Challenging Accessory Pathway Ablation

Jae-Sun Uhm, MD
Dept. of Cardiology, Severance Hospital,
College of Medicine, Yonsei University, Seoul, Republic of Korea
Agenda

1. Epicardial accessory pathways
   1) Accessory pathway in the coronary sinus diverticulum
   2) Accessory pathway in the middle cardiac vein

2. Accessory pathways at the prior valve surgery site
   1) Accessory pathway at the prior mitral valve replacement (MVR) site
   2) Accessory pathway at the prior tricuspid valve replacement (TVR) site
Epicardial Accessory Pathways
Epicardial Accessory Pathways

- AP in the coronary sinus diverticulum
- AP in the middle cardiac vein
- AP in the vein (or ligament) of Marshall
- AP in the atrial appendage
CASE 1: 67/F, Recurrent palpitation
CASE 1: 67/F, Recurrent palpitation
CASE 1: Cardiac venography
CASE 1: Antegrade mapping & diverticulogram
CASE 1: Retrograde mapping & diverticulogram
CASE 1: AP was blocked within 2 seconds of RFCA
CASE 1: ECG after RFCA for AP

Referred by:  
Confirmed By: LEE MOON HYOU NG
CASE 2: 11/M, Recurrent palpitation
Catheters Position
CASE 2: Sinus Rhythm and Delta Wave

(AH = 80, HV = -20, QRS = 138)
CASE 2: RFCA at the posteroseptal area, but failed
Cardiac Venogram
CASE 2: Mapping & RFCA for AP at middle cardiac vein
CASE 2: AP was blocked within 4 seconds of RFCA
ECG after RFCA
<table>
<thead>
<tr>
<th>Finding</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>PPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steep negative delta in II</td>
<td>87%</td>
<td>79%</td>
<td>50%</td>
</tr>
<tr>
<td>Steep positive delta in aVR</td>
<td>61%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep S in V6</td>
<td>70%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS diverticulum</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Accessory Pathways in Posteroseptal Region

From Wood MA. Catheter Ablation of Cardiac Arrhythmias. 2015

Epicardial APs

- Cardiac venography should be performed.
- When early local ventricular electrogram or large amplitude AP potentials, energy delivery should be performed.
- RF energy should be carried out using low initial power.
  - Coronary sinus RF energy carries an risk of coagulation formation or coronary artery injury.
- Particularly MCV, PD coronary artery courses within the vascular sheath of MCV.
  - This risk higher in children.
Accessory Pathways in Patients who underwent MVR
CASE 3: 40/M, Recurrent palpitation

- Chief complaint:
  - Palpitation

- Medical & surgical history:
  - WPW syndrome with paroxysmal AF
  - s/p RFCA for left posterior AP, failed at other hospital, 1 year ago
  - s/p MVR for severe MR & surgical ablation for left posterior AP, 8 months ago
Initial ECG

HR = 124 BPM

Referred by:  Confirmed By:  HONG MYEONG KI
Operation Records

- For severe MR
  - MVR with St Jude 31mm
- For AF & WPW syndrome
  - Biatrial maze operation with cryoablation
  - Cryoablation at posterior mitral annulus
ECG 8 Months after Surgical Ablation

Referred by: HONG G R  
Confirmed By: LEE MOON HYOUNG

HR = 72 BPM
Induction of Tachycardia (TCL = 272 ms)
Transspetal & Transaortic Approach → Failed
Bipolar Ablation

Ablation cathether = (+) (anode)

Dispersive catheter = (-) cathode

Output port of RF generator

Signal

Ground of RF generator
Bipolar ablation: Above-valve – Under-valve → Failed
AP was blocked within 5 sec of bipolar ablation (under-valve – CS)
ECG after Surgical Ablation
Accessory Pathways in Patients who underwent TVR
CASE 4

- **Patient**
  - A 23-year-old Mongolian man

- **Chief complaint**
  - Palpitation & chest pain

- **History**
  - At the age of 10s years, diagnosed with Ebstein anomaly & WPW syndrome
  - In 2010 (at the age of 16), underwent RFCA for WPW syndrome and TVR for Ebstein anomaly in India
  - In 2016, underwent RFCA for WPW syndrome in Mongolia
  - In 2017, underwent RFCA for WPW syndrome in Mongolia
ECG at Palpitation

Referred by: 

Confirmed By: HONG MYEONG KI
ECG after Injection of Adenosine

Referred by: 

Confirmed By: HONG MYEONG KI

Electrocardiogram traces from different leads showing the effects after injection of adenosine.
Mechanical Valve at Tricuspid Position
Intermittent delta wave during RAP 600mg
Delta wave just after adenosine injection
Tachycardia induction by RAP 500ms
Fully augmented delta wave during tachycardia
Summary of EP study

- Intermittent antegrade conduction via AP during A pacing or adenosine injection
  - AP conduction velocity < AV node conduction velocity
- Decremental VA conduction via AV node
- Easy induction of antidromic tachycardia
- The true tricuspid annulus was located under the mechanical valve.
- Planned to perform surgical ablation during redo TVR
Cardiac CT

CS os

CS
Catheter Position & Aortography
Tachycardia induction by RAP 500ms

165 ms
Determination of Annulus & Crossed the Valve

Distal RCA
Accessory Pathway Mapping

34 ms

-34 msec
RFCA for Right Posterior AP
AP was blocked within 2 sec of RFCA
AV Block during RAP 460ms
AV Block during Adenosine Injection
ECG after RFCA

Referred by:  

Confirmed By:  HONG MYEONG KI
Summary of Case 4

- WPW syndrome in a patient who underwent TVR for Ebstein anomaly
- Right posterior AP under the mechanical valve
- Catheter ablation for right posterior AP through the mechanical valve
- Performed redo TVR with a bioprosthetic valve after catheter ablation
ECG is important for prediction of unusual AP.

Cardiac venography should be performed in patients with posteroseptal AP.

Right coronary angiography should be performed for identifying the true annulus in patients with Ebstein anomaly.

Detailed, meticulous mapping should be performed above and below prosthetic valve in patients with AP at the site of prior valve surgery.
Thank all of you!