

Comparison of Catheter Stability between Magnetically Guided and Manual Cooled-Tip Ablation Catheters

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Introduction: Catheter stability has implications for lesion consistency and procedure safety and efficacy. This study compared mechanical behavior and lesions created between magnetic (RMT) and manual (CONV) cooled-tip ablation catheters (Biosense Webster, Inc., Diamond Bar, CA, Magnetic system: Stereotaxis, Inc., St Louis, MO) in 2 clinically relevant bench models.

Methods: Contact force and stability were tested at multiple initial applied forces (600 points/force) in an instrumented three-dimensional cardiac wall surface contact model (3D). Lesion characteristics and catheter behavior were compared at similar forces (15 lesions per force) in a dynamic "beating-heart" phantom (BH) using avian tissue substrate.

Results: 3D data showed reduced force (deviation from initial contact force through a mimicked cardiac cycle) with RMT (Figure 1, $p < 0.05$). Mean stability (deviation from initial contact point) was 2.06mm for CONV vs. 1.06 mm for RMT ($p < 0.05$) at the same applied force. CONV stability was increased by increasing applied force. Results from the BH phantom showed that RMT at 10g of contact force created equivalently sized lesions to CONV at 40g of force ($p > 0.05$). RMT achieved stability in the BH model at lower initial contact forces.

Conclusions: RMT require lower forces to maintain stable tissue contact than CONV while creating equivalent lesions. These results support the hypothesis that stability coupled with lower contact force can produce efficacious lesions while conferring a potential safety advantage of reduction in risk of force-related injury.

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Summary:

- This abstract, presented at HRS 2008, describes a series of bench studies comparing magnetically navigated and manual irrigated catheters.
- Evaluation on an instrumented 3D phantom showed a significant reduction in both mean contact force and contact force volatility through a mimicked cardiac cycle with the magnetic catheter.
- The magnetic catheter had a greater average stability than the manual catheter in this same model.
- In a beating-heart phantom with a tissue substrate, the magnetic catheter created an equivalent lesion at 10g contact force as the conventional catheter at 40g contact force.
- In the same beating-heart phantom, the magnetic catheter achieved stability at lower applied contact forces.