Post-LAAO Anti-thrombotic Strategy

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Disclosure

- Nothing to disclose

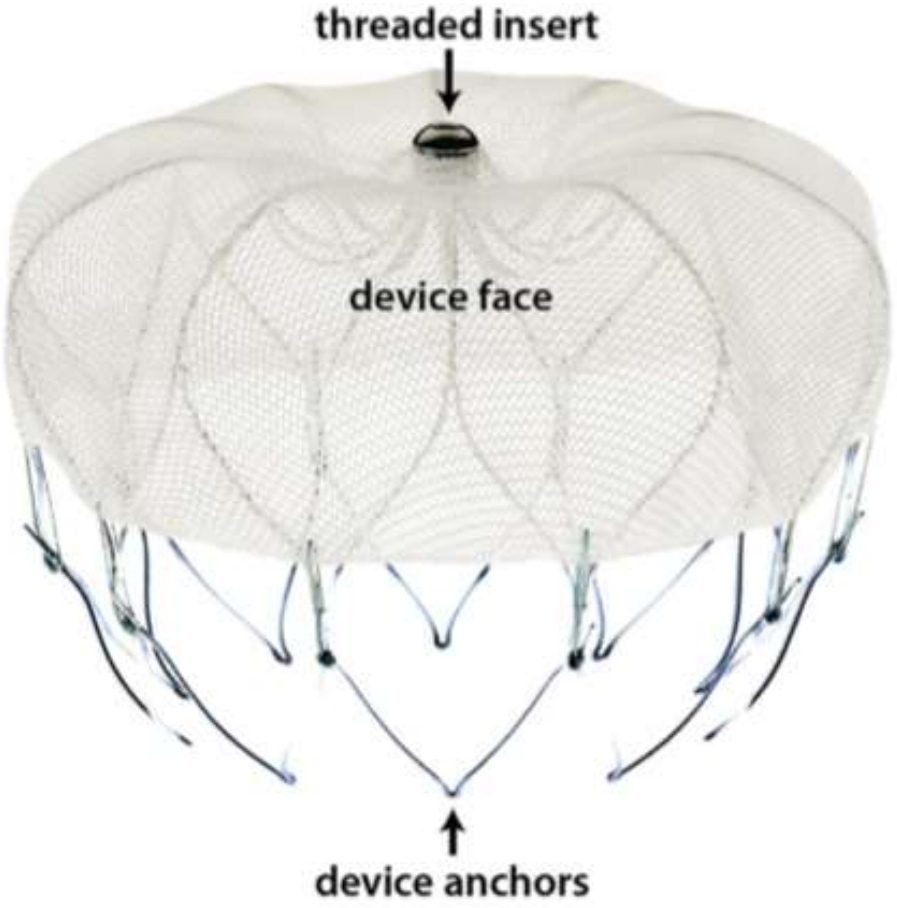
What are the issues?

- Why do we need anti-thrombotics?
- What does device-related thrombus (DRT) look like?
- What happen if there is DRT?
- How to detect DRT?
- What are the predictors of DRT?
- What are the anti-thrombotic regimens available?
- What is the duration of anti-thrombotics?
- How to treat DRT when it occurs?

Why do we need anti-thrombotics?

- Foreign body (commonly nitinol) needs time for re-endothelialization
- Initiated by thrombotic material formation → transformed to connective tissue
- If healing process incomplete → thrombus propagation → device-related thrombus (DRT)
- Anti-thrombotics aim to slow down clot formation → let time for re-endothelialization
- DRT incidence: ~3-7%

Exposed nitinol → nidus for DRT formation



Canine Model – 30 Day

Canine Model – 45 Day

Human Pathology – 9 Months Post-implant
(Non-device related death)

