Left Atrial Appendage Occlusion

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Agenda

• A couple of cases
• Why LAA Closure
• Procedure and data
Case 1

- 76 year old female: **HTN, type 2 DM, CAD, TIA**
- Permanent AF (overall controlled ventricular rate)
- Failed prior AAD’s: Amiodarone; Tikosyn
- Coumadin: Labile INR (1.2-6.8 with GI bleeding)
  - Poor compliance with medications
  - Financial issues?
- Normal LVEF, Large LA (echo)
- Has been off OAC for 4 months
- What next…?
AF Treatment: The 4 Pillars

**Thromboembolism Prevention**
- Warfarin
- NOAC
- LAA Occlusion

**Ventricular Rate Control**
- BB, CCB
- Digoxin
- AVJ Ablation

**Rhythm Control**
- Antiarrhythmic drugs
- Catheter Ablation
- Surgical Maze

**Risk Factors Modifications**
- Weight, Exercise
- Sleep apnea
- Hypertension...
AF Treatment: The 4 Pillars

Thromboembolism Prevention

Warfarin
NOAC
LAA Occlusion

New guidelines for anticoagulation

- CHA2DS2-VASc = 0 nothing (IIa)
- CHA2DS2-VASc = 1 nothing /Asp/ OAC (IIb)
- CHA2DS2-VASc ≥ 2 OAC
Why LAA?

LAA Occlusion

AF increases risk of stroke
Blood clots form in the left atrial appendage
Many patients are unprotected

Non-LAA
10%
90% Thrombus Originate LAA

Non-LAA
10%
90% Thrombus Originate LAA

5x greater risk of stroke with AF²

>90% of stroke-causing clots that come from the left atrium in non-valvular AF are formed in the LAA³

~45% of patients eligible for warfarin are untreated (tolerance/adherence)⁴

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Rationale for LAA Occlusion

• Patients at high risk of stroke remain unprotected
  – Not given OAC: ~45% of indicated patients
  – Stop OAC: ~30% at 2 years
  – Ongoing risk of bleeding: ~2-3% /year

• Does LAA Occlusion confer the same stroke prevention benefit without the ongoing risk of bleeding and compliance?
LA Appendage Closure

Percutaneous LAA Closure

• Epicardial Ligation

• Endocardial
  – PLAATO
  – Amplatzer Cardiac Plug
  – Wavecrest
  – Watchman
Warfarin + ASA (81mg) daily

Clopidogrel (75mg) + ASA (325 mg) daily

ASA (325mg) daily

Implant 45 days

*if leak >5mm, patients remained on warfarin + ASA until seal documented, skipping the clopidogrel + ASA pharmacotherapy

Current Protocol:

Post Procedure Therapy

Destination Therapy

Patients need to be on OAC

TEE

9 Months Post-implant “Endothelialization”
Procedure

Implant Success: >95% of patients

Complications: 2.7%

- Effusion and tamponnade
- Device embolization
- Stroke
Outcome

PROTECT AF demonstrated superiority for primary efficacy at 5 years.
PROTECT AF/PREVAIL Meta-Analysis:

<table>
<thead>
<tr>
<th>Efficacy</th>
<th>HR</th>
<th>p-value</th>
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</thead>
<tbody>
<tr>
<td>All stroke or SE</td>
<td>1.02</td>
<td>0.94</td>
</tr>
<tr>
<td>Ischemic stroke or SE</td>
<td>1.95</td>
<td>0.05</td>
</tr>
<tr>
<td>Hemorrhagic stroke</td>
<td>0.22</td>
<td>0.004</td>
</tr>
<tr>
<td>Ischemic stroke or SE &gt;7 days</td>
<td>1.56</td>
<td>0.21</td>
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<tr>
<td>CV/unexplained death</td>
<td>0.48</td>
<td>0.006</td>
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<tr>
<td>All-cause death</td>
<td>0.73</td>
<td>0.07</td>
</tr>
<tr>
<td>Major bleed, all</td>
<td>1.00</td>
<td>0.98</td>
</tr>
<tr>
<td>Major bleeding, non procedure-related</td>
<td>0.51</td>
<td>0.002</td>
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</table>

