VENTRICULAR TACHYCARDIA ABLATION EXPERIENCE IN TAIPEI VETERANS GENERAL HOSPITAL

SPEAKER: YI-LAN KUO
CLASSIFICATION OF VENTRICULAR ARRHYTHMIA (VA)

- **Focal VT:**
  - The mechanism can be automaticity, triggered activity, or microreentry.

- **Scar-related reentry:**
  - Characteristics of reentry that originate from an area of myocardial scar.
VT MORPHOLOGY

- Monomorphic VT: one morphology
- Multiple monomorphic VTs: different QRS in separate episode
- Polymorphic VT: continuously changing QRS
- Pleomorphic VT: different QRS in same episode
- Ventricular fibrillation (VF): a chaotic rhythm defined on the surface ECG
EXAMPLE OF MORPHOLOGY
EXAMPLE OF MORPHOLOGY

Pleomorphic VT

320

280
EXAMPLE OF MORPHOLOGY

Polymorphic VT
COMMON IDIOPATHIC VT

- Outflow tract
- LV summit
- Perivalve
- Intracavity
- Fascicular
## COMMON VT LOCALIZATION

<table>
<thead>
<tr>
<th>DIAGNOSIS</th>
<th>LV</th>
<th>RV</th>
<th>EPI</th>
<th>INHERITED</th>
</tr>
</thead>
<tbody>
<tr>
<td>RVOT</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARVD (or ARVC)</td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Brugada Syndrome</td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>LVOT</td>
<td>✔</td>
<td></td>
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<tr>
<td>Fascicular VT</td>
<td>✔</td>
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<tr>
<td>Cuspid VT (Aorta Ostium)</td>
<td>✔</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>HCM (or HOCM) VT</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>DCM VT</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>(✔)</td>
</tr>
<tr>
<td>Catecholaminergic Polymorphic VT</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Ischemia VT</td>
<td>✔</td>
<td></td>
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<td></td>
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<tr>
<td>** Electrical Storm</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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</tbody>
</table>

* RVOT: Right Ventricular Outflow Tract
* ARVD: Arrhythmogenic RV Dysplasia
* ARVC: Arrhythmogenic RV Cardiomyopathy
* HCM: Hypertrophic Cardiomyopathy
* DCM: Dilated Cardiomyopathy
* VPCs: 20,000/day or >20%
DEFINITION OF LOCATION

- **ENDOCARDIUM**
  - Reachable via systemic venous or arterial access

- **EPICARDIUM**
  - Potentially approach through epicardial coronary venous system
  - Requires percutaneous and/or surgical pericardial access
VT Ablation Location

- Endocardium
- Epicardium
RV APPROACH

Phrenic Nerves

Epicardial Membrane

Epicardial Space

Coronary Arteries

Ablation catheter
LV approach

retrograde

ante-grade

Epi
Pre-procedure / patient

- Informed consent
- Lab data review
- Comfortable position & Emotion support
- Proper Patient Connections:
  - 12 lead ECG
  - Defibrillation patches
  - Ablator pad
  - 3-D Mapping patches
- The proper configuration of the drug
Patient Connections Placement

- Defibrillator patches
- Ablator Pad

Areas of interest:
- RA (Right Atrium)
- LA (Left Atrium)
- V1-V6
- RL (Right Leg)
- LL (Left Leg)
Chest Electrode Placement
VT catheter preparation

- **Sheath:**
  - 9 Fr or Long Sheath (Vein) for RV Endo
  - 8 or 9 Fr or Non-Kinking Long Sheath (Artery) for LV endo (retrograde)
  - Deflectable Long Sheath (Vein) for LV (Antegrad, transseptal)
Patient Preparation

prepare table

puncture
Patient Preparation

setting Blood Pressure system

setting Catheter Cable
During procedure

- Check CAG
- Hemodynamic condition: BP, HR, O2 sat & Conscious
- Fluid challenge: IV 0.9% N/S 1000 - 2000 cc
- Records of the process
- Generator: select power control or temperature control setting power, temperature & time
During procedure

- Noise: Check ECG lead connection; IC signal, grounding line connection
- LV approach: check ACT q20 min, keep ACT 250-300sec
- Cardioversion: unsynchronize
- Complication: signs and symptoms monitoring
Post ablation

- Remove Sheath: vein sheath could be removed immediately; arterial sheath could be removed with ACT < 170 sec (if use heparin)

- Chest discomfort is common after ablation. The patients should tell the nurse if any deterioration.