From Boston Scientific

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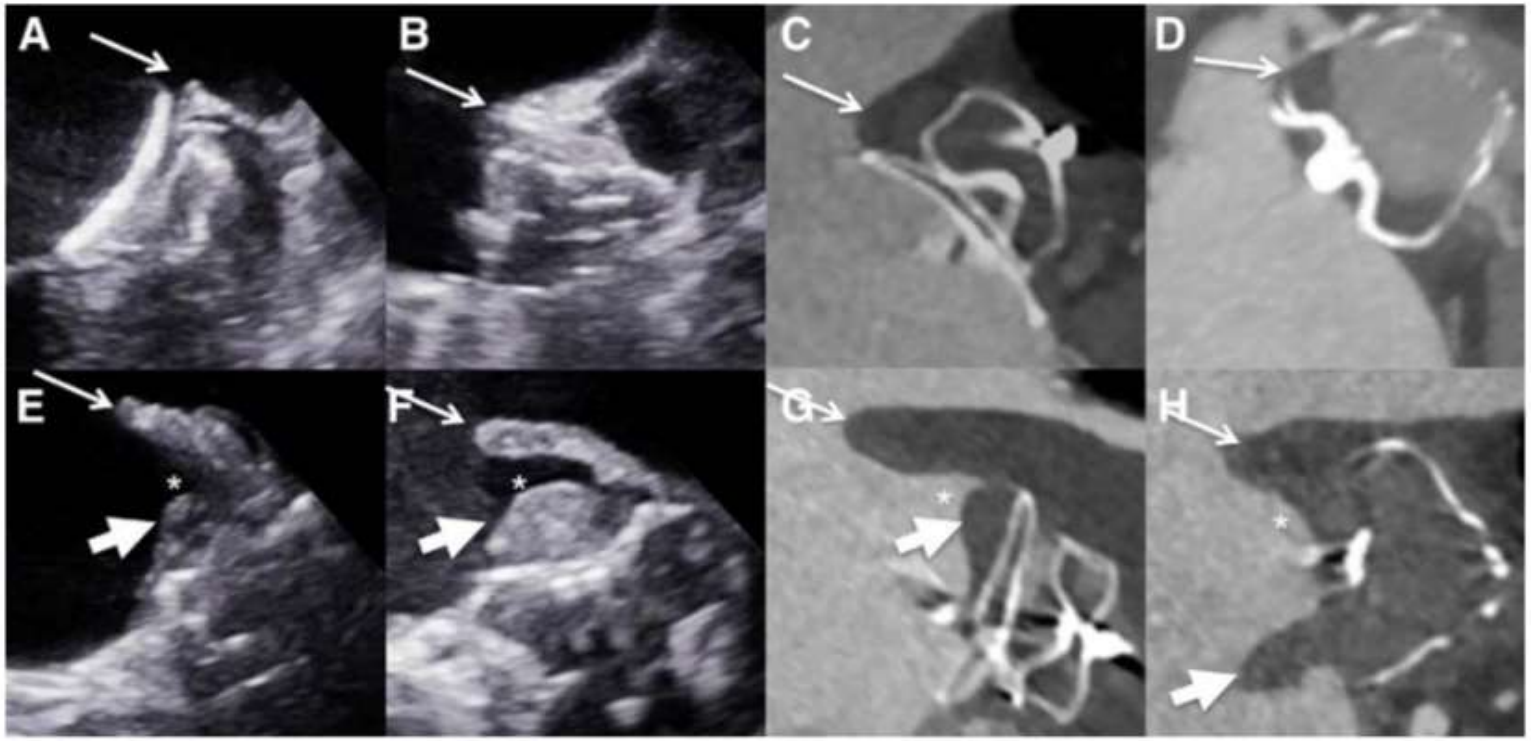
DRT on TEE and CT

Pulmonary ridge



Thrombus

Pracon, R., et al. (2018). Circ Cardiovasc Interv 11(3): e005997.

DRT Adjudication Protocol (from PROTECT-AF Trial)

Main, M. L., et al. (2016). Am J Cardiol 117(7): 1127-1134.

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What happen if there is DRT?

- 3x increase (25.0% vs 6.8%) in risk of stroke or systemic embolism
- Also increase risk of bleeding (probably due to the use of more aggressive anti-thrombotic therapy)
- No association with CV/all-cause death

- Note: 75.0% of patients having DRT does NOT have stroke/systemic embolism
- Any causal relationship??? → some suggestions of temporal relationship (number too small for analysis)

Dukkipati, S. R., et al. (2018). Circulation 138(9): 874-885.

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How to detect DRT?

- Routine surveillance TEE vs event-driven TEE
- Variable protocols: 45 days, 1-3 months, 3 months, 6 months, 12 months, etc
- Real-world registry data (n=487) in France

	All Patients (N = 487)	Watchman Nitinol Cage (n = 272)	Amplatzer ACP or Amultet Nitinol Plug (n = 197)	p Value (Nitinol Cage vs. Nitinol Plug)
LAA imaging during follow-up*	340 (72.1)	238 (87.5)	101 (51.3)	<0.0001

Fauchier, L., et al. (2018). J Am Coll Cardiol 71(14): 1528-1536.

