VII CONGRESSO NAZIONALE

ECOCARDIOCHIRURGIA 2014

Quando decidere di chiudere l'auricola sx Cenni di tecnica

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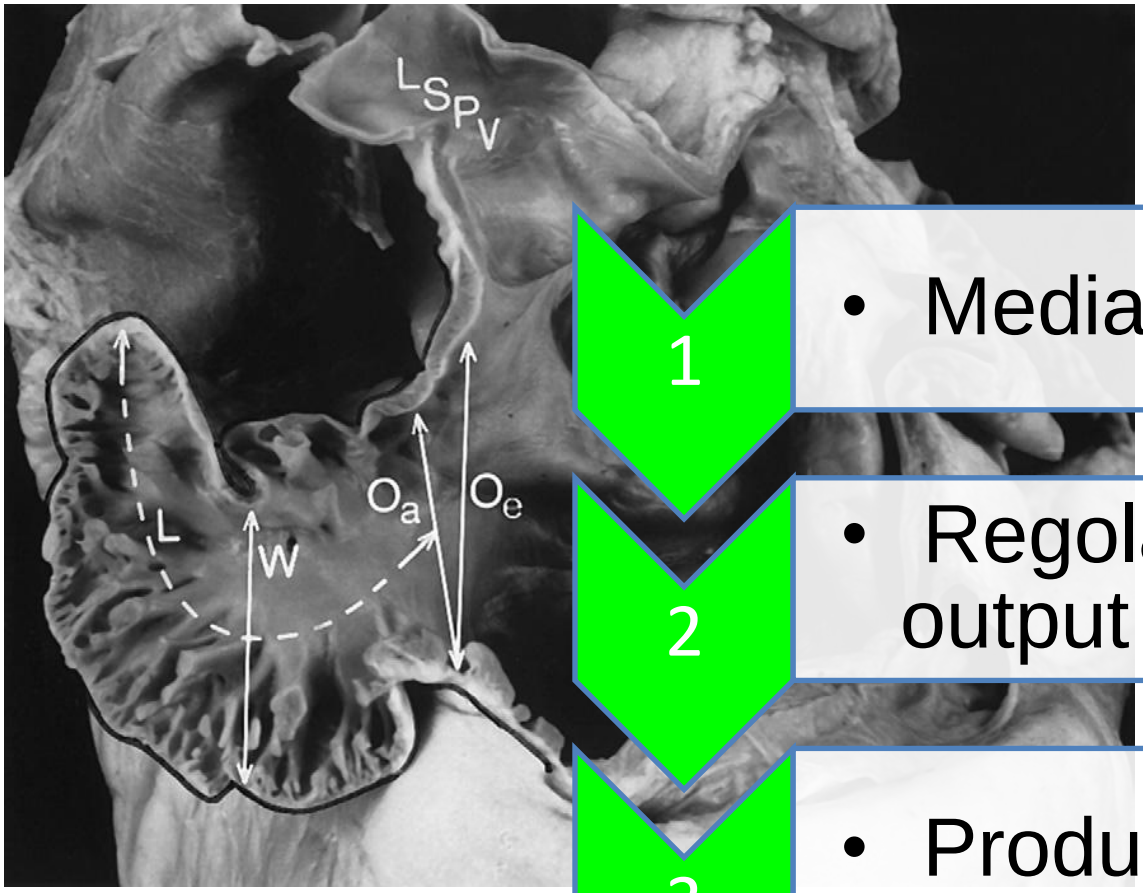
UNIVERSITÀ DEGLI STUDI DI MILANO

LAA: "appendice" così inutile?

LAA … Funzioni…??



1. • Mediatore della sete
2. • Regolatore cardiac output
3. • Produttore ANP e BNP

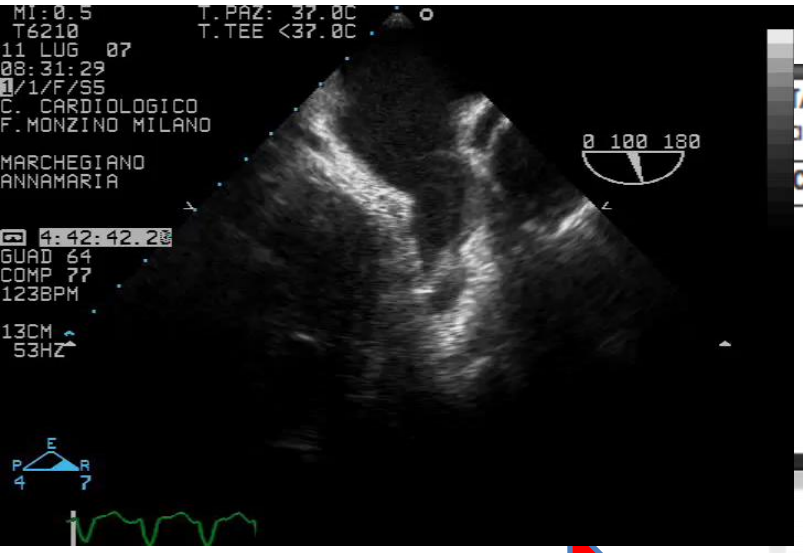


TABLE 1. Annual risk of stroke in patients with nonvalvular AF not treated with anticoagulation (with 95% CIs) according to the $CHADS_2$ score

$CHADS_2$ Score	Stroke Risk (%)	95% CI	Patients (n = 1733)
0	1.9	1.2-3.0	120
1	2.8	2.0-3.8	463
2	4.0	3.1-5.1	523
3	5.9	4.6-7.3	337
4	8.5	6.3-11.1	220
5	12.5	8.2-17.5	65
6	18.2	10.5-27.4	5

1

- NV-Afib: 17% LA thrombosis : 91% in LAA (*Blackshear and Odell; Ann Thorac Surg 1996*)

2

- LAA remodeling in Hypertension, Heart failure and Afib

Blackshear et al Ann Thor Surg 1996

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

Setting	No. of Patients	Thrombus Location: LA Appendage	Thrombus Location: LA Cavity	Reference No.
TEE[a]	317	66	1	40
TEE	233	34	1	25
Autopsy	506	35	12	39
TEE	52	2	2	28
TEE	48	12	1	41
TEE and Operation	171	8	3	24
SPAF III TEE Study	359	19	1	42
TEE	272	19	0	26
TEE	60	6	0	43
Total	1,288	201	21	

[a] 5% of this cohort had mitral stenosis or a prosthetic mitral valve.

LA = left atrium; SPAF III = Stroke Prevention in Atrial Fibrillation Trial; TEE = transesophageal echocardiography.

CHA_2DS_2-VASc Score[2]

Risk factors for stroke and thrombo-embolism in non-valvular AF

'Major' risk factors

'Clinically relevant non-major' risk factors

Risk factor-based approach as a point based scoring system with the acronym CHA_2DS_2-VASc (Note maximum score is 9 since age may contribute 0, 1 or 2 points)

Risk Factor | Score

- Previc TIA, o embo
- Age ≥

a. Prior my may var

Letter	Clinical Characteristic	Points Awarded
H	Hypertension	1
A	Abnormal renal and liver function (1 point each)	1 or 2
S	Stroke	1
B	Bleeding	1
L	Labile INRs	1
E	Elderly	1
D	Drugs or alcohol (1 point each)	1 or 2
Maximum possible score is 9		

