Med Clin (Barc). 2018;150(4):131–137

MEDICINA CLINICA

www.elsevier.es/medicinaclinica

Original article

Quantitative evaluation of capillaroscopic microvascular changes in patients with established coronary heart disease☆

M. Esther Sanchez-Garcia[a,b], Irene Ramirez-Lara[a,b], Francisco Gomez-Delgado[a,b], Elena M. Yubero-Serrano[a,b], Ana Leon-Acuña[a,b], Carmen Marin[a,b], Juan F. Alcala-Diaz[a,b], Antonio Camargo[a,b], Javier Lopez-Moreno[a,b], Pablo Perez-Martinez[a,b], Francisco José Tinahones[b,c], Jose M. Ordovas[d,e,f], Javier Caballero[g], Angeles Blanco-Molina[a,b], Jose Lopez-Miranda[a,b,*], Javier Delgado-Lista[a,b]

[a] *Unidad de Lípidos y Arteroscleroses, Hospital Universitario Reina Sofía, Instituto Maimónides de Investigación Biomédica de Córdoba (IMIBIC), Universidad de Córdoba, Córdoba, Spain*
[b] *Centro de Investigación Biomédica en Red de Fisiopatología de la Obesidad y Nutrición (CIBEROBN), Instituto de Salud Carlos III, Madrid, Spain*
[c] *Laboratorio de Investigación Biomédica, Departamento de Endocrinología, Hospital Virgen de la Victoria, Málaga, Spain*
[d] *Departamento de Epidemiología Cardiovascular y Genética Poblacional, Centro Nacional de Investigaciones Cardiovasculares (CNIC), Madrid, Spain*
[e] *IMDEA Alimentación, Madrid, Spain*
[f] *Nutrition and Genomics Laboratory, JM-USDA Human Nutrition Research Center on Aging at Tufts University, Boston, MA, United States*
[g] *Laboratorio de Bioquímica, Hospital Universitario Reina Sofía, Córdoba, Spain*

ARTICLE INFO

Article history:
Received 14 March 2017
Accepted 8 June 2017
Available online 5 January 2018

Keywords:
CORDIOPREV clinical trial
Coronary artery disease
Capillaroscopy
Microvascular dysfunction
Capillary density
Cutaneous microcirculation

ABSTRACT

Introduction and objectives: Microcirculation disturbances have been associated to most of the cardiovascular risk factors as well as to multiple inflammatory diseases. However, whether these abnormalities are specifically augmented in patients with coronary heart disease is still unknown. We aimed to evaluate if there is a relationship between the presence of coronary heart disease and the existence of functional and structural capillary abnormalities evaluated in the cutaneous microcirculation by videocapillaroscopy.
Material and methods: Two matched samples of 30 participants with and without coronary heart disease but with similar clinical and anthropometric characteristics were evaluated by videocapillaroscopy at the dorsal skin of the third finger of the non-dominant hand. We calculated basal capillary density as well as capillary density after a period of arterial and venous occlusion in order to evaluate functionality and maximum capillary density. We also measured capillary recruitment.
Results: Microvascular capillary density at rest was significantly lower in patients suffering from coronary heart disease than in controls. This fact was also found after dynamic tests (arterial and venous occlusion), suggesting functional impairments. Capillary recruitment of the samples was not different in our sample.
Conclusions: In our study, patients with coronary heart disease exhibit functional and structural microvascular disturbances. Although this is a very preliminary study, these findings open the door for further studying the microvascular functionality in coronary patients and how it relates to the response to treatment and/or the prognosis of the disease.

© 2017 Elsevier España, S.L.U. All rights reserved.

☆ Please cite this article as: Sanchez-Garcia ME, Ramirez-Lara I, Gomez-Delgado F, Yubero-Serrano EM, Leon-Acuña A, Marin C, et al. Evaluación cuantitativa de los cambios microvasculares capilaroscópicos en pacientes con cardiopatía isquémica establecida. Med Clin (Barc). 2018;150:131–137.

* Corresponding author.
E-mail address: jlopezmir@uco.es (J. Lopez-Miranda).

2387-0206/© 2017 Elsevier España, S.L.U. All rights reserved.

Evaluación cuantitativa de los cambios microvasculares capilaroscópicos en pacientes con cardiopatía isquémica establecida

Palabras clave:
Ensayo clínico CORDIOPREV
Cardiopatía isquémica
Capilaroscopia
Disfunción microvascular
Densidad capilar
Microcirculación cutánea

