“Atrial Fibrillation Catheter Ablation with New Technology: Improving Quality of Life and Outcomes in Various Disease States”

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## Presenter Disclosure Information

Within the past 12 months,

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<tr>
<th><strong>Company Name</strong></th>
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<tr>
<td>Biosense Webster</td>
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Atrial Fibrillation

Classification and Ablation Outcome

✓ Classify the patient based on the most frequent AF clinical pattern

- **Paroxysmal**
  - Duration: < 7 days
  - Cardioversion: spontaneous termination

- **Persistent**
  - Duration: > 7 days
  - Cardioversion: pharmacological or electrical

- **Longstanding Persistent/Permanent**
  - More than 1 year
  - Cardioversion – failed to restore sinus rhythm
How does Afib start?

*Triggers from the pulmonary Veins!!*
Paroxysmal AF- Pulmonary Vein Isolation Multicenter Randomized Prospective Study Failed Initial Drug Therapy (159pts)

**All Recurrent AT/AF**

**Safety**

- **Ablation Group (6.8%, n=103)**
  - 1 pericarditis
  - 1 pulmonary edema
  - 1 pericardial effusion (no tx needed)
  - 5 vascular complications
  - No Stroke/Embolism, Tamponade, Atrio-Esophageal fistula, PV stenosis, or Phrenic nerve paralysis

- **AAD group (17.9%, n=56)**
  - 3 life-threatening ventricular arrhythmias
  - 7 disabling symptoms requiring drug withdrawal

P<0.001

Wilber D et al, *JAMA*, 2010
FIRST LINE TREATMENT of PAF (RAAFT 2 TRIAL)

- No deaths, No strokes
- 43% of patients with recurrent AF with meds had AF ablation at 1 yr

Morillo C et al JAMA 2014;311(7):692-699
Class I
1) Catheter ablation is useful in patients with symptomatic, paroxysmal AF who are refractory or intolerant to at least 1 Class 1 or 3 antiarrhythmic agent when a rhythm control strategy is desired (Level of Evidence: A)

2. Prior to consideration of AF ablation, assessment of procedural risks and outcomes relevant to the individual patient is recommended. (Level of Evidence C)

Class IIA
In patients with recurrent symptomatic paroxysmal AF, catheter ablation is a reasonable initial rhythm-control strategy before therapeutic trials of antiarrhythmic drug therapy, after weighing the risks and outcomes of drug and ablation therapy. (Level of Evidence: B)

J Am Coll Cardiol. 2014; 63(22):2489-2489
Clinical Efficacy for **Longstanding Persistent AF (>1yr)**

**Antral PV Isolation + Trigger RF Ablation**

N=130 pts followed for >1 year

- **Long term control in ~ 50% without AADs**
- **~22% with AADs**
- **Repeat ablation required in 28%**

Persistent AF/Recurrent Paroxysmal Catheter Ablation - Target Substrate?

Ganglionated Plexi

PVI plus non PVI triggers

Which Technique?
- ? Make lines/Isolate Post LA
- ? Target fractionated Egs
- ? Isolate the SVC, CS, LAA
- ? Ganglionated Plexi ablation
- ? Target rotors

Which Patients?
Catheter Ablation for **Persistent AF**—New Guidelines (2014)

**Class IIa**

1) AF catheter ablation **is reasonable** for some patients with symptomatic persistent AF refractory or intolerant to at least 1 class I or III antiarrhythmic medication (Level of Evidence: A)

**Class IIb**

1) AF catheter ablation **may be considered** for symptomatic long-standing (>12 months) persistent AF refractory or intolerant to at least 1 class I or III antiarrhythmic medication when a rhythm-control strategy is desired (154,167). (Level of Evidence: B)

2. AF catheter ablation **may be considered before** initiation of antiarrhythmic drug therapy with a class I or III antiarrhythmic medication for symptomatic persistent AF when a rhythm-control strategy is desired. (Level of Evidence: C)

*J Am Coll Cardiol.* 2014; 63(22):2489-2489
Role of Experience on Ablation Outcome

National Inpatient Sample: 93,801 AF patients treated with catheter ablation 2000-2010; 20% hospitals sampled

- In hospital complications assessed by ICD 9 codes
- Acute complications, inversely related to operator/program volume
- 81% of AF ablations done by low volume operators who perform < 25 /yr

Paroxysmal or Persistent AF

Why does ablation fail?

Technology to Make PV Isolation More Permanent
- JET Ventilation/sheaths for stability
- Contact Force Sensing

Reconnected PV
Jet Ventilation and Sheaths to Improve Stability and Improve PVI Outcome

Fewer Recurrences

Fewer Reconnections

P <0.006

Hutchinson MD Heart Rhythm 2013;10:347–353
Impact of Maintaining Good Catheter Tip Contact with Force-Sensing Catheter

Natale A et al J Am Coll Cardiol 2014;64:647–56)
AF Catheter Ablation Outcome

- **LA Fibrosis** *(MRI preprocedure)*
- MR (Functional?)
- LV dysfunction and AF?
- Elderly
- Late recurrences
Atrial Fibrillation

**Classification**

- **Paroxysmal**
  - Duration: < 7 days
  - Cardioversion: spontaneous

- **Persistent**
  - Duration: > 7 days
  - Cardioversion: pharmacological or electrical

- **Longstanding Persistent/Permanent**
  - More than 1 year
  - CV failed—usually accepted to not restore sinus rhythm

✓ Classify the patient based on the most frequent clinical pattern

Influence of LA tissue Fibrosis on MR Imaging Pre Ablation on Post Ablation Outcome