Rischio stroke annuo

2.2%

Systolic > 160

CRD; Crea>200
Cirrhosis;
AST/ALTx3

Previous or high risk

TTR<60%

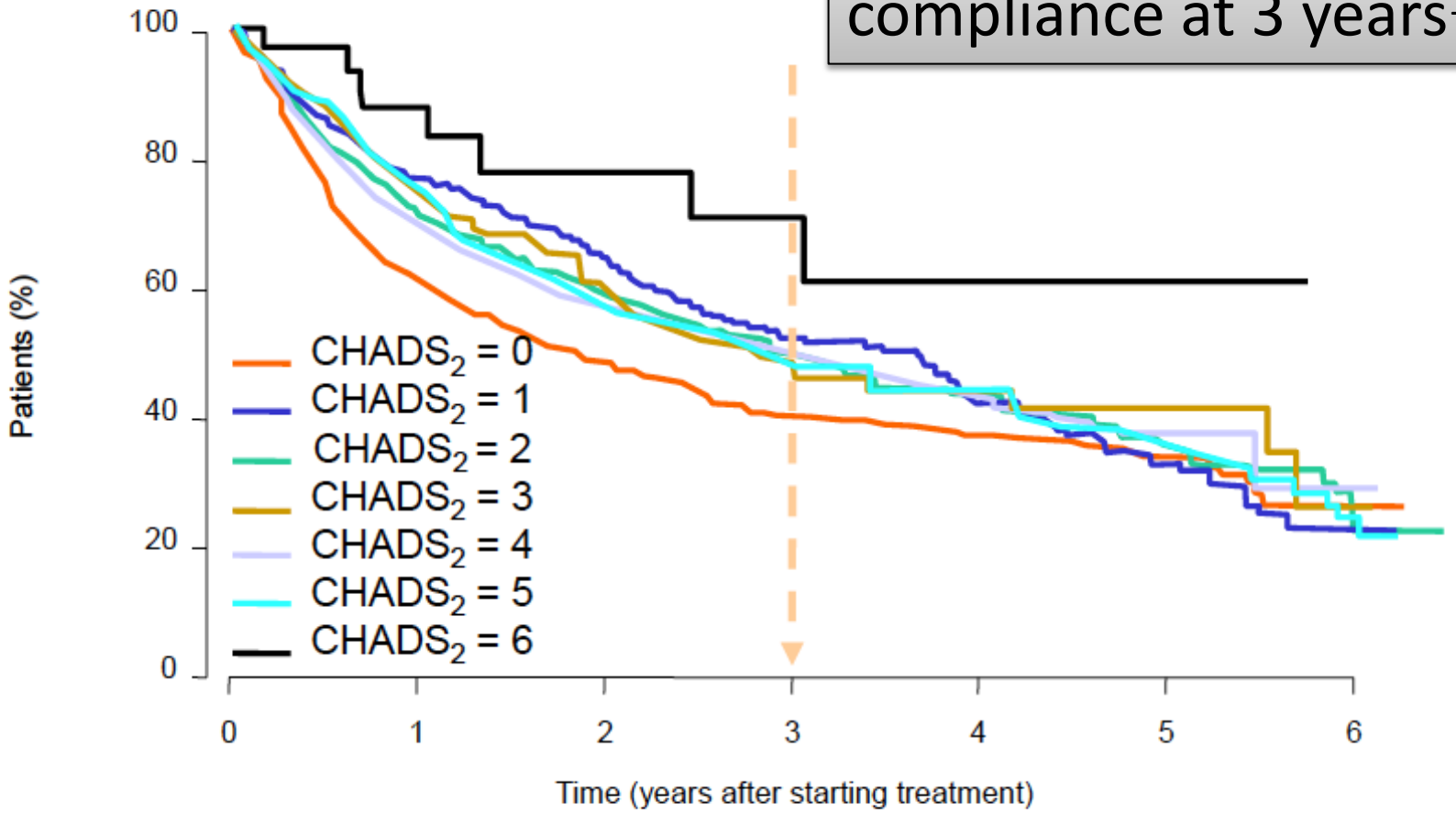
>65

NSAID/steroids

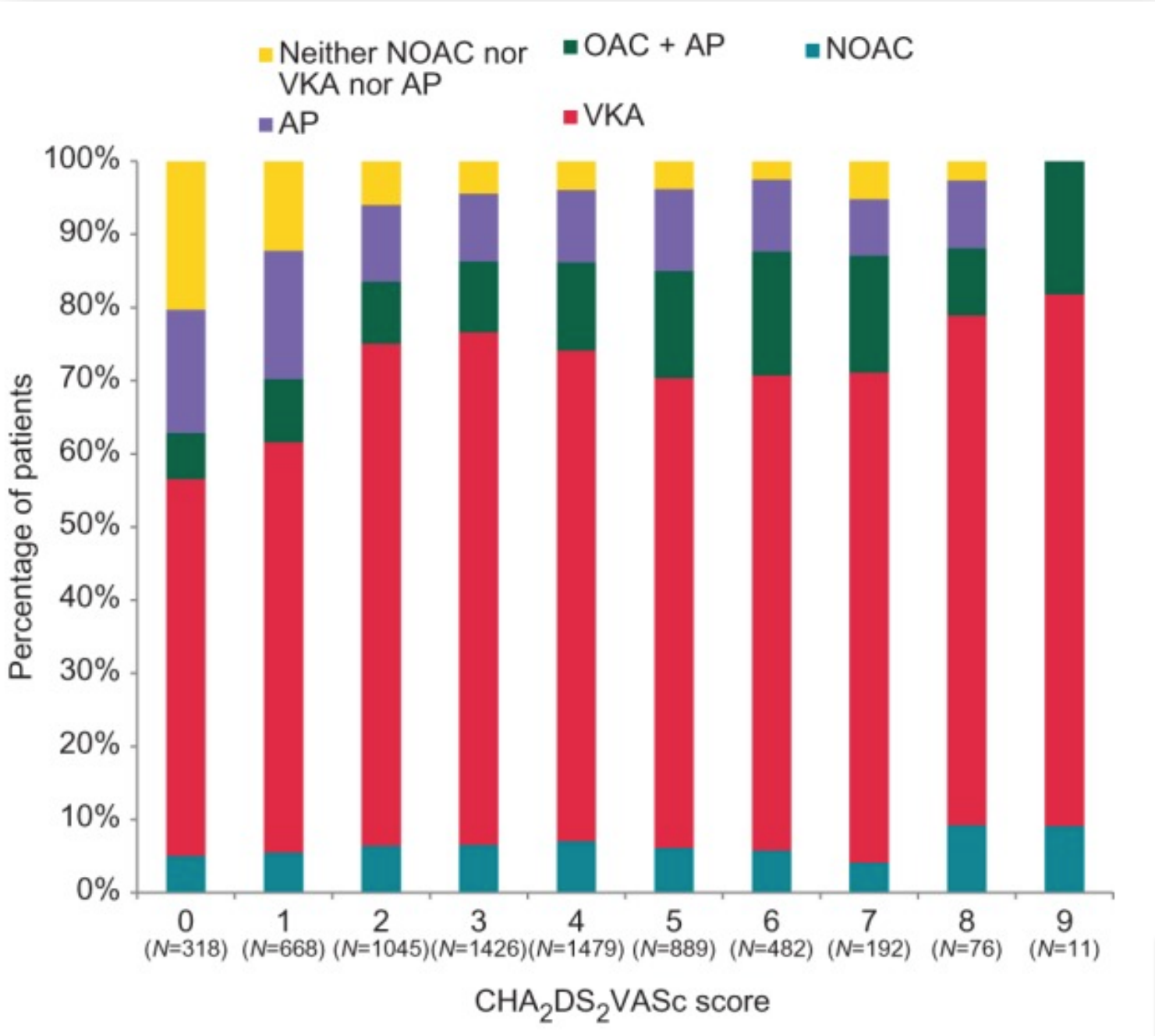
ESC : if > 3 caution with OAC!

Do the appropriate patients receive stroke prophylaxis?

Approximately 50% loss of compliance at 3 years[1]



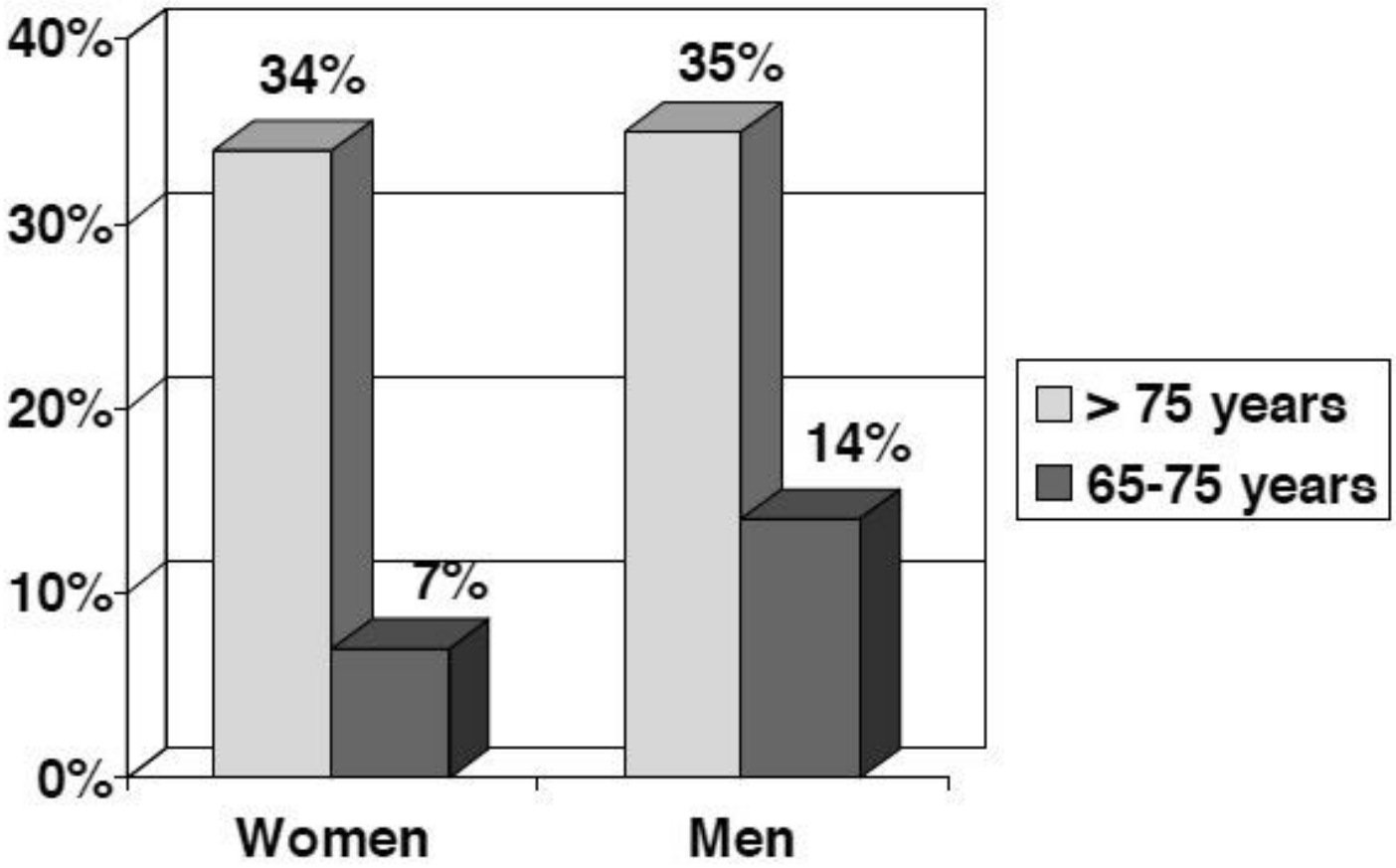
[1] Gallagher AM, et al., Initiation and persistence of Warfarin or aspirin in patients with chronic AF in general practice J Thromb Haemost 2008; 6: 1500–6.
[2] Khoo, Lip Initiation and persistence of Warfarin or aspirin as thromboprophylaxis in chronic AF - J Thromb Haemost 2008; 6: 1622



PREFER in AF Trial
Kirchhof et al
Europace 2013

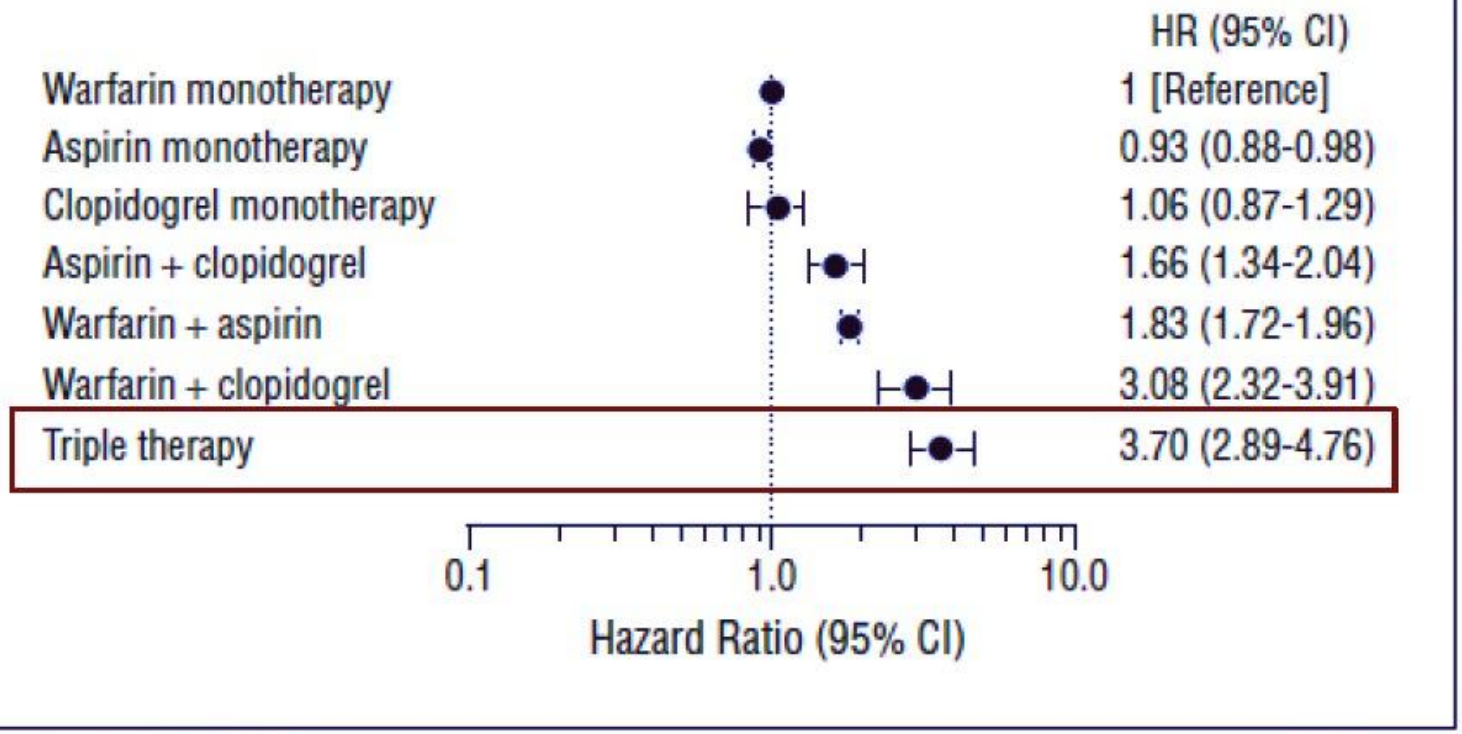
Irreversible contraindication (SPAF III) to OAC:

- Major bleeding during previous 6 months
- Frequent falls
- Inability to comply to treatment
- Alcohol consumption
- Uncontrolled Hypertension
- Frequent use od NSAIDs