- CT scan is an alternative (fewer discomforts, lower risks)

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What are the predictors of DRT?

- Older age, history of stroke; DAPT and OAC at discharge are protective
  (Fauchier, L., et al. (2018). J Am Coll Cardiol 71(14): 1528-1536.)
- CHA2DS2-Vasc score, deep implantation
  (Kaneko, H., et al. (2017). Heart Vessels 32(9): 1137-1143.)
- History of thromboembolism, lower LVEF, deep implantation, large occluders
  (Pracon, R., et al. (2018). Circ Cardiovasc Interv 11(3): e005997.)
- History of TIA/stroke, permanent AF, vascular disease, larger LA, lower LVEF
  (Dukkipati, S. R., et al. (2018). Circulation 138(9): 874-885.)
- Other potential predictors: CKD, DM, hypercoagulability status, clopidogrel resistance, etc

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Watchman Data – Randomized Trials

- PROTECT-AF (n=463)
- PREVAIL (n=269)
- CAP (n=566)
- CAP2 (n=578)

- Targeting patients who can tolerate short term OAC

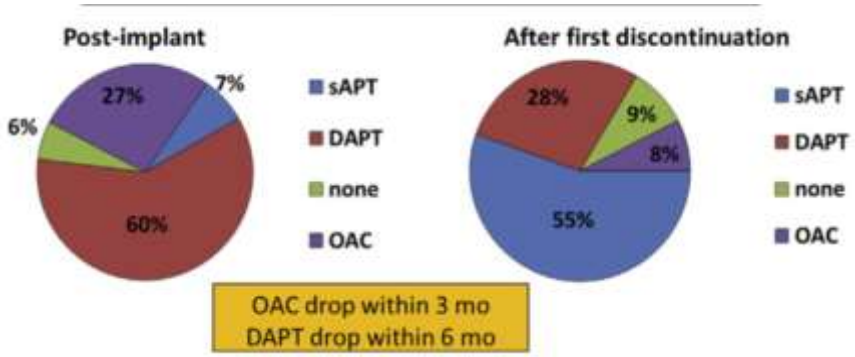
- Standardized regimen:
  - Warfarin + ASA for 45 days
    then Clopidogrel + ASA for 6 months
    then ASA alone for life
- DRT rate: 3.7%

Watchman Data – Registries

- EWOLUTION (n=1025)
- ASAP (n=150)

- Targeting patients who cannot tolerate even short-term OAC

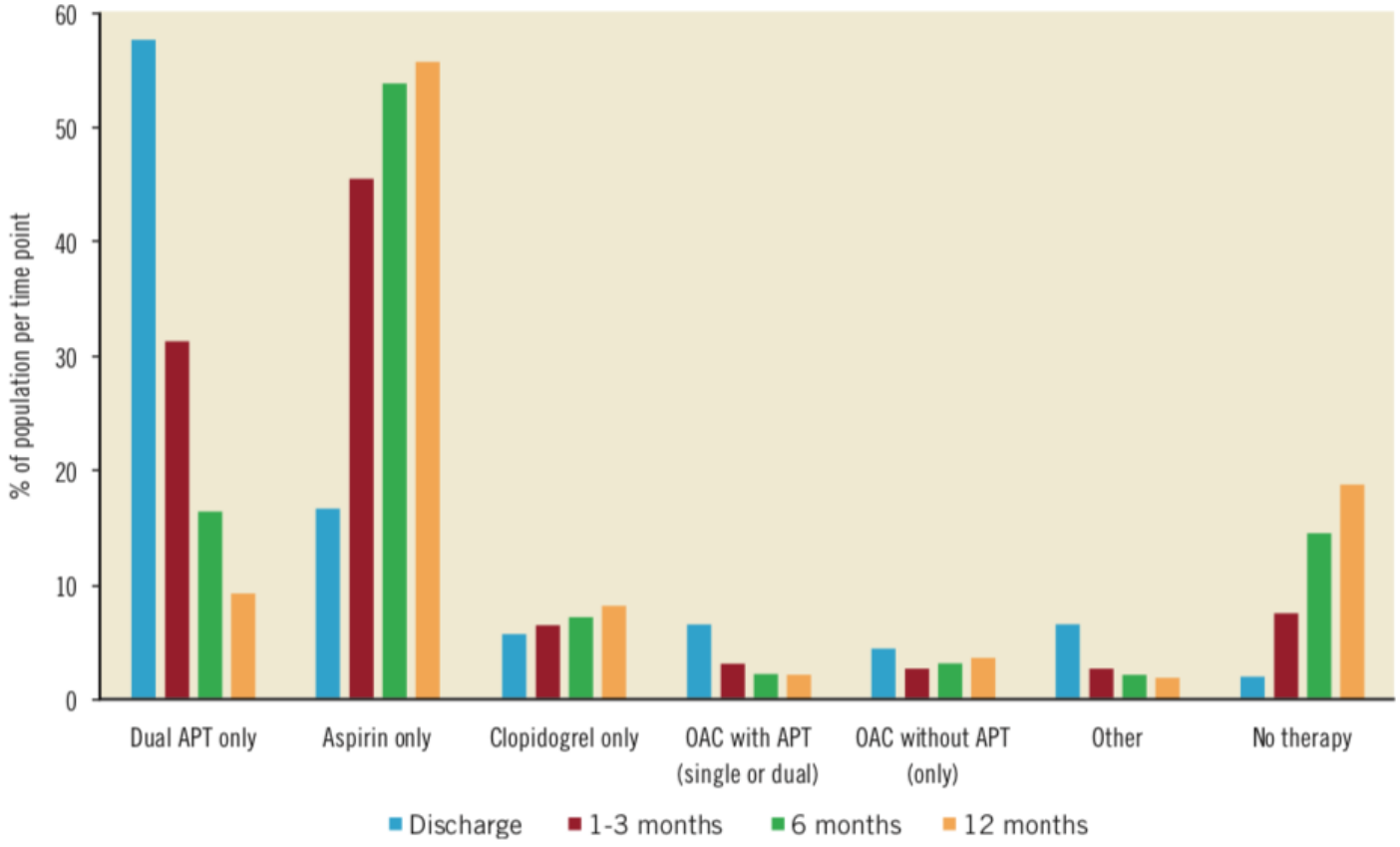
- Variable regimens:
  - Mainly DAPT for 3-6 months then ASA
- DRT rate: 4%, 3.7%



