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ORIGINAL ARTICLE

Diagnostic utility of handheld ultrasonography as an extension of the physical examination of patients with heart failure☆,☆☆

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Abstract
Background and objectives: Conventional echocardiography is the technique of choice for assessing left ventricular function and the presence of structural heart disease in patients with heart failure. The aim of this study was to assess the diagnostic performance of handheld ultrasonography performed by a medical internist on patients with a clinical diagnosis of heart failure.
Patients and methods: Cross-sectional observational study of 212 patients diagnosed with heart failure in a hospital center. A medical internist with basic training in echocardiography performed an examination using handheld ultrasonography and semiquantitatively assessed several variables. The patients' left ventricular systolic function was assessed, along with the cavity dimensions, significant valvular heart disease, pericardial effusion and the diameter of the inferior vena cava.
Results: The examination using handheld ultrasonography was conducted in less than 6 min. The agreement between the diagnoses of the medical internist and the expert echocardiographist was very good ($k > 0.81$) for the diameter, hypertrophy and left ventricular systolic function, valvular regurgitation, pericardial effusion and diameter of the inferior vena cava.
Conclusions: Handheld echocardiography performed by a medical internist, as an extension of the physical examination of patients with heart failure, is a valid and safe test that helps increase the diagnostic performance.

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PALABRAS CLAVE
Ecógrafo de bolsillo;
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Utilidad diagnóstica de la ecografía de bolsillo en la insuficiencia cardiaca

Resumen
Antecedentes y objetivos: La ecocardiografía convencional es la técnica de elección para valorar la función del ventrículo izquierdo y la presencia de cardiopatía estructural en pacientes con insuficiencia cardiaca. El objetivo del estudio ha sido valorar el rendimiento diagnóstico de la ecografía de bolsillo realizada por un médico internista en pacientes con diagnóstico clínico de insuficiencia cardiaca.
Pacientes y métodos: Estudio observacional transversal de 212 pacientes con diagnóstico de insuficiencia cardiaca en un centro hospitalario. Un médico internista con formación básica en ecocardiografía realizó una exploración mediante ecografía de bolsillo y valoró, de forma semicuantitativa, diferentes variables. Se valoraron la función sistólica del ventrículo izquierdo, dimensión de cavidades, valvulopatías significativas, derrame pericárdico y el diámetro de la vena cava inferior.
Resultados: La exploración mediante ecografía de bolsillo se realizó en menos de 6 min. La concordancia entre los diagnósticos del médico internista y el ecocardiografista experto fue muy buena ($k > 0{,}81$) para el diámetro, hipertrofia y función sistólica del ventrículo izquierdo, regurgitación valvular, derrame pericárdico y el diámetro de la vena cava inferior.
Conclusiones: La ecocardiografía de bolsillo realizada por un médico internista, como extensión de la exploración física en pacientes con insuficiencia cardiaca, es una prueba válida y segura y permite incrementar el rendimiento diagnóstico de la historia clínica.

Background

Heart failure (HF) is a clinical syndrome characterized by symptoms along with evidence of structural or functional cardiac impairment at rest.[1] The diagnosis of HF is eminently clinical, but its signs and symptoms can be difficult to identify and interpret, especially in the initial stages, in elderly patients, in patients with obesity and in those with chronic pulmonary disease.[2] The clinical suspicion of HF should be confirmed through objective diagnostic tests, especially those that assess cardiac function. Echocardiography has the greatest sensitivity and specificity for assessing structural heart disease and left ventricle (LV) dysfunction due to its specific characteristics (inexpensive, safe and accessible) and is the technique of choice for the diagnosis of these disorders.[1,2]

In recent years, conventional echocardiography has undergone miniaturization, known as ''echoscopy'' or handheld ultrasonography (HUS), which enables clinicians to perform proper assessments using two-dimensional ultrasonography and color Doppler. This is an authentic revolution in clinical medicine and redefines the concept of the cardiovascular physical examination at the point-of-care.[3,4] HUS can be an extension of the physical examination, conducted by the physician who treats the patient, enabling a basic and semiquantitative heart assessment, which includes visually estimating overall LV systolic function, measuring cavity dimensions, detecting pericardial effusion and significant valvular heart disease and calculating blood volume.[5]

Various studies have shown a good concordance between HUS and conventional echocardiography and have shown its usefulness, as an extension of the physical examination, in various clinical scenarios (emergency departments, intensive care units, admission areas, ambulances and home care).[6,7] However, we do not know the true validity and safety of HUS as an extension of the physical examination, conducted by noncardiologist physicians in standard clinical practice conditions at the point-of-care for patients with a clinical diagnosis of HF.

The study objectives were as follows: (1) To determine the validity and safety of HUS conducted at the point-of-care by a noncardiologist physician (internist) as an extension of the physical examination, to assess structural heart disease in patients with a clinical diagnosis of HF. (2) To analyze the value of HUS for increasing the diagnostic performance of the medical history (case history, physical examination) for patients with a clinical diagnosis of HF.

Patients and methods

Design

Observational cross-sectional study.

Study setting and inclusion criteria

The study included patients hospitalized in the Internal Medicine and Cardiology Units of Hospital Torrecardenas, Almeria, Spain (a tertiary hospital), with a clinical diagnosis of HF and who had signed the informed consent document for participating in the study. The patient recruitment period lasted from July 1, 2013 to December 31, 2013. The study was approved by the Clinical Research Ethics Committee of Hospital Torrecardenas.