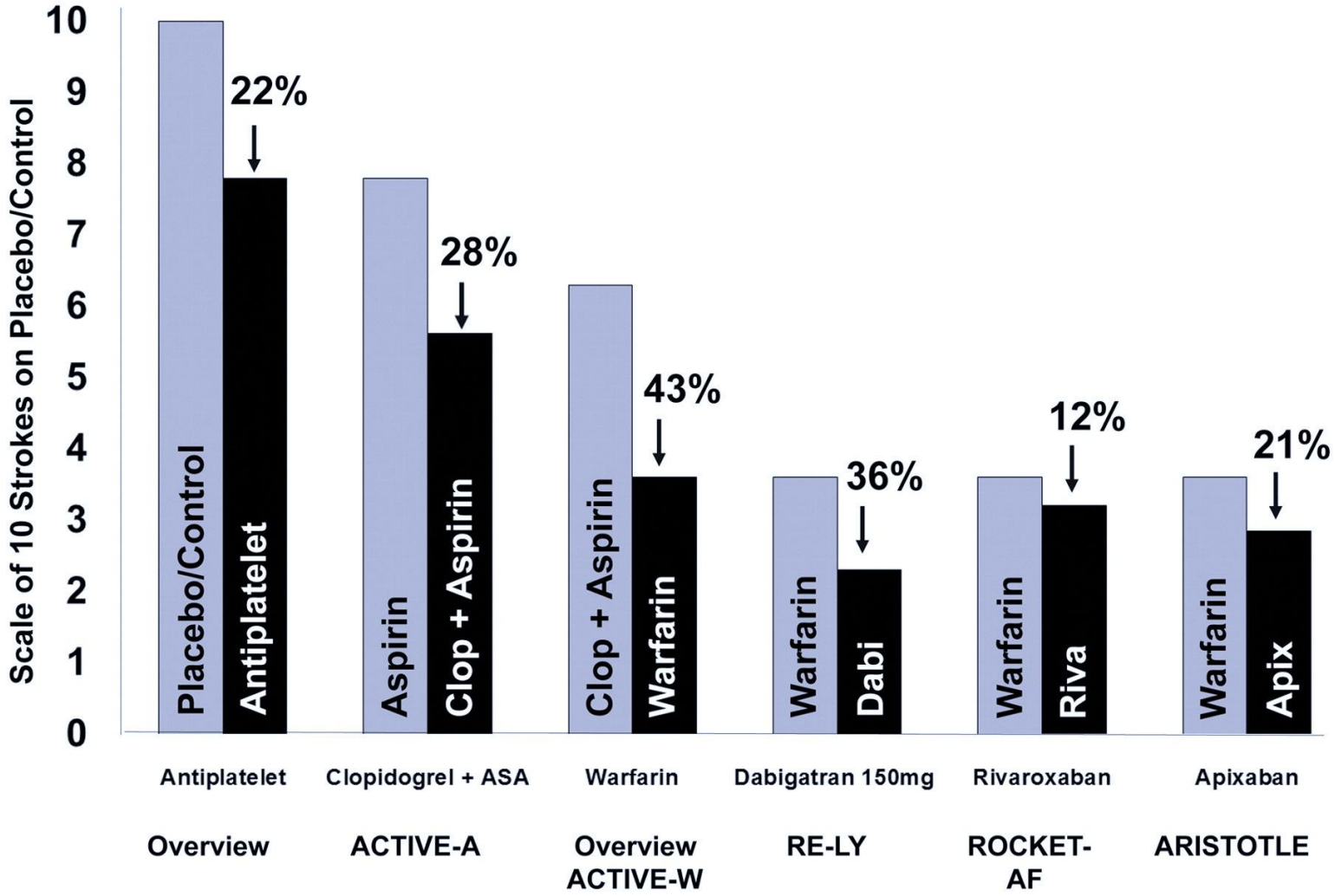
Sudlow M et al The Lancet 1998

Risk of bleeding or ischemic stroke with single, dual or triple therapy (Warfarin, Aspirin, Clopidogrel) in AF Pts



Hansen ML, Archives of Internal Medicine 170, 1433-41 (2010)

Stroke risk reductions from randomized trials of antithrombotic agents in AF



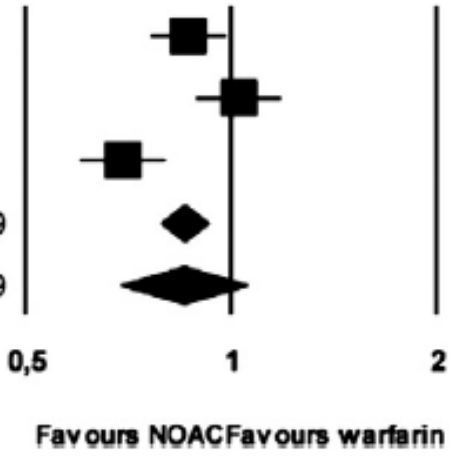
Granger C B , and Armaganijan L V Circulation. 2012;125:159-164

American Heart Association.

Int J Cardiol 2012

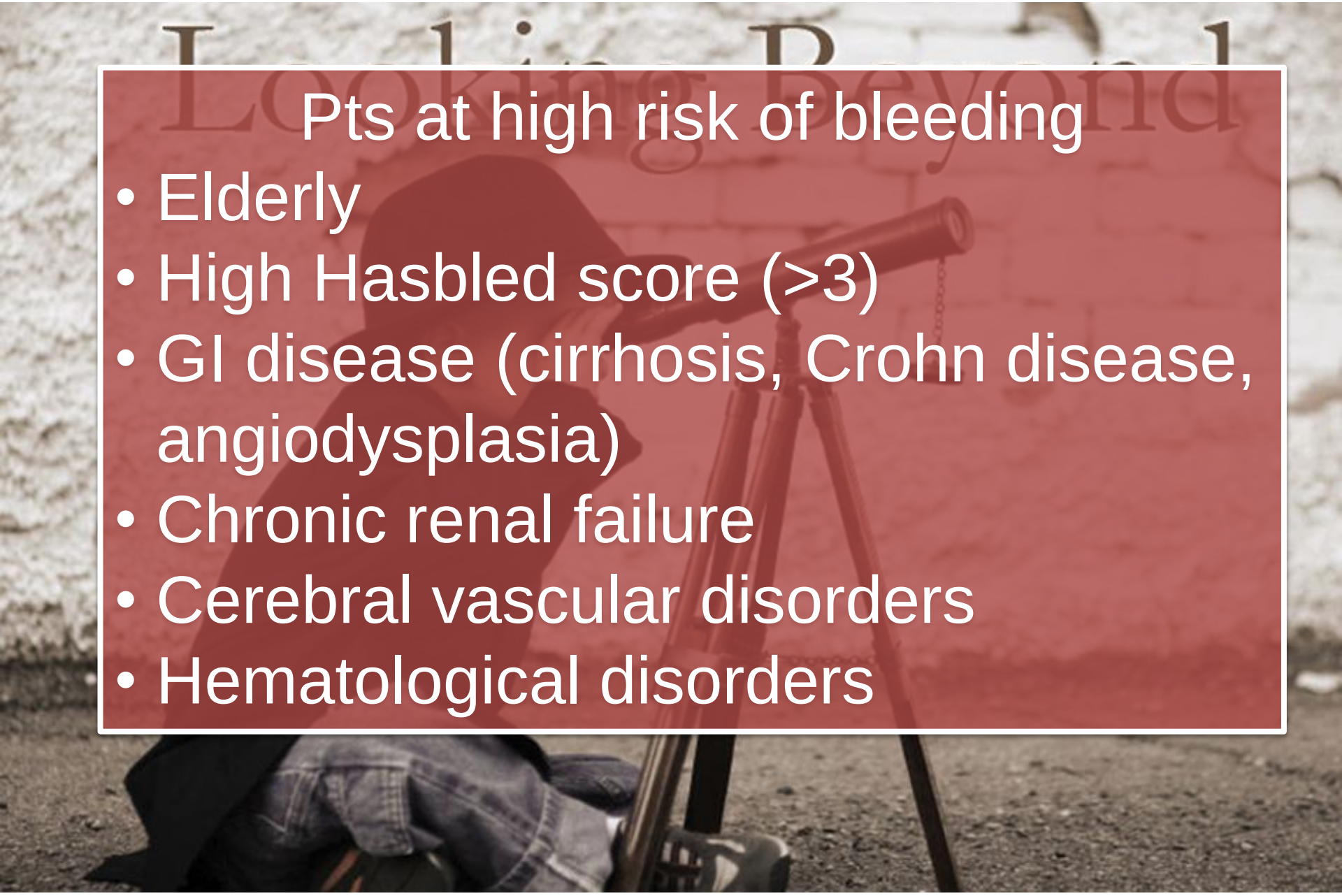
Major Bleeding

Model	Study name	Odds ratio	Lower limit	Upper limit	p-Value	NOAC	Warfarin
	RE-LY	0,867	0,763	0,984	0,028	697 / 12091	397 / 6022
	ROCKET-AF	1,027	0,889	1,186	0,719	395 / 7111	386 / 7125
	ARISTOTLE	0,694	0,600	0,802	0,000	327 / 9088	462 / 9052
Fixed		0,853	0,788	0,924	0,000	1419 / 28290	1245 / 22199
Random		0,852	0,688	1,054	0,141	1419 / 28290	1245 / 22199



Efficacy and Safety Outcomes in patients treated with NOACs or Warfarin.

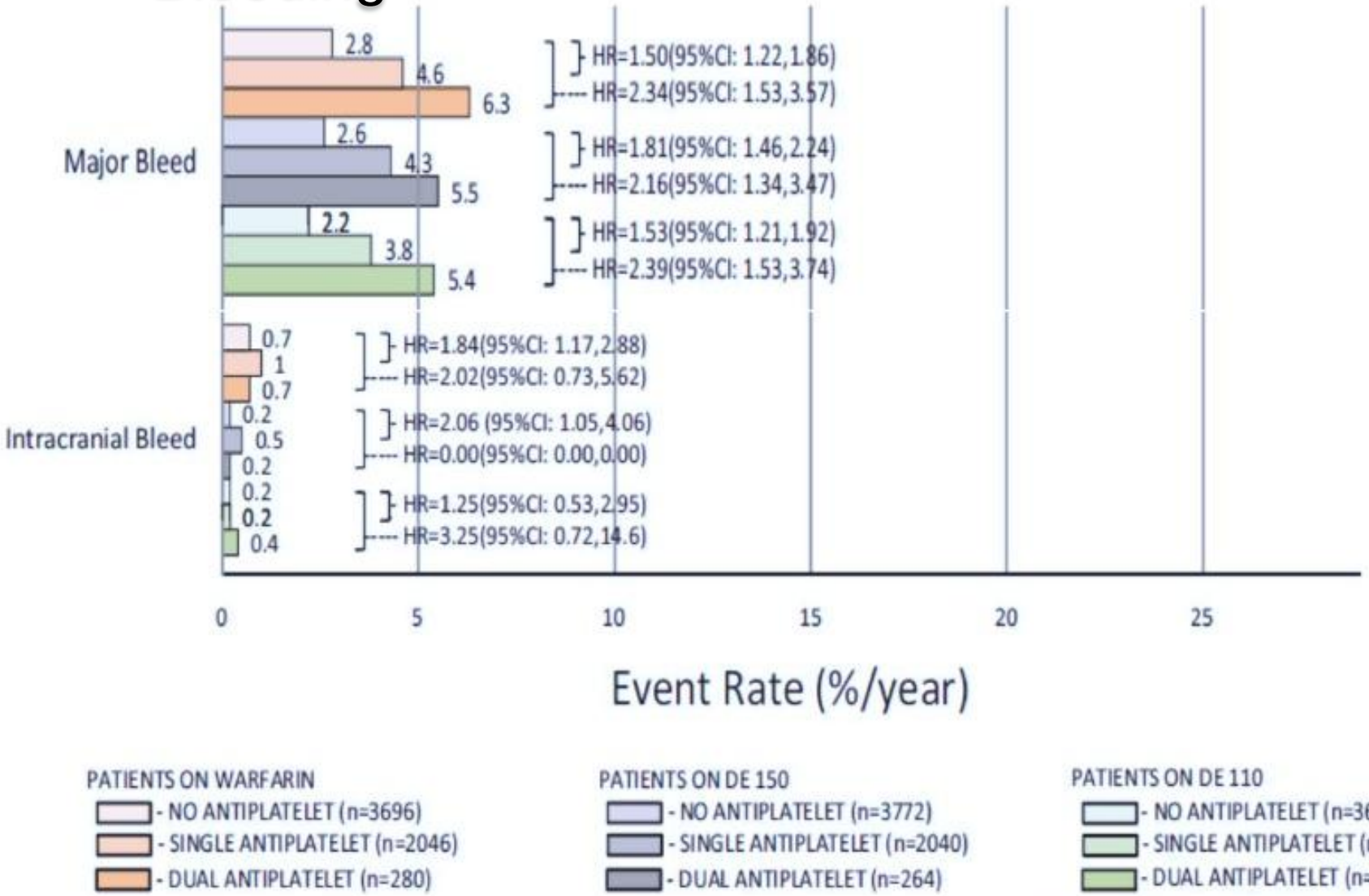
Endpoint, % (n/N)	NOACs (n = 28342)	Warfarin (n = 22236)	Random Effects (OR, 95% CI)	Fixed Effects (OR, 95% CI)	P value	I^2, %	Heterogeneity, p
Efficacy							
Stroke or systemic embolism	2.8 (797/28292)	3.5 (770/22193)	0.82 (0.74–0.91)	0.82 (0.74–0.91)	<0.001	0	0.62
Stroke	2.4 (688/28292)	3.0 (670/22193)	0.79 (0.71–0.88)	0.79 (0.71–0.88)	<0.001	0	0.80
Hemorrhagic	0.3 (95/28292)	0.8 (173/22193)	0.44 (0.30–0.66)	0.45 (0.35–0.58)	<0.001	59	0.09
Ischemic or unspecified	2.0 (588/28292)	2.2 (489/22193)	0.93 (0.82–1.05)	0.93 (0.82–1.05)	0.21	0	0.96
Death from any cause	6.0 (1695/28292)	6.3 (1406/22193)	0.88 (0.82–0.95)	0.88 (0.82–0.95)	0.001	0	0.76
Myocardial Infarction	1.3 (366/28292)	1.3 (291/22193)	0.99 (0.71–1.38)	0.98 (0.83–1.15)	0.94	76	0.02
Safety							
Major bleeding	5.0 (1419/28290)	5.6 (1245/22199)	0.85 (0.69–1.05)	0.85 (0.79–0.92)	0.14	86%	0.001
Intracranial bleeding	0.6 (170/28290)	1.3 (293/22199)	0.46 (0.38–0.55)	0.46 (0.33–0.65)	<0.001	70%	0.036
Gastrointestinal bleeding	2.3 (644/28290)	1.3 (291/22199)	1.68 (1.03–2.72)	1.70 (1.47–1.96)	0.036	91%	<0.001
ALT or AST >3× ULN with concurrent bilirubin >2× ULN	0.3 (89/27990)	0.4 (87/21903)	0.85 (0.63–1.14)	0.85 (0.63–1.14)	0.28	0	0.44



