Atrial Fibrillation: New Options in Ablation Therapy

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Disclosures

☐ None
Physiology of Atrial Fibrillation

- 2-10 waves
- Spiraling
- Chaos

Left Atrium
Triggers of Atrial Fibrillation

- Atrial premature contractions
- Pulmonary vein muscle sleeves
- IVC/SVC/Appendage
Maintenance of Atrial Fibrillation

Electrical remodeling (AF begets AF)

Maintenance of Atrial Fibrillation

Anatomic changes (fibrosis)

Before AF

6 weeks of AF

Classification of AF

First Detected

Paroxysmal
Self-terminating in <7 d

Persistent
Lasts >7d or requires CV

Permanent
CV failed or no rhythm control attempt

Progression of Atrial Fibrillation

- Early Stage
- Middle
- Late Stage

Focal Triggers
Substrate

Adapted, Gerhard Hindricks, HRS Scientific sessions, 2011
Ablation Strategy

Triggers

Substrate

2012 HRS/EHRA/ECAS Consensus Statement on AF Ablation
Isolating Triggers of AF

- Paroxysmal AF
- Pulmonary Veins
- Well established
- Effective
- First line therapy

2012 HRS/EHRA/ECAS Consensus Statement on AF Ablation
Modifying Substrate

- Persistent AF
- Entire left atrium
- Efficacy variable
- No consensus
- Not first line
Classification of AF

First Detected

Paroxysmal
Self-terminating in <7 d

Persistent
Lasts >7d or requires CV

Permanent
CV failed or no rhythm control attempt

Pulmonary Vein Isolation
Summary of randomized control trials comparing catheter ablation versus antiarrhythmic therapy.

Ablation Versus Antiarrhythmic Therapy: Randomized Trials

<table>
<thead>
<tr>
<th>Study</th>
<th>Ablation</th>
<th>AAD</th>
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</thead>
<tbody>
<tr>
<td>Krittayaphong et al. (2003)</td>
<td>90</td>
<td>50</td>
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<td>Wazni et al. (2005)</td>
<td>80</td>
<td>40</td>
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<td>APAF Pappone et al. (2006)</td>
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<td>Oral et al. (2006)</td>
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<td>Stabile et al. (2006)</td>
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<td>A4 Jais et al. (2008)</td>
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<tr>
<td>Forleo et al. (2009)</td>
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<td>70</td>
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<tr>
<td>Wilber et al. (2010)</td>
<td>80</td>
<td>60</td>
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</tbody>
</table>
Ablation Complications

- Worldwide survey
- 521 centers
- 2003-2006
- 16,000 pts, 20,000 procedures

Table 7. Major Complications in the Overall Population

<table>
<thead>
<tr>
<th>Type of Complication</th>
<th>No. of Patients</th>
<th>Rate, %</th>
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</thead>
<tbody>
<tr>
<td>Death</td>
<td>25</td>
<td>0.15</td>
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<tr>
<td>Tamponade</td>
<td>213</td>
<td>1.31</td>
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<tr>
<td>Pneumothorax</td>
<td>15</td>
<td>0.09</td>
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<tr>
<td>Hemothorax</td>
<td>4</td>
<td>0.02</td>
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<tr>
<td>Sepsis, abscesses, or endocarditis</td>
<td>2</td>
<td>0.01</td>
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<tr>
<td>Permanent diaphragmatic paralysis</td>
<td>28</td>
<td>0.17</td>
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<tr>
<td>Total femoral pseudoaneurysm</td>
<td>152</td>
<td>0.93</td>
</tr>
<tr>
<td>Total artero-venous fistulae</td>
<td>88</td>
<td>0.54</td>
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<tr>
<td>Valve damage/requiring surgery</td>
<td>11/7</td>
<td>0.07</td>
</tr>
<tr>
<td>Atrium-esophageal fistulae</td>
<td>6</td>
<td>0.04</td>
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<tr>
<td>Stroke</td>
<td>37</td>
<td>0.23</td>
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<tr>
<td>Transient ischemic attack</td>
<td>115</td>
<td>0.71</td>
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<tr>
<td>PV stenoses requiring intervention</td>
<td>48</td>
<td>0.29</td>
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<tr>
<td>Total</td>
<td>741</td>
<td>4.54</td>
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</tbody>
</table>

Cappato et al. Circ AE 2010;32-38
Persistent AF Ablation

Substrate Modification
The original cut-and-sew Cox-Maze procedure III.
Common Ablation Lesion Sets for Persistent AF.
Linear Lesions

- Segment atrium so that reentry no longer possible
- Roof, mitral isthmus, posterior LA
- Modest efficacy
- Pro-arrhythmia

North Shore LIJ
Focal triggers of reentry (rotors)

Hugh Calkins et al. Europace 2007;9:335-379

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Convergent Endo & Epicardial Ablation
Conclusions

- Paroxysmal AF Ablation – first line therapy
- Persistent AF Ablation – remains a challenge
  - Science & technology progressing rapidly
  - Soon will likely be first line therapy
- When considering AF ablation
  - AF pattern (paroxysmal) is best predictor of success
Thank You