Innovations in Heart Rhythm Management

Manish Mehta, MD
Medical Director,
Cardiac Electrophysiology
Legacy Medical Group

Disclosures
None
Topics to cover

• Atrial fibrillation and new monitoring/treatment options
• Ablation mapping technology
• Left atrial appendage occlusion devices
• Current monitoring devices
• The world’s smallest pacemaker

At a galaxy far far away...
Luke Skywalker

65 yo male with h/o paroxysmal atrial fibrillation, rates of 100-120 bpm was referred for evaluation. He has been on Metoprolol, Flecainide and Eliquis. All at modest doses.

PMHx- HTN, DM, Injuries from light saber

Medications - Metoprolol, Flecainide, Eliquis, Metformin

What would you do next?

A) Increase the dose of Flecainide from 50 mg BID to 100 mg BID or higher
B) Change anti-arrhythmic medication
C) Consider AF ablation
D) Recommend watching re-runs of Seinfeld
Atrial Fibrillation
Health Risks and Costs

• Negative impact on quality of life\(^1,2\)
• Leading cause of stroke: 5x increased risk\(^3\)
• Increases risk of heart failure: 3x increased risk\(^4\)
• Increases US healthcare system costs: $12 billion estimated cost to treat AF\(^5\)

Atrial Fibrillation: Fibrillation of the Muscles of the Atria of the Heart

Normal sinus rhythm

Abnormal electrical pathways

Medication to control the heart rate or rhythm

Restoration of normal heart rhythm through an electrical cardioversion or medications

Radiofrequency or Cryoablation to help keep the heart in a normal rhythm

Surgery to create lines of scar tissue to block abnormal electrical circuits causing AF

Pacemakers may be used in conjunction with medication or catheter ablation

AF Treatment Options
Minimally Invasive

TRANSVENOUS CATHETER ABLATION

Radiofrequency energy and Cryoballoon ablation are two standard ablation systems used today.

Freezing tissue with a 23 or 28mm balloon

Burning tissue with point-by-point radiofrequency

Atrial fibrillation ablation with cryoballoon

Fluoroscopy Images of Cryoballoon Ablation

A) LSPV in LAO view

B) LIPV in LAO view

C) RSPV in LAO view

D) RIPV in LAO view
FIRE AND ICE Trial
Predefined Secondary Analyses
Significant Improvements Favoring Cryoballoon

Relative to radiofrequency, Cryoballoon demonstrated:

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<thead>
<tr>
<th></th>
<th>Cryo</th>
<th>RFC</th>
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<tbody>
<tr>
<td>Fewer Cardiovascular</td>
<td>139 events</td>
<td>203 events</td>
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<tr>
<td>Hospitalizations</td>
<td>89 subjects</td>
<td>135 subjects</td>
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<tr>
<td>(23.8%)</td>
<td>(35.9%)</td>
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<tr>
<td>Fewer Repeat Ablations</td>
<td>49 events</td>
<td>70 events</td>
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<td>(11.8%)</td>
<td>(17.6%)</td>
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European Heart Journal
The authors stated, "The extent of reduction in reinterventions and rehospitalizations is not only statistically significant but also clinically relevant. Our presented data are the main events that define the patients' perception regarding the procedural success of an AF ablation procedure."

Mapping systems

Left atrial appendage occlusion
Patient with unknown age, presented with palpitations for the last century. Given his unpredictable lifestyle, it has been a challenge to decide on a monitoring device. We discussed various options....
Diagnostic Strategies

Advances in Monitoring and Detection of Arrhythmias

• Mobile applications and monitors are revolutionizing the way we interact with patients who have or are at risk for arrhythmias
• These include wireless patch monitors, smartwatches, apps and implantable loop recorders
Implantable loop recorder

CRYSTAL AF: monitoring with ICM superior to SOC

Master Yoda

We were able to detect paroxysmal atrial fibrillation and intermittent bradycardia with heart rates in the 20-30s.

It was time to decide on a pacemaker. He did not have much time as he was getting ready for the final Jedi fight between him and Darth Vader. Whatever needed to be done had to be done before that.
Leadless pacemaker

MICRA™ AV TRANSCATHETER PACING SYSTEM

The world’s smallest pacemaker, now with AV synchrony

- Micra AV’s accelerometer detects mechanical atrial activity and uses this information to deliver AV synchronous ventricular pacing.
- New, integrated circuitry capable of sustaining new AV synchrony functionality.
- Estimated average battery longevity of 8-13 years, dependent on the patient’s degree of AV block.
Micra™ AV and Micra™ VR Transcatheter Pacing Systems

**PROCEDURE**

Delivery catheter provides visual feedback when adequate tip pressure has been achieved, and retracts during deployment.¹

Linear, one-step deployment facilitates consistent capsule placement; no torque required.¹²

**MULTIPLE MICRA™ DEVICES CAN BE IMPLANTED IN THE RV**
Advantages

• There are no Endovascular leads
• Low Risk of Infection and more easily treated
• Lower risk of dislodgement
• No limitations regarding cell phones or movement of the upper extremities
• The WEAKEST link, the leads have been removed from the system

Disadvantages

• Difficult to extract
• Battery life estimated to be 10-13 yrs.
• Planning needed for younger patients.
Yoda Wins !!

Thank you and may the Force be with you...
Please feel free to contact me for any questions at mmehta@lhs.org