Hazard Ratio (95% CI)
4.4.1. Percutaneous Approaches to Occlude the LAA

<table>
<thead>
<tr>
<th>COR</th>
<th>LOE</th>
<th>Recommendation</th>
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</table>
| IIb | B-NR | 1. Percutaneous LAA occlusion may be considered in patients with AF at increased risk of stroke who have contraindications to long-term anticoagulation (S4.4.1-1–S4.4.1-5).  
**NEW:** Clinical trial data and FDA approval of the Watchman device necessitated this recommendation. |
Indication

FDA
• NonValvular AF
• CHADSVASC ≥2
• Recommended for OAC
• Suitable for warfarin
• Appropriate rationale to seek non-drug alternative

CMS
• High CHADSVASC ≥3
• Suitable for short-term warfarin
• Unable to take long-term oral anticoagulation
• Shared decision interaction with an independent non-interventional physician
• Registry
Case 1

- 78 year old female, HTN, type 2 DM, CAD, TIA
- Permanent AF (overall controlled ventricular rate)
- Failed prior AAD’s: Amiodarone; Tikosyn
- Coumadin: Labile INR (1.2-6.8 with GI bleeding)
  - Poor compliance with medications
  - Financial issues?
- Normal LVEF, Large LA (echo)
- Has been off OAC for 2 months

- What next…?

ChadsVasc score: 7
HAS Bled score: 4
# Stroke and Bleeding Risk Scores in NVAF

## CHADS<sub>2</sub>-VASc Score

<table>
<thead>
<tr>
<th>Condition</th>
<th>Score</th>
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<tbody>
<tr>
<td>CHF</td>
<td>1</td>
</tr>
<tr>
<td>HT</td>
<td>1</td>
</tr>
<tr>
<td>Age &gt; 75 years</td>
<td>1</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1</td>
</tr>
<tr>
<td>Stroke</td>
<td>2</td>
</tr>
<tr>
<td>Vascular Disease</td>
<td>1</td>
</tr>
<tr>
<td>Age 65-74 years</td>
<td>1</td>
</tr>
<tr>
<td>Sex category</td>
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</table>

### CHA<sub>2</sub>DS<sub>2</sub>-VASc Score and Annual Risk of Stroke (%)

<table>
<thead>
<tr>
<th>CHA&lt;sub&gt;2&lt;/sub&gt;DS&lt;sub&gt;2&lt;/sub&gt;-VASc Score</th>
<th>Annual Risk of Stroke (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>2</td>
<td>2.2</td>
</tr>
<tr>
<td>3</td>
<td>3.2</td>
</tr>
<tr>
<td>4</td>
<td>4.0</td>
</tr>
<tr>
<td>5</td>
<td>6.7</td>
</tr>
<tr>
<td>7</td>
<td>9.6</td>
</tr>
<tr>
<td>9</td>
<td>15.2</td>
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## HAS-BLED

<table>
<thead>
<tr>
<th>Condition</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>HT</td>
<td>1</td>
</tr>
<tr>
<td>Abnormal renal or liver function</td>
<td>1</td>
</tr>
<tr>
<td>Stroke</td>
<td>1</td>
</tr>
<tr>
<td>Bleeding</td>
<td>1</td>
</tr>
<tr>
<td>Labile INR</td>
<td>1</td>
</tr>
<tr>
<td>Elderly (&gt; 65 years)</td>
<td>1</td>
</tr>
<tr>
<td>Drug or alcohol use</td>
<td>1</td>
</tr>
</tbody>
</table>

### HAS-BLED Score and Annual Risk of Bleed (%)

<table>
<thead>
<tr>
<th>HAS-BLED Score</th>
<th>Annual Risk of Bleed (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.9</td>
</tr>
<tr>
<td>1</td>
<td>3.4</td>
</tr>
<tr>
<td>2</td>
<td>4.1</td>
</tr>
<tr>
<td>3</td>
<td>5.8</td>
</tr>
<tr>
<td>4</td>
<td>8.9</td>
</tr>
<tr>
<td>5</td>
<td>9.1</td>
</tr>
</tbody>
</table>

### Recommended for LAAO

- CHA2DS2-Vasc: 7
- HAS Bled: 4
Initial Experience With High-Risk Patients Excluded From Clinical Trials: Safety of Short-Term Anticoagulation After LAA Closure Device.

