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Procedural and Clinical Outcomes of Transitioning to High Power Short Duration Guided Ablation for Atrial Fibrillation

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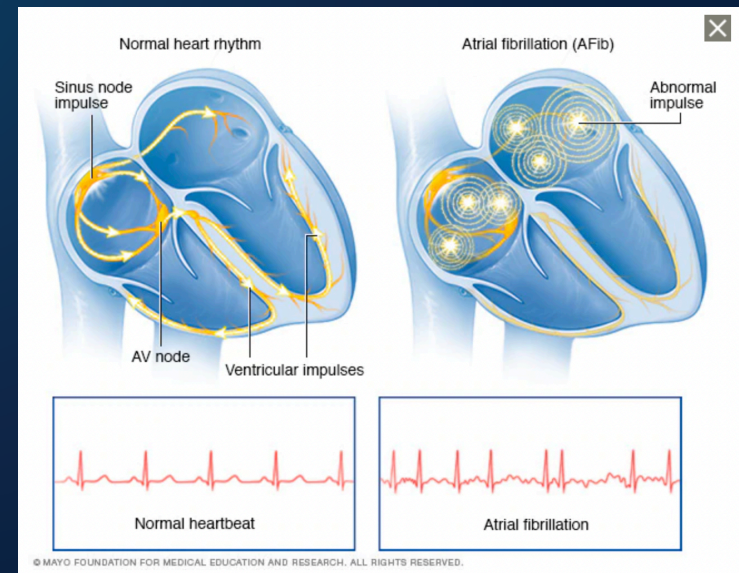
Clinical and Procedural Effects of Transitioning to High Power Short Duration Ablation for Atrial Fibrillation

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(*) indicates primary project advisor

(**) indicates another student who is declaring the same project as primary for SI

- Atrial Fibrillation (AF) is a cardiac arrhythmia
 - Caused by chaotic electrical signals
 - Mortality risk: reduced cardiac output & thrombus
- Pulmonary Vein Isolation (PVI) is an established and effective therapy for AF
 - Catheter ablation of Pulmonary veins
- High Power Short Duration (HPSD) ablation method is novel in PVI compared to Standard Power Standard Duration (SPSD) and Temperature Controlled Non-Contact (TCNC)
 - HPSD has been shown to reduce ablation time without negative impacts on efficacy and safety of PVI



Objectives & Hypothesis

- Research Question
 - What are the clinical and procedural outcomes of using HPSD compared to SPSSD and TCNC ablation methods for PVI?
- Hypothesis
 - HPSD ablation for PVI would take less time, require less ablation, have fewer complications and have better clinical outcomes (less AF recurrence, fewer repeat ablations) than PVI with SPSSD and TCNC ablation methods

Approach & Results

- Study design
 - Retrospective Chart Review
- Population
 - 171 patients with AF that underwent PVI at Jefferson
 - From July 2013 to November 2019
 - 76 HPSD, 51 SPSD, 44 TCNC
- Rationale for Approach
 - Compare clinical and procedural outcomes of ablation techniques as ablation methods are evolving
 - Variables include ablation time, safety outcomes, procedural outcomes, and follow up data (3 and 12 month)

Approach & Results

• Findings

- HPSD reduced total ablation time
 - Reduced Left and Right Pulmonary vein isolation time
 - Reduced Radiofrequency ablation time
- There was no difference in ability to reinduce arrhythmias between groups

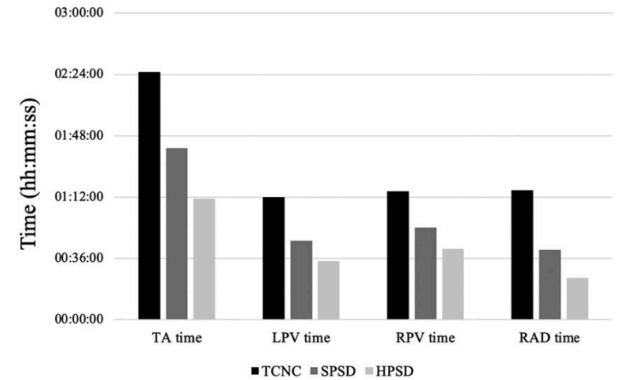


FIGURE 1 Procedural time by catheter type. HPSD, high-power short-duration; LPV left pulmonary vein isolation; RAD radiofrequency ablation delivery; RPV right pulmonary vein isolation; SPSD, standard-power standard-duration; TA total ablation; TCNC temperature-controlled noncontact

