Intracardiac echo Catheter Navigation and use for Transseptal Access

Jacob S. Koruth, MD
Director, Experimental Laboratory
Helmsley Electrophysiology Center,
Mount Sinai Medical Center,
New York, NY

Jacob.koruth@mountsinai.org
Disclosures

• Research Grants: Biosense Webster, Iowa approach, Vytronus, Medlumics, Luxcath, Abbott, Cardionext:
• Biosense Webster, Abbott, ACT - Consultant
• Iowa approach, Medtronic- Advisory board
## Types of Intracardiac Echo (ICE)

<table>
<thead>
<tr>
<th>Device name</th>
<th>Company</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>UltraICE</td>
<td>Boston Scientific</td>
<td>9-Fr nonsteerable rotational motor-driven grayscale-only.</td>
</tr>
<tr>
<td>AcuNav</td>
<td>Siemens, Biosense Webster</td>
<td>Side-looking 64-element phased-array 4-way steerability, 8-Fr and 10-Fr, grayscale, color Doppler, tissue Doppler.</td>
</tr>
<tr>
<td>ViewFlex Xtra</td>
<td>St. Jude Medical</td>
<td>Side-looking 64-element phased-array 4-way steerability, 8-Fr, grayscale, color Doppler.</td>
</tr>
<tr>
<td>EP Med ViewFlex</td>
<td>St. Jude Medical</td>
<td>Run side-looking 64-element catheter on the ViewMate scanner, 10-Fr introducer, 2-way flex color Doppler, grayscale, tissue Doppler 8 to 2 MHz.</td>
</tr>
<tr>
<td>ClearICE</td>
<td>St. Jude Medical</td>
<td>Derived from the hockey stick, 64-element side-looking highly steerable 4-way side-looking array with 2 sets of electrodes for integration of 3D localization with EnSite NavX, runs on the GE Vivid/scanner, grayscale, tissue Doppler, synchronization mapping, 2D speckle tracking.</td>
</tr>
<tr>
<td>Soundstar</td>
<td>Biosense Webster</td>
<td>10-Fr device with integrated ultrasound array with the Carto magnetic sensor in the tip, allows for integration of ICE and 3D map.</td>
</tr>
</tbody>
</table>

Advantages/Disadvantages of ICE

**ADVANTAGES OF ICE**
- High image resolution → safer procedure if TEE contraindicated
- Local anesthesia → no general anesthesia risk/intubation
- Improve workflow → faster turnaround of cases
- Improve logistics → reduces room personnel (anesthesiologists, sonographers, nurses)
- Less TEE-related injuries → safer procedure and better patient experience
- Quicker patient recovery → reduced costs and better patient experience

**DISADVANTAGES OF ICE**
- Additional venous puncture → potential for vascular complications
- Longer learning curve → easier if previous experience with TEE views
- Single-use catheter → potential for reusing minimizes costs
- TEE allows multiplanar and 3D views → newer ICE systems have 3D imaging

**Transseptal**
- Safety
- Targeted puncture for specific atrial access
- Avoiding thickened septa / ASD occluder cases

Paiva, Gonclaves, Catheterization and Cardiavascular interventions 2018
Utility of ICE – beyond the transseptal

- Ruling out left atrial thrombus
- Confirmation of location of catheters- during EAM or during placement of balloon catheters
- Assessment of catheter tissue contact, leak around balloons
- Location of esophagus
- Lesion formation, steam pop, endocardial/sheath thrombus
- Cartosound platform
- Fluroless ablation protocols
Do we really need imaging for defining the LA?
Step-by-Step Workflow for the atrium

- Home view
- Anteriorly flex (TV in view)
- Advance gently into the RV
- Release deflection - view inferior RV

Step-by-Step Workflow for the atrium

- After documenting LV function and effusion
- Release flexion and return to home view
- Clock the catheter to view the interatrial septum and the LA
- Assess the quality of septum and determine site of puncture
  
  Very useful if thick (prior access), post surgical, ASD occlusion, floppy septum
Step-by-Step Workflow for the atrium

R/o Thrombus LAA

Clock- short axis view: LAA and LSPV

Advance into RVOT- long axis

RVOT& PV

At this point counter clock to view the PA horizontally prior to advancing the ICE probe (atraumatic entry into PA)
ICE Guided Transseptal Technique

Visualization of SVC - Wire

Visualization of wire - anterior/septal

Lerman BB, Cheung J et al HRJ 2017
ICE Guided Transseptal Technique

Visualization of Sheath over Wire

Sheath advancement into SVC

Sheath pullback into fossa ovalis for second transseptal

LIPV

SVC

Cheung J et al HRJ 2017
ICE Guided Transseptal Technique

Puncture

Wire in left veins
Identifying Pulmonary Veins

- LSPV
- LIPV
- RIPV
- RSPV
- Carina
ICE assisted views of LAA
ICE Assisted Views of LAA

LSPV

LAA

Left Atrial Appendage

Courtesy: V Reddy
ICE Guided: Cavotricuspid Ablation
ICE demonstration of progressive edema in a swine model
Other applications of ICE in the atria

• 1) Assessment of one shot techniques for PVI
• 2) Assessment of large foot print catheters
ICE guidance for one shot approach

Multi-Electrode Balloon Ablation Catheter
Directionally-Titratable RF Energy
Novel RF tips

Expandable irrigated tip catheter with surface thermocouples: 9mm irrigated-tip that also contains thermocouples: Temperature-controlled mode

Uniform RF delivery over the entire electrode-tip, providing a much larger effective surface area (250 - 275 mm²)

Wider lesions compared to traditional RF tips (that are typically 3.5-4mm in length)
Thank you