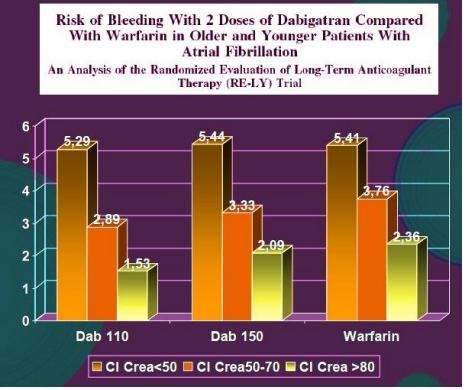
Pts at high risk of bleeding

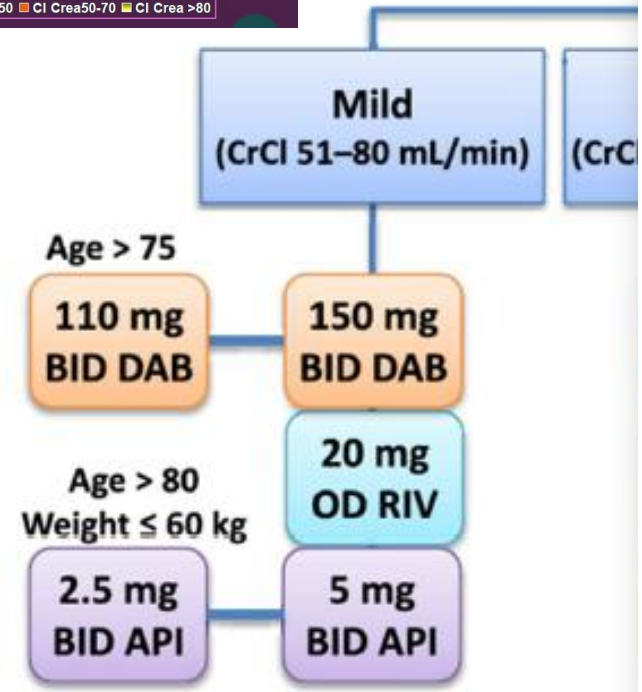
- Elderly
- High Hasbled score (>3)
- GI disease (cirrhosis, Crohn disease, angiodysplasia)
- Chronic renal failure
- Cerebral vascular disorders
- Hematological disorders

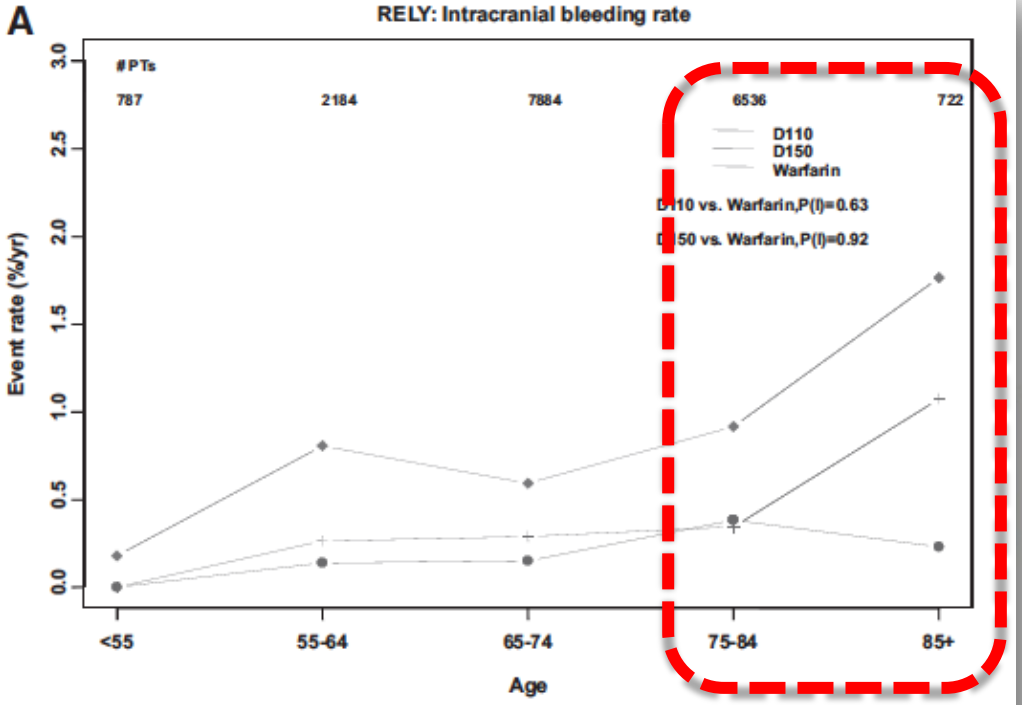
Antiplatelet + Dabigatran in RELY : Bleeding

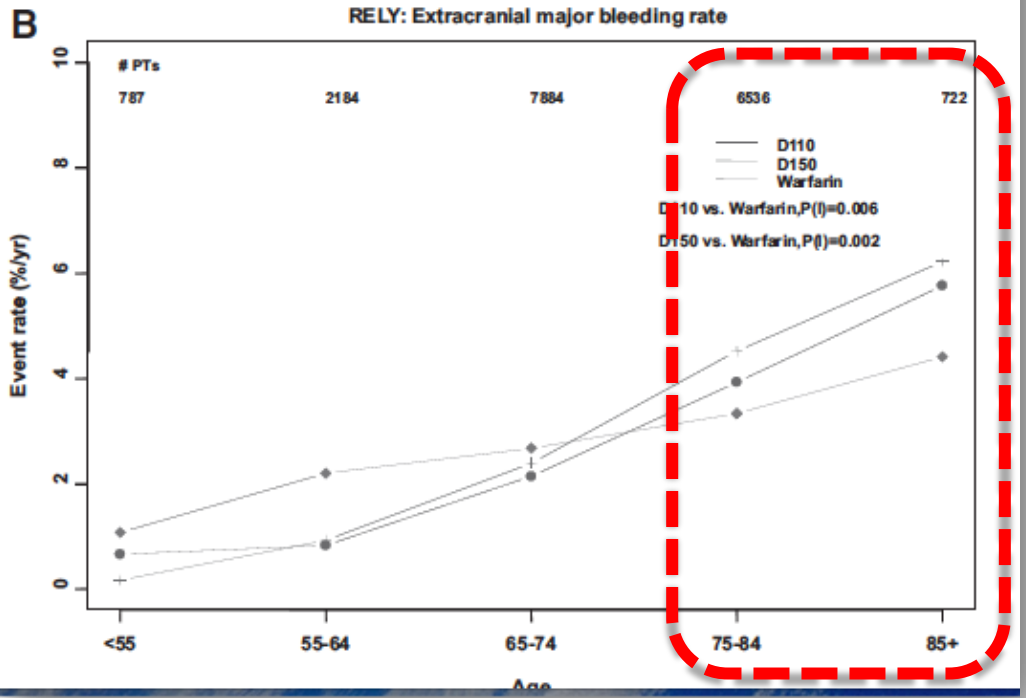


Circulation. 2013;127:634-640


Risk of Bleeding With 2 Doses of Dabigatran Compared With Warfarin in Older and Younger Patients With Atrial Fibrillation
An Analysis of the Randomized Evaluation of Long-Term Anticoagulant Therapy (RE-LY) Trial
5.29
2.89
1.53
5.44
3.33
2.09
5.41
3.76
2.36
Dab 110
Dab 150
Warfarin
Cl Crea<50
Cl Crea50-70
Cl Crea >80


Mild
(CrCl 51–80 mL/min)
Age > 75
110 mg
BID DAB
150 mg
BID DAB
20 mg
OD RIV
Age > 80
Weight ≤ 60 kg
2.5 mg
BID API
5 mg
BID API


A
RELY: Intracranial bleeding rate
PTs
787
2184
7884
6536
722
D110
D150
Warfarin
D110 vs. Warfarin,P(I)=0.63
D150 vs. Warfarin,P(I)=0.92
Event rate (%/yr)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
<55
55-64
65-74
75-84
85+
Age


B
RELY: Extracranial major bleeding rate
PTs
787
2184
7884
6536
722
D110
D150
Warfarin
D110 vs. Warfarin,P(I)=0.006
D150 vs. Warfarin,P(I)=0.002
Event rate (%/yr)
0
2
4
6
8
10
<55
55-64
65-74
75-84
85+

