# SHORT TERM AND LONG-TERM RESULTS OF RADIOFREQUENCY CATHETER ABLATION FOR ATRIOVENTRICULAR NODAL REENTRANT TACHYCARDIA AT TAM DUC HEART HOSPITAL

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# BACKGROUND

- AVNRT is the most common form of paroxysmal regular supraventricular tachycardia in adults.
- AVNRT related to the presence of dual anterograde atrioventricular (AV) node pathways with disparate electrophysiological (EP) properties
- Symptom onset occurs between 30-50 years
- Elderly patients (>60 years) represent only 12–22% of those with AVNRT

*Yusuf I. Alihanoglu et al,Circulation Journal Vol.79, May 2015*

# BACKGROUND

- Radiofrequency catheter ablation (RFCA) is an effective therapeutic strategy in treating patient who has paroxysmal supraventricular tachycardia, especially AVNRT
- The safety, efficacy, and long term results have not been reported in a large series of consecutive patient with AVNRT in Vietnam.

*Yusuf I. Alihanoglu et al,Circulation Journal Vol.79, May 2015*

# OBJECTIVES

- Access the acute success and long-term results of RF catheter ablation for AVNRT
- Compare the safety and efficacy of slow-pathway RF CA between young patients and elderly patients

# Method

- Between July 2008 and February 2017
- A total of 394 consecutive patients AVNRT have been enrolled
- Patients were divided into 2 groups: group I included 300 patients aged <60 years and group II included 94 patients aged >= 60 years

# Inclusion criteria

- All patients had symptomatic AVNRT episodes documented by 12-lead surface electrocardiography (ECG) before the ablation procedure
- Refractory to at least one AAD
- EP study confirming AVNRT diagnosis.

# Exclusion critera

- Arteriosclerosis obliterance
- Acute coronary syndrome
- Heart failure (not induce by arrhythmias)
- Other critical illness
- Severe coagulopathy
- Infection
- The patient does not agree to the procedure

# EP study and mapping

- After obtaining informed consent from patients, EPS was performed for all patients in the fasting and non-sedated state.
- Before the study, all AADs except amiodarone were discontinued for at least 5 half-lives.

# EP study and mapping

- GE electrophysiology recording system
- Approach via the right femoral vein
- Catheters positioned in the high right atrium, the right ventricular apex, and the His bundle region, and the coronary sinus
- EP study was performed by using standard techniques
- Mechanism of the tachycardia was determined by pacing maneuver.

# AVNRT diagnosis criteria

- Anterograde and rarely retrograde dual AV node pathways with or without echo beats
- Induction of tachycardia dependent on a critical delay in the atrial-His (A-H) interval (jump)
- AH jump was defined as the difference between any consecutive AH intervals equal to, or more than, 50ms during programmed or incremental atrial pacing
- Exclusion of an accessory pathway or atrial tachycardia using conventional pacing and mapping techniques

# EP study and mapping

- RF pulses of 60–90s were applied at optimal sites, with a maximum temperature of 60°C and maximum power of 50W
- Power, impedance and temperature were measured and stored during each application of RF energy

# EP study and mapping

- **Acute success:** defined as junctional ectopic beats during ablation, noninducibility of AVNRT with or without infusion of atropine or Isopretenol, with a maximum of 1 AV nodal echobeat, regardless of the persistence of dual AV nodal physiology during programmed atrial stimulation
- All patients were monitored for 3–6h, and 12-lead ECG was taken from all patients immediately after the ablation procedure, before discharge, and 1 month after discharge.

