



Original article

Comparison between left atrial features in well-controlled hypertensive patients and normal subjects assessed by three-dimensional speckle tracking echocardiography



Noriyuki Onishi (MSc)^a, Masanori Kawasaki (MD, PhD, FJCC)^{b,*},
 Ryuhei Tanaka (MD, PhD)^c, Hidemaro Sato (MSc)^d, Maki Saeki (MSc)^a,
 Maki Nagaya (MSc)^a, Noriaki Sato (MSc)^a, Shingo Minatoguchi (MD)^c,
 Takatomo Watanabe (MD)^b, Koji Ono (MD, PhD)^c, Masazumi Arai (MD, PhD)^c,
 Toshiyuki Noda (MD, PhD)^c, Kazuo Amano (MD, PhD)^a, Koshi Goto (MD, PhD)^d,
 Sachiro Watanabe (MD, PhD, FJCC)^c, Shinya Minatoguchi (MD, PhD, FJCC)^b

^a Department of Echo Laboratory, Gifu Prefectural General Medical Center, Gifu, Japan

^b Department of Cardiology, Gifu University Graduate School of Medicine, Gifu, Japan

^c Department of Cardiology, Gifu Prefectural General Medical Center, Gifu, Japan

^d Department of Cardiology, Sawada Hospital, Gifu, Japan

ARTICLE INFO

Article history:

Received 17 May 2013

Received in revised form 9 September 2013

Accepted 16 September 2013

Available online 29 October 2013

Keywords:

Three-dimensional echocardiography

Speckle tracking

Atrial volume

Atrial function

Hypertension

ABSTRACT

Background: Three-dimensional speckle tracking echocardiography (3D-STE) has a major advantage in the improvement of accuracy in the evaluation of cardiac chamber volume without any geometrical assumption. Thus, the aim of this study was to use 3D-STE to elucidate the features of left atrial (LA) volume and function that are altered by hypertension (HTN) by comparing well-controlled HTN patients with normal subjects.

Methods: Conventional echocardiographic parameters and LA phasic volume and function were measured from apical view by 3D-STE in 40 patients with well-controlled HTN [systolic blood pressure (BP) <140 and diastolic BP <90 mmHg for more than one year] and 40 normotensive subjects.

Results: The passive LA emptying function (EF) in the patients with well-controlled HTN significantly decreased ($16 \pm 7\%$ vs. $22 \pm 8\%$, $p = 0.0013$) and the active LAEF in patients with well-controlled HTN significantly increased ($35 \pm 10\%$ vs. $30 \pm 9\%$, $p = 0.029$) compared with the values in normotensive subjects. Multivariate logistic regression analysis revealed that E/e' was an independent determinant of well-controlled HTN. The maximum LA volume index was correlated with elevated E/e' ($r = 0.30$, $p = 0.0064$), whereas the maximum LA volume index was not correlated with LV mass index or systolic BP. This change was independent of age.

Conclusions: These results suggest that LV diastolic dysfunction occurs before structural changes of left atrium and left ventricle even in patients with well-controlled HTN.

© 2013 Japanese College of Cardiology. Published by Elsevier Ltd. All rights reserved.

Introduction

Hypertension (HTN) causes pressure overload in the left ventricle (LV) that results in LV hypertrophy, increased LV stiffness, and diastolic dysfunction, which increases with age [1]. Left atrial

(LA) volume and function are thought to reflect LV diastolic function and may serve as useful predictors of cardiovascular outcomes [2,3]. Thus, assessment of LA volume and function is important in the clinical setting.

Recently, two-dimensional speckle tracking echocardiography (2D-STE) has been used to evaluate LV and LA structure and function using Simpson's method with the assumption of uniform geometry [3,4]. However, since cardiac motion is three-dimensional, 2D-STE is limited by the geometrical assumptions required to use Simpson's method [5]. In contrast, three-dimensional speckle tracking echocardiography (3D-STE) has a major advantage in that there is improved accuracy in the evaluation of cardiac chamber volume

* Corresponding author at: Department of Cardiology, Gifu University Graduate School of Medicine, Yanagido, Gifu 501-1194, Japan. Tel.: +81 58 23 6523; fax: +81 58 23 6524.

E-mail addresses: masanori@ya2.so-net.net.jp, kawasapi2004@yahoo.co.jp (M. Kawasaki).

without any geometrical assumptions [5–7]. For the left ventricle, 3D-STE was shown to be superior to 2D-STE for the measurement of LV volume and function [5–7].

We recently reported that 3D-STE allows more accurate measurement of LA volume and function than 2D-STE and has high reproducibility when it was compared with 3D-computed tomography (CT) [8,9]. Therefore, the purpose of this study was to use 3D-STE to elucidate the features of LA volume and function that are altered by HTN comparing patients with well-controlled HTN and normotensive subjects.

