

Role of Contact Force in Esophageal Injury During Left Atrial Radiofrequency Ablation

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Introduction: Contact force (CF) is a main determinant of RF lesion depth and collateral injury, but CF could not be measured. A RF catheter has been developed to measure real-time CF. 3 optical fibers measure micro-deformation of the catheter tip. CF is calculated every 100 ms from the strain on the 3 fibers (resolution <1 g). The purpose of this study was to determine the relationship between CF and esophageal (Eso) injury during RF ablation in the left atrium (LA) using a canine model.

Methods: 5 dogs were studied using transeptal puncture. A 7F catheter with 3.5mm saline irrigated electrode and contact sensor (Endosense SA) was positioned against posterior LA close to Eso. A 25 mm air-filled balloon with 7 thermocouples, 2mm apart (ProTect, ProRhythm) was placed in Eso. The ablation electrode was maneuvered to within 3 mm of Eso balloon. 2 RF applications (30 W, 60 sec, 17 ml/min irrigation) were delivered in each dog to separate sites in LA with: 1) low CF (7-30, median 12 g); and 2) moderate to high CF (45-90, median 50 g). Eso endoscopy was performed after each RF. Dogs were sacrificed at 2 hrs and Eso ulcer size was measured.

Results: At same RF power and time, Eso temp increased with increased CF in all 5 dogs (Fig A). Eso ulcer occurred with RF at low CF in 2/5 dogs and at mod-high CF in all 5 dogs. Eso ulcer size increased with increasing CF (Fig B) and peak Eso temp (Fig C).

Conclusions: This canine model demonstrates the striking role of CF in Eso injury during RF ablation in the LA close to Eso. The future ability to titrate RF power based on real-time CF may reduce the risk of Eso injury while preserving an effective RF lesion.