Boersma, L. V., et al. (2017). Heart Rhythm 14(9): 1302-1308.

AMULET Global Registry

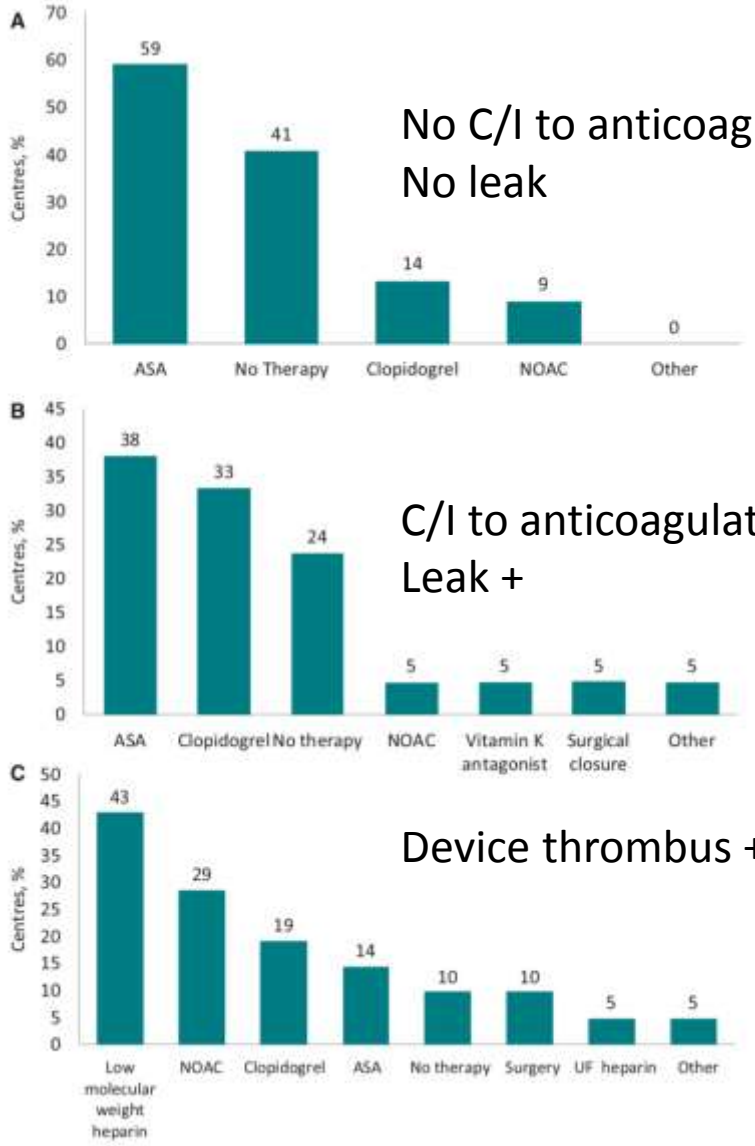
DRT rate: 1.7%



Landmesser, U., et al. (2018). EuroIntervention 14(5): e590-e597.

