who had visited our department to undergo GATED-SPECT ergometry to diagnose ischemic heart disease. Seven patients showed EI-LBBB throughout the exercise testing. Coronary angiography was performed in 4 of them. Patients were followed-up over an average period of time of 30 ± 8 months. The onset of major cardiovascular events was recorded during the follow-up period.

Results: The prevalence of EI-LBBB was 0.37%. Six out of 7 patients were women. Myocardial function and perfusion were normal in 3 patients. Three patients had fixed perfusion defects and one patient had a reversible defect. Two out of the 4 patients showing perfusion defects presented a moderate-severe decrease of the left ventricular ejection fraction. None of the 4 patients with perfusion defects were found to have coronary disease on coronary angiography.

Conclusions: The prevalence of EI-LBBB among the patients that came to undergo GATED-SPECT ergometry was very low. The finding was more frequent in women. In our series, 2 patients presented non-ischemic structural heart disease, but no patient was diagnosed with coronary artery disease. In our patients the presence of EI-LBBB did not relate to a greater risk of experiencing a major cardiovascular event.

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Bloqueo de rama izquierda inducido por el ejercicio en la ergometría isotópica. Hallazgos y valor pronóstico

RESUMEN

Introducción: El bloqueo completo de rama izquierda inducido por el ejercicio (BCRI-IE) es un fenómeno poco frecuente y de significado incierto. El propósito del presente trabajo ha sido describir las características gammagráficas y el valor pronóstico de dicho hallazgo.

Material y método: Se han revisado las características de 1.885 pacientes que habían acudido a nuestro servicio a realizarse una ergometría-GATED SPECT para diagnóstico de cardiopatía isquémica. Siete de ellos presentaron BCRI-IE en la prueba de esfuerzo. Se realizó coronariografía a 4 de los 7 pacientes. Estos pacientes se han seguido durante un tiempo medio de 30 ± 8 meses. Se investigó la aparición de eventos cardiovasculares mayores.

Resultados: La prevalencia del BCRI-IE fue del 0,37%. Seis de los 7 pacientes eran mujeres. La perfusión y la función miocárdicas fueron normales en 3 pacientes. Tres pacientes presentaron defectos fijos de la perfusión y uno un defecto reversible. Dos de estos pacientes presentaron una FEVI moderada-severamente deprimida. Las coronarias fueron normales en los 4 pacientes con defectos de la perfusión.

Palabras clave:

Bloqueo de rama izquierda inducido por el ejercicio

Ergometría-GATED SPECT

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Conclusiones: La prevalencia del BCRI-IE entre los pacientes que acudieron a realizarse una ergometría con estudio de perfusión miocárdica fue muy baja. El hallazgo fue mucho más frecuente en mujeres. En nuestra serie 2 pacientes presentaron cardiopatía estructural de origen no isquémico pero ninguno fue diagnosticado de enfermedad coronaria. En nuestra serie la presencia de BCRI-IE no se asoció a un mayor riesgo de eventos cardiovasculares mayores.

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Introduction

Exercise-induced left bundle branch block (EI-LBBB) is an infrequent finding in stress tests, and according to different studies the incidence ranges between 0.2 and 1.1%.^{1,2} It has been suggested that EI-LBBB indicates the presence of coronary artery disease in a high percentage of cases, but the clinical significance of the appearance of EI-LBBB is controversial.³⁻⁵

The aim of the present study was to establish the prevalence of this phenomenon in a population attended in our department using a stress test and myocardial perfusion scintigraphy to determine the presence of ischemic heart disease. We also describe the clinical and scintigraphic characteristics of the patients presenting EI-LBBB and determine the prognostic value of this finding.

Material and method

We reviewed the clinical, electrocardiographic and scintigraphic characteristics of the patients attended by our department for the diagnosis of ischemic heart disease from 2014 to 2016. Patients with EI-LBBB were followed for a mean time of 30 ± 8 months. The basal and evolutive characteristics of the patients were collected by direct consultation and review of the clinical histories.

Patients

Of the 1885 patients reviewed, 7 presented EI-LBBB, 6 being women. The mean age of the study population was 65 ± 10 years. Four patients presented arterial hypertension, one had arterial hypertension, diabetes and dyslipidemia, another had arterial hypertension and diabetes, and the last patient did not present any cardiovascular risk factor. The reason for study was the presence of atypical chest pain in 5 patients, dyspnea in 2 and dizziness in one patient. Two patients were not under treatment, 3 were receiving antihypertensive drugs, and 2 patients were taking oral antidiabetic and hypocholesterolemia drugs.

Ergometry

Continuous electrocardiography monitoring was registered on roll strip charts evaluating electrocardiographic changes and blood pressure as well as the appearance of clinical manifestations of chest pain and the metabolic equivalents reached.

Standard criteria were used to define LBBB: duration of the QRS complex greater than 120 ms, QS or rS complex in lead V1 and a monophasic R wave in leads I and V6.

The test was discontinued if a patient reached the maximum frequency or on the appearance of fatigue.

Myocardial perfusion scintigraphy (GATED-SPECT)

A dose of 540 MBq ^{99m}Tc-MIBI (isonitryl) was injected 1 min before finalizing the exercise. All the patients presented EI-LBBB at injection. The GATED-SPECT study after exercise was performed following the usual protocol. The study was processed using the 4D (University of Michigan) program, and qualitative and

semiquantitative perfusion data were obtained. We also obtained data on post-stress myocardial function. The quantitative data are expressed as percentage of the perfusion defect in the different vascular territories and in the total myocardium. The perfusion defect was obtained by comparison with a database including patients with normal perfusion.

When considered necessary because of the presence of perfusion defects in the stress images, another study was performed during resting 24 h after the administration of a new dose of the radiotracer.

Ultrasonography

All the patients underwent ultrasonography.

Coronarography

Four of the 7 patients underwent coronarography according to the criteria of the attending cardiologist. These patients presented perfusion defects. Coronary artery obstruction was considered when obstruction was greater than 60%.

Data analysis

Continuous variables are expressed as mean \pm standard deviation (SD) and discrete variables are expressed as proportions.

The final criteria for analysis of the prognostic value included all-cause mortality, percutaneous or surgical revascularization, acute myocardial infarction, heart failure or the implantation of an automatic defibrillator.

Results

The prevalence of EI-LBBB among patients attended to undergo the isotopic exercise test was 0.37%. Six of the patients were women.

The ergometry was clinically negative in all the patients and electrically not evaluable due to the initiation of EI-LBBB. The conduction disorder appeared at variable times from minute 1 to minute 4.5 after starting the exercise test and lasted until recovery. The mean frequency to the appearance of heart block was 93 ± 9 bpm.

The ultrasonography was normal in 3 patients, 2 patients showed slight hypertrophy of the left ventricle, and the remaining 2 presented dilated cardiomyopathy.

The myocardial perfusion was normal in 3 patients. These patients did not return for a resting study. Normal ventricular function was normal. The mean left ventricular ejection fraction (LVEF) was $67\% \pm 4$, and systolic and diastolic volumes were normal. They did not present any alterations in thickening or contractility.

The other 4 patients presented perfusion defects in the anterior descending artery (ADA). In 3 patients the defect was fixed and was reversible in the fourth patient. The mean perfusion defect in this territory (anteroseptal region) in the stress test was $27\% \pm 3$. Only 1 of these 4 patients presented the perfusion defect only in the anteroseptal region. The remaining 3 also presented defects

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