Arrhythmia recurrence per 1% increase in LA fibrosis = 1.06(1.03 -1.08) <.001

Marrouche N et al DECAAF Study JAMA 2014; 311: 498 -506
LA tissue Fibrosis on MR Imaging Pre Ablation

“Patient with Long – Standing Persistent AF”

Stage 1/2

- Antral PV Isolation plus non-PV trigger ablation

Stage 3/4

- Direct Ablation Procedure
  - Antral PV Isolation plus non-PV trigger ablation + Substrate Ablation
Catheter Ablation Outcome

- LA Fibrosis
- MR and AF → Reversible Disease States?
- LV dysfunction

54 y/o with increase in LA and severity of MR associated with onset of long-lived but mostly self terminating AF over the last two years?
**Functional Mitral Regurgitation Due to AF: Reversal with AF Ablation**

(Retrospective Cohort Study – 53 pts in each group)

Only 24% remained mod/severe

Post successful ablation
No/minimal MR ass with
A size
Annular

54 y/o with increase in LA and severity of MR associated with AF over the last two years? – **Effort to control AF may reverse the MR**

Observational Study – AF and Low LV EF (48 pts)

Atrial Fibrillation Ablation
Effect on LV Ejection Fraction

LVEF1
Ablation – Time 0

Frequent paroxysmal AF (34pts) or apparent rate control
with persistent (14pts) AF

LVEF2
Post Ablation

Improvement in All
Normalization in 94%

57%
(P < 0.001)

41%

The CAMTAF Trial (Heart Failure and AF)

Randomized Control Trial – Catheter Ablation (26) versus Medical (24) Tx

- **EF**: 40±12% vs. 31±13%
- **Peak VO2**: Medical treatment - 30±12 mL/kg/min, Catheter ablation - 35±12 mL/kg/min
- **BNP**: Medical treatment - 500±200 pg/mL, Catheter ablation - 400±200 pg/mL
- **NYHA**: Medical treatment - 2.5±0.5, Catheter ablation - 2.2±0.5

Catheter Ablation Outcome

- LA Fibrosis
- Functional MR
- LV dysfunction
- Elderly
  - 82y/o symptomatic paroxysmal atrial fibrillation intolerant to beta blockers, flecainide, propafenone, sotalol?
Major complications – Risk related to age

N=2039 procedures

- TIA/Stroke 1.7%
- Effusion/Tamponade 2.3%
- Severe PV stenosis 4.2%
- Esophageal fistula
- Phrenic nerve injury
- Retroperitoneal bleeding 4.2%
- Anaphylaxis

Major - 1.7%  P=0.031

# of Procedures

- <45 N=293
- 45-54 N=577
- 55-64 N=767
- 65-74 N=354
- >75 N=48

From Leong-Sit et al Circ Arrhythm Electrophysiol 2010 Oct 1;3(5):452-457
Complication Rate Based on Age

93,801 AF patients treated with catheter ablation 2000-2010
Effect of Age on Long-Term (>12 mo) AF Ablation Outcome (N=1165 pts)

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<thead>
<tr>
<th>Age (Years)</th>
<th>% AF Control</th>
<th>Repeat Procedures</th>
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<tr>
<td>&lt;65</td>
<td>89%</td>
<td>26%</td>
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<tr>
<td>65-74</td>
<td>84%</td>
<td>27%</td>
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<tr>
<td>≥75</td>
<td>86%</td>
<td>9%</td>
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- Elderly > 75 years – similar outcome with double risk

Catheter Ablation Outcome

- LA Fibrosis
- Functional MR ➔ Reversible Disease States?
- LV dysfunction
- Elderly
- Late recurrences
  - 56 y/o male with symptomatic Persistent AF – 1-2 episodes per month for 2 years undergoes AF ablation and then experiences one AF episode 18mos later – CV – Wants to know prognosis?
Late Recurrence Rate of ~ 7% Per Year After Ablation of AF


“Not all Doom and Gloom”
430 consecutive patients with AF after ablation blanking period
(First ablation 2004 - 2008)

At least 18 mos (mean 41 ± 19 mos) of additional follow-up

Time of 1st Recurrence

- Early: 245 pts
- Late: 118 pts
- Very Late: 76 pts

From Gaztañaga L et al Heart Rhythm 2013 Jan;10(1):2-9
Rare* AF during Long Term Follow-up
Mean 41 ± 19 months

**P < 0.001

N = 245 pts

N = 118 pts

N = 76 pts

* Rare - ≤2 AF episodes and ≤ 1 cardioversion/6mos

Gaztañaga L et al Heart Rhythm 2013 Jan;10(1):2-9
Frequent AF (≥3 AF episodes or > 1 CV per 6 mos) After Initial Recurrence

56 y/o male with symptomatic Persistent AF – 1-2 episode per month for 2 yrs – undergoes ablation and then 1 AF episode 18mos later – Undergoes CV

Wants to know prognosis?

Gaztañaga L et al Heart Rhythm 2013 Jan;10(1):2-9
AF ablation has become an integral part of AF management in patients with paroxysmal and persistent AF.

Efforts to improve catheter stability and contact further improve outcome.

LA Fibrosis (MRI preprocedure) has predictive value that may influence patient selection and type of ablation procedure.

Moderate/severe MR with LA dilatation or LV dysfunction + AF may be functional/ reversed with successful AF ablation.

Elderly (>75yrs) - higher ablation complication rate – consider hybrid therapy (drug/one ablation) to limit risk.

Late recurrence (>1yr) after ablation - more benign prognosis.