Intracranial Hemorrage recurrence rate

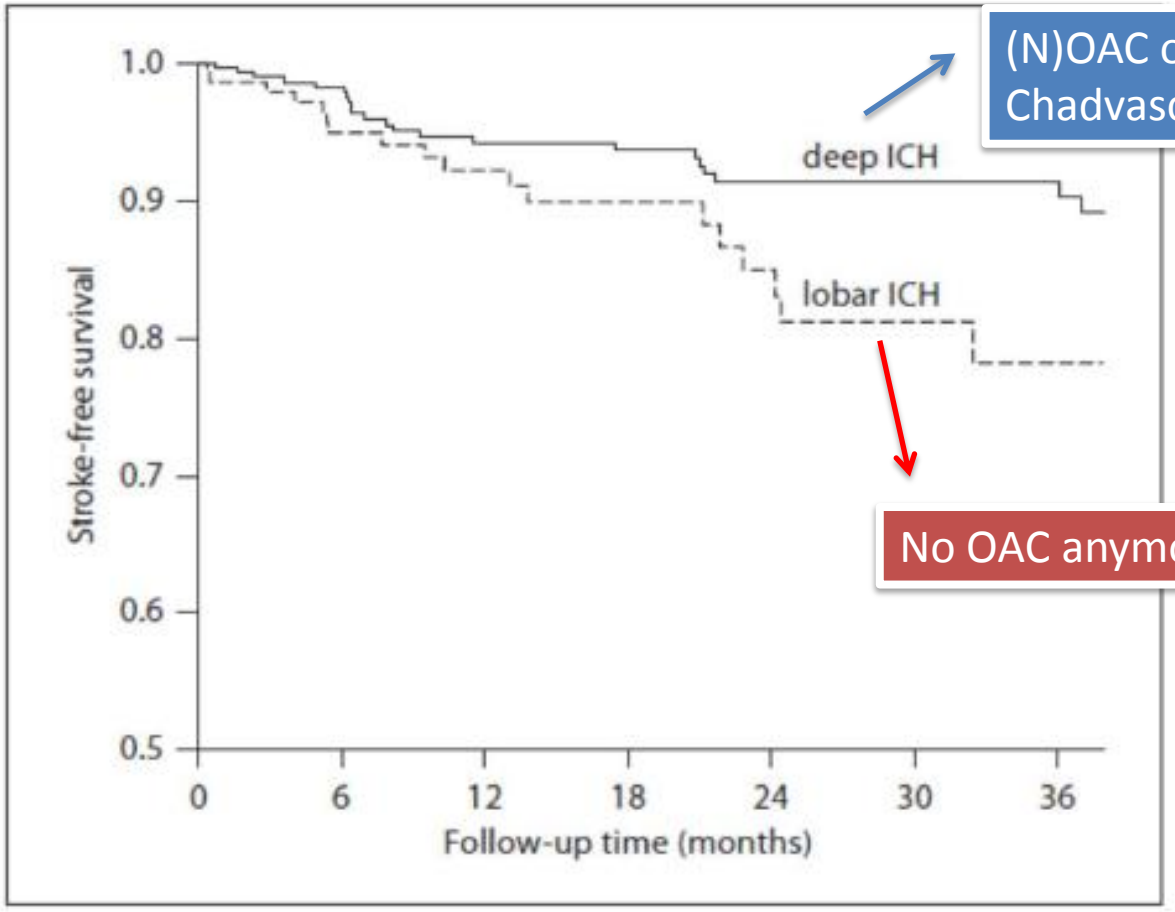
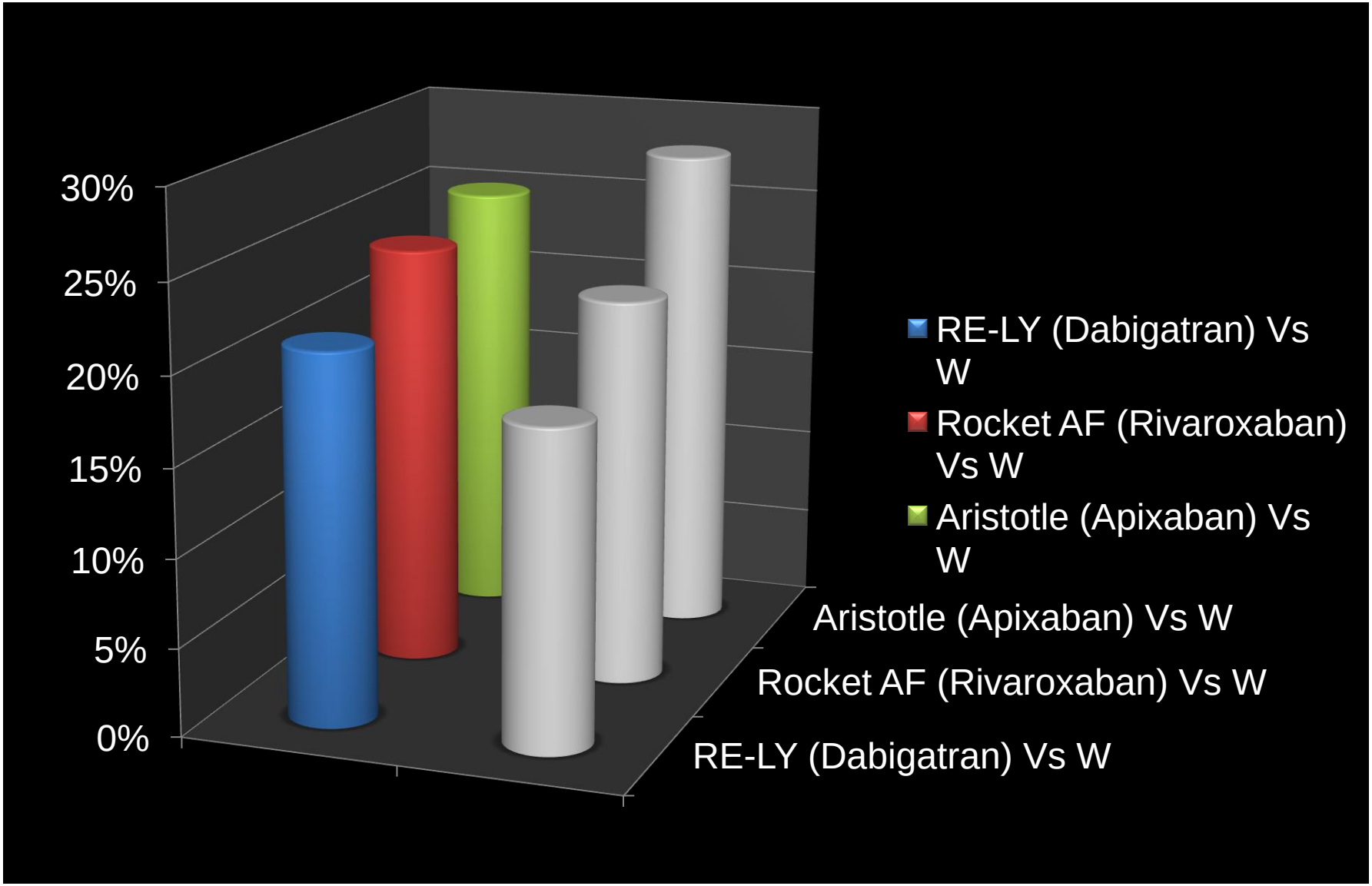
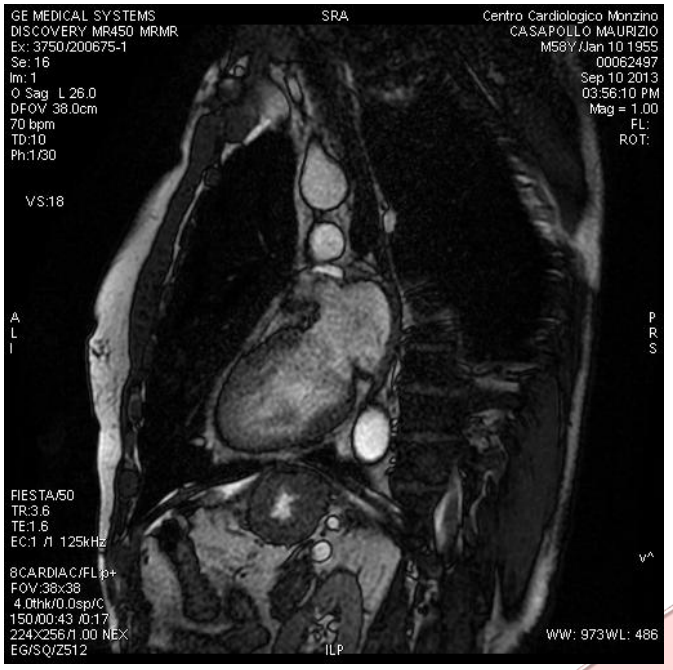


Fig. 1. Kaplan-Meier curves for stroke-free survival after deep (n = 308) and lobar (n = 157) ICH.

Weimar et al; Cerebrovascular Dis 2011; 32: 283-288

NOACs : Drug discontinuation rate





Staples-exclusion

Percutaneous occlusion (PLAATO early 2000's)

Current percutaneous devices

Hybrid approach (Lariat)

Evidences

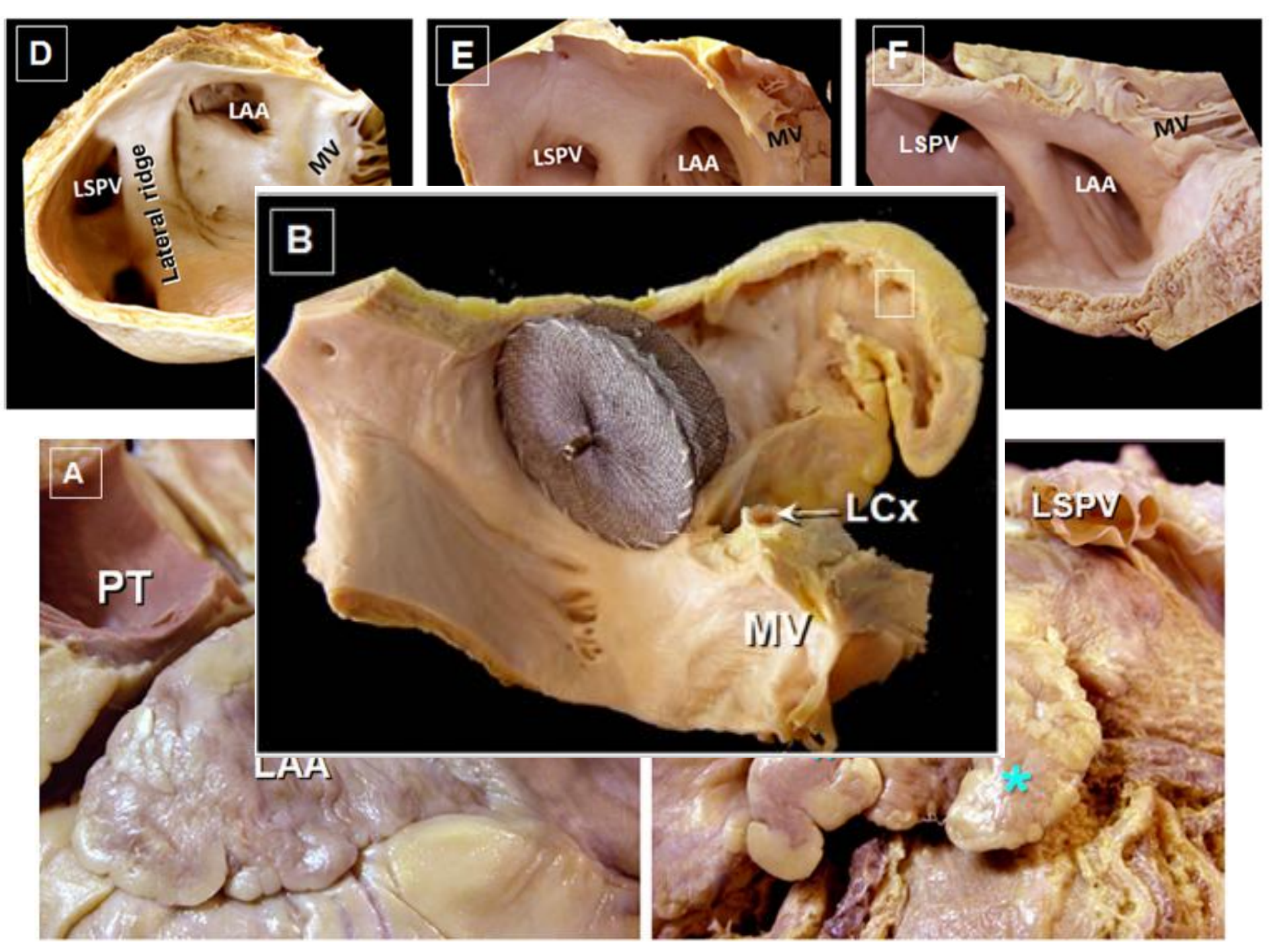
RESECTION OF THE LEFT AURICULAR APPENDIX

A Prophylaxis for Recurrent Arterial Emboli

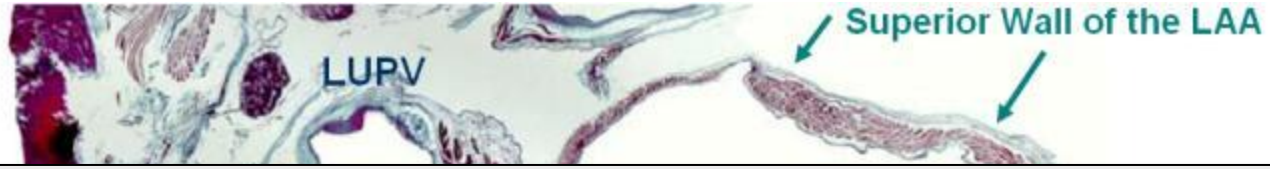
JOHN L. MADDEN, M.D.
New York

JAMA. 1949;

bility
stroke
prevention
(concomita
nt)