- Lying down for 4-6 hours.

- CCU care if indicated
Mapping Techniques

- Activation mapping (earliest)
- Pace mapping (most likely)
- Voltage (low or scar)
- Entrainment (reentry circus)
Epicardial VT Ablation
TAIPEI VGH EXPERIENCE IN EPI ABLATION

Epicardial ablation in Taipei VGH

- ARVC: 43%
- Brugada syndrome: 20%
- IDC: 14%
- Other NICM: 16%
- Idiopathic: 5%
- ICM: 3%
PREPARING FOR EPI APPROACH

1. 6Fr sheath: for RV cath and RVG
2. 8Fr Epicardia puncture sheath
3. Epicardial puncture needle
4. Agilis long sheath for ablation
5. Hemovac for drainage of irrigated fluid
6. Ioban
7. 0.032-260 GW
8. Drainage bag
9. Ablation catheter
Cordis

EMERALD™ Guidewire

260 cm

3 mm .032 in. (.81 mm)

STANDARD, EXCHANGE
J-TIP
PATIENT PREPARATION

1. Positioning the patient in bed
2. Confirmed the 3D patches location according the procedure
3. 3D patches location should avoid the Epicardia puncture site
4. ECG patch, the border should be fixed by Tegarden
5. General Anesthesia, on foley
6. Sterization: chest, inguina
EPICARDIAL PUNCTURE SETS IN TVGH

- Epicardial Puncture Set
  - Tuohy Needle (18G ARROW)
  - 0.032 guidewire/Sheath (Cordis)
  - Agilis Sheath (St. Jude Medical)
Abdominal compression
EPICARDIAL PUNCTURE
PRESSURE GUIDED PUNCTURE
CONFIRM GUIDE WIRE POSITION
TEST CONTRAST
COMPLICATION

- **Bleeding**
  - Inferior epigastric vessels and liver diaphragmatic vessels
  - Coronary and pericardial vessels

- **Ventricular perforation/laceration (17%)**
  - Late pseudoaneurysm formation
  - Ventriculoabdominal fistula

- **Phrenic nerve injury (with ablation)**

- **Coronary vasospasm**

- **Late coronary stenosis, tamponade and severe pericardial inflammatory reaction**
<table>
<thead>
<tr>
<th>Complications</th>
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<tbody>
<tr>
<td><strong>Major complications</strong></td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td></td>
</tr>
<tr>
<td>Intrapericardial bleeding (&gt; 80 cm³)</td>
<td>5 (6.3%)</td>
</tr>
<tr>
<td>Intra-thoracic bleeding</td>
<td>1 (1.3%)</td>
</tr>
<tr>
<td>Intra-abdominal bleeding</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Delayed (&gt;48 h)</td>
<td></td>
</tr>
<tr>
<td>Major pericardial reaction</td>
<td>1 (1.3%)</td>
</tr>
<tr>
<td>Delayed tamponade</td>
<td>1 (1.3%)</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>8 (10.0%)</td>
</tr>
<tr>
<td><strong>Minor complications</strong></td>
<td></td>
</tr>
<tr>
<td>RV puncture without consequence</td>
<td>6 (7.5%)</td>
</tr>
<tr>
<td>Subxyphoid hematoma</td>
<td>1 (1.3%)</td>
</tr>
<tr>
<td>Prolonged pleuritic pain &gt; 3 days</td>
<td>4 (5.0%)</td>
</tr>
<tr>
<td>Transient acute coronary syndrome</td>
<td>3 (3.8%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>14 (17.5%)</td>
</tr>
</tbody>
</table>

Lin CY, Chung FP et al. Acta Cardiologica Sinica 2017
END PROCEDURE

- 1. hydrocortisol 100mg and keto 1 Amp
- 2. Remove Epicardial sheath, insert pigtail into epicardial space
- 3. CCU
ELECTRICAL STORM

- Three distinct episodes of sustained VT or VF within the last 24 hours
- Occurrence of incessant VT for at least 12 hours
- ≥3 shocks in the last 24 hours (separated by ≥5 min)

Pedersen CT et al. Heart Rhythm 2014; 11: e166-e196
2018 VT STORM AND HEART STUNNING WITH LVAD SUPPORT
NO MORE ELECTRIC STORM AFTER ABLATION

The patient has more time for the heat transplantation!
THANK YOU!

台北榮總心導管室護理師

郭宜蘭
HOW TO DECIDE THE APPROACH

Sveson et al. JACC 1990