EP Wire Survey

- Post-LAAO > 6 months
- Amplatzer more commonly used



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Optimal Duration of Anti-thrombotics

- Patients eligible for LAAO are usually those with high bleeding risk
- As short as possible
- ?individualized
  - More predictors for DRT → longer duration
  - More frequent surveillance TEE → minimize duration and reinitiate if required
- Duration may not be important
  (Pracon, R., et al. (2018). Circ Cardiovasc Interv 11(3): e005997.)

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Treatment of DRT

- Insufficient data
- Most if not all DRT resolves with reinitiation or up-titration of antithrombotic therapy
- LMWH, warfarin, NOAC
- Frequent serial imaging to ensure resolution

Case - Amulet

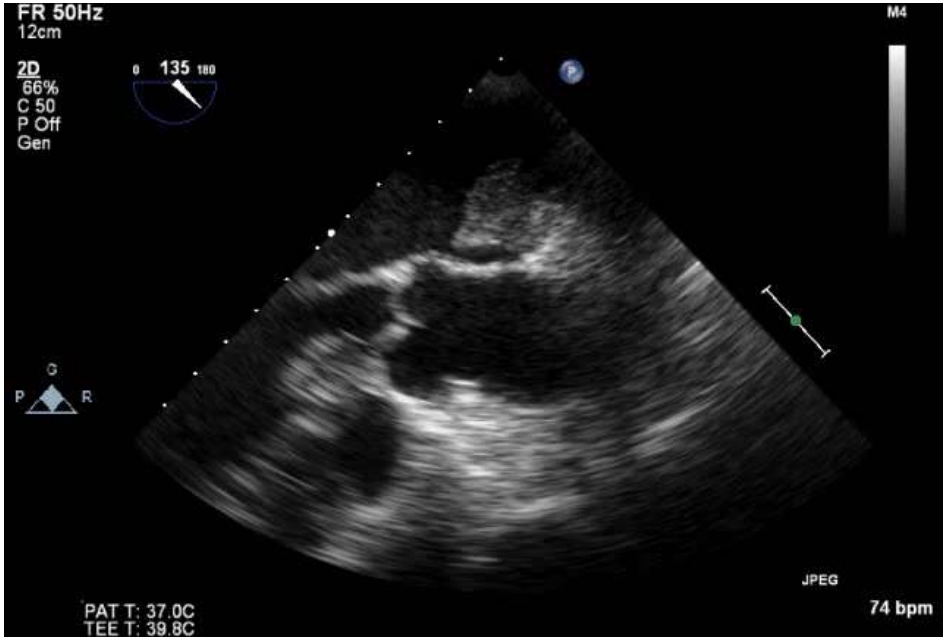
- F/92
- Permanent AF
- HT/CHF/TIA
- Hx of ICH while on apixaban 2.5mg BD