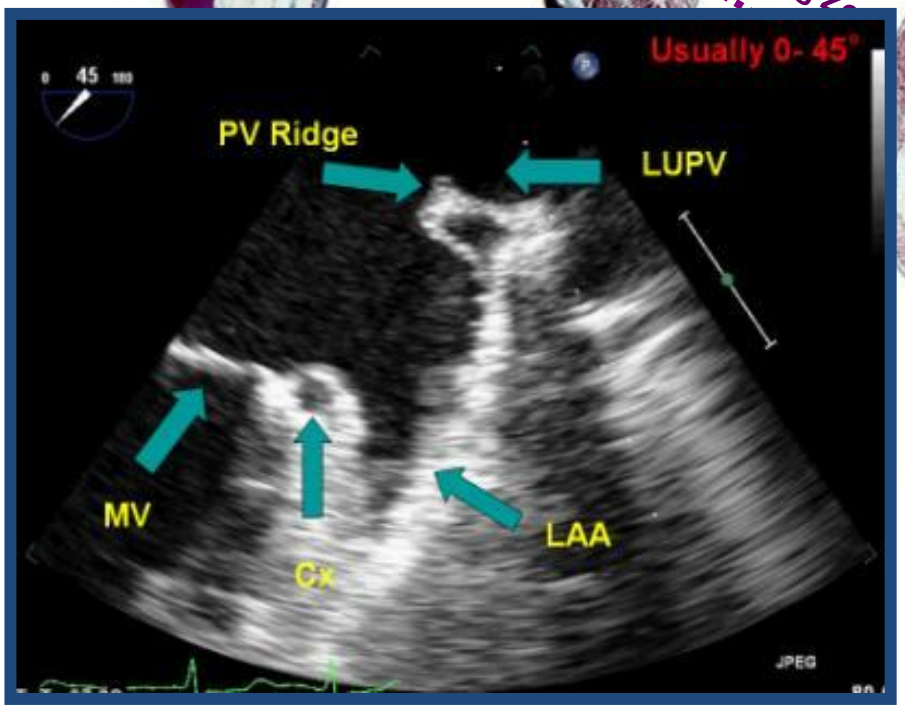

D
LAA
MV
LSPV
Lateral ridge
E
LSPV
LAA
MV
F
LSPV
MV
LAA
B
LCx
MV
A
PT
LAA
LSPV

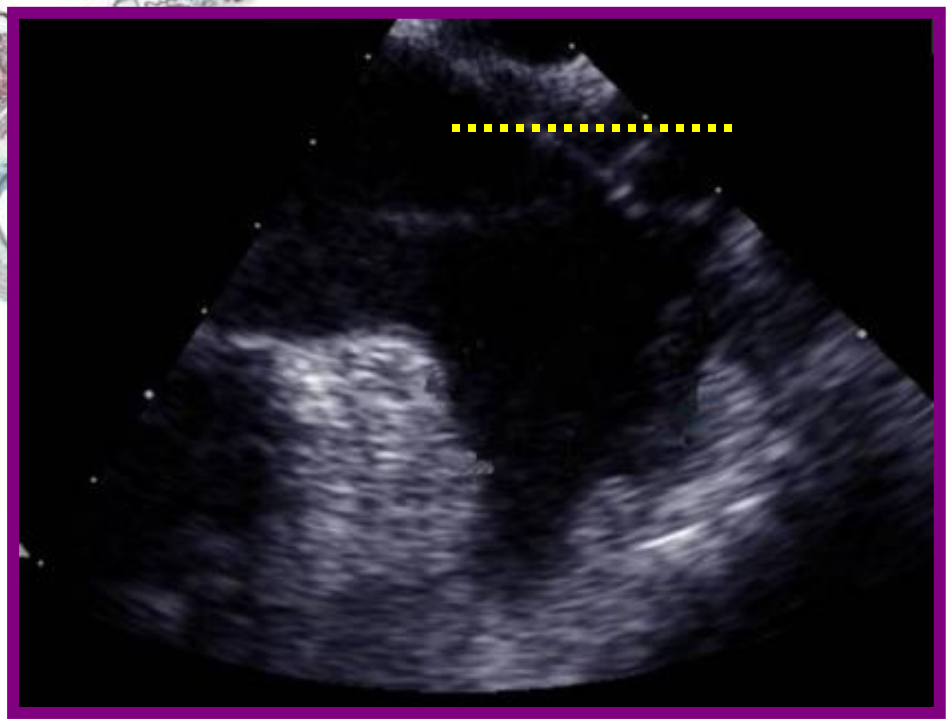
LAA Anatomy and landmarks



Short Axis View

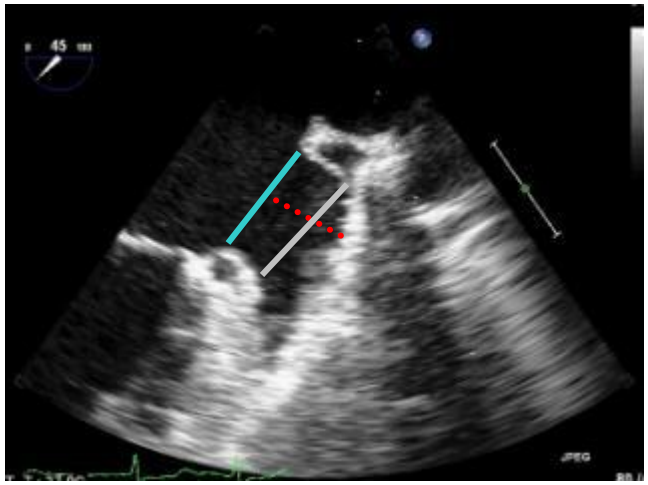
Long Axis View

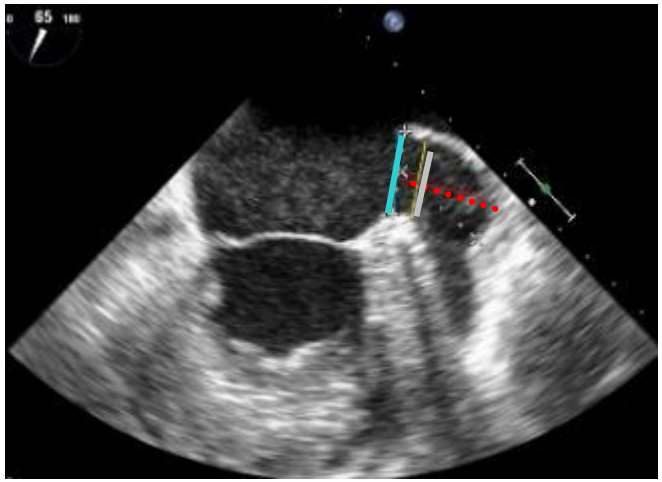




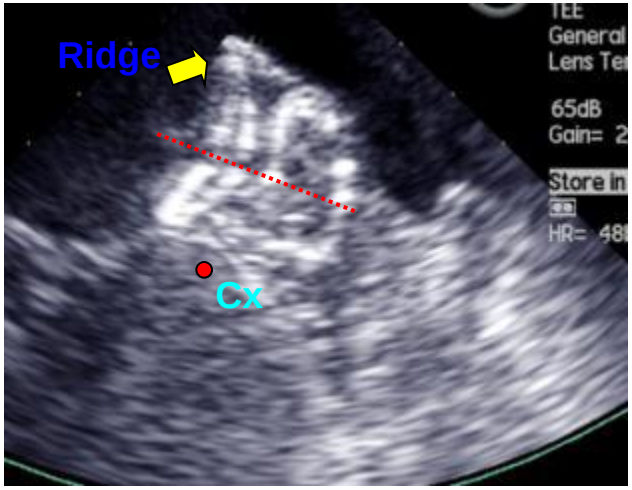
LAA Measurements and ACP Location

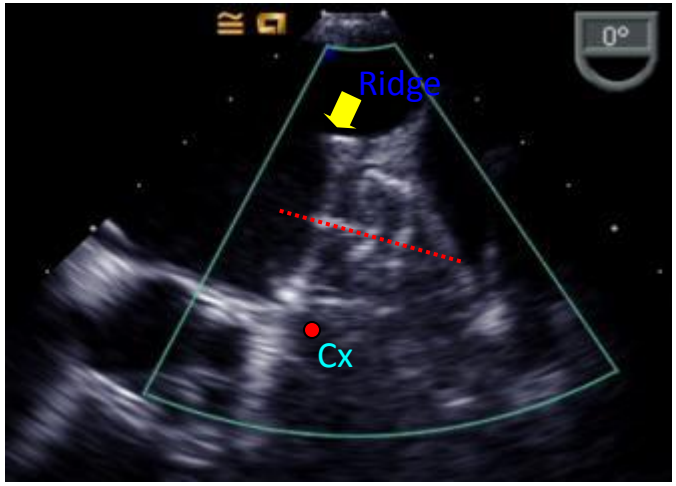
- How to define the landing zone and orifice of the LAA
  - LAA orifice in BLUE
  - Landing zone in GRAY
  - LAA depth in RED



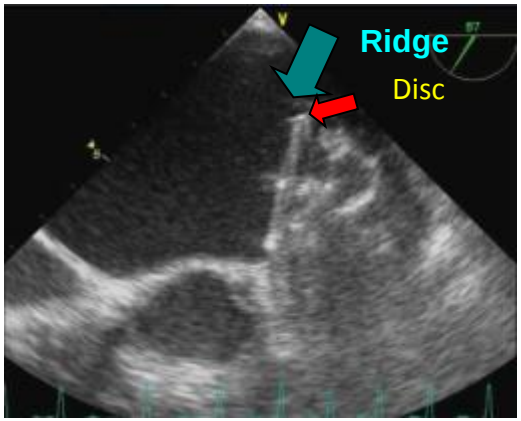
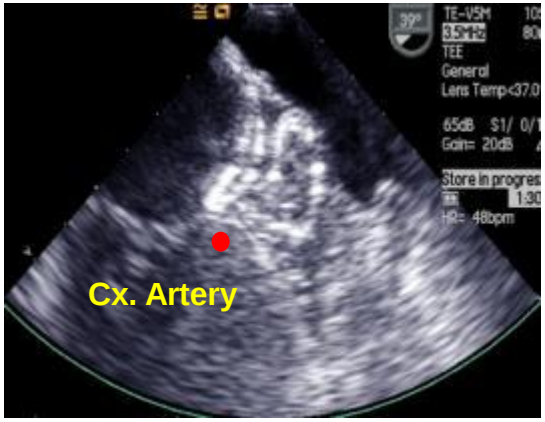
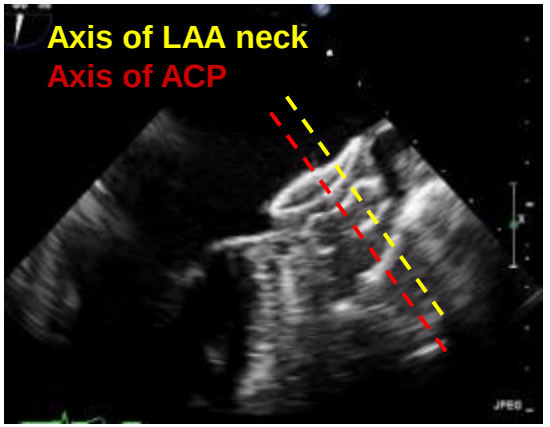
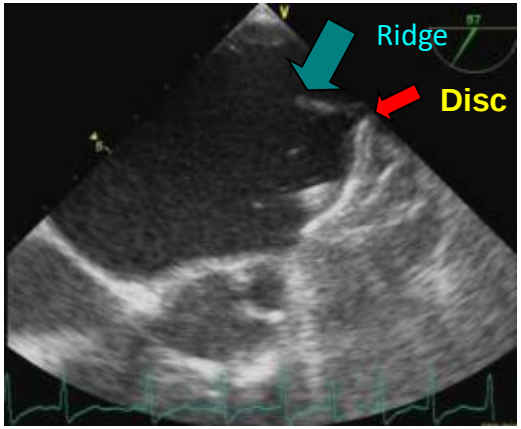
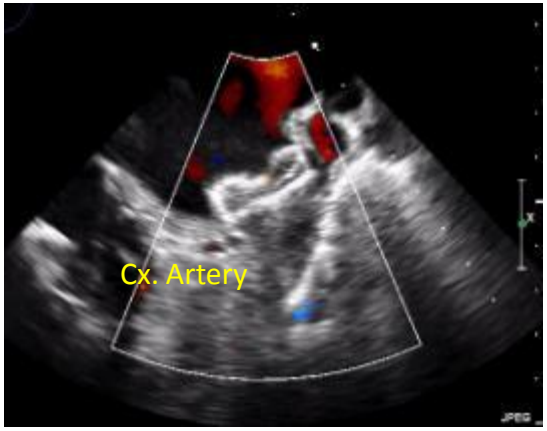
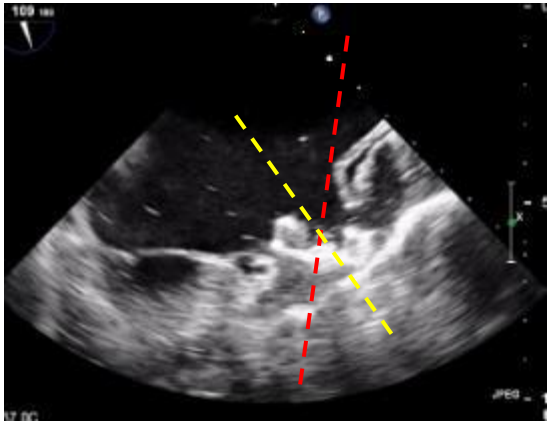


