Clinical Practice Guidelines and the Under Treatment of Concomitant AF

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Morgantown, WV
Disclosures

No Relevant Financial Disclosures

Writing committee:
  2017 AATS Expert Consensus Guidelines
  2017 STS Clinical Practice Guidelines
  2017 HRS Expert Consensus Statement
Objectives

• What are the merits of concomitant surgical ablation?

• What are we currently doing?

• What should we be doing?
**AF Definitions**

**Paroxysmal**
AF that terminates spontaneously or with intervention within 7 d

**Persistent**
Continuous AF sustained beyond 7d

**Early Persistent**
AF that is sustained beyond 7 days but is less than 3 months in duration.

**LS Persistent**
Continuous AF sustained > 12m

**Permanent**
Joint decision, no effort to maintain SR as a therapeutic attitude and *should no longer be used*

*Heart Rhythm. 2017;S1547*
65 yo P2 flail, severe MR, 2 V CAD, LA size 4.6, early persistent AF

A) MV repair, CABG only, DCCV
B) MV repair, CABG, LAA clip
C) MV repair, CABG, epicardial pulmonary vein isolation
D) MV repair, CABG, Cox-Maze IV
The Cox-Maze Procedure

- Left Appendage
- Right Appendage
- Superior Vena Cava
- Tricuspid Annulus
- Mitral Annulus
- Right Coronary Artery
- Circumflex Coronary Artery
- Coronary Sinus
- Inferior Vena Cava

Incision
RF or Cryoablation
Cryoablation
Surgical Ablation for AF at the time of Concomitant Surgery

Why bother?
Why Perform Surgical Ablation?
One-year mortality and costs associated with surgical ablation for atrial fibrillation concomitant to coronary artery bypass grafting†
Beyond 90-days, survival was better with SA, and improved survival persisted after risk adjustment (HR=0.58, p=0.03).

A trend existed for reduced late health care costs (p=0.05).
Surgical Ablation and Isolated CABG

Percentage Free

Years Post Surgery

Freedom from ATA
Freedom from ATA off AAD
Freedom from AC

1  2  3  4  5
57  40  32  25  21

Mortality is Reduced when Surgical Ablation for Atrial Fibrillation is Performed Concomitantly with Mitral Operations

J. Scott Rankin, Maria Grau-Sepulveda, Niv Ad, Ralph J. Damiano, A. Marc Gillinov, Patrick M. McCarthy, Vinod H. Thourani, Jeffrey P. Jacobs, David M. Shahian and Vinay Badhwar
Mortality is Reduced when Surgical Ablation for Atrial Fibrillation is Performed Concomitantly with Mitral Operations

STS Adult Cardiac Surgery Database
July 1, 2011 – June 30, 2014
89,668 Patients isolated MVRR

**Included:** Patients with associated CABG, ASD closure, and tricuspid valve repair (TVr).

**Excluded:** Previous MitraClip procedures, missing gender or age information, and/or right atrial SA only

**88,765 Patients**
Mortality is Reduced when Surgical Ablation for Atrial Fibrillation is Performed Concomitantly with Mitral Operations

- Unadjusted Operative Mortality and Major Morbidity
- Multivariable Logistic Regression – Risk Adjusted Odds Ratios (OR) for Mortality and Morbidity.
## Results

### Baseline Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control No-AF/No-SA n=53,519</th>
<th>AF No-SA n=10,780</th>
<th>AF+SA n=16,352</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>63</td>
<td>71</td>
<td>70</td>
</tr>
<tr>
<td>Elective Presentation (%)</td>
<td>67</td>
<td>58</td>
<td>72</td>
</tr>
<tr>
<td>NYHA Class III/IV (%)</td>
<td>66</td>
<td>75</td>
<td>68</td>
</tr>
<tr>
<td>Median EF (%)</td>
<td>57</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Cardiac Reoperation (%)</td>
<td>14</td>
<td>30</td>
<td>9</td>
</tr>
<tr>
<td>Persistent AF (%)</td>
<td>-</td>
<td>53</td>
<td>58</td>
</tr>
<tr>
<td>Mitral Repair (%)</td>
<td>62</td>
<td>42</td>
<td>60</td>
</tr>
<tr>
<td>Mitral Replacement (%)</td>
<td>38</td>
<td>58</td>
<td>40</td>
</tr>
<tr>
<td>Concomitant CABG (%)</td>
<td>32</td>
<td>28</td>
<td>25</td>
</tr>
<tr>
<td>Tricuspid Valve Repair (%)</td>
<td>9</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>Cross Clamp Time (min)</td>
<td>93</td>
<td>94</td>
<td>104</td>
</tr>
</tbody>
</table>
## Results

