

Moderated poster presentation

Acute injury immediately post atrial fibrillation ablation defined by MRI

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Introduction

Catheter ablation is effective in symptomatic, drug refractory atrial fibrillation and can result in cure but success rates vary significantly with recurrences ranging from 40-86%. In the months following ablation, LA wall scarring on late gadolinium enhancement (LGE) is useful for determining the location and extent of injury and has been used to guide follow up ablation to 'close the gaps' after unsuccessful PVAI. More recently, imaging acute ablation injury using double inversion recovery (DIR) sequences has been shown feasible and has generated interest for its potential clinical value in guiding ablations.

Purpose

To further define the tissue characteristics of acute injury to the LA wall immediately after ablation using a modified T2 weighted (T2w), DIR, turbo spin echo (TSE) sequence on a 3 T scanner.

Methods

Twenty-five patients presenting for AF ablation underwent underwent MR imaging pre- and immediately post ablation in an EP-MRI laboratory using a 3 Tesla MRI scanner (Verio, Siemens). Acute injury was imaged using a modified T2w DIR TSE sequence (TE = 83 ms, TR = 2RR, fat suppression using spectral adiabatic inversion recovery (SPAIR) with in-plane resolution 1.25 mm × 1.25 mm,

slice thickness 4 mm). LGE MRI was also acquired with the same in-plane resolution with slice thickness 2.5 mm. Both sequences were respiratory navigated, ECG gated with data acquisition during LA diastole.

Results

Diffuse left atrial wall enhancement is seen routinely using our T2w DIR TSE sequence immediately post ablation and reflects acute tissue edema (figures 1, 2). Though the location of injury generally correlates with CARTO ablation points, the surrounding tissue is also clearly enhanced and suggests more diffuse LA wall injury (figure 3). LGE MRI, also performed immediately post ablation, shows a different pattern of LA wall enhancement (figure 4).

Conclusion

Delivery of RF energy during AF ablation to LA wall appears to cause changes not only in the regions where RF energy was directly applied, but also in the regions where no energy was delivered. If characteristics of LA wall (e.g. thickness, water content, conductivity) change during the procedure, this may have important implications for achieving permanent lesions leading to successful ablation. In addition, a different injury pattern is seen on LGE MRI in the acute setting. Further study of early ablation

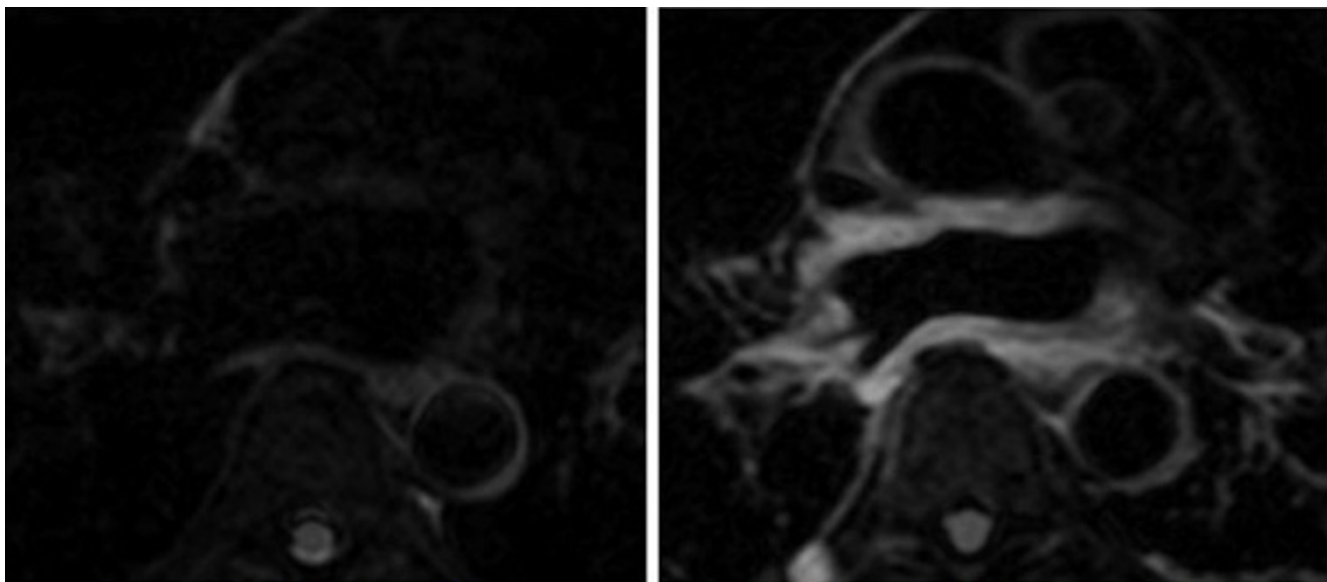


Figure 1
a. T2w DIR FSE pre ablation (left) and post ablation (right). Left arterial wall is diffusely enhanced on this axial slice view on post ablation images.