- Correct location and orientation of the ACP
  - The ACP must align with the axis of the LAA Neck (in red dotted line)





Signs to Check before Releasing Device I

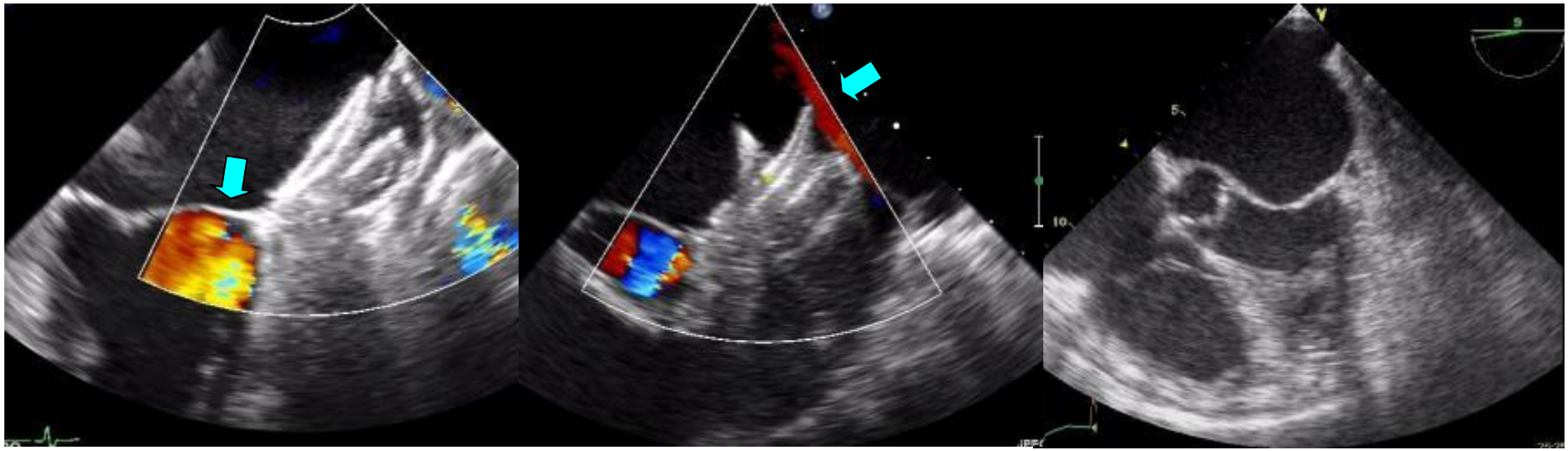
	Seal the OS with disc	Lobe should be inside LAA neck below Cx. A	ACP parallel with the LAA neck
Correct			
Incorrect			

Signs to Check before Releasing Device II

MV Impingement

LUPV Obstruction

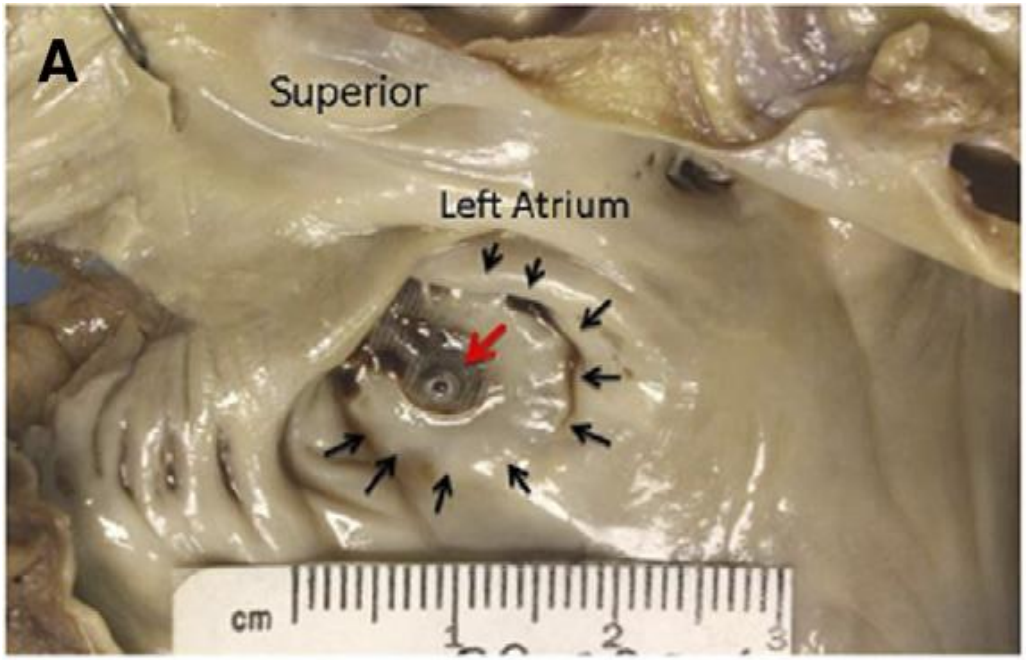
Pericardial Effusion

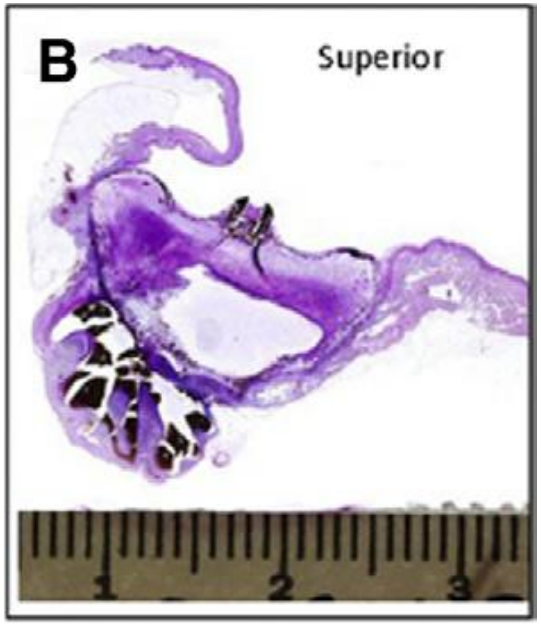


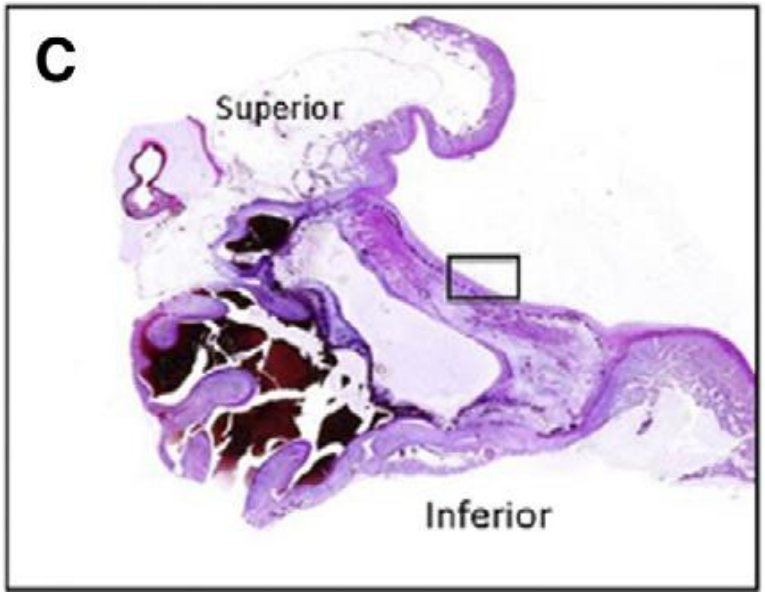
Processo di integrazione device-LAA

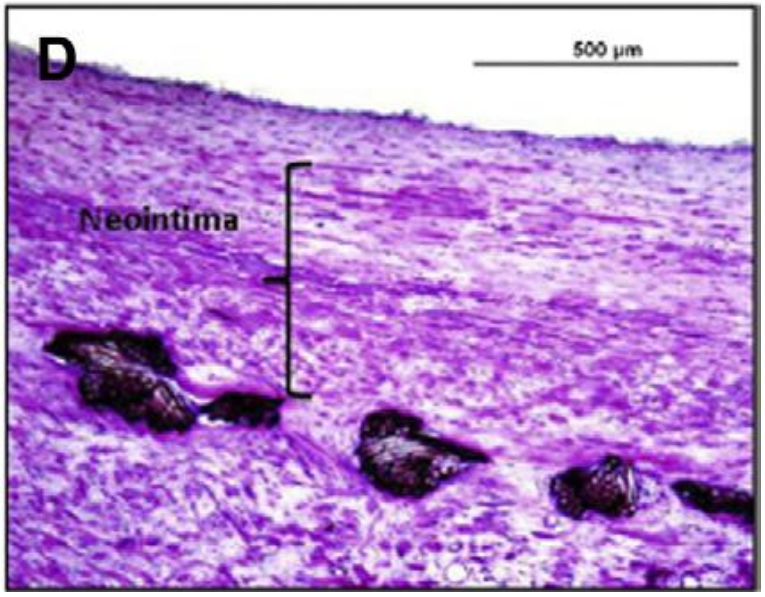
(***evidenze sull'animale e/o post-mortem sull'uomo***)

(dopo 852 giorni)



