Unknown EP Tracings

Jaemin Shim, MD
Arrhythmia Center,
Korea University Anam Hospital, Seoul, Korea
45 year-old female

- Intermittent chest fluttering since 1990

- EPS at other hospital (1991 & 2008)
  - Failed to find out tachycardia mechanism (?)

- EPS at other hospital (2014.10.16)
  - Atypical AVNRT ➔ slow pathway ablation
CASE 1

ECG during palpitation at other hospital

R/O SVT with LBBB aberration
A. Clinical Diagnosis
Wide QRS tachycardia which was terminated with adenosine
Clinically documented AVNRT

B. Procedure note
Left femoral veins were punctured and instrumented with intravascular sheath. Two quadripolar catheters were placed in His area, RV apex and duodecapolar catheter within RA through coronary sinus.
Decremental and dual AV nodal physiology was demonstrated by AH jump during AEST.
Retrograde VA conduction through VACS was noted.
Wide QRS tachycardia (LBBB pattern, TCL 380ms, AH 210ms, HV 40ms, QRSd 120ms, VA 130ms at HBE) was induced by RVP 260ms and AEST 600/260ms during isoproterenol infusion. During tachycardia the atrial activation sequence was concentric. PVC given during HBE refractory period did not reset atrial activation. The tachycardia was compatible with atypical AVNRT (slow-slow).
Ablation catheter (EPT, LC, 7Fr) was placed at Koch triangle. RF ablation (50°C, 50W, 60 seconds) was attempted at P2 area with slow pathway potential guidance and there was frequent junctional rhythm during RF ablation. But SVT was still inducible even with profuse Koch triangle ablation, therefore intraCS extension was suspected. An irrigation catheter (Celcius, 7Fr) was introduced into CS and RF ablation (25W, 20CC, 60 seconds) was given with frequent junctional rhythm during RF ablation. But due to still inducible SVT, after transseptal puncture, a deflectable ablation catheter (EPT, 7Fr) was introduced into LA and CS Os roof was ablated at lateral mitral annulus. With or without isoproterenol infusion AVNRT was not induced anymore and one nodal echo beat was observed after final RF ablation.
CASE 1

12 lead ECG at OPD
• EP Study, catheter position
• CS angiography
- Baseline SR (SCL 800, AH 71ms, HV 37ms, QRS 85ms)
- RAP 600ms, LBBB
● RAP 500ms, His preceded by RV
- **RAP 400ms (AVBCL 380ms)**
- AEST 600/360ms
• AEST 600/340ms, AP ERP
- AEST 600/300ms, AVNERP
- RVP 450ms, concentric, EA at HIS, VABCL 400ms
**VEST 600/280ms, decremental property (+)**
- Para-Hisian pacing, SA (Narrow/Wide QRS) 76/118ms
- RVP (SA at apex 105ms vs. SA at base 170ms)
- VEST 400/250ms, SVT Induction during ISP infusion
SVT (TCL 290ms, VA 117ms)
• SVT, 12 lead ECG
● V reset
● V overdrive pacing
- VA during RVP (110ms) vs. during SVT (117ms)
- Adenosine (12mg) administration
EPS summary

- Antegrade conduction: right free wall AP
- Retrograde conduction
  - Concentric activation
  - Decremental property (+)
  - Para-Hisian pacing: AVN conduction
  - RV apex/base pacing: AVN conduction
- Tachycardia
  - LBBB with superior axis
  - $\Delta$VA interval (SR-SVT): 110-117 = -7ms (AVRT > AVNRT)
  - V-reset
  - VOP: termination of tachycardia
Differential Diagnosis

- Atypical AVNRT with bystander AP
- Antidromic AVRT using right free wall AP
SVT, 12 lead ECG

SVT

RAP 400ms
Increasing $S-V_{RV}$ interval
- A-reset: late lateral RA extrastimulus
• Right freewall AP mapping during RAP
During ablation, Mahaim potential?
CASE 1

- During ablation, delta (-)
Ablation site
- After ablation, no delta wave
- Adenosine (12mg) administration: AVD
12 lead ECG after RFCA
Case summary

✓ WQRST with LBBB and superior axis
✓ 1st EPS & RFCA
  - Atypical AVNRT
  - Slow pathway ablation
✓ 2nd EPS & RFCA
  - Ventricular preexcitation via decremental Rt. free wall AP (atriofascicular AP, Mahaim fiber)
  - Antidromic AVRT using atriofascicular AP
  - No inducible tachycardia after successful AP ablation
**CASE 1**

- **RAP 400ms**
- Delta wave: V1(-), III/aVF/II (+/+/+), V4-5 transition