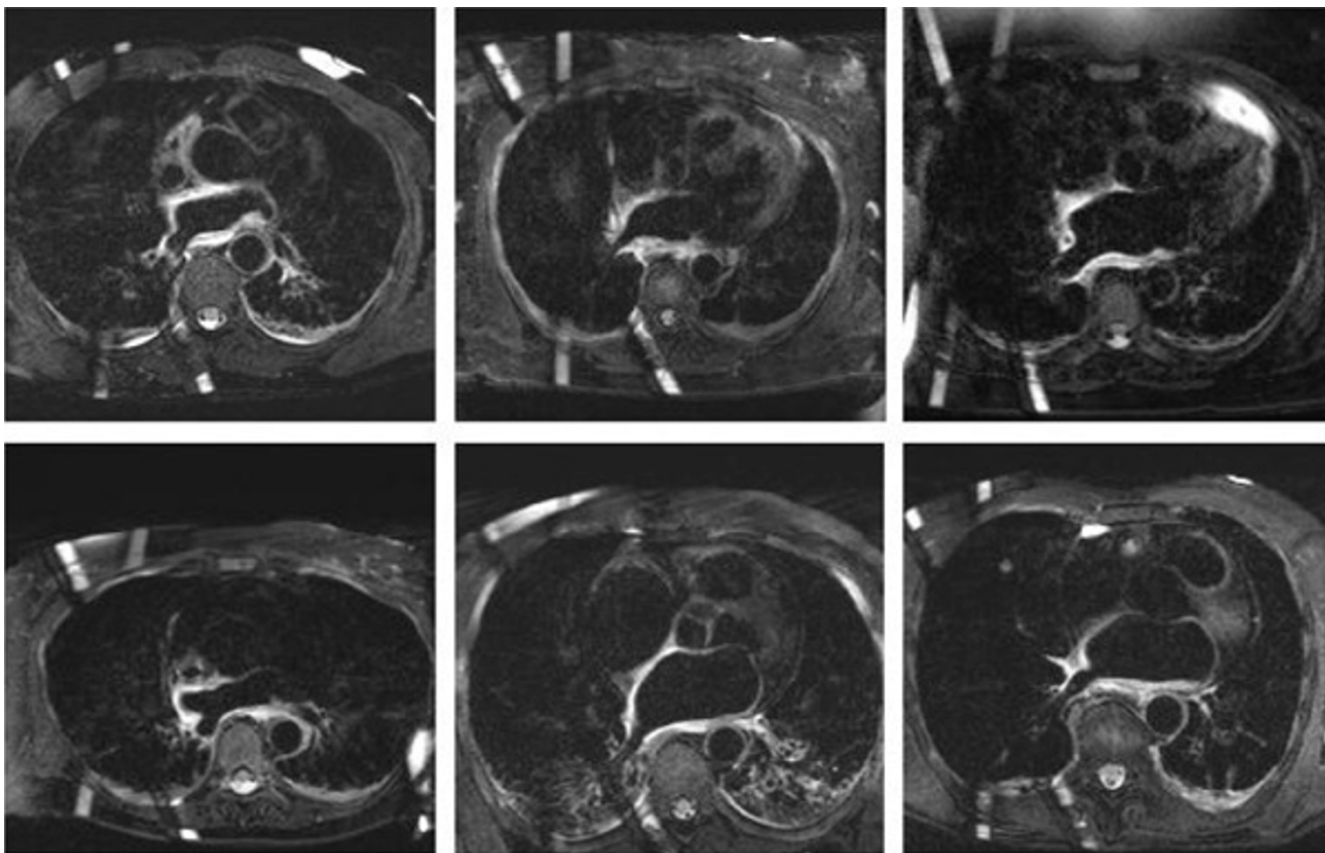


Figure 2
Examples of T2w DIR TSE immediately post ablation.