TABLE 2 Procedural time by catheter type

| | Total ablation time | | | Left pulmonary vein isolation time | | | Right pulmonary vein isolation time | | | Radiofrequency ablation delivery time | | |
|---------|---------------------|---------|---------|------------------------------------|---------|---------|-------------------------------------|---------|---------|---------------------------------------|----------|----------|
| | TCNC | SPSD | HPSD | TCNC | SPSD | HPSD | TCNC | SPSD | HPSD | TCNC | SPSD | HPSD |
| N | 40 | 47 | 70 | 40 | 47 | 62 | 39 | 47 | 70 | 40 | 47 | 70 |
| Mean | 2:25:35 | 1:40:42 | 1:11:10 | 1:12:04 | 0:46:28 | 0:34:23 | 1:15:24 | 0:54:13 | 0:41:45 | 01:15:59 | 00:41:10 | 00:24:31 |
| SD | 0:52:39 | 0:40:16 | 0:31:09 | 0:33:57 | 0:24:42 | 0:17:25 | 0:32:37 | 0:25:16 | 0:20:45 | 00:27:47 | 00:14:21 | 00:10:57 |
| p Value | <.001 | | | <.001 | | | <.001 | | | <.001 | | |

Abbreviations: HPSD, high-power short-duration; SPSD, standard-power standard-duration; TCNC, temperature-controlled noncontact.

- Findings

- 3 month and 12 month outcomes

- No difference in overall sinus rhythm, Type of AF, Left Atrial Volume, CHA₂DS₂-VASc, or Left Ventricular Ejection Fraction

TABLE 4 Patients in sinus rhythm after 3 months based on clinical characteristics and catheter type

| | | TCNC (N = 44) | SPSD (N = 51) | HPSD (N = 74) | p Value |
|---|------------|------------------|------------------|------------------|---------|
| Overall patients in sinus rhythm, no. (%) | | 30 (68.2) | 40 (78.4) | 61 (82.4) | |
| Type of AF, no. | Paroxysmal | 12 | 15 | 25 | .20 |
| | Persistent | 18 | 25 | 36 | |
| LA volume in ml, no. | ≥150 | 13 | 20 | 34 | .94 |
| | <150 | 17 | 20 | 27 | |
| CHA ₂ DS ₂ -VASc score, no. | ≥2 | 16 | 19 | 34 | .72 |
| | <2 | 14 | 21 | 27 | |
| Left ventricular EF%, no. | ≥55 | 24 | 29 | 45 | .75 |
| | <55 | 6 | 11 | 16 | |

Abbreviations: AF, atrial fibrillation; EF, ejection fraction; HPSD, high-power short-duration; LA, left atrial; SPSP, standard-power standard-duration; TCNC, temperature-controlled noncontact.

TABLE 5 Patients in sinus rhythm after 12 months based on clinical characteristics and catheter type

| | | TCNC (N = 44) | SPSD (N = 51) | HPSD (N = 70) | p Value |
|---|------------|------------------|------------------|------------------|---------|
| Overall patients in sinus rhythm, no. (%) | | 30 (68.2) | 38 (74.5) | 55 (78.6) | .47 |
| Type of AF, no. | Paroxysmal | 14 | 13 | 32 | .55 |
| | Persistent | 16 | 25 | 23 | |
| LA volume in ml, no. | ≥150 | 11 | 22 | 27 | .21 |
| | <150 | 19 | 16 | 28 | |
| CHA ₂ DS ₂ -VASc score, no. | ≥2 | 16 | 17 | 24 | .64 |
| | <2 | 14 | 21 | 31 | |
| Left ventricular EF%, no. | ≥55 | 22 | 27 | 41 | .96 |
| | <55 | 8 | 11 | 14 | |

Abbreviations: AF, atrial fibrillation; EF, ejection fraction; HPSD, high-power short-duration; LA, left atrial; SPSP, standard-power standard-duration; TCNC, temperature-controlled noncontact.



Conclusions

- HPSD ablation in PVI notably reduced ablation procedure time with similar sinus maintenance and safety profile compared to SPSD and TCNC
 - Our research supports the use of HPSD ablation
 - Agree with current literature and acceptance of using HPSD ablation methods



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Future Directions

- Future studies could examine long term outcomes at 5 years and 10 years with larger a cohort

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