Allied Professional: Epicardial Approach

Tools & Technics

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Outline

• How to select the patient.
• How to prepare the patient.
• How to do epicardial approach.
• How to prepare the tools.
A 72 years old woman with apical HCM

- Diagnosed by CMR at the age of 67 years and AICD for NSVT and syncope.
- She had history of VT storm and epicardial RFA by voltage mapping using core isolation was done 3 years ago.
A 72 years old woman with apical HCM

- Now presented with frequent shocks again.
A 72 years old woman with apical HCM

- 4 morphologies of PVC were noted in the EP lab.

- All originated around the previously ablated aneurysmal area.

- Epicardial adhesion prevented apical area mapping.
Who needs to be ablated epicardially?

- VT originating from the subepicardium is an important cause of failure of endocardial ablation approach.

- A percutaneous epicardial mapping approach allows many of these VTs to be ablated in the electrophysiology laboratory.

- Up to 17% of procedures may involve epicardial mapping; not all resulted in epicardial ablation.
## Substrate of Epicardial VT

<table>
<thead>
<tr>
<th>Type of Cardiomyopathy</th>
<th>Epicardial Substrate</th>
<th>Epicardial Ablation</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARVC/D</td>
<td>Very frequent</td>
<td>First line or after ineffective endocardial ablation/arrhythmia recurrence</td>
<td>Histo-pathological studies show more extensive epicardial than endocardial scar tissue</td>
</tr>
<tr>
<td>Dilated cardiomyopathy</td>
<td>Frequent</td>
<td>After ineffective endocardial ablation/arrhythmia recurrence or may be considered first line in selected patients</td>
<td>No epicardial ablation necessary in cases with bundle-brunch-reentry or focal mechanism</td>
</tr>
<tr>
<td>Myocarditis</td>
<td>Probably frequent</td>
<td>May have a role, only scarce data</td>
<td>Inflammation involves mainly mid-wall and sub-epicardium</td>
</tr>
<tr>
<td>Chagasic cardiomyopathy</td>
<td>Very Frequent</td>
<td>May be attempted first line</td>
<td>Epicardial scar area larger than endocardial scar area</td>
</tr>
<tr>
<td>Hypertrophic cardiomyopathy</td>
<td>Probably frequent</td>
<td>May have a role, only small case series</td>
<td>Apical form of hypertrophic cardiomyopathy may more frequently have epicardial substrate</td>
</tr>
<tr>
<td>Brugada syndrome</td>
<td>Probably frequent</td>
<td>Very effective according to one single study</td>
<td>If frequent ventricular ectopics present endocardial ablation of ectopics very successful</td>
</tr>
<tr>
<td>Sarcoidosis</td>
<td>Probably frequent</td>
<td>May have a role, only small case series</td>
<td>Predilection of granulomas to the sub-epicardium</td>
</tr>
<tr>
<td>Ischemic cardiomyopathy</td>
<td>Less frequent</td>
<td>After ineffective endocardial ablation/arrhythmia recurrence</td>
<td>Epicardial ablation may be required more frequently in the presence of an inferior myocardial infarction</td>
</tr>
<tr>
<td>Idiopathic VT</td>
<td>Rare</td>
<td>Mapping and ablation mostly successful from within cardiac venous system in case of epicardial origin</td>
<td>Epicardial left VT origin likely if MDI ≥0.55 and VT origin remote from the sinus of Valsalva</td>
</tr>
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ARVC/D = arrhythmogenic right ventricular cardiomyopathy/dysplasia; VT = ventricular tachycardia.
Contraindications

• Prior pericarditis or cardiac surgery, may cause pericardial adhesions that prohibit epicardial access or constrain catheter maneuverability.

• Pericardial agenesis.