- Proceed to LAAO with AMULET #25mm

At Implantation

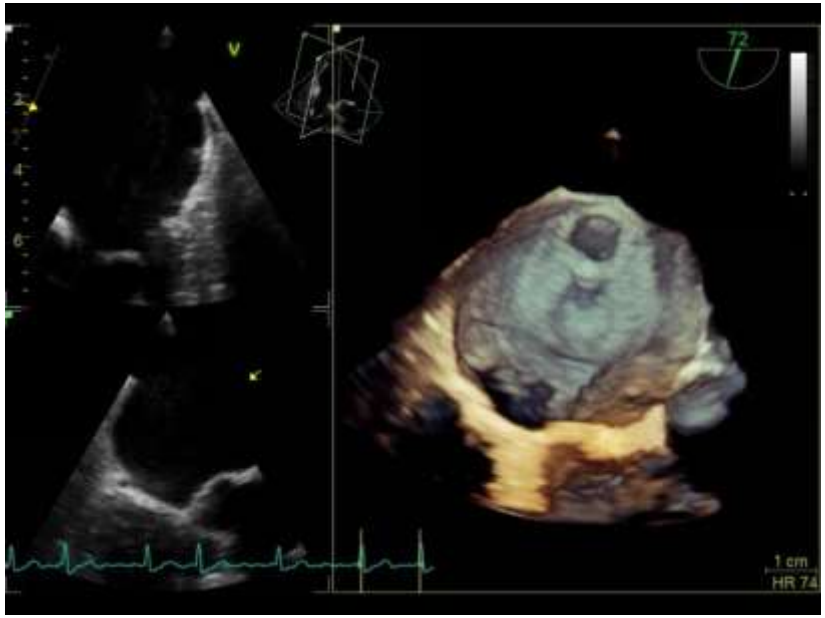
Post-LAAO started on DAPT

3 month TEE



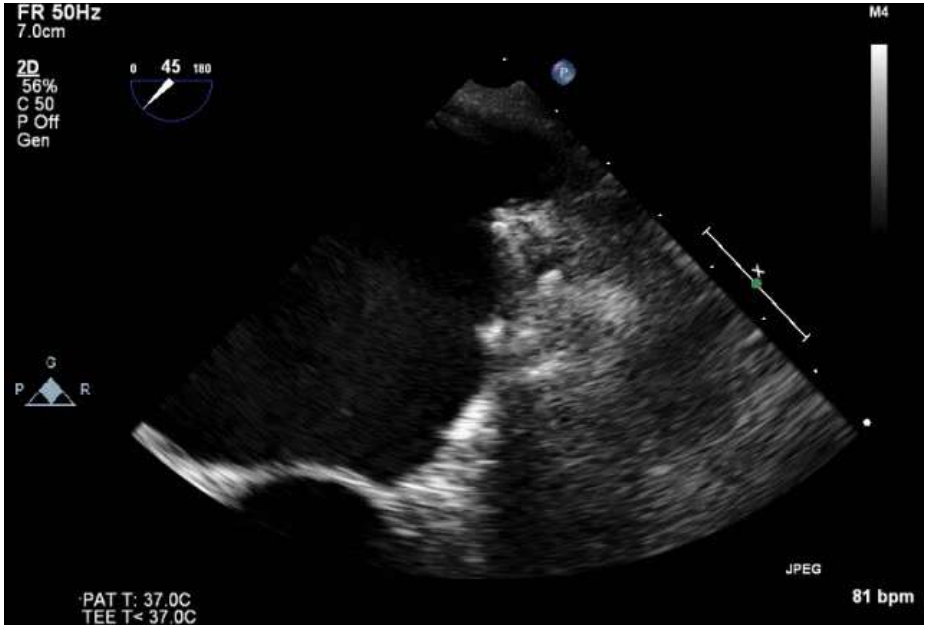
Huge clot → Switched DAPT to edoxaban 30mg daily

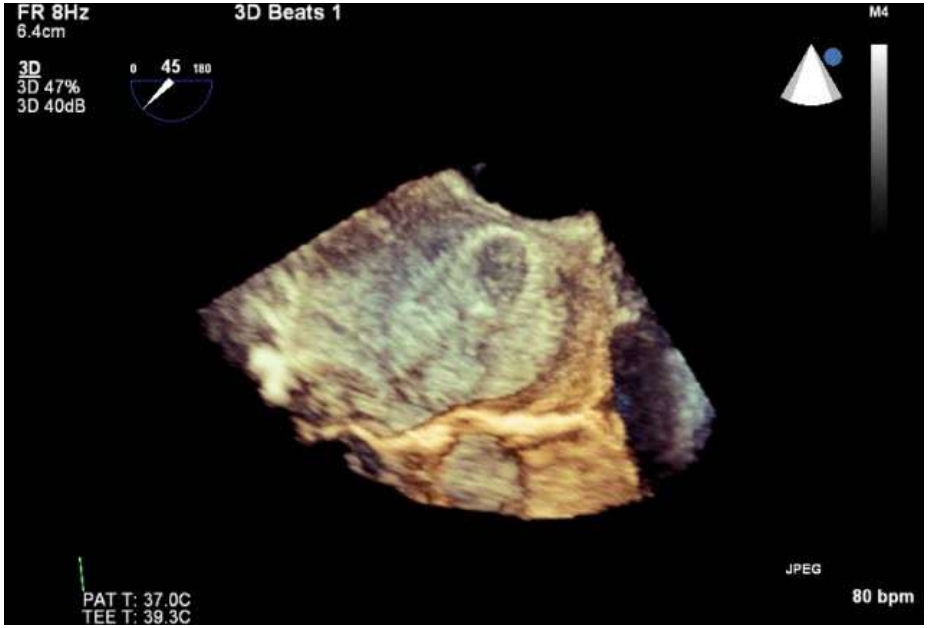
6 month TEE



DRT resolved, edoxaban kept for 3 more months

12 month TEE





No more DRT, what next?

