

Poster presentation

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Feasibility study of Global-to-Local Tandem Method for detecting the coronary stationary period in whole-heart magnetic resonance coronary angiography (WH MRCA)

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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):P34 doi:10.1186/1532-429X-12-S1-P34

This abstract is available from: <http://jcmr-online.com/content/12/S1/P34>

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Introduction

WH MRCA studies are usually performed during the stationary period of coronary arteries, which is determined using cine display and therefore depends on the operator's experience. Several automatic methods have been developed. One such method uses the global heart signal for analysis [1] and is suitable for detecting motion during all cardiac phases, but this method tends to suffer from noise. Another method employs a ROI for analysis [2] and is suitable for precise detection of the stationary period, but not for all cardiac phases. We have developed the Global-to-Local Tandem Method, in which the coronary stationary period is roughly analyzed by the global method and then precisely analyzed by the local method. We have also conducted clinical feasibility studies.

Methods

2D SSFP cine images were obtained using a 1.5-T MRI scanner with TR/TE = 3.2/1.6 and matrix = 160. A total of 40-50 images were obtained in 10 healthy volunteers. In the global method, the differences between adjacent cine images were analyzed using the whole-heart signal. The local method was then applied by setting a ROI on the coronary automatically or manually, and based on the cross-correlation around the phases determined by the global method. The data for 10 subjects were analyzed by 5 operators, and the stationary period and the time required were recorded and compared by the software.

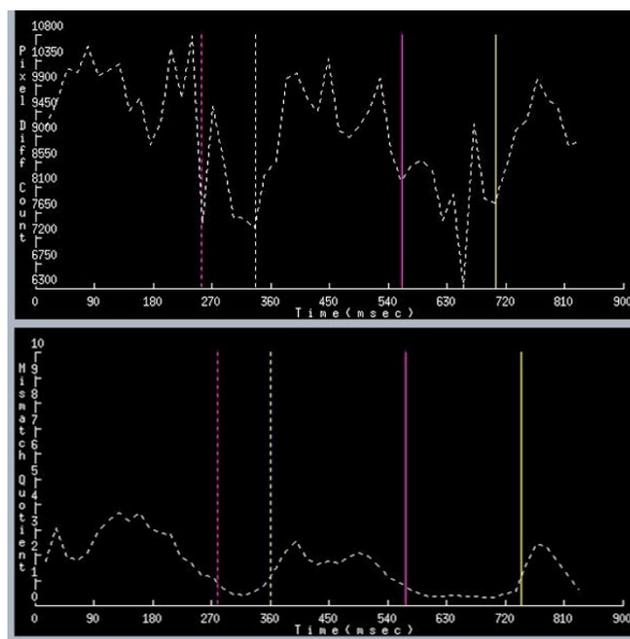


Figure 1
Global-to-Local Tandem Method (Upper: Global, Lower: Local).

The suitability was obtained as the success rate (%), with success defined as the outcome that the software results were within the range of variation observed among operators.

Results and discussion

The variation in the reading values of the 5 operators was 17 ± 8 ms at the beginning of systole and 58 ± 19 ms at the beginning of diastole. The suitability of the global method was 90% for diastole but 70% for systole. When the tandem method was used, the suitability exceeded 90% even in systole and was easily increased to 100% by using an interface coupled with cine images. The tandem method reduced the measuring time to about 30 seconds, as compared to the time required by operators (43 ± 17 s, max. 120 s) Figure 1.

Conclusion

The Global-to-Local Tandem Method can robustly detect the coronary artery stationary period in WH MRCA. It is therefore concluded that this method should prove to be very useful for clinical WH MRCA examinations.

References

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