

WALKING POSTER PRESENTATION

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Real-time magnetic resonance imaging guidance improves the yield of endomyocardial biopsy

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Background

In current practice, the diagnostic yield of endomyocardial biopsy is low because the procedure is performed 'blind' using X-ray fluoroscopy guidance and because many pathologies affect the myocardium in a patchy distribution. We hypothesized that biopsy performed under direct real-time MRI guidance would have superior diagnostic yield, in an animal model of focal myocardium pathology.

Methods

An active visualization MR conditional biptome was designed and built for transcatheter endomyocardial biopsy (MRI Interventions, Irvine, CA). A porcine model of focal myocardial pathology that enhances with late gadolinium enhancement imaging and that contained fluorescent tags that are easily identifiable under ultraviolet light was created. Under X-ray fluoroscopy, selective coronary artery catheterization was performed and 3 mL of fluorescent microspheres (NuFlow Hydrocoat, 15µm diameter, 5 million spheres/mL) was infused, followed by 2 mL of 100% ethanol to create a focal lesion. Animals were survived for min 7 days, after which each animal underwent both MRI and X-ray guided biopsy. Specimens were analysed using a Leica MZFIII dissecting microscope under transmitted or ultraviolet light with a 400-480 nm band pass filter.

Results

The biptome shaft was actively visualized under real-time MR imaging. The jaws appeared as a distinct signal void (arrow, Figure 1A). After administration of systemic gadolinium contrast, the lesion was visible using LGE or

inversion recovery real-time MRI (Figure 1B). The biptome was navigated to the pathology and specimens were collected. Animals were then transferred to an X-ray catheterization laboratory, where 'conventional' fluoroscopy guided biopsy was performed. Examination of the biopsy specimens under ultraviolet light revealed fluorescent microspheres in 24/27 specimens obtained using MRI guidance compared with 7/28 specimens obtained using X-ray fluoroscopy guidance (Figure 2).

Conclusions

Endomyocardial biopsy under direct real-time MRI guidance using an active visualization MRI-conditional biptome is feasible. Using this biptome we demonstrate targeted biopsy of focal myocardial pathology. Compared with X-ray fluoroscopy guided endomyocardial biopsy, MRI guidance substantially improves the diagnostic yield in an animal model of focal myocardial pathology.

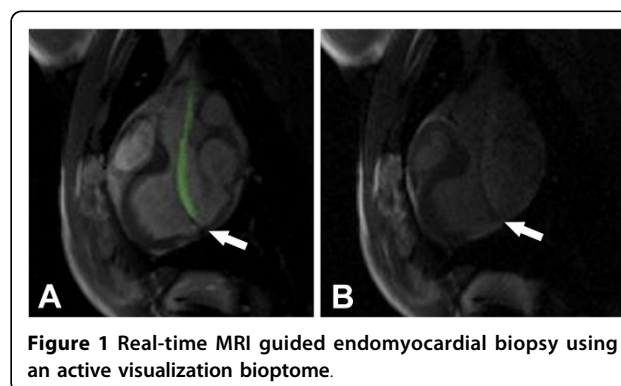
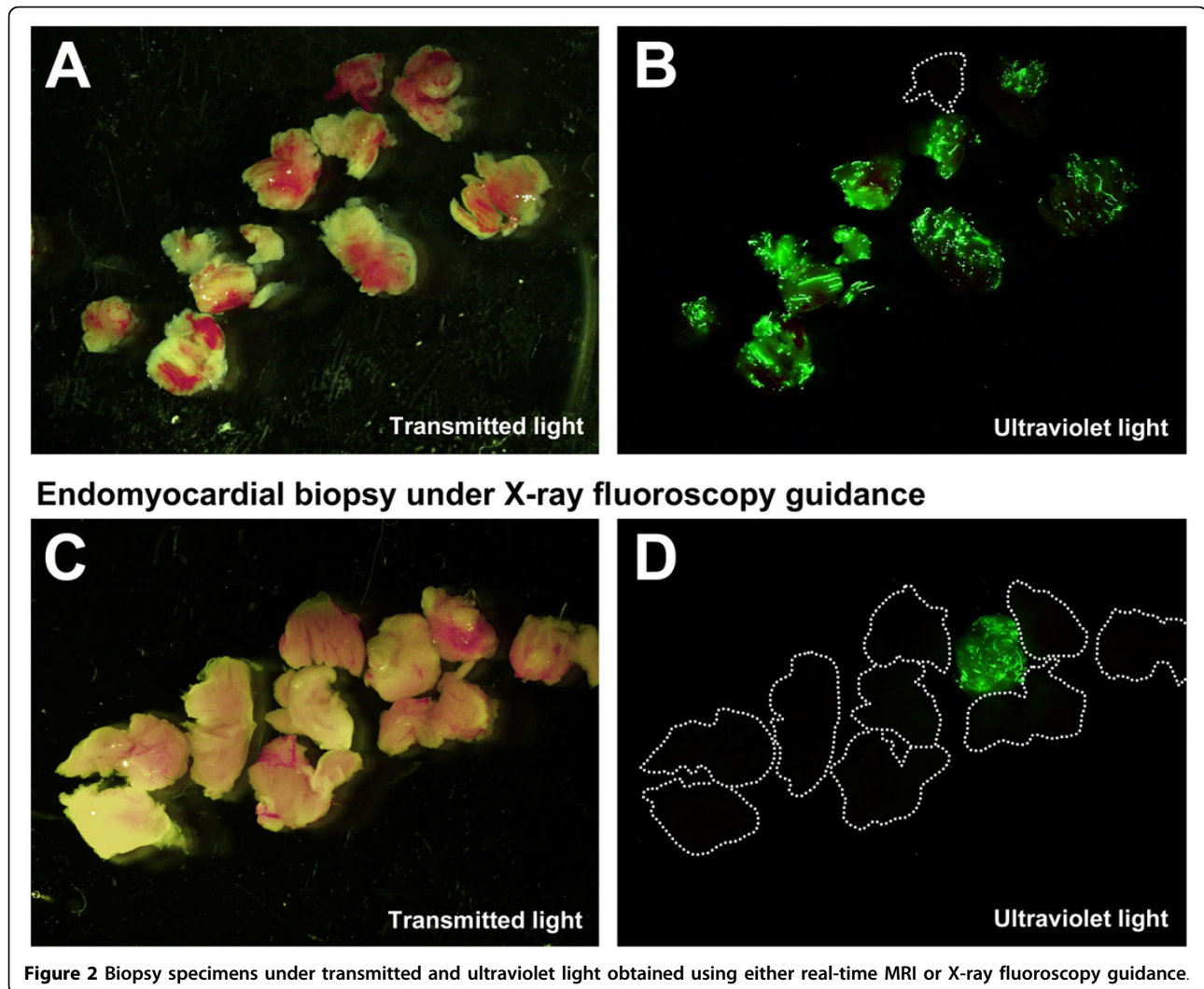


Figure 1 Real-time MRI guided endomyocardial biopsy using an active visualization biptome.

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