Atrial Fibrillation

The map quest

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Disclosure: None
Prevalence in USA

6 million 2014 → 16 millions 2050
Introduction

Heart = Pump

60 bpm regularly

“Sinus rhythm”
Sinus rhythm

(60 bpm)

Sinus (SA) node

Atrioventricular (AV) node

Normal electrical pathways

(60 bpm)
Atrial fibrillation = Problems

- > 500 bpm
- Rapid, irregular HR
- No atrial pump
- Ventricular failure

Symptoms
- Stroke X 5
- Mortality X 2

Abnormal electrical pathways

100-250 bpm, irregularly
Management of atrial fibrillation

- Live longer
  
  **Anticoagulation**

- Live better
  
  1.) Medical therapy: not very effective
  
  2.) Ablation: more effective
Medical therapy: rhythm control

Amiodarone vs Propafenone & Sotalol

40-70%

Roy et al. NEJM 2000;342:913-
Thermocool AF study

Any Atrial Arrhythmia

Freedom From Any Atrial Arrhythmia

63% vs 17%
p<0.001

Follow-up, mo

HR, 0.29; 95% CI, 0.18-0.45; Log-rank P <.001

Wilber JAMA Jan 27, 2010
Ablation: The map quest

Transmurality
Left atrium (PA view)
Triggers and substrate

A. Ganglion
B. CFAE
C. Triggers
D. Rotor
Atrial fibrillation ablation

Paroxysmal (≤ 7 d)       Persistent       Long lasting persistent (≥ 1 yr)

Pulmonary vein isolation
Antrum

More substrate ablations
Paroxysmal Atrial fibrillation ablation
1. Manual catheter ablation
“Accurate geometry”  3D mapping system

Good lesions in PV antrum
Pulmonary vein isolation (PVI) 7-90%
Figure 4. Complete and incomplete circumferential lesions formed during radiofrequency ablation of the LA can be assessed and visually examined using DE-MRI.
**TOCCATA study Conclusions**

Significant better clinical outcome after 12 months with average Contact Force > 10 g (target 20 g) with average Force Time Integral > 500 g·s

**EFFICAS I study Conclusions**

Contact Force guidelines

- Minimum Contact Force (minimal 10 gr; target 20 gr.)
- Minimum Force Time Integral (minimal FTI 400 g·s) ≤ 35 watts power in LA

74% of all patients were free from AF/AFL/AT recurrences at the end of 12-month follow-up.

When Contact Force is within the defined range most of the time (≥85% of the time), procedure success rate was >88%.

- Safety outcomes met pre-determined performance goal
- Primary adverse events were not correlated to the amount of contact force applied
Contact Force guidelines from TOCCATA, EFFICAS:

- **TARGET** 20 g with range [10 g, 30 g]
- Min > 10 g for any ablation point
- Min > 400 gs for any ablation point
- **ONE SHOT** ➔ Transmurality should be achieved in one shot

20-30 W
20 g x 20 s
95% of PV’s isolated using pace guidance alone

7% of PV’s isolated after anatomical ring of ablation lesions

Steven, Reddy...Michaud HR 2010
2. Remote navigation catheter ablation

Stereotaxis system

Contact force: 5-20 g

> 20 g, high power 50W
3. Cryo-balloon ablation

1. Wire Targeted Vein
2. Inflate and Position
3. Occlude and Ablate

Greater uniformity in cooling with 8 jets
Cryo-balloon atrial fibrillation ablation
Paroxysmal / earlier persistent A fib

Limitations:

1. Persistent / long lasting persistent A fib
2. Redo
3. Atypical atrial flutter
✓ Persistent
✓ Long lasting persistent

Atrial fibrillation ablation
Persistent / Long lasting persistent

Lines
CFAE
Rotor / triggers
Maze atrial segmentation impeding deployment of reentrant waves ( >4 cm Ø )
Rotors

A. FIRM Site (LA Posterolateral Rotor) Near Conventional Ablation

- Left Atrium
- Right Atrium

- FIRM Site

- Conventional Lesions

- Early
- Late
<table>
<thead>
<tr>
<th>Section</th>
<th>View</th>
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</thead>
<tbody>
<tr>
<td>Right Atrium</td>
<td>Right Anterior Oblique</td>
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<tr>
<td>Left Atrium</td>
<td>Left Anterior Oblique</td>
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Persistent / long lasting persistent A fib ablation

- Need more extensive ablation
- 20-30% less successful rate
- 2-4 ablations
- More to learn

Refer patients for ablation earlier
<table>
<thead>
<tr>
<th>Complications 4-8% (2%)</th>
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<tbody>
<tr>
<td>Mortality: &lt; 0.2%</td>
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<td>Stroke: &lt; 0.5%</td>
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<td>Phrenic nerve palsy</td>
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<td>PE / Tamponade: 1-4%</td>
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<td>Others</td>
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Take home Points

✓ Anticoagulation: reduce mortality (stroke)
✓ Ablation: (symptom) More, more effective
✓ Window (paroxysmal and earlier persistent)
✓ Needs 1-3 procedures (long term, 5-10 yrs)
Future

Failure is the mother of success.