Journal of Cardiovascular Magnetic Resonance

BioMed Central

Poster presentation

Open Access

Development of automated and semi-automated analysis software for coronary rest period

Zainal Arief*[1], Tetsuo Sato[1], Tomohisa Okada[2], Shigehide Kuhara[3], Shotaro Kanao[2], Kaori Togashi[2] and Kotaro Minato[1]

Address: [1]Nara Institute of Science and Technology, Ikoma, Japan, [2]Kyoto University Graduate School of Medicine, Kyoto, Japan and [3]Toshiba Medical System Corporation, Otawara, Japan

* Corresponding author

from 13th Annual SCMR Scientific Sessions
Phoenix, AZ, USA. 21-24 January 2010

Published: 21 January 2010

Journal of Cardiovascular Magnetic Resonance 2010, **12**(Suppl 1):P48 doi:10.1186/1532-429X-12-S1-P48

This abstract is available from: http://jcmr-online.com/content/12/S1/P48

Introduction

The Coronary Artery (CA) rest period in the cardiac cycle varies substantially from patient to patient [Wang 1999]. The cross-correlations between images of consecutive heart phases may be used to characterize the cardiac motion, and an optimal acquisition window could be automatically identified [Nehrke 2003]. For selecting an optimal data acquisition window, an automated placing of a Region of Interest (ROI) without user interaction was implemented, and yielded similar result compared to the visual assessment [Jahnke 2005; Maruyama 2007]. Combined with user interaction in placing an ROI, the semi-automated approach was developed [Uneno 2009]. However, accurate identification of an ROI still needs to be enhanced.

Purpose

To compares the performance of the developed automated and semi-automated approach for rest period detection with the visual assessment by two radiologist.

Methods

Retrospectively gated cine images from Twenty five health volunteers were acquired using 1.5 Tesla Scanner (Toshiba Medical Systems Corporation, Japan). 2D SSFP images (50-70 phases/cardiac cycles) in 4 chamber orientation were acquired with FOV of 350 mm and slice thickness of 10 mm. The rest period from each subject was calculated using the two approaches: 1) automatic placement of an ROI template (44 × 44 mm2) created by averaging ROIs of five subjects, and 2) semi-automated approach of manual selection of two ROI (20 × 20 mm2) placed at both right and left CAs. The maximum cross-correlation value will be used and marked as ROI location. The process was iteratively implemented to the whole consecutive cine. The rest period was determined as the minimum movement of the ROI from consecutive cine and stated in number of frames. A method distance is assumed as an

Table 1: Distance difference between each approach

Method distance	Mean ± SD (frames)
auto - Radiologist A	8.72 ± 8.10
auto - Radiologist B	8.37 ± 7.25
Right CA - Radiologist A	5.99 ± 3.68
Right CA - Radiologist B	4.98 ± 3.28
Left CA - Radiologist A	5.62 ± 3.97
Left CA - Radiologist B	5.34 ± 3.81
Right CA - Left CA	4.7 ± 3.23
Radiologist A - Radiologist B	4.01 ± 3.74

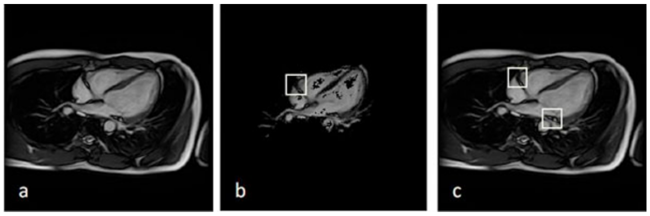

Figure 1
Cine image source (a) automatic placing of ROI (44 × 44)mm2 in automated approach (b) manually placing of Right and Left CA (20 × 20)mm2 in semi-automated approach (c). The process is then continued with ROI detection and rest period determination.

average of a distance difference between each approach from twenty five subjects.

Results

Figure 1 illustrates an automatically placing of an ROI in automated approach and manually placing of two ROIs at right and left CAs in semi-automated approach. The distance between automated and visual assessment was bigger than those between semi-automated and visual assessments for both right and left CAs Table 1.

Conclusion

Rest period detection using automatic placement of ROI had largest difference with the visual assessment compared to semi-automated approach. Error in automated ROI placement was considered to be a cause for the big difference. Meanwhile, the semi-automated approach with user interaction seems more acceptable for both right and left CAs. Minimal intervention of ROI placement can minimize differences compared with visual assessment.