**Risk-Adjusted Outcome**

<table>
<thead>
<tr>
<th>In-Hospital Outcomes</th>
<th>Variable</th>
<th>Adjusted OR [95% CI]</th>
<th>p-value</th>
<th>Global Wald X² p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operative Mortality</strong></td>
<td>AF No-SA vs. Control</td>
<td>1.15 [1.04-1.27]</td>
<td>0.0058</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AF+SA vs. Control</td>
<td>1.08 [0.96-1.21]</td>
<td>0.1868</td>
<td>0.0175</td>
</tr>
<tr>
<td></td>
<td>AF+SA vs. AF No-SA</td>
<td>0.94 [0.82-1.07]</td>
<td>0.3441</td>
<td></td>
</tr>
<tr>
<td><strong>Composite Major Morbidity</strong></td>
<td>AF No-SA vs. Control</td>
<td>1.13 [1.07-1.19]</td>
<td>&lt;.0001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AF+SA vs. Control</td>
<td>1.08 [1.02-1.15]</td>
<td>0.0078</td>
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<td>AF+SA vs. AF No-SA</td>
<td>0.96 [0.90-1.03]</td>
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Mortality is Reduced when Surgical Ablation for Atrial Fibrillation is Performed Concomitantly with Mitral Operations

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1. AF at the time of MVRR independently increases Operative Mortality and Morbidity.

2. Addition of SA reduces Relative Risk of Mortality to a level equivalent to control patients without AF.

3. Early Mortality Benefit of Contemporary SA.
What are we doing?
US Rates of Surgical Ablation

Number of Patients

- Mitral Valve
  - Untreated: 52%
  - Treated: 8%
  - Total: 68

- Aortic Valve
  - Untreated: 28%
  - Treated: 28%
  - Total: 33

- Isolated CABG
  - Untreated: 24%
  - Treated: 76%
  - Total: 30

- Total (Mitral + Aortic + Isolated CABG)
  - Untreated: 33%
  - Treated: 67%
  - Total: 37

Source: STS Database 2016
Surgical Ablation of Atrial Fibrillation in the United States: Trends and Propensity Matched Outcomes

Vinay Badhwar, MD, J. Scott Rankin, MD, Niv Ad, MD, Maria Grau-Sepulveda, MD, MPH, Ralph J. Damiano, MD, A. Marc Gillinov, MD, Patrick M. McCarthy, MD, Vinod H. Thourani, MD, Rakesh M. Suri, MD, DPhil, Jeffrey P. Jacobs, MD, and James L. Cox, MD

Department of Cardiovascular and Thoracic Surgery, West Virginia University, Morgantown, West Virginia; Duke Clinical Research Institute, Durham, North Carolina; Division of Cardiothoracic Surgery, Washington University, St. Louis, Missouri; Department of Thoracic and Cardiovascular Surgery, Cleveland Clinic, Cleveland, Ohio; Division of Cardiac Surgery, Northwestern University Feinberg School of Medicine, Chicago, Illinois; Division of Cardiothoracic Surgery, Emory University, Atlanta, Georgia; and Division of Cardiac Surgery, Johns Hopkins University School of Medicine, Baltimore, Maryland
Surgical Ablation of Atrial Fibrillation in the United States: Trends and Propensity Matched Outcomes

![Graph showing surgical ablation trends by operative procedure](image)
Represents a 50% increase over time (p<0.0001)

Ann Thorac Surg 2017;104:493–500
Comparative Outcomes of Concomitant SA

- All 84,105 concomitant SA operations
- Comprehensive propensity matching following multivariate regression. Continuous variables were evaluated using restricted cubic spline plots to assess linearity
- AF type (paroxysmal vs. persistent), operative type and major STS risk covariates in propensity model
- 1:1 Greedy 5-1 matching algorithm, SD < 1%
- 28,739 propensity matched pairs of concomitant SA vs. No SA for AF
Relative Risk of Concomitant Surgical Ablation in Propensity Matched Patients with Atrial Fibrillation

<table>
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<tr>
<th>Outcome</th>
<th>Overall (N=57,478)</th>
<th>No Ablation (N=28,739)</th>
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<td>0.92 (0.85-1.00)</td>
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<td>Reoperation for Bleeding</td>
<td>3.61%</td>
<td>3.73%</td>
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<td>0.93 (0.86-1.02)</td>
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<td>Permanent Stroke</td>
<td>1.96%</td>
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<td>0.84 (0.74-0.94)</td>
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<td>0.38%</td>
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<td>0.80 (0.61-1.05)</td>
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<td>Prolonged Ventilation</td>
<td>16.31%</td>
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<td>Readmission 30-days</td>
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Surgical Ablation of Atrial Fibrillation in the United States: Trends and Propensity Matched Outcomes

- Surgical ablation utilization is increasing across all operative categories, with largest increases observed in concomitant mitral operations.
- Surgical ablation decreases risk of mortality by 8% and stroke by 16%.
- LAA obliteration was performed greater than 80% with all concomitant operations, but only 64% in stand-alone. This represents an opportunity for improvement.
What do the Guidelines say we should be doing?
Clinical Practice Guidelines

2014 ACC AHA HRS Guideline  
COR IIa, LOE C

- Grouped all cardiac operations as a whole
- Utilized early surgical ablation data acquired from cases performed between 1998-2005
- Classified recommendations by AF symptoms and presence of antiarrhythmic therapy
- Essentially a catheter based ablation guideline
Clinical Practice Guidelines

2017 STS Clinical Practice Guidelines for the Surgical Treatment of Atrial Fibrillation

• Distinct from 2014 HRS and 2016 ESC guidelines:
  • Recommendations by specific operative procedures: Mitral Valve, Aortic Valve, CABG
  • Weight and relevance of AF symptoms at the time of planned symptomatic cardiac operation
• Evidence based options for surgeons in typical clinical scenarios based on mortality, morbidity and 1-year outcome
2017 STS Clinical Practice Guidelines

Mitral Valve Operations

- Multiple populations studied: 11 RCTs, 4 Meta-analyses, Several Institutional experiences

Recommendation:

- Surgical ablation for AF can be performed without additional risk of operative mortality or major morbidity, and is recommended at the time of concomitant mitral operations to restore sinus rhythm.