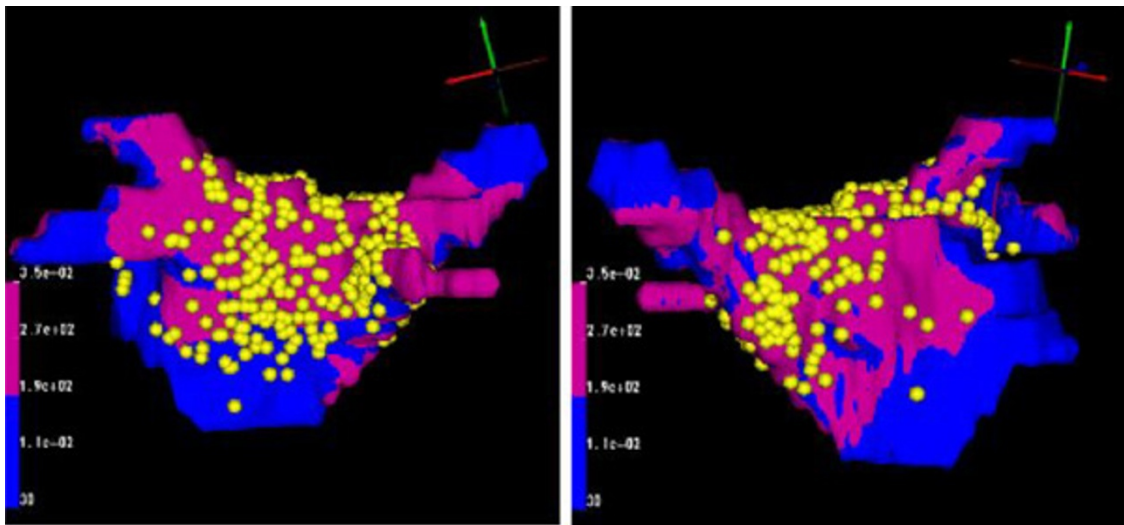


Figure 3
Projection of ablation points (yellow) onto surface mesh with T2w DIR TSE (purple).

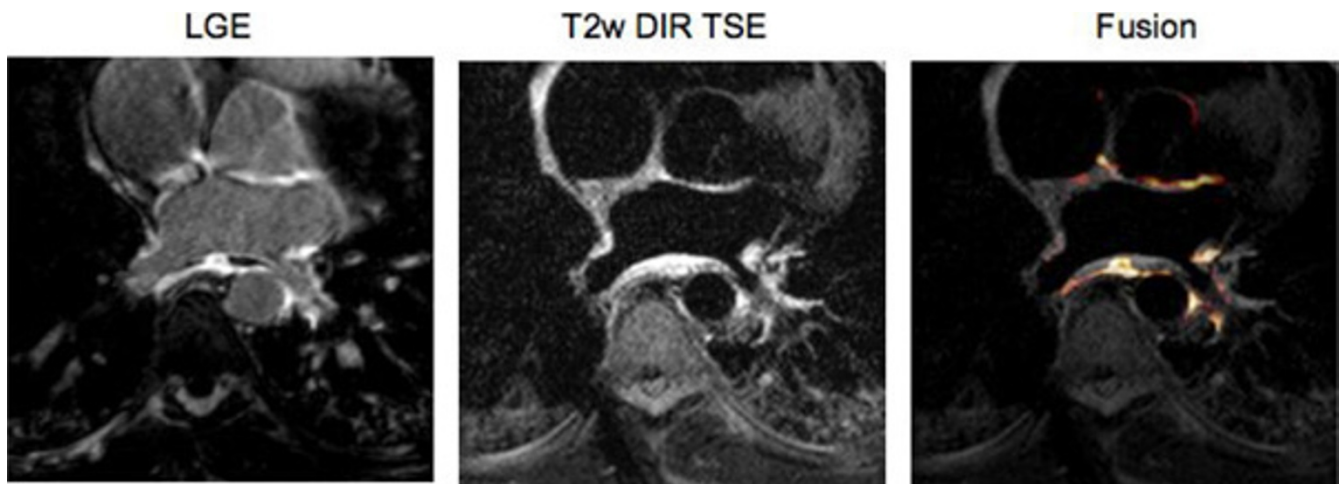


Figure 4
Fusion of LGE and T2w DIR TSE images. MR images acquired in EP-MRI lab on 3 T scanner immediately post AF ablation procedure.

injury on MRI may reduce the number of repeat procedures and improve outcomes.

References

1. Knowles , et al.: ISMRM 2009:487.
2. Peters , et al.: ISMRM 2009:4433.

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