

Poster presentation

New details of reflected pressure wave propagation on left ventricular segments

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Introduction

Pulse wave generation during left ventricular (LV) contraction and subsequent wave reflections directly affect the ventricular workload.

Purpose

The aim of this study was to obtain new information on regional LV wall motion corresponding to the propagation of reflected waves on ventricular segments.

Methods

The regional ventricular wall motion was investigated in two groups of healthy volunteers between the ages of 23 ± 3 and 66 ± 7 years old respectively, using navigator gated tissue phase mapping. The left ventricle was divided into 16 segments (six basal, six middle and four apical) and regional wall motion was studied in high temporal detail. The results were also compared with those obtained in one patient with peripheral vascular disease and in a second patient with a massive LV scar.

Results

An early diastolic notch corresponding to the expected timing of the propagation of reflected wave on ventricular segments was recorded on radial, circumferential and longitudinal velocity graphs. The prominence of this early diastolic notch in septal segments (2, 3, 8 and 9) was commensurate with the attachment of the aorta to the septum, enabling a direct propagation of the reflected waves

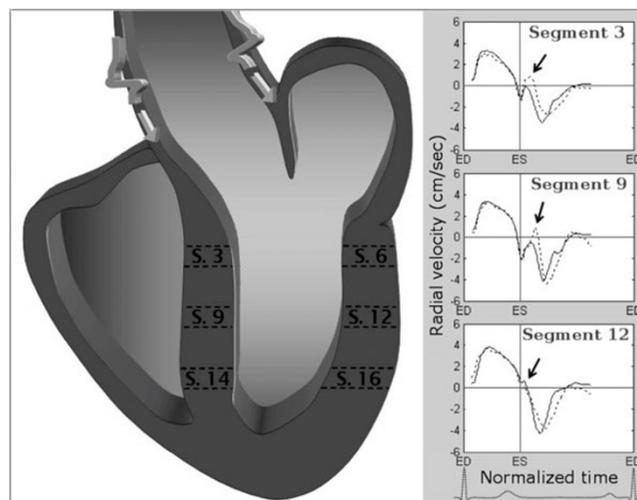


Figure 1
Schematic representation of reflected wave propagation on LV segments and radial velocity graphs for segments 3, 9 and 12 (AHA segmentation model).

The arrows show an upward directed notch in early diastole corresponding to the propagation of reflected wave on LV segments. The graphs represent average values for both groups (solid line - younger age group, dotted line - older age group). Positive values show inward motion towards the centre of the ventricle, whilst negative values show outward expansion.

on septal segments (Fig. 1). The larger size of the notch in the older age group, consistent with a progressive loss of arterial compliance with age, shifted the diastolic phase of the velocity curves, causing an apparent delay in LV expansion in most segments. A paradoxical increase in the size of the notch from the LV base towards the apex was noted on radial velocity graphs in the patient with an LV scar, resulting in an additional wave of inward radial movement in diastole and affecting the entire pattern of LV motion.

Conclusion

The results provide new insights on the propagation of reflected waves on ventricular segments and their effects on ventricular motion patterns in health and disease.

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