Troubleshooting problems in EP lab (cases)

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CASE 1
41yr / female

- **C.C. : palpitation**
  - Frequency : Monthly
  - Duration : 2~3 hr
  - (Adenosine → NSR at ER)

- **PMHx**
  - HTN(-)
  - DM (-)
  - Syncope/SCD(-)

- **Chest x-ray** : No active lung lesion

- **Echocardiography** : Mild TR, Mild pul HTN
Baseline ECG

HR 67bpm, Normal axis
PSVT

- Age: 41 Years
- Gender:
- Height:
- Weight:
- Heart Rate (BPM): 218
- RR (msec): 274
- PR (msec): 25-468
- QRS dur (msec): 72
- QT / QTc (msec): 132 / 252
- Display scale: 25 mm/sec
- Display scale: 15 mm/mV

Heart rate trace:
AH jump : AH interval 204ms → 318ms
AEST 500/330
Induction
Successful site
Patient symptoms

Chest discomfort

What happened to this patient?

Sweating

Unconsciousness
Cardiac Tamponade
Patient transferred to the operating room for repair
Cardiac Tamponade

RA collapse

RV collapse
Management of Acute tamponade

All patients should receive the following:

- **Oxygen**
- **Volume expansion** with blood, plasma, dextran, or isotonic sodium chloride solution, as necessary to maintain adequate intravascular volume

- **Bed rest with leg elevation**: This may help increase venous return.

- **Inotropic drugs** (e.g., Dobutamine): These can be useful because they do not increase systemic vascular resistance while increasing cardiac output.
• Emergency subxiphoid percutaneous drainage

• Echocardiographically guided pericardiocentesis

• Percutaneous balloon pericardiotomy
Useful Echocardiography

Focus Assessed Transthoracic Echo (FATE)
Scanning through position 1 - 4 in the most favourable sequence

- Pos 1: Subcostal
- Pos 2: Apical 4-chamber
- Pos 3: Parasternal long axis
- Pos 4: Parasternal short axis
- Pos 5: Pleural scanning

Apical four chamber view
- RV, LA, LV
- Aortic valve, mitral valve
- Right atrium, left atrium
- Septum

Subcostal view
- RV, LA, LV
- Aortic arch, mitral valve
- Right atrium, left atrium
- Septum

Left parasternal long axis view
- RV, LA, LV
- Aortic valve, mitral valve
- Right ventricle, left ventricle
- Septum

Short axis view of left ventricle
- RV, LA, LV
- Aortic arch, mitral valve
- Right ventricle, left ventricle
- Septum
What is the cause of cardiac tamponade??

Popping phenomenon

- Popping phenomenon is associated with sudden change in impedance
  - Catheter dislodgement
  - Coagulum formation

- Coagulum formation
  - Arcing
  - Tissue Charring
What’s the lesson of this case?

1. Close attention should be paid to the sudden rise of impedance during delivery of the RF current.

2. Don’t neglect patient’s symptoms. If necessary → Echo, BP check.
CASE 2
53yr / male

• C.C. : palpitation
  Usually at night
  Frequency : 20 times per a month
  Chest X-ray : normal
  CAG : normal
  2D-echo : WNL
12 lead ECGs recorded at baseline
shortly after treadmill exercise testing
RVOT VT

• Origin
  - LBBB / RAD
  - No evidence of structural heart disease

• Induction of RVOT VT
  - programmed stimulation
  - facilitated by catecholamine infusion

• Termination of RVOT VT
  - Medication: adenosine as well as verapamil
  - Catheter ablation
Ablation of Idiopathic Right Ventricular Outflow Tract Tachycardia: Current Perspectives

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Figure 3. Schematic demonstrating the orientation of the right ventricular outflow tract (RVOT) in the chest cavity. AO = aorta.

Figure 4. Schematic of the RVOT endocardium opened along the anterior junction between the free wall and the septum. The schematic is divided into 16 segments to characterize the location of successful ablation sites (and site of VT origin) in 72 patients undergoing electroanatomical mapping of idiopathic RVOT VT. The number inside each segment indicates the number of tachycardias localized to that segment.
PVCs and NSVT
VF induction during RFCA
Posteroseptal of RVOT
What’s the cause?

Ventricular fibrillation induced by a radiofrequency energy delivery for idiopathic right ventricular outflow tachycardia

Sachiko Ito\textsuperscript{a}, Hiroshi Tada\textsuperscript{c,*}, Jong-Dae Lee\textsuperscript{b}, Isamu Miyamori\textsuperscript{a}

Temperature elevation and/or Mechanical stress during the RF energy deliveries

VF in idiopathic RVOT VT
What should we do for this patient?

① Ablation at the same site
   - Deep sedation
   - Defib pads on

② Medication

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dose</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sotalol HCl</td>
<td>40mg</td>
<td>80mg</td>
</tr>
<tr>
<td>Imidapril</td>
<td>10mg</td>
<td>1T 1회 2P</td>
</tr>
<tr>
<td>Amlodipine</td>
<td>5mg</td>
<td>1T 1회 3M</td>
</tr>
<tr>
<td>Diltiazem</td>
<td>30mg</td>
<td>1T 3회 3P</td>
</tr>
</tbody>
</table>
What’s the lesson of this case?

① VF can be triggered by delivery of RF energy during RFCA in RVOT arrhythmia

② Be alert to this possible phenomenon during RF deliveries for idiopathic VT.
CASE 3
80yr / female

• C.C. : palpitation

• PMHx

  HTN(+)   DM (+)   CRF (+)
Baseline ECG

HR 60bpm, Normal axis
PSVT
CS angiography

RA
His
RV
CS

RA
His
RV
CS
PL-SVC

- Most frequent anomalies of systemic venous return.

- Incidence of 2~4% among all CHD.

- Easily identified
  Echo, Angio,
  Electrode catheter - EPS
Why they exist?
PSVT induction

AEST 500/300/290 (induction with AH jump)
His potential (+) at CS os, roof, and bed
What should we do for this patient?

1. Detailed mapping
   - Antegrade approach via femoral vein approach
   - Retrograde approach via PL-SVC

Radiofrequency Catheter Ablation for AV Nodal Reentrant Tachycardia Associated with Persistent Left Superior Vena Cava

PACE, Vol. 20 September 1997
Many potentials were recorded

The bed of the coronary sinus

Coronary Sinus mapping
Anterograde and Retrograde
Left subclavian vein & Femoral
Treatment
- RFCA versus Cryoablation
Cryoablation is a safe and efficacious treatment for AVNRT.
③ Medication
   : AV nodal blocking agents
     - Verapamil, Diltiazem

   : β- blockers

   : Class- IC antiarrhythmic agents
     - flecainide, propafenone
What’s the lesson of this case?

1. RF catheter ablation is feasible and safe for AV nodal modification associated with PLSVC

2. Subclavian vein or CS angiogram
   - If CS catheter could not be placed in the RA

3. Detailed mapping
   - for identifying SP potentials especially on the Bed of the CS
Take-Home Message

- To avoid cardiac tamponade
  - Pay attention to impedance change > 20~30 Ohms

- VF induced by RF ablation in patient with RVOT VT
  - VF was triggered by delivery of RF energy

- AV nodal modification associated with PLSVC
  - Many SP potentials was recorded (Bed of the CS)
  - Retrograde & Anterograde approach (FV or Subclavian vein)
Impact of Cryoablation

Cryoablation is a safe and efficacious treatment for AVNRT. There is always of risk of heart block with RF ablation. Although this experience confirms previous findings that the risk with cryo is zero.