Methods

Study population and study protocol

Consecutive adults ≥ 20 years of age were studied in our echocardiography laboratory using transthoracic echocardiography to screen for cardiac disease in patients with well-controlled HTN for more than one year [systolic blood pressure (BP) < 140 mmHg and diastolic BP < 90 mmHg]. According to the guideline proposed by

the Japanese Society of Hypertension, two consecutive BP measurements were taken from each patient in a sitting position at the outpatient department [10]. Patients were included in this study if they were on medical therapy for hypertension for more than one year. Exclusion criteria were the presence of arrhythmia including persistent or permanent atrial fibrillation, a paced rhythm from an implanted device, and moderate to severe mitral valve disease. We also examined 40 normotensive subjects using transthoracic echocardiography. The normotensive subjects included 16 volunteers with chest pain or discomfort. All of these 40 subjects had normal medical histories and physical examinations including echocardiography. The final study population consisted of 40 patients with well-controlled HTN and 40 normotensive subjects.

Three-dimensional speckle tracking echocardiography

3D-STE (Artida, Toshiba Medical Systems, Tochigi, Japan) can provide a time–LA volume curve with a frame rate of 30–40 frames/second (Fig. 1). 3D-STE was performed using a PST-25SX with a 2–4 MHz phased array matrix transducer (Toshiba

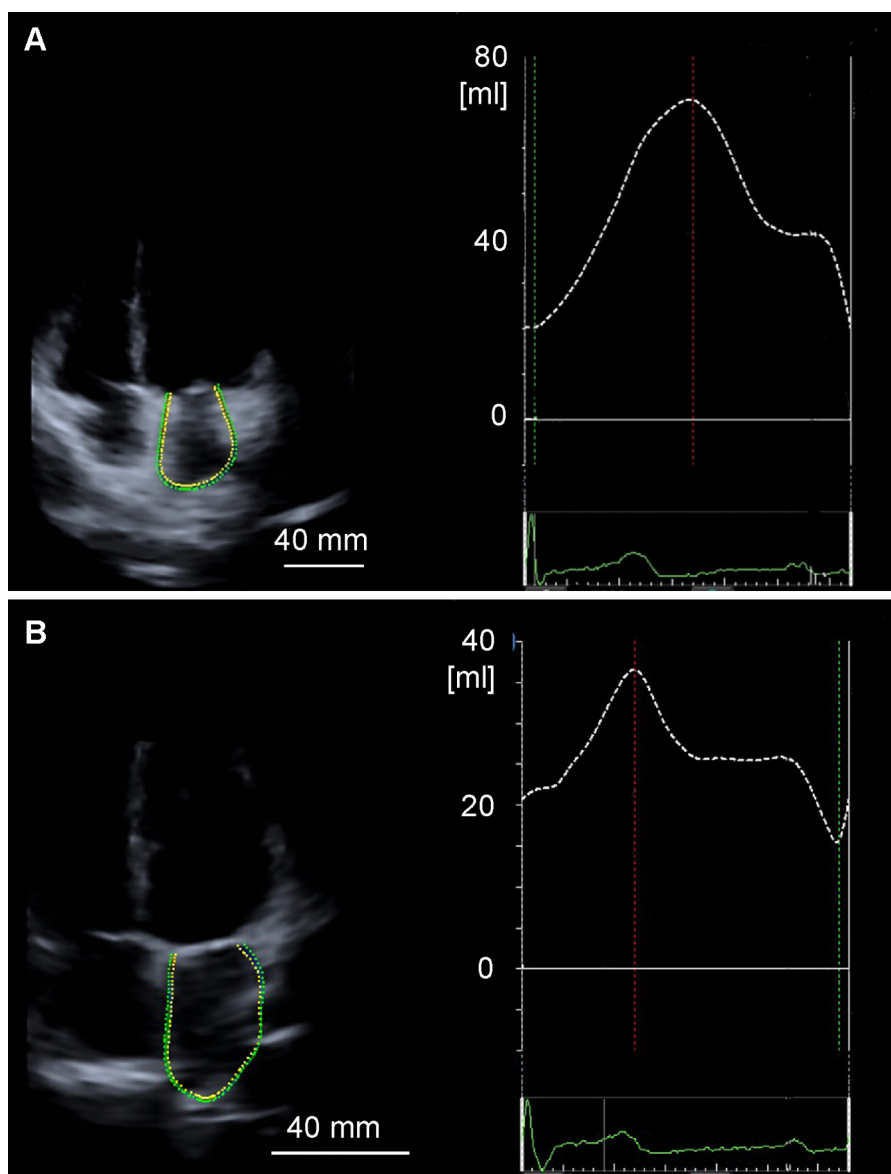


Fig. 1. Representative image of three-dimensional speckle tracking echocardiography and time–left atrial volume curve during one cardiac cycle. (A) Well-controlled hypertension. (B) Normotensive subject. yellow line, endocardium of left atrium; black line, myocardium of left atrium; green line, epicardium of left atrium; broken line, time–left atrial volume curve.

Download English Version:

<https://daneshyari.com/en/article/5984049>

Download Persian Version:

<https://daneshyari.com/article/5984049>

[Daneshyari.com](https://daneshyari.com)