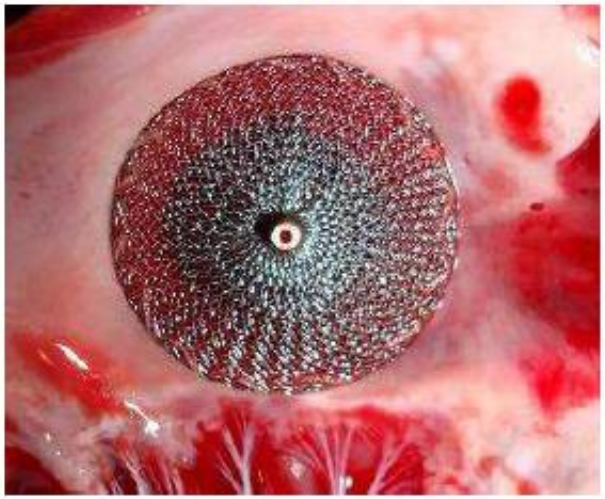




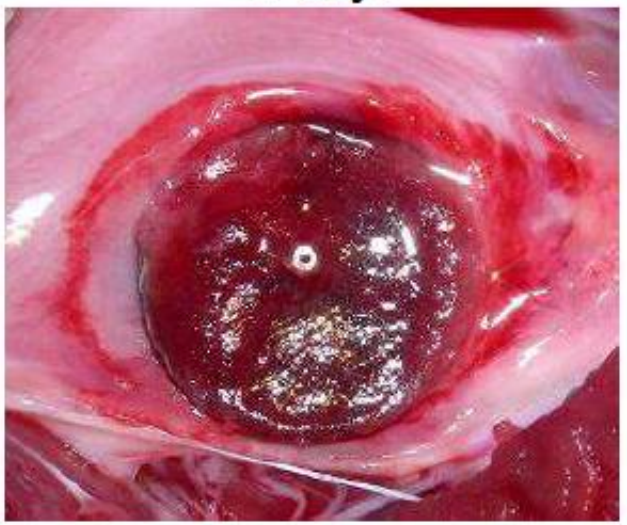


AMPLATZER Cardiac Plug – endothelization

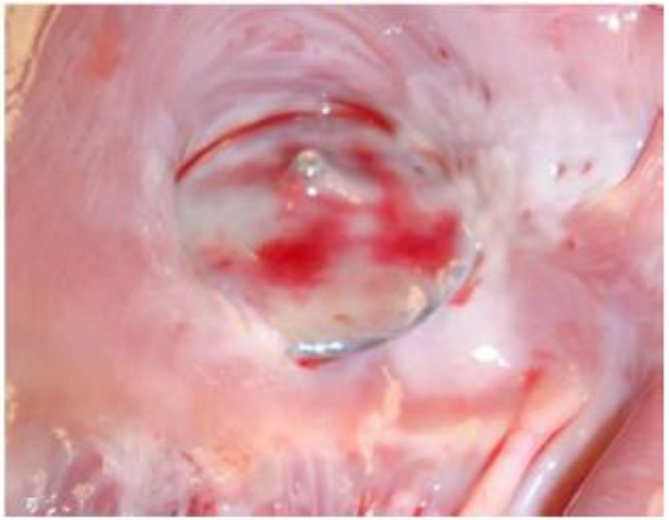
Acute



2 days



1 month



3 months

Europace (2013) 15, 652–656
doi:10.1093/europace/eus043

An update and current expert opinions on percutaneous left atrial appendage occlusion for stroke prevention in atrial fibrillation

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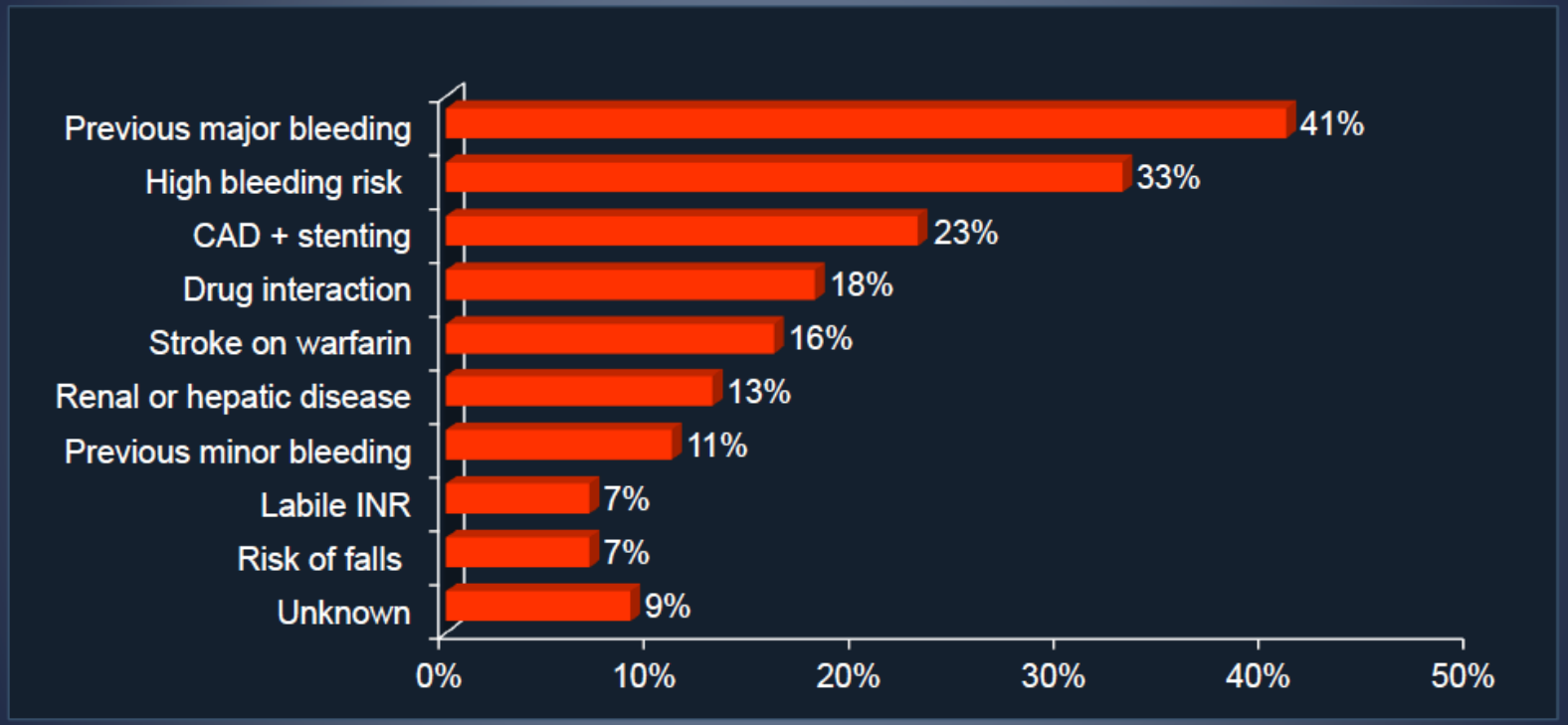
Conditions in which percutaneous LAA occlusion may be considered

Condition	Details
Recurrent ischaemic stroke despite well-controlled therapeutic OAC	Percutaneous LAA occlusion may be considered after exclusion of other sources of embolism
Previous ICH	Percutaneous LAA occlusion may be considered as an alternative to the use of novel anticoagulants, acknowledging individual patient factors, and bleeding aetiology
Recurrent GI bleeding	Bleeding from unknown origin or intestinal angiodysplasia despite endoscopic therapy. Lesions that are not accessible for endoscopic therapy
Co-morbidities	Uncontrolled hypertension, cerebral microbleeds, cerebral amyloid angiopathy
Coagulopathies	Low platelet counts, myelodysplastic syndrome
Intolerance to new OAC drugs	GI intolerance, severe liver and kidney dysfunction. Vitamin K antagonists are the first option to consider, percutaneous LAA occlusion may be considered as a secondary alternative

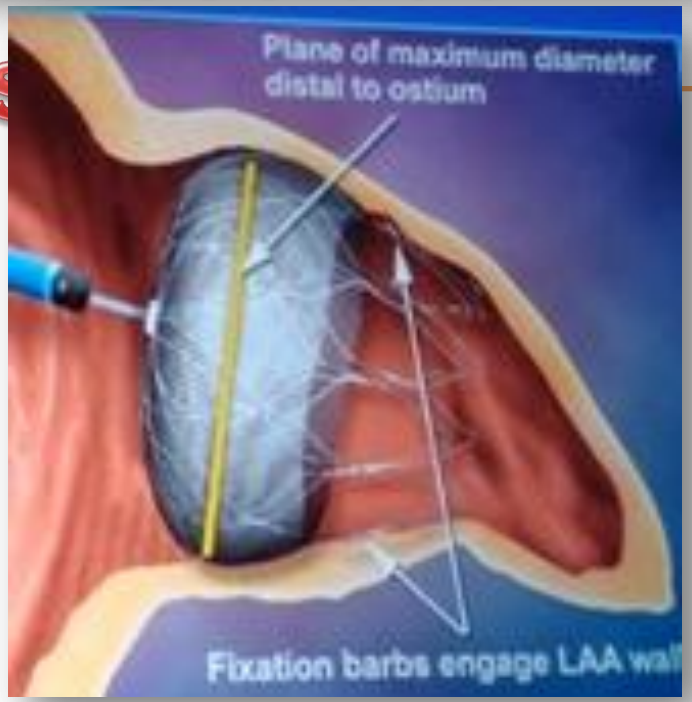
Multicenter Experience with the Amplatzer Cardiac Plug (ACP)

Indications for LAAO



Only 29.5% of the patients were on (N)OAC at the time of implantation

LAA percutaneous occlusion devices



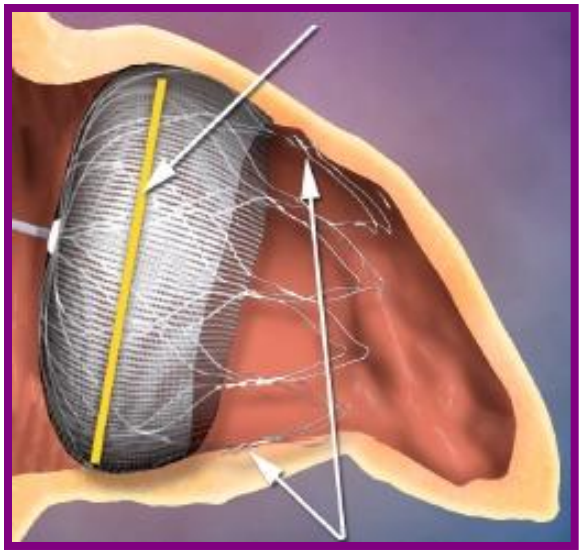
Technical features and sizes: ACP vs. Watchman

	ACP	WATCHMAN
Device Materials		
Device Anchoring System		
Occlusion Technology		
Device Sizes	8	
Delivery System Sizes	3	

ACP	Watchman
Aspirin for 6 months + clopidogrel for 1 month	Warfarin for minimum of 45 days +/- clopidogrel for 6 months + aspirin

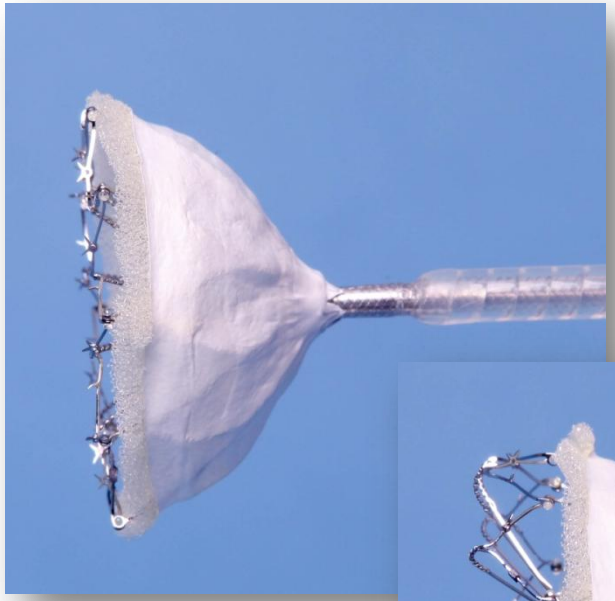
minimum LAA length	10mm	21mm
minimum LAA width	12,6mm	17mm
Maximum LAA width	28,5mm	31mm

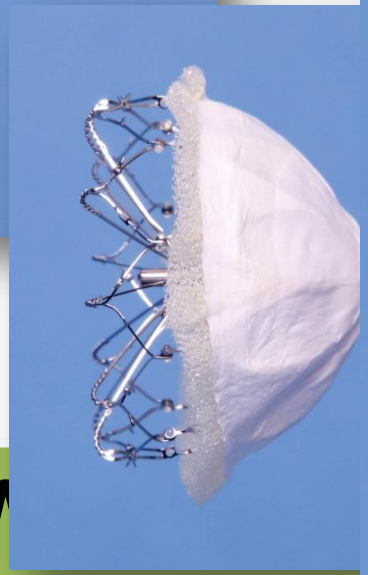
Comparison of Designs