(COR: I, LOE: A)
2017 STS Clinical Practice Guidelines

**AVR, isolated CABG, AVR+CABG Operations**

- Limited populations studied: 2 RCTs, 2 Meta-analyses, limited Institutional experiences

Recommendation:

- Surgical ablation for AF can be performed without additional risk operative of mortality or major morbidity, and is recommended at the time of concomitant isolated AVR, isolated CABG, and AVR+CABG operations to restore sinus rhythm.

(COR: I, LOE: B-NR)
2017 STS Clinical Practice Guidelines

All Operations

Recommendation:

• Surgical ablation for symptomatic AF in the setting of left atrial enlargement (≥ 4.5 cm) or more than moderate mitral regurgitation by pulmonary vein isolation alone is not recommended.

(COR: III - No Benefit, LOE: C-EO)
2017 STS Clinical Practice Guidelines

All Operations

Recommendation:

• It is reasonable to perform LA appendage excision or exclusion in conjunction with surgical ablation for AF for longitudinal thromboembolic morbidity prevention.  
  (COR: IIA, LOE: C-LD)
Clinical Practice Guidelines

2017 AATS Expert Consensus Guidelines Examining Surgical Treatment for Atrial Fibrillation

• Aligned with STS Clinical Practice Guidelines with complimentary non-duplicative recommendations
• Important additional clarity provided on mortality, stroke prevention, quality of life, surgical experience, energy source
• Meta-analyses, Forest plot comparisons
2017 AATS Expert Consensus Guidelines

Forest plot: Improved perioperative survival (<30 days) with concomitant surgical ablation.

(COR: I, LOE: A)
Survival at 1 year and > 1 year

Recommendation:

- It is reasonable to choose to perform a concomitant surgical ablation procedure for patients with a history of AF over no treatment of AF because long-term survival is unaffected or improved by surgical ablation.

(COR: IIA, LOE: A 1 year, B-NR > 1 year)
2017 AATS Expert Consensus Guidelines

Stroke

Recommendation:

• It is reasonable to choose to perform a concomitant surgical ablation procedure for patients with a history of AF over no treatment of AF because there is no increased risk of perioperative stroke/TIA.

• (COR: IIA, LOE: A)
Clinical Practice Guidelines

2017 HRS Expert Consensus Statement on Catheter and Surgical Ablation of Atrial Fibrillation

• Aligned with STS and AATS Clinical Practice Guidelines with complimentary recommendations

• Distinct from STS and AATS in that HRS retains recommendations based establishment of AF symptoms and medicinal treatment

• However, language of acknowledgement on relevance of symptoms in concomitant operation
2017 HRS Expert Consensus Statement on Catheter and Surgical Ablation of Atrial Fibrillation

Indications for Concomitant Open (Such as Mitral Valve) Surgical Ablation of AF

Symptomatic AF

Paroxysmal AF
- AA Drugs
- Surgical Ablation

Persistent AF
- AA Drugs
- Surgical Ablation

Longstanding Persistent AF
- AA Drugs
- Surgical Ablation

Heart Rhythm. 2017;S1547
2017 HRS Expert Consensus Statement on Catheter and Surgical Ablation of Atrial Fibrillation

Indications for Concomitant Closed (Such as CABG or AVR) Surgical Ablation of AF

- Symptomatic AF
  - Paroxysmal AF
    - Ila
    - AA Drugs
    - Surgical Ablation
  - Persistent AF
    - Ila
    - AA Drugs
    - Surgical Ablation
  - Long-standing Persistent AF
    - Ila
    - AA Drugs
    - Surgical Ablation

Heart Rhythm. 2017;S1547
2017 HRS Expert Consensus Statement on Catheter and Surgical Ablation of Atrial Fibrillation

Indications for Stand-Alone Surgical Ablation of AF

Symptomatic AF
- Paroxysmal AF
  - AA Drugs
  - IIb Surgical Ablation
- Persistent AF
  - AA Drugs
  - IIa Surgical Ablation
- Long-standing Persistent AF
  - AA Drugs
  - IIa Surgical Ablation

Heart Rhythm. 2017;S1547
Clinical Practice Guidelines Summary

- Substantial progress on multidisciplinary collaboration and societal recommendations
- Classification of surgical ablation by operative category: open atrial, close atrial, stand-alone
- Important new knowledge on the impact of surgical ablation on mortality, survival and late morbidity
- Guidelines provide recommendations based on an interpretation of the evidence but do not replace the decision between patient and physician