Case - LAmbre

F/88 pAF Hx of CSDH

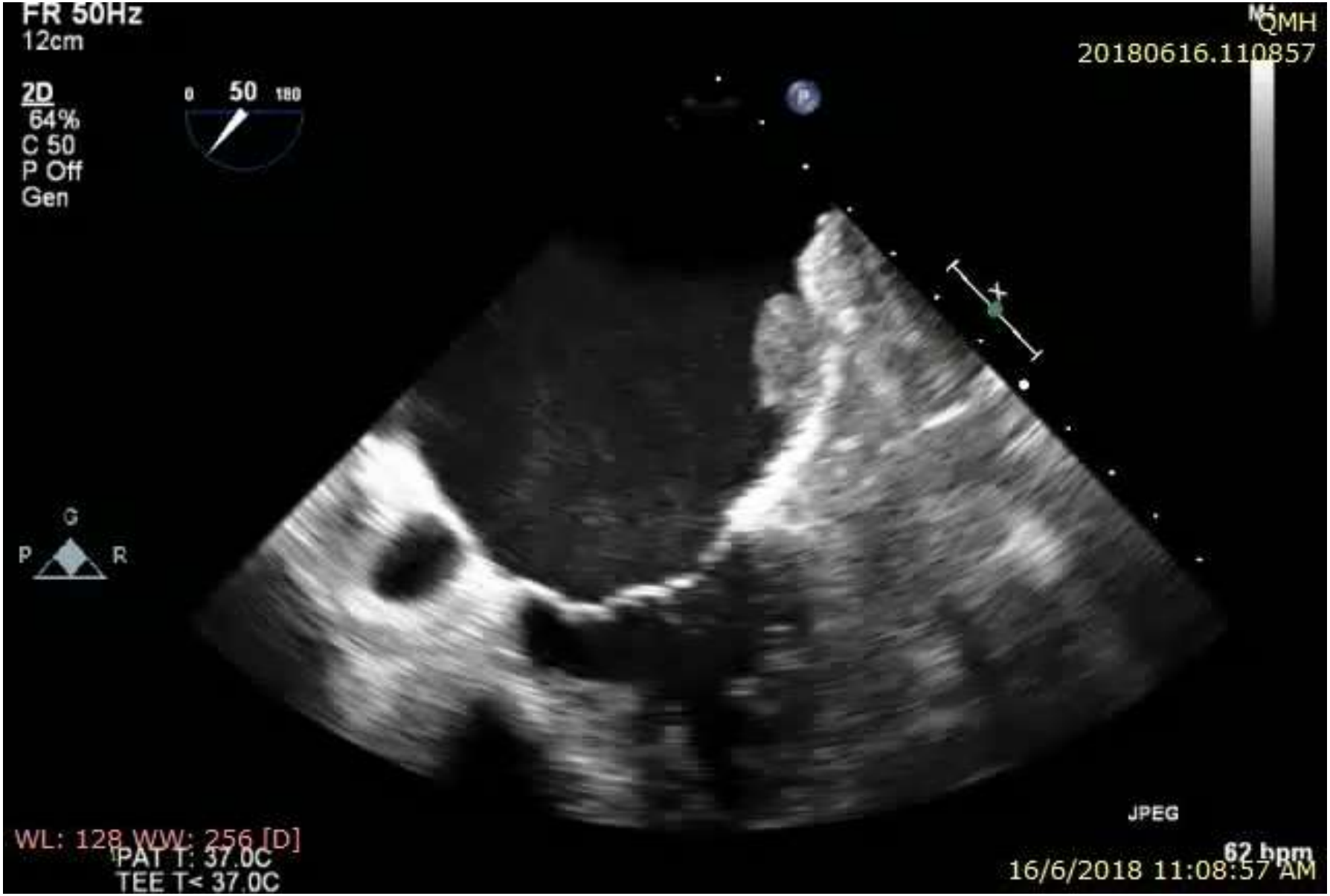
Implantation of LAmbre #2436 12/2017

aspirin+ apixaban on discharge

3M reassessment TEE – No leak/thrombus

Keep aspirin only

TEE at 6M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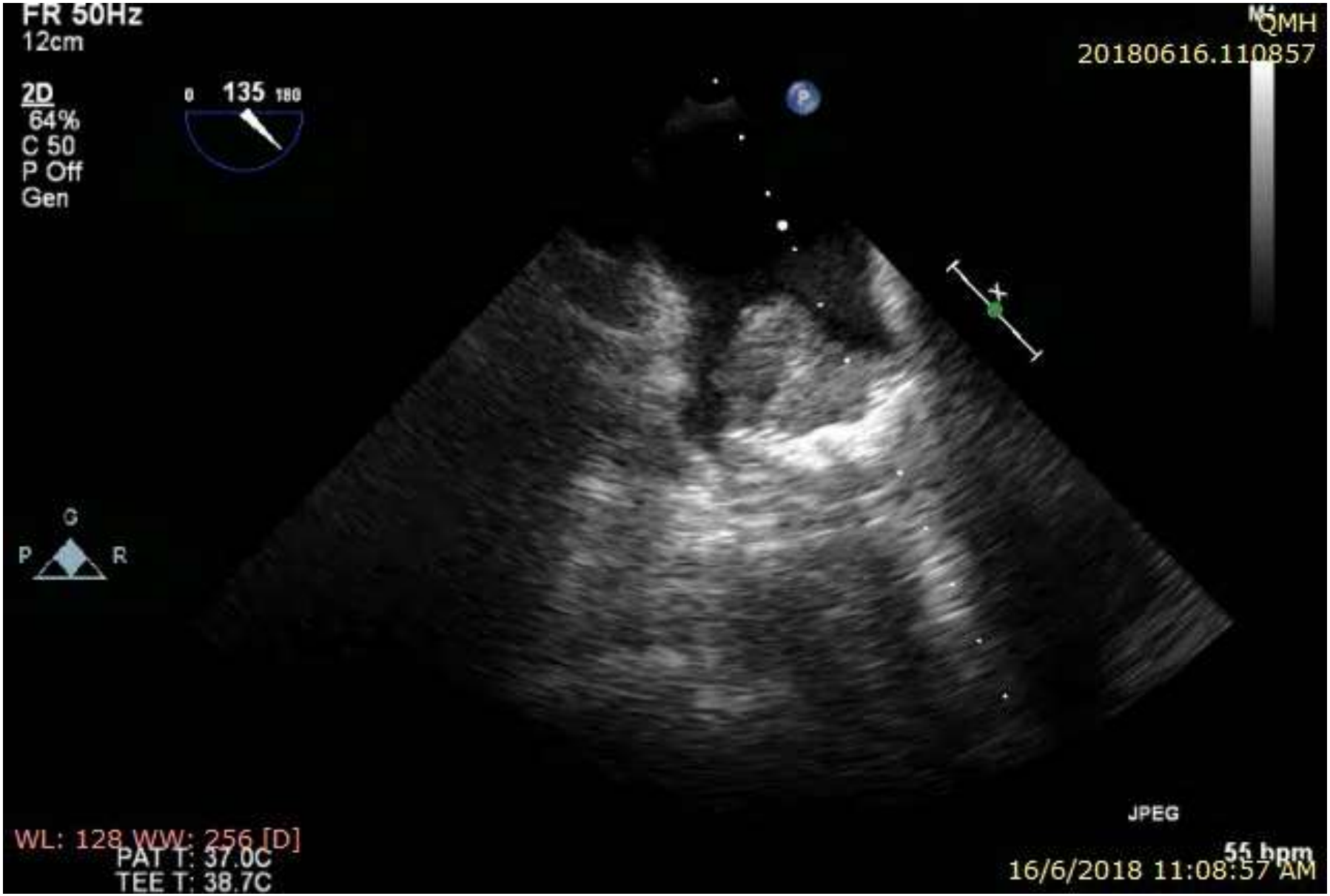
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Resumed on aspirin **+ apixaban**

Proceed to 9M TEE

TEE at 9M and 12M

- Total resolution of thrombus
- Keep single antiplatelet 6M then off

Conclusions

- DRT rate: 3-7%
- DRT is associated with stroke or systemic embolization
- Post-LAAO regimens are very variable
  - For watchman: 45 days of warfarin + ASA then 6 months of clopidogrel + ASA then aspirin life-long
  - For Amplatzer: DAPT for 1-6 months
- Increased surveillance → pick up more DRT
  BUT more aggressive anti-thrombotic regimen → more bleeding
  ?risks/benefits