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ORIGINAL

Meal ingestion markedly increases liver stiffness suggesting the need for liver stiffness determination in fasting conditions

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Abstract
Introduction: The introduction of noninvasive liver stiffness (LS) determination has heralded a new stage in the diagnosis and treatment of liver fibrosis.
Aim: We evaluated the effect of food intake on LS in patients with different degrees of liver disease.
Patients and methods: We evaluated 24 patients ($F \leq 1$, $n = 11$ and $F > 1$, $n = 13$). LS (Fibroscan®) and portal blood flow (PBF) (Doppler ultrasound) were studied before and 30 min after ingestion of a standard liquid meal.
Results: Food intake increased PBF ($51 \pm 10\%$, $p < 0.001$). Splanchnic hyperemia was accompanied by a significant rise in LS (from 7.8 ± 3.3 to 10.3 ± 4.1 kPa, $p < 0.001$). These increases were similar in patients with minimal fibrosis($F \leq 1$) and in those with more advanced fibrosis or cirrhosis ($F > 1$). Hemodynamic and LS values returned to baseline pre-meal levels within 2 hours.
Conclusion: LS increases markedly after ingestion of a standard meal, irrespective of the degree of fibrosis. Our results strongly suggest that LS should be measured in fasting conditions.

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PALABRAS CLAVE
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Ingesta de alimento;
Condición de ayuno

La ingesta de una comida ocasiona un aumento de la rigidez hepática, lo que sugiere que esta determinación debe ser siempre evaluada en ayunas

Resumen
Introducción: El desarrollo de nuevos métodos que permiten la determinación no invasiva de la rigidez hepática ha abierto una nueva era en el manejo de la fibrosis hepática.
Objetivo: El objetivo del trabajo fue evaluar el efecto de ingesta de una comida sobre la rigidez hepática en pacientes con diferentes grados de fibrosis.
Pacientes y métodos: Se evaluaron 24 pacientes ($F \leq 1$, n = 11, y $F > 1$, n = 13), que fueron estudiados basalmente y 30 min después de la ingesta de una comida estándar (Ensure Plus®). La rigidez hepática se midió por Fibroscan®, y los parámetros hemodinámicos portales, mediante Doppler. La ingesta de una comida ocasionó un aumento del flujo sanguíneo portal (51 ± 10%, $p < 0{,}001$). La hiperemia esplácnica fue acompañada por un marcado incremento en la rigidez hepática (7,8 ± 3,3 a 10,3 ± 4,1 kPa, $p < 0{,}001$). Este efecto fue similar en pacientes con fibrosis mínima ($F \leq 1$) y con fibrosis significativa ($F > 1$). Los valores de ambos parámetros retornaron a niveles similares a los basales a las 2 h luego de la ingesta.
Conclusión: Este estudio demuestra que la respuesta vascular posprandial se acompaña de aumento de la rigidez hepática. Los cambios son independientes del grado de fibrosis. Nuestros resultados sugieren fuertemente que los estudios deben realizarse en condiciones de ayuno.

Introduction

The medicine of the future is addressed, in addition to increasing the therapeutic efficacy to improve the quality of life of patients. It is for this reason that the use of less invasive tests, faster, easier to perform and with good sensitivity and specifity is highly recommended. In this regard, a new technique based on the evaluation of liver elasticity, called transient elastography, has been developed during the last years.[1] This technique has demonstrated an excellent ability to exclude cirrhosis and it is good at identifying patients with different stages of fibrosis.[2,3]

From a physical point of view, the liver is an organ whapped in a distensible but non extensible Glisson's capsule, so stiffness is definitively influence by pressure that can be either hydrostatic or osmotic. This is evident in different clinical situations, such as inflammation, extrahepatic cholestasis, or congestion and it can interfere with measurements of liver stiffness, independently of fibrosis.[4]

Hemodynamic responses to feeding have been extensively studied in normal subjects and in patients with cirrhosis.[5,6] In these studies, a postprandial hyperemia occurs in the splanchnic vascular bed following ingestion of the meal.[5,6] Considering the dynamic component of the liver stiffness and splanchnic vasodilatation associated with food intake, we observed that the fasting condition has not been considered in most studies. Moreover, in a study of Castera et al., the authors said that the examinations were performed on a non fasting condition.[7] Therefore, the aim of the present study was to determine if the measurement of liver stiffness is altered after food intake in patients with different degrees of liver disease.

Patients and methods

We prospectively studied 24 subjects with different degrees of liver disease. They were referred to the liver center for the study of abnormal liver function tests, specifically increased transaminases. All the patients included had had liver biopsies. The degree of liver fibrosis was established based on the Metavir score.

The protocol was approved by the Clinical Research Committee of the Hospital Aleman in July 2012. Subjects gave their consent to participate after a full explanation of the nature and purposes of the study.

Blood flow measurement

Blood flow was measured by a duplex scanner,[8–10] comprising a real-time, two dimensional, ultrasonic scanner and an associated 3.5 MHz pulsed Doppler flowmeter. After a sampling marker had been set in the middle of the lumen (portal vein) along the beam axis, a second marker was positioned parallel to the direction of blood flow. Care was taken to maintain the angle θ (the angle formed by the ultrasonic beam and blood flow direction) below 60°, since the accuracy of the measurements decreases with greater angles. Every measurement was repeated until good and reproducible spectrum patterns and blood sounds were obtained. Measurements were carried out during expiration, because it can be easily be standardized and permits a better visualization of the portal vein for Doppler purposes as the angle θ is reduced to a minimum.

Liver stiffness measured by Fibroscan

Details of the technical description and examination of the procedure have been previously described.[1–4] The tip of the probe transducer was placed on the skin between the ribs and the level of the right lobe of the liver. The measurement depth was between 25 and 65 mm. Ten measurements were performed with success rates of at least 60%. The results were expressed in kilopascals (kPa). The median value was taken as representative.