Idiopathic ventricular tachycardia: is catheter ablation the first-line treatment?

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Disclosures.

None.
Backgrounds of IVT

• Idiopathic VT (IVT) can usually occur without SHD, and sometimes with SHD.

• The substrate of IVT is NOT scar-related or progressive.

Once the IVT is successfully ablated, development of another VT will be rare.

• IVT is usually monomorphic and hemodynamically stable.

Catheter mapping and ablation should be easier as compared with scar-related VT.
Backgrounds of IVT

- IVT is basically benign, but can sometimes cause tachycardia-induced cardiomyopathy. In such cases, IVTs need to be completely cured without any delay.

- IVT is likely to occur in younger patients who cannot tolerate AADs for a long time. Younger patients are likely to prefer catheter ablation to medication.
Backgrounds of IVT

- The mechanisms of IVT are already well recognized.
  - Mainly focal except left fascicular VTs with a macro-reentrant mechanism.

- The major sites of IVT origins are also well recognized.
  - Extensive mapping is usually unnecessary.
# The major sites of IVT origins

<table>
<thead>
<tr>
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<th>RV</th>
<th>LV</th>
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</thead>
<tbody>
<tr>
<td><strong>Outflow tract region</strong></td>
<td>PA, RVOT</td>
<td>Aorta, LVOT (AMC), GCV, AIVV, LV summit</td>
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<tr>
<td>Supravalvular</td>
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<tr>
<td>Endocardial</td>
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<tr>
<td>Epicardial</td>
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<tr>
<td><strong>Annuli</strong></td>
<td>TA (Peri-Hisian)</td>
<td>MA</td>
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<td><strong>Fascicles</strong></td>
<td></td>
<td>LPF &gt;&gt; LAF, Upper septum</td>
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<tr>
<td><strong>Papillary muscle</strong></td>
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<td>PPM &gt;&gt; APM</td>
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<tr>
<td><strong>Epicardium</strong></td>
<td></td>
<td>Crux, MCV</td>
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<td><strong>Others</strong></td>
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<td>BBR</td>
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<td>Bidirectional VT</td>
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Techniques and Efficacy of CA of IVTs

- Twelve-lead ECG can predict the site of origin accurately before the procedure. Strategy and equipment can be determined in advance based on a presumed origin (Rt. vs Lt., Endo vs Epi).

- Good predictors of successful ABL of IVTs
  - Local activation time > 20 ms
  - Excellent pace map
  - Pre-potential for VTs from ASCs and PM
  - Purkinje potential and PPI identical to VT CL for left fascicular VTs
Techniques and Efficacy of CA of IVTs

- Success rate of catheter ABL of IVTs is ≈ 95% with those predictors.

- Failure is usually due to inability to induce the arrhythmia for mapping.
Challenges in catheter ABL of IVTs

- Papillary muscle VT
- Preferential conduction
- Epicardial foci
- Foci close to the coronary artery
- Foci close to the HB
- Intramural foci in the IVS and LVOT
Challenges in CA of Papillary muscle VT

- The foci are usually located deep inside the PM.
- Single focus with preferential conduction with multiple breakout sites.
- It is challenging to keep a good contact of ABL catheter on the PM because of vigorous movement of the PM.

Challenges in CA of Papillary muscle VT

- The success rate of catheter ABL of papillary muscle VTs can be improved by
  - Use of an irrigated or 8 mm tip ABL catheter
  - Guidance of ICE and TTE
  - Transseptal approach for the posterior PM VT
Preferential conduction in the VOT

Preferential conduction in the VOT

PM score     22/24     5/24

PVC          RVOT      LCC           PVC          RVOT      LCC
Preferential conduction in the VOT

V-QRS = -24ms
Preferential conduction in the VOT

- Efficacy of pace mapping is sometimes limited because of preferential conduction.
- Activation mapping is most reliable to identify a site of IVT origin.
Epicardial foci

• The LV summit


• The crux of the heart.

Where is the LV summit?

- A region of the LV epicardial surface bounded by the left anterior descending coronary artery (LAD) and left circumflex coronary artery (LCx) that lies superior to the aortic portion of the LV ostium occupies the most superior portion of the LV and has been termed the LV summit by McAlpine.

LV summit

- Ao
- PA
- LMCA
- LCx
- LAD
- AIVV
- GCV
- HB
- ABL
- CS
- LAO
- RAO
- LMCA
- LAD
- LCx
- CS
- ABL
- HB
- RAO

1 cm
Where is the crux of the heart?

- The crux of the heart is formed by the junction of the AV groove and the posterior interventricular groove and corresponds roughly to the junction of the middle cardiac vein and the CS, near the origin of the posterior descending coronary artery.
Intramural foci in the IVS and LVOT

Intramural foci in the IVS and LVOT
**Intramural foci in the IVS and LVOT**

Irrigated needle ABL catheter and transcoronary ethanol ABL may be helpful to treat the intramural origin.

SAPP JL, STEVENSON WG, et al. JCE 2006;17:657-661
Safety of CA of IVTs

- There are several potential risks. These risks depend on the location of the VT origin and thus are predictable.
  - Perforation in the RVOT free wall
  - Occlusion of the coronary artery ostium
  - Collateral damage to the coronary artery
  - Inadvertent AV block and BBBs
  - Valvular regurgitation
Safety of CA of IVTs

• These complications can be avoided by

  ✓ Use of non-irrigated ABL catheter in the RVOT FW
  ✓ ABL within the ASCs with an angiographic catheter in the coronary arteries and/or ICE guidance
  ✓ Frequent contrast injection to the coronary artery
  ✓ Avoidance to give a lesion within 5 mm from the important structures and too much ABL to the valves and PMs.
Safety of CA of IVTs

• The complications during catheter ABL of IVTs are very rare although those data are reported from well-experienced centers.

• Catheter ABL of IVT is considered to be safe if it is appropriately performed.
Indications for catheter ABL of IVT

EHRA/ HRS Expert Consensus (2009)

1. For monomorphic VT that is causing severe symptoms.

2. For monomorphic VT when AADs are not effective, not tolerated, or not desired.

This indication may be expanded.
Indications for catheter ABL of IVT

If monomorphic IVT is symptomatic, catheter ABL can be offered to a patient as a treatment option along with medication.
Conclusions

• Catheter ablation of IVT is safe and highly effective if it is performed appropriately.

• Currently, catheter ablation could be the first-line treatment of symptomatic IVTs with a patient’s preference.
Thank you so much for your attention.