LAA occluders: for whom?

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Disclosures

• None related to this talk.

• General disclosures:
  
  • Lecture fees from AstraZeneca, Baxter, Bayer, Boehringer Ingelheim, Bristol-Myers Squibb, MSD, Sysmex, and Pfizer.

  • Advisory board meetings for AstraZeneca, Bayer, Boehringer Ingelheim, and Bristol-Myers Squibb.
Outline of talk: LAA occluders

- Why? An intriguing concept.
- How?
- Evidence
- Guideline recommendations
- When?

- Conclusions & gaps in evidence
Percutaneous Left Atrial Appendage Occlusion: An intriguing concept

• Oral anticoagulant treatment reduces the risk of ischaemic stroke in pts with AF with >60% and is the main strategy for stroke prevention – but OAC have inherent challenges, e.g. compliance, surgery, drug interactions, adverse events including GI & IC bleeding.

• Concerns over bleeding contribute to significant under treatment and leave a substantial proportion of patients at risk of stroke.

• Therefore, LAAO is an increasingly used alternative to OAC.

• The concept of LAAO is based on the understanding that in non-valvular AF, the majority of thrombi form in the LAA – so closing the LAA can prevent stroke & peripheral arterial embolization.
Percutaneous Left Atrial Appendage Occlusion: An intriguing concept

In pts with AF, up to 91%* of thrombi are localized in the LAA.
Closing the LAA will prevent >90% of ischaemic strokes?


Table 1. Review of Published Reports Detailing the Frequency and Site of Thrombus Location in Patients With Nonrheumatic Atrial Fibrillation

<table>
<thead>
<tr>
<th>Setting</th>
<th>No. of Patients</th>
<th>LA Appendage</th>
<th>LA Cavity</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEEa</td>
<td>317</td>
<td>66</td>
<td>1</td>
</tr>
<tr>
<td>TEE</td>
<td>233</td>
<td>34</td>
<td>1</td>
</tr>
<tr>
<td>Autopsy</td>
<td>506</td>
<td>35</td>
<td>12</td>
</tr>
<tr>
<td>TEE</td>
<td>52</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>TEE</td>
<td>48</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>TEE and Operation</td>
<td>171</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>SPAF III TEE Study</td>
<td>359</td>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td>TEE</td>
<td>272</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td>TEE</td>
<td>60</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>1,288</td>
<td>201</td>
<td>21</td>
</tr>
</tbody>
</table>

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LAAO techniques

Other options include: WaveCrest, Occlutech, Lariat, LAmbre etc.
LAA anatomy

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Imaging: cardiac CT, TEE, intra-cardiac echo
LAAO technique: sizing
Periprocedural complications (Watchman®)

Composite cardiac perforation, pericardial effusion with tamponade, ischaemic stroke, device embolization, and other vascular complications

- PROTECT AF: 8.7% (n=39)
- CAP: 4.1% (n=23)
- PREVAIL: 4.2% (n=12)

Holmes et al, JACC 2015.
## Patient-level meta-analysis: Mortality

<table>
<thead>
<tr>
<th></th>
<th>P-value</th>
<th>HR</th>
</tr>
</thead>
<tbody>
<tr>
<td>All-cause death</td>
<td>0.07</td>
<td>0.73</td>
</tr>
<tr>
<td>Cardiovascular / unexplained death</td>
<td>0.006</td>
<td>0.48</td>
</tr>
</tbody>
</table>

3.2 vs 4.8%

Favors WATCHMAN $\leftarrow$ Favors warfarin

Hazard Ratio (95% CI)

Holmes et al, JACC 2015.
Patient-level meta-analysis: Stroke

<table>
<thead>
<tr>
<th>Condition</th>
<th>P-value</th>
<th>HR</th>
</tr>
</thead>
<tbody>
<tr>
<td>All stroke or SE</td>
<td>0.94</td>
<td>1.02</td>
</tr>
<tr>
<td>Ischemic stroke or SE</td>
<td>0.05</td>
<td>1.95</td>
</tr>
<tr>
<td>Hemorrhagic stroke</td>
<td>0.004</td>
<td>0.22</td>
</tr>
</tbody>
</table>

Favors WATCHMAN ⇐ 0.01 0.1 1 10 100 0.1 0.01 Favors warfarin

Holmes et al, JACC 2015.
Amplatzer® Cardiac Plug (ACP)

LAAO guidelines recommendations

- Consensus statements/guidelines from ACC/HRS/SCAI + EHRA/EAPCI – and, most recently, from the ESC (AF guidelines, August 2016) provide some guidance on the use of LAAO in selected patients:

  LAA occlusion may be considered for stroke prevention in patients with AF and contra-indications for long-term anticoagulant treatment (e.g. those with a previous life-threatening bleed without a reversible cause).
**LAAO guidelines recommendations: ESC**

- **Patient with AF suffering from an intracranial bleed on OAC**
  - If acute event: establish intensity of anticoagulation (see bleeding flow chart)

- **Contra-indication for OAC**

- **Consider further information to allow informed judgement**
  - Factors supporting withholding of OAC:
  - Factors supporting relinitiation of OAC:

- **LAA occlusion may be considered for stroke prevention in patients with AF and contra-indications for long-term anticoagulant treatment**
  - e.g. those with a previous life-threatening bleed without a reversible cause.

- **Iib**

- **B**

- **by multidisciplinary team advice**

- **No stroke protection (no evidence)**

- **LAA occlusion (IibC)**

- **Initiate or resume OAC, choosing an agent with low intracranial bleeding risk, after 4-8 weeks (IibB)**
LAAO – for whom?

Non-valvular atrial fibrillation with increased thromboembolic risk (CHA2DS2-VASc ≥2)

**Suitable for OAC**
- HAS-Bled ≥3
- Increased bleeding risk not reflected by HAS-Bled score (e.g. thrombocytopenia, tumor associated bleeding)
- Recurrent bleeding on (N)OAC

**Increased risk of bleeding**

*#Class I

**VKA vs NOAC**

Yes

Acceptable risk for OAC?

$No

LAA closure (If anatomic suitability and individualized risk/benefit evaluation)

**Contraindication for (N)OAC**

*Class IIb

Based on recommendations from ESC, AHA/ACC/HRS, EHRA/EAPCI & Suradi et al 2017.

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LAAO contraindications

- AF with low risk of stroke, e.g. CHA2DS2-VASc ≤ 1
- Valvular heart disease, e.g. mitral stenosis
- Other indications for long-term OAC: VTE, mechanical prosthetic valve, thrombi in left atrium or ventricle.
- Contraindications for transseptal puncture, e.g. thrombus/tumour/infection, (atrial septum closure device).
LAAO: Conclusions & gaps in evidence

• An intriguing concept, but more evidence is warranted.
• Refinement of techniques & improved patient selection.
• Post-procedural antithrombotic treatment?
• Importance & management of device-related thrombi and peri-device flow?
• Role of LAA in neurohormonal regulation & arrhythmia propagation?
• Follow-up & choice of imaging (cardiac CT, TEE etc)?
• LAAO vs NOAC in AF pts eligible for OAC? (PRAGUE-17)

• LAAO may be considered in pts with non-valvular AF ineligible for OAC (IIb,B). Particularly in AF pts eligible for OAC, LAAO should preferably be performed as a part of a clinical trial!