The use of a radiofrequency needle improves the safety and efficacy of transseptal puncture for atrial fibrillation ablation

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INTRODUCTION

- This large case series compares the safety and efficacy of transseptal puncture using the purpose-built radiofrequency (RF) NRG® Transseptal Needle (Baylis Medical) to a sharp mechanical needle (BRK-1™ or BRK-1™ ES, Abbott) for atrial septal puncture.

METHODS

- 1550 consecutive atrial fibrillation ablations were retrospectively analyzed.
- Fluoroscopy, intracardiac ultrasound, pressure measurement and/or contrast injection were used to guide the transseptal puncture.

Transseptal puncture

- Mechanical needle (975 ablations).
  - Forward force was applied for TSP and to advance the transseptal apparatus across the septum.
- NRG® RF needle (575 ablations).
  - RF energy was applied using a dedicated generator (RFP-100, Baylis Medical) to perforate the septum with no significant forward motion of the needle.
  - The transseptal apparatus was then advanced into the left atrium (LA) over the needle.
- After a successful transseptal puncture, all patients underwent standard AF ablation.

Data analysis

- Instrumentation time was recorded from lidocaine injection to heparin injection upon LA access.
- Complications during TSP were assessed, including failure of LA access, pericardial tamponade, inadvertent aortic puncture, death, stroke or transient ischemia.
- Operator experience over time was assessed by quartile using Cochran-Armitage trend analysis.

RESULTS

- Failure of TSP was lower with RF needle than mechanical needle (0.17% vs. 1.23%; p=0.039).
- No cardiac tamponade occurred with RF needle compared to mechanical needle (0 vs. 0.92%; p<0.04).
- With mechanical needle, septal crossing rates (P =0.79) and rate of tamponade (P =0.46) did not improve with operator experience.
- Instrumentation time was shorter with the RF needle than mechanical needle (27.1 ± 10.9 min vs. 36.4 ± 17.7 min; p<0.0001).

DISCUSSION & CONCLUSIONS

- RF needles reduce the rate of atrial perforation by requiring minimum forward movement to cross the septum compared to sharp mechanical needles.
- RF needles improve the rate of crossing, even in septa that are thick or scarred from prior punctures.
  - Atraumatic tip of RF needle allows verification of needle tip position without tissue penetration.
  - Sharp mechanical needles can create micro-punctures upon tissue contact that may lead to procedure termination to prevent risks from procedural anticoagulation.
- Clean tissue perforation requires a dedicated RF needle and purpose-built generator.
  - Connecting an ablation generator to a mechanical or RF needle may lead to tissue heating, necrosis and septal damage.
- This study showed that purpose-built RF needles reduce instrumentation times, increase TSP efficacy and reduce the incidence of pericardial tamponade during AF ablation.

Figure 1 Multivariate analysis of pericardial tamponade indicated that the RF needle is the only variable associated with lower tamponade (95% conf. interval).