• Coagulation status and the presence of antithrombotic or anticoagulant drugs should be considered before attempting epicardial access; warfarin is stopped 3-5 days, NOAC 24 hrs.
### Recommendations for epicardial access for catheter ablation

<table>
<thead>
<tr>
<th>COR</th>
<th>LOE</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>C-E0</td>
<td>1. In patients undergoing epicardial VT ablation, imaging of the epicardial coronary arteries by coronary arteriography or coronary CT angiogram prior to ablation is recommended to reduce the risk of arterial injury.</td>
</tr>
<tr>
<td>I</td>
<td>C-E0</td>
<td>2. In patients undergoing epicardial VT ablation via a percutaneous approach, provision for immediate echocardiography, blood transfusion, and onsite cardiothoracic surgical backup is recommended.</td>
</tr>
<tr>
<td>I</td>
<td>C-E0</td>
<td>3. In patients with prior cardiac surgery or pericardial adhesions for whom epicardial VT ablation via a percutaneous approach is considered, careful assessment of the risk/benefit ratio and alternative therapies such as surgical dissection are recommended.</td>
</tr>
<tr>
<td>I</td>
<td>C-E0</td>
<td>4. In patients undergoing epicardial VT ablation, pacing with high stimulus intensity from the ablation electrode to rule out diaphragmatic stimulation is recommended to avoid phrenic nerve injury.</td>
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</table>
Patient preparation

• Notify cardiac surgeons.

• Perform Transthoracic echocardiographic.

• Administer conscious sedation to ensure patient’s comfort.

• Lie the patient in supine positioned.
Patient preparation (cont.)

- 12 Leads ECG, 3D mapping reference patch were covered by Ioban™ to avoid noise from humidity due to skin preparation process.
- Use a RV catheter or a RV lead as RV apex marker.
- Arterial blood pressure should be closely monitoring.
How to do epicardial approach?
Epicardial Access Technique

- Subxiphoid approach;
  - 17-18 Gauge, 6” Tuohy needle
  - 7 cm, 18 Gauge needle
  - A thinner 21 Gauge needle
  - A needle in needle technique

Epicardial access

- Similar needle connected with syringe
- J tip, 0.032 wire
- 8.5Fr. SL0 sheath
Subxiphoid approach

• The skin is punctured between the left border of the subxiphoid process and the left rib cage.

• The needle is directed to the left shoulder.

Subxiphoid approach

- A steeper angle (with respect to the chest wall), tends to be more posterior/inferior.
- A shallower angle tends to be more anterior.

Epicardial access  AP Vs. LL view
Contrast injection into the pericardial space.

Wire insertion into the pericardial space should be free and unrestricted.
Position of the Guidewire in LAO view
• 8.5 Fr. SL0 sheath was placed in epicardial space.

• 8.5 Fr. Deflectable sheath was used for better manipulation.

• Antibiotic should be start administration after the sheath was placed.
Summary Tools for subxiphoid access

<table>
<thead>
<tr>
<th>Equipment type</th>
<th>Item</th>
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<tbody>
<tr>
<td>Sheath</td>
<td>- 8.5 Fr. SL0 Sheath&lt;br&gt;- 8.5 Fr. Deflectable sheath <em>(considered)</em></td>
</tr>
<tr>
<td>Needle</td>
<td>- 18 G 7 cm.&lt;br&gt;- 17 G standard Tuohy needle <em>(considered)</em></td>
</tr>
<tr>
<td>Wire</td>
<td>0.032” ,145 cm. J tip</td>
</tr>
<tr>
<td>Drugs</td>
<td>Anesthetic drugs&lt;br&gt;- Fentanyl&lt;br&gt;- Midazolam</td>
</tr>
<tr>
<td></td>
<td>Antibiotics</td>
</tr>
</tbody>
</table>
During Mapping and Ablation

- The bidirectional - irrigated ablation catheter was used.
- The flow of irrigated tip catheter ablation was set:
  - mapping flow rate 2 ml/min.
  - ablation flow rate 17 ml/min.
- Pericardial aspiration should be done as needed.
Take home massage

- Epicardial approach can be useful for many types of Ventricular tachycardia.

- Avoid doing it on anticoagulation.

- Check in LAO or Left lateral view to make sure that your guide wire wraps around the inside of the pericardial sac.

- Arterial blood pressure should be closely monitoring.

- Careful when you ablate.
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