None of the patients had spontaneous major bleeding during the course of OAC after device implantation.
AF Stroke prevention: A multidisciplinary Approach
Case 2

• 64 yo woman
• Symptomatic Persistent AF with breakthrough on Dofetilide
• CHADSVASC=5 for HTN, DM, Gender, h/o TIA
• Intracranial Bleeding on Rivaroxaban
• HAS-BLED = 4
• MRI: Cavernous malformation not amenable to surgical removal

→ Off anticoagulation

Now What should we do ??
“Indication” for LAAC

- High CHADS\text{VASC} \geq 3
- Suitable for short-term warfarin
- Unable to take long-term oral anticoagulation

Indication for AF ablation

- Symptomatic AF despite suppressive AAD’s.
Now What should we do ??

• Switch to Warfarin?
• Ablate AF and if she has recurrence consider Watchman
• Implant Watchman then Ablate 6 months later
• Ablate AF and Implant Watchman at a later date
• Send her for surgical MAZE and LAA clipping.
• AF ablation + Watchman implant in same setting

Combined procedure

AF ablation + LAA occlusion - same setting
• 38 patients
  – CHA2DS2-VASc  5.0 ± 1.3
  – HASBLED     4.2 ± 1.0.

• Prior ICH events:
  – intraparenchymal (60%),
  – subdural (24%),
  – subarachnoid bleeds (16%).

• Event to Implant time (median 637 days)

• All patients completed 45 days of OAC:
  • Warfarin (55%), apixaban (37%), dabigatran (8%)

• No recurrent ICH on OAC
  • Minor bleeding in 1 patient (trauma related lower extremity)

• F/U at 13 mo: No strokes, ICH or deaths.
Follow-up at 1 year

- AF free for one year on no AAD’s.
- Took 3 months of OAC + 3 months Plavix + ASA
  → now on aspirin only.
- No bleeding events.
- Feels Better
### Combined AF ablation + LAA closure device Implant

#### Benefits
- Shorter Bleeding risk
- Avoid risk duplication
  - TSP, access, heparin, GA
- Lower cost?
- Lower AF?

#### Issues
- Reimbursement
- LAA access for re-ablation
- Duration of OAC??
- **Stability**
  - edema, scar, fluid load, atrial remodeling
  - Rhythm
  - Sizing? Sequence?
Efficacy

- Pooled data from prospective multicenter analysis
  - 349 pts combined CA and LAAC (2009-2015)
  - CHA2DS2-VASc 3.0; HAS-BLED: 3.0
- Successful LAA Closure: 100%
- Complications: 2.2%
- At 35 mo F/U
  - AF recurrence 51%

OAC: 93.9% 15.1%

High Implant success
Low complication
CCF experience with combined procedures

- 28 patients (2015-2018)
  - 14 F; Age: 72.1 ± 8 yo
  - CHADS<sub>2</sub>VASC 3.8 ± 1.2, HAS-BLED 3.9 ± 1.3.
  - Indications for LAAO: prior life threatening bleeding (48.1%)

- LAAO Implant: 26/28 successful Implant (2 patients small LAA size).
  - No major procedural complications.
  - No significant leaks (>5mm) on follow-up TEEs (45 days)

- Mean follow-up: 20.7 ± 12.7 months
  - 75% of patients arrhythmia free
  - All remained off anticoagulation
  - No stroke or major bleeding
OPTION Trial

N ~ 1600 pts

1. Non-valvular AF
2. CHADSVASC ≥ 2 (men) or ≥ 3 (women)
3. Recent or planned AF ablation (ablation: 3-6 months prior or concomitant)

AF ablation + WATCHMAN + short term OAC+ASA  
N=800

AF ablation + OAC  
N=800

3y f/u 3y f/u

Co-primary Endpoints
- Death, stroke, and SE (non-inferiority)
- Major non-procedural bleeding (superiority)
Who to Consider for LAA occlusion

- Patients with CHADsVASc>2 and “Contraindication” to long term OAC
  - High bleeding risk: Antiplatelet therapy (3x bleeding risk)
  - H/o major bleeding (GI, Neuro, GU, …)
  - Refractory to OAC (Stroke, TIA)
  - Intolerant of OAC (25% discontinuation rate)
  - Poorly compliant with OAC
  - Active lifestyle, Fall risk…
  - Post PVI with high CHADsVASC?
  - As a primary replacement to OAC in all patients (Still too Early to tell)

LAA occlusion is a promising strategy to reduce the risk of stroke without the bleeding risk associated with long term anticoagulation.
Thank You