RESUMEN

Introducción y objetivos: Las alteraciones microvasculares se han asociado a la mayoría de los factores de riesgo cardiovascular, así como a múltiples enfermedades inflamatorias. Sin embargo, se desconoce si estas anomalías son más frecuentes en pacientes con enfermedades coronarias. Nuestro objetivo fue evaluar si existe una relación entre la presencia de cardiopatía isquémica y la existencia de alteraciones capilares funcionales y estructurales en la microcirculación cutánea evaluada mediante videocapilaroscopia.
Material y métodos: Comparamos 2 muestras emparejadas de 30 participantes con o sin cardiopatía isquémica pero con un perfil antropométrico y clínico similar. Realizamos una videocapilaroscopia en el dorso del tercer dedo de la mano no dominante cuantificando la densidad capilar basal, así como la densidad capilar tras la oclusión arterial y venosa para evaluar su funcionalidad y la densidad capilar máxima. También calculamos el reclutamiento capilar.
Resultados: La densidad microvascular fue significativamente menor en los pacientes con cardiopatía isquémica que en los controles tanto a nivel basal como tras el estudio dinámico (oclusión arterial y venosa). No encontramos diferencias en el reclutamiento capilar.
Conclusiones: En nuestro estudio, los pacientes con cardiopatía isquémica presentaban cambios microvasculares tanto funcionales como estructurales. Dado que estos resultados han sido obtenidos de una pequeña muestra, se precisarán estudios que valoren la microcirculación en pacientes coronarios y si esta está relacionada con la respuesta terapéutica y/o el pronóstico de la enfermedad.
© 2017 Elsevier España, S.L.U. Todos los derechos reservados.

Introduction

Microcirculation is defined as the network of small vessels with a diameter less than 150 μm which includes arterioles, capillaries and venules. Its main functions are to optimize nutrients and oxygen supply to the tissues and to avoid large fluctuations at the capillar hydrostatic pressure. Therefore, it is an important check point of peripheral vascular resistance.[1,2] Microvascular dermal function and blood flow distribution are defined by baseline capillary density (CD), vasodilatory capacity through dynamic oscillations in the diameter of the arterioles which leads to changes in the CD, and by the capillary recruitment (CR) of normally closed capillaries.[1]

Microvascular dysfunction, both anatomically and functionally, is related to cardiovascular risk factors such as hypertension, abdominal obesity, insulin resistance and the associated entity metabolic syndrome (MetS).[3] In fact, it has been postulated that microvascular function could partially explain some of the components of MetS.[2] In hypertensive patients, there is a deregulated vasomotor tone which shifts toward an increased vasoconstriction and a reduction in the vasodilator response. In these patients, there is an anatomic structural disturbance in the pre-capillar resistance vessels that involves a reduction in the number of arterioles and capillaries in the tissues called "vascular rarefaction". Furthermore, these microcirculatory abnormalities precede hypertension and are crucial in the increase of blood pressure because they partly condition the mean arterial pressure,[4,5] increasing the peripheral vascular resistances.[2] In type 2 diabetes, it has been proven that capillary blood flow reduction may contribute to the development of insulin resistance disrupting glucose uptake by muscle cells.[6] In adults, visceral adiposity has been inversely associated to cutaneous CR.[7,8]

Coronary microvascular disease may be caused both by a reduction in the reserve and an impairment in the autoregulation mechanisms which control coronary blood flow.[9] However, it is unknown whether patients with coronary artery disease (CAD) per se have a capillary rarefaction as a morphological expression of microvascular involvement. Some authors have proposed different techniques [single proton emission computed tomography (SPECT), computed tomography (CT) scan, Doppler ultrasound, quantitative contrast echocardiography, positron emission tomography (PET) and magnetic resonance (MR)] in order to assess coronary microcirculation[10] although they are not used routinely because of different reasons but mainly, because there is a lack of standardization and they are difficult to be conducted by clinicians in daily practice.[11]

With the above background, our aim was to determinate if patients with established CAD show capillary alterations at the cutaneous microcirculation assessed by videocapillaroscopy compared to individuals without CAD. We evaluated not only a structural capillar loss, i.e., a decrease in basal CD but also the presence of functional abnormalities that may be developed much earlier, and that include the vasomotor response to arterial and venous ischemia.

Methods

Subjects and design

This study was conducted within the framework of the CORDIOPREV study (Coronary Dietary Intervention with Olive Oil and Cardiovascular Prevention Study; US National Library of Medicine Clinical Trials registry NCT00924937). The CORDIOPREV study is an ongoing prospective, randomized, single blind, controlled trial including 1002 patients with CAD, which had their last coronary event more than 6 months ago. The main objective of the CordioPrev is to evaluate the long-term influence (7 years median follow-up) of two healthy diets (Mediterranean diet and low-fat diet) in addition to conventional treatment in cardiovascular events. The eligibility criteria, exclusion criteria, design and methods of the CORDIOPREV clinical trial have been reported elsewhere.[12,13] In summary, patients were eligible if they were older than 20 years, but younger than 75, had established CAD without clinical events in the last 6 months, were thought to follow a long-term dietary intervention and did not have severe diseases or expected life expectancy lower than 5 years.

The current study involves the first 30 participants of the CordioPrev who entered the study when this sub-study was initiated, and a control group of 30 participants, matched by similar demographic data and baseline conditions to the cases group, who was recruited in parallel, with the same inclusion and exclusion criteria, but without CAD. The CordioPrev participants were evaluated at the entering in the study, when no intervention had been initiated.

Download English Version:

https://daneshyari.com/en/article/8762945

Download Persian Version:

https://daneshyari.com/article/8762945

Daneshyari.com