# Clinical Follow-up

- Followed-up 1 month after RFCA and every 3 months thereafter.
- 12-lead ECGs at each visit
- Patients not coming for follow- up were contacted over telephone.
- Recurrences**:** defined as recurrence of AVNRT (ECG or  EP study)

# Statistical Methods

- Data were expressed as the mean ± SD or percentage.
- Continuous values were compared by Student T test/ Mann-Whitney U test.
- A chi-square test with Yates' correction or Fisher's exact test was used for categorical data.
- $P < 0.05$ was considered significant.
- SPSS 20.0 (Chicago, IL, USA) was used

# RESULTS (N=394)

**Baseline characteristics of patients with AVNRT**

- Age (year) 48.78 ± 15.09 (13-84)
- **Gender** (male; %) 99 (25.1%)
- **Hypertension** 103 (26.1%)
- **Diabetes mellitus** 26 (6.6%)
- Coronary artery disease 6 (1.5%)
- Cardiomyopathy 1 (0.3%)
- Frequency of symptoms (epi/m) 1.4 (0.3-2)
- Duration of symptoms (month) 55.68 ± 54.62

# RESULTS (N=394)

**Co-exist tachycardia**

- Co-AF 3 (0.8%)
- Co-Afl 3 (0.8%)
- Co-AT 4 (1%)
- Co-AVRT 5 (1.3%)

# RESULTS

**AADs used before RFCA**

| | |
|---|---|
| • β-blocker | 188 (47.7%) |
| • CCB | 23 (5.8%) |
| • Flecainide | 34 (8.6%) |
| • Amiodarone | 6 (1.5%) |
| • No-Med | 136 (34.6%) |
| • Unknown | 7 (1.7%) |

# RESULTS

## Baseline Electrophysiologic Characteristics

- BCL (ms) 784 ± 143
- AERP (ms) 231 ± 37
- AV node WCL (ms) 355 ± 66
- Fast ERP (ms) 316 ± 51
- Slow ERP (ms) 271 ± 38
- AH interval (ms) 71 ± 15
- HV interval (ms) 42 ± 8
- **AH jump (%)** **78.9%**
- Multiple AH jumps, n (%) 1 (0.3)
- TCL (ms) 360 ± 58
- SVT rate (b/m) 172 ± 28

# RESULTS

**Electrophysiologic Characteristics After Successful Radiofrequency Catheter Ablation**

- Acute succes (%) 390/394 (99%)
- AV node WCL (ms) 342 ± 53
- AERP (ms) 248 ± 54
- AV ERP (ms) 292 ± 59
- AH interval (ms) 71 ± 24
- HV interval (ms) 42 ± 7
- Post-abl echo beat (%) 5.1%
- Residual SP (%) 4.8%

# RESULTS

**Comparison of Electrophysiologic Characteristics between before and After Radiofrequency Catheter Ablation**

| | Before | After | p value |
|---|---|---|---|
| •AERP (ms) | 228 ± 38 | 241± 44 | 0.958 |
| •AV node WCL (ms) | 347 ± 76 | 343 ± 59 | 0.08 |
| •AV ERP (ms) | 268 ± 39 | 297 ± 62 | 0.228 |
| •AH interval (ms) | 70 ± 16 | 72 ± 24 | 0.052 |
| •HV interval (ms) | 41± 7 | 42 ± 7 | 0.213 |

# RESULTS

## Ablation Procedure-Related Data

| | |
|---|---|
| Total procedure duration (min) | 58 ± 34 |
| Total fluoroscopy time (min) | 19 ± 11 |
| Number of radiofrequency impulses | 6 ± 5.5 |
| Ablation time (min) | 2.2 ± 2.18 |

# RESULTS (N=394)

**Outcome**

| | |
|---|---|
| • Acute success | 390 (99%) |
| • Complication | 15 (3.8%) |
| • Follow-up duration (month) | 29.49 ± 24.5 |
| • Recurrent | 8 (2%) |

# RESULTS

## Complication

- Prolong PR 7 (1.9%)
- Complete heart block 3 (0.76%)
  (Need for PM implantation)
- Fistula 1 (0.3%)
- Hematoma 1 (0.3%)
- Tamponade 1 (0.3%)
- Pneumothorax 2 (0.5%)

# RESULTS

**Comparison of Basic Clinical Characteristics Between the 2 Groups**

| | Group 1 <60y (n=300) | Group ≥60y (n=94) | p value |
|---|---|---|---|
| • Hypertension | 51 (17%) | 52 (55.3%) | 0.000 |
| • Diabetes mellitus | 10 (3.3%) | 16 (17.02%) | 0.000 |
| • Coronary artery disease | 1 (0.3%) | 5 (5.3%) | 0.001 |
| • Cardiomyopathy | 1 (0.3%) | 0 | 0.374 |
| • Co-AF | 2 (0.6%) | 1 (1.06%) | 0.699 |
| • Co-Afl | 1 (0.3%) | 2 (2.12%) | 0.081 |
| • Co-AT | 3 (0.9%) | 1 (1.06%) | 0.957 |
| • Co-AVRT | 4 (0.12%) | 1 (1.06%) | 0.839 |

# RESULTS

**Comparison of Baseline Electrophysiologic Characteristics of the 2 Groups**

| | Group 1 <60y (N=300) | Group 2≥60y (N=94) | P value |
|---|---|---|---|
| • BCL (ms) | 784 ± 145 | 786 ± 136 | 0.738 |
| • AERP (ms) | 236 ± 42 | 218± 24 | 0.018 |
| • WCL (ms) | 351 ±69 | 371 ± 52 | 0.55 |
| • Fast ERP (ms) | 320 ± 47 | 301 ± 63 | 0.123 |
| • Slow ERP (ms) | 267 ± 34 | 295 ± 55 | 0.08 |
| • AH interval (ms) | 70 ± 15 | 74 ± 13 | 0.036 |
| • HV interval (ms) | 41 ± 7 | 43 ± 11 | 0.000 |
| • TCL (ms) | 354 ± 55 | 386 ± 65 | 0.354 |
| • SVT rate (b/m) | 174 ± 28 | 164 ± 27 | 0.610 |

# RESULTS

**Comparison of the Ablation Procedure-Related Data Between the 2 Groups**

| | Group 1 <60y (N=300) | Group 2≥60y (N=94) | P value |
|---|---|---|---|
| • Total procedure duration (min) | 55.34 ± 33.1 | 67.7 ± 35.6 | 0.731 |
| • Total fluoroscopy time (min) | 18.31 ± 11.8 | 20.3 ± 8.3 | 0.394 |
| • Ablation number | 6.1 ± 5.17 | 7.04 ± 5.4 | 0.738 |
| • Ablation time (min) | 2.49 ± 2.18 | 2.2 ± 1.2 | 0.392 |

# RESULTS

**Comparison of acute success and outcome between the 2 Groups**

| | Group 1 <60y (N=300) | Group 2≥60y (N=94) | P value |
|---|---|---|---|
| • Acute success | 296 (98.7%) | 94 (100%) | |
| • Prolong PR | 4 (1.3%) | 1(1.06%) | 0.947 |
| • Complete heart block | 2 (0.67%) | 1 (1.06%) | 0.3 |
| • Fistula | 0 | 1 (1.06%) | 0.074 |
| • Hematoma | 1 (0.33%) | 0 | 0.173 |
| • Tamponade | 0 | 1 (1.06%) | 0.074 |
| • Pneumothorax | 1 (0.33%) | 1 (1.06%) | 0.138 |
| • Recurrent | 8 (2.67%) | 0 | 0.11 |

# Discussion

| | Yusuf I. Alihanoglu et al | Udyavar AR et al | Our study |
|---|---|---|---|
| Acute success | 99.3% | 99.6% | 99% |
| Complications | 0.77% | 2.6% | 3.8% |
| Recurrence | - | 0.3% | 2% |

# CONCLUSIONS

- RF ablation is very effective to treat AVNRT.
- RF catheter ablation, could be considered as first-line therapy for AVNRT patients older than 60 years as well as younger patients
- There was no significant difference between the 2 groups in respect of the complications rates and recurrence rates.

# Thank you for your attention