Left Atrial Appendage Closure
Past, Present and Future

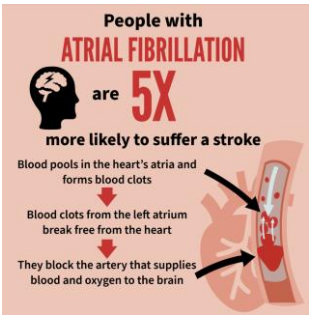
Muhammad Rizwan Afzal, MD, FACC
Associate Professor of Medicine
The Ohio State University Wexner Medical Center

Disclosure

- None

Objectives

- What is relationship of AFIB and Stroke?
- Stroke prevention strategies?
- Role of left atrial appendage closure (LAAC) in stroke prevention
- Evolution of Watchman device over the years
- Challenges of Watchman
- What is new?



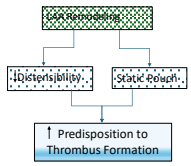
Stroke Risk is associated with CHADVASC score

Components of CHA_2DS_2-VASc	
Risk Factor	Score
Cardiac failure	1
HTN	1
Age ≥75 y	2
Diabetes	1
Stroke	2
Vascular disease (MI, PAD, aortic atherosclerosis)	1
Age 65-74 y	1
Sex category (female)	1

CHA_2DS_2-VASc Score	Annual Risk of Stroke (%)
0	0
1	1.3
2	2.2
3	3.2
4	4.0
5	6.7
6	9.8
7	9.6
8	6.7
9	15.2

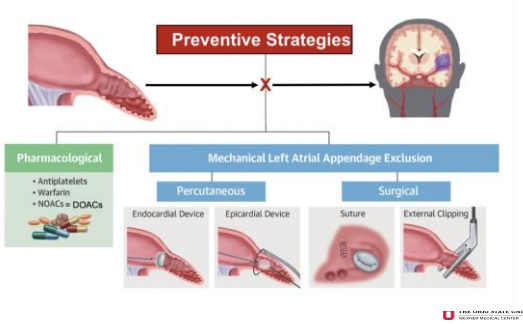
Stroke risk stratification in atrial fibrillation. From: Lip GY, Nieuwlaat R, Pisters R, Lane DA, Crijns HJ. Refining clinical risk stratification for predicting stroke and thromboembolism in atrial fibrillation using a novel risk factor-based approach: the euro heart survey on atrial fibrillation. Chest. 2010;137:263-72. HTN, Hypertension; MI, myocardial infarction; PAD, peripheral arterial disease.

AF Creates Environment for Thrombus Formation in Left Atrium Appendage



- **Stasis-related LAA thrombus** is a predictor of TIA[1] and ischemic stroke[2]
- In non-valvular AF, >90% of stroke-causing clots that come from the LA are formed in the LAA[3].

1. Blackshear et al. Ann Heart J. (2005)
2. Goldman et al. (Ann Soc Echocardiogr (1999)
3. Blackshear JL, Odell JA. Annals of Thoracic Surg (1996)



7

Who should be on anticoagulation?

2014[1] ACC/AHA/HRS Treatment Guidelines to Prevent Thromboembolism in Patients with AF & 2019[2] Focused Update

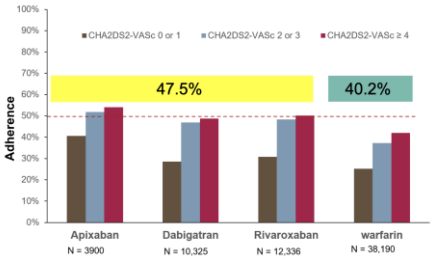
CHA$_2$DS$_2$-VASc Score in Men	CHA$_2$DS$_2$-VASc Score in Women	Recommendation
0	0	No anticoagulant
1	2	Aspirin (81-325 mg daily) or oral anticoagulants may be considered
≥ 2	≥ 3	Oral anticoagulants are recommended*

*DOACS (dabigatran, rivaroxaban, apixaban, and edoxaban) recommended over warfarin in DOAC-eligible patients

8

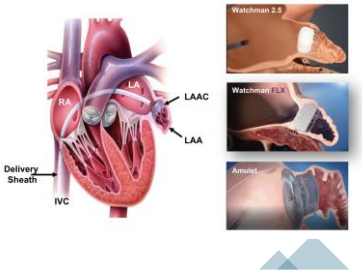
Adherence to Anticoagulation Remains a Challenge

64, 661 patients from large US commercial insurance database (2010-2014)



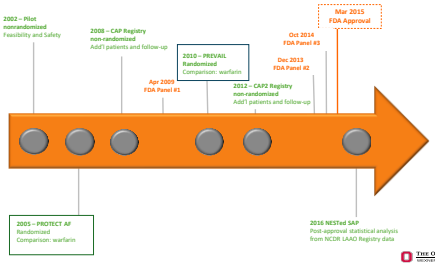
9

Percutaneous Endocardial LAA Closure Device



10

WATCHMAN 2.5 vs. Warfarin



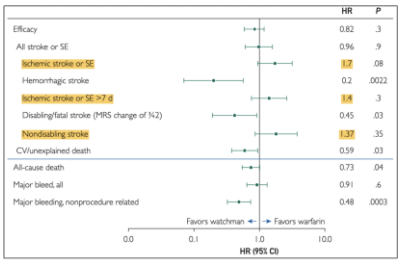
11

✓ Preventing Early and Late device related thrombus

✓ Enhancing Endothelialization

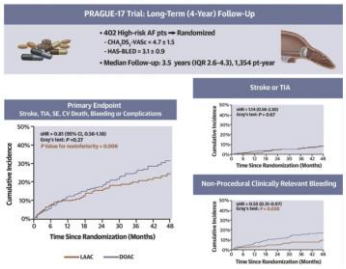
12

WATCHMAN 2.5 vs. Warfarin



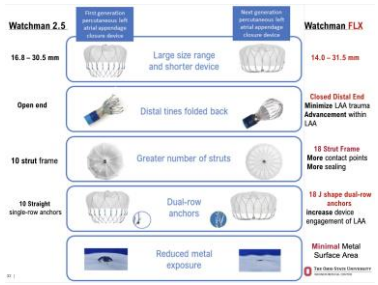
13

LAA Closure Device vs. DOAC



14

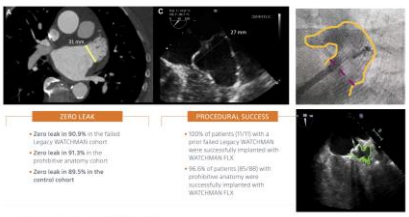
Improvement in device characteristics



15

PINNACLE FLX

FAILED Watchman 2.5 (11) and ***PROHIBITIVE*** Anatomy (88)



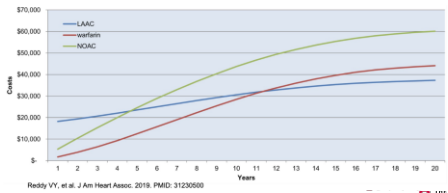
Ellis et al. Heart Rhythm, Vol 18, No 7, July 2021

16

Cost-Effectiveness of Left Atrial Appendage Closure for Stroke Reduction in Atrial Fibrillation: Analysis of Pooled, 5-Year, Long-Term Data

LAAC was cost-effective relative to warfarin by year 7 and dominant (more effective and less costly) by year 10.

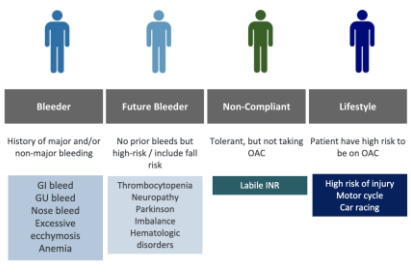
LAAC became cost-effective and dominant compared with NOACs by year 5



Reddy VY, et al. J Am Heart Assoc. 2019. PMID: 31230500

17

Candidates for LAAO device



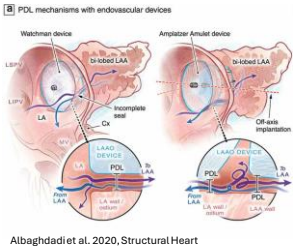
18

Challenges of LAAC

- Peri-device leak – common
- Device related thrombus – uncommon
- Device Embolization – rare

What is a Peridevice Leak (PDL)?

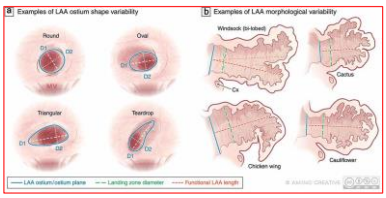
- PDL is a residual communication between LAA and LA after LAA closure devices – epicardial or endocardial
- PDL is often detected at follow-up imaging
- Some inherent reasons of device structure and LAA anatomy
- It can not be Eliminated BUT incidence can be lowered



Albaghdadi et al. 2020, Structural Heart

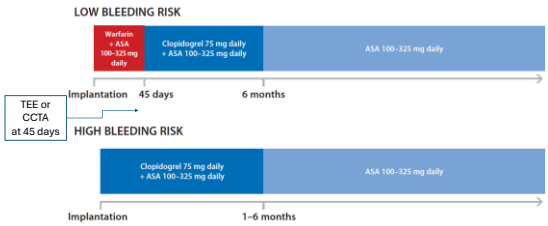
Mechanism of PDL- Role of LAA anatomy

- Ellipsoid LAA and circular LAAC device
- Non-chicken wing LAA
- Rhythm change from implant to follow up
  - Sinus- contractile appendage
  - AF- dilated, eccentric
- Larger LAA orifice size



Albaghdadi et al. 2020, Structural Heart

Antithrombotic Regimens After LAAC



Clinical Implications of PDL Background – What a big deal?

- PDL ≥ 5 mm: Arbitrarily cut off for clinical significance in PROTECT AF & PREVAIL
- Criteria for discontinuation of anticoagulation in early studies:
  - 45-day TEE with PDL <5 mm and no device related thrombus (DRT), Transition to DAPT and then low dose aspirin
- PDL <5 mm thought to be clinically insignificant **
- 5 mm threshold for Watchman FLX (PINNACLE FLX) and Amplatzer Amulet (Amulet IDE)
- HOWEVER, recent data for Long-term follow-up suggests that any PDL portends adverse long-term consequences – lets talk about that…

Viles-Gonzalez et al. 2012, JACC*
Saw et al. 2017, JACC Cardiovasc Interv*

JACC: CLINICAL ELECTROPHYSIOLOGY VOL. 8, NO. 1, 2022
© 2022 BY THE AMERICAN COLLEGE OF CARDIOLOGY FOUNDATION
PUBLISHED BY ELSEVIER

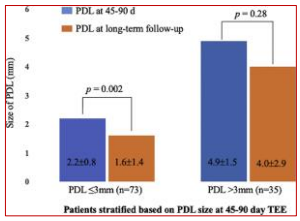
ATRIAL FIBRILLATION

Temporal Changes and Clinical Implications of Delayed Peridevice Leak Following Left Atrial Appendage Closure

Muhammad R. Afzal, MD,[a,*] James K. Gabriels, MD,[b,c] Gregory G. Jackson, MD,[c,d] Lu Chen, MD,[d] Benjamin Buck, MD,[e] Sandra Campbell, RN,[e] Dawn F. Sabin, RN,[e] Bruce Goldner, MD,[f] Haisam Ismail, MD,[g] Christopher F. Liu, MD,[h] Apoor Patel, MD,[i] Stuart Beldner, MD,[j] Emile G. Daoud, MD,[k] John D. Hummel, MD,[a] Christopher R. Ellis, MD[a]

Clinical Implications – New Horizons

- **Afzal et al. 2022, JACC EP**
- Multicenter retrospective study (Cornell, OSU, Northwell, Vanderbilt)
- Inclusion:
  - 1039 patients with successful Watchman
  - 108 (11%):
  - No PDL at baseline but PDL at 45 days and at least one follow up imaging after 45 days
- Outcome:
  - Significantly more TIA/CVA with PDL detected on TEE at 45-90 days, irrespective of leak size
  - No leak vs any leak and no leak vs <5 mm, were both significantly associated with TIA/stroke
  - Notably, 89% of patients with any PDL and TIA/stroke had a PDL <5 mm
- PDL ≤3 mm regressed significantly on follow-up TEE while PDL >3 mm remained unchanged
- PDL >3 mm associated with a significant increase in the primary composite outcome (failure to stop OAC after 45-90 days, TIA/stroke, DRT, or need for PDL closure) primarily driven by continued OAC



25

Clinical Implications – Summary of emerging data

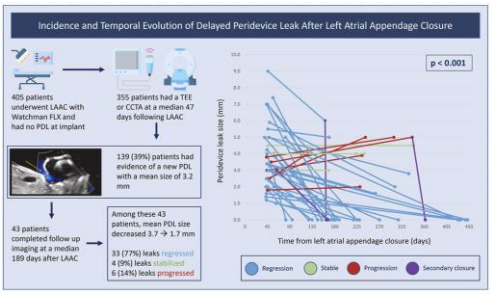
- Presence of any PDL is clinically relevant
- PDL size can evolve over time
- Significant PDL
  - Can preclude the cessation of OAC after LAAC
  - Require surveillance imaging
  - May necessitate secondary closure

26

Incidence and temporal evolution of delayed peridevice leak after left atrial appendage closure

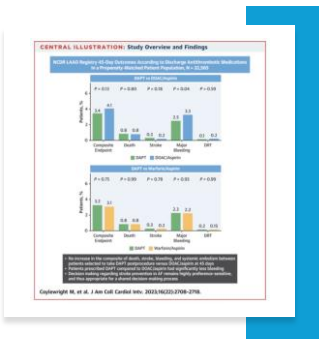
Sapan Bhuta, MD, Austin Carlen, BS, Salvatore J. Savona, MD, FHRS, Ralph S. Augostini, MD, FHRS, Steven J. Kalbfleisch, MD, FHRS, Mahmoud Houmsse, MD, FHRS, Emile G. Daoud, MD, FHRS, John D. Hummel, MD, FHRS, Muhammad R. Afzal, MD

27



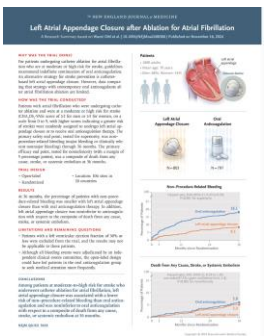
28

What is new?
DAPT = AC



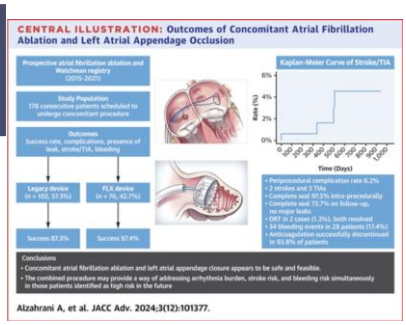
29

Option Trial Ablation + Watchman vs Ablation + AC is similar for stroke prevention but lower bleeding

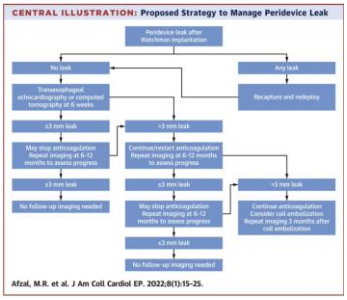


30

Concomitant procedures



31



32

Thanks

33