

Optical Tissue Interrogation for Assessment of Catheter-Tissue Contact and Lesion Progression During Linear Lesion Formation

Introduction: Most RF ablation procedures require linear lesions to form lines of conduction block in the myocardium. We evaluated a catheter and system design that utilizes NADH fluorescence (fNADH) to assess catheter-to-myocardium contact, catheter stability, tissue characteristics, and linear lesion progression during the creation of linear lesions.

Methods: An irrigated RF ablation catheter incorporating imaging optics (LuxCath LLC, an Allied Minds subsidiary) was inserted transvenously into the RA of 3 anesthetized swine and positioned against the endocardial surface. Light was delivered to the tissue adjacent to the catheter tip during ablation, and the fluoresced response was captured via spectrometer and analyzed in real-time. Spectral data was acquired pre, during, and post formation of RF linear lesions.

Results: Fluorescence provided indications of good catheter contact, catheter stability, and lesion progression, and helped to direct catheter movement during linear lesion formation. Contact between the tip and myocardium was clearly indicated by a strong fNADH response, whereas blood blocked tissue optical response in the absence of contact. Myocardial fNADH response declined by 50% or more within the first 10 sec for each catheter location along the line. Catheter movement during linear lesion formation was evidenced by sharp increases in fNADH response.

Conclusions: Real-time monitoring of fNADH during linear lesion formation via catheter ablation can be achieved and provides assessments of quality of myocardial contact, catheter stability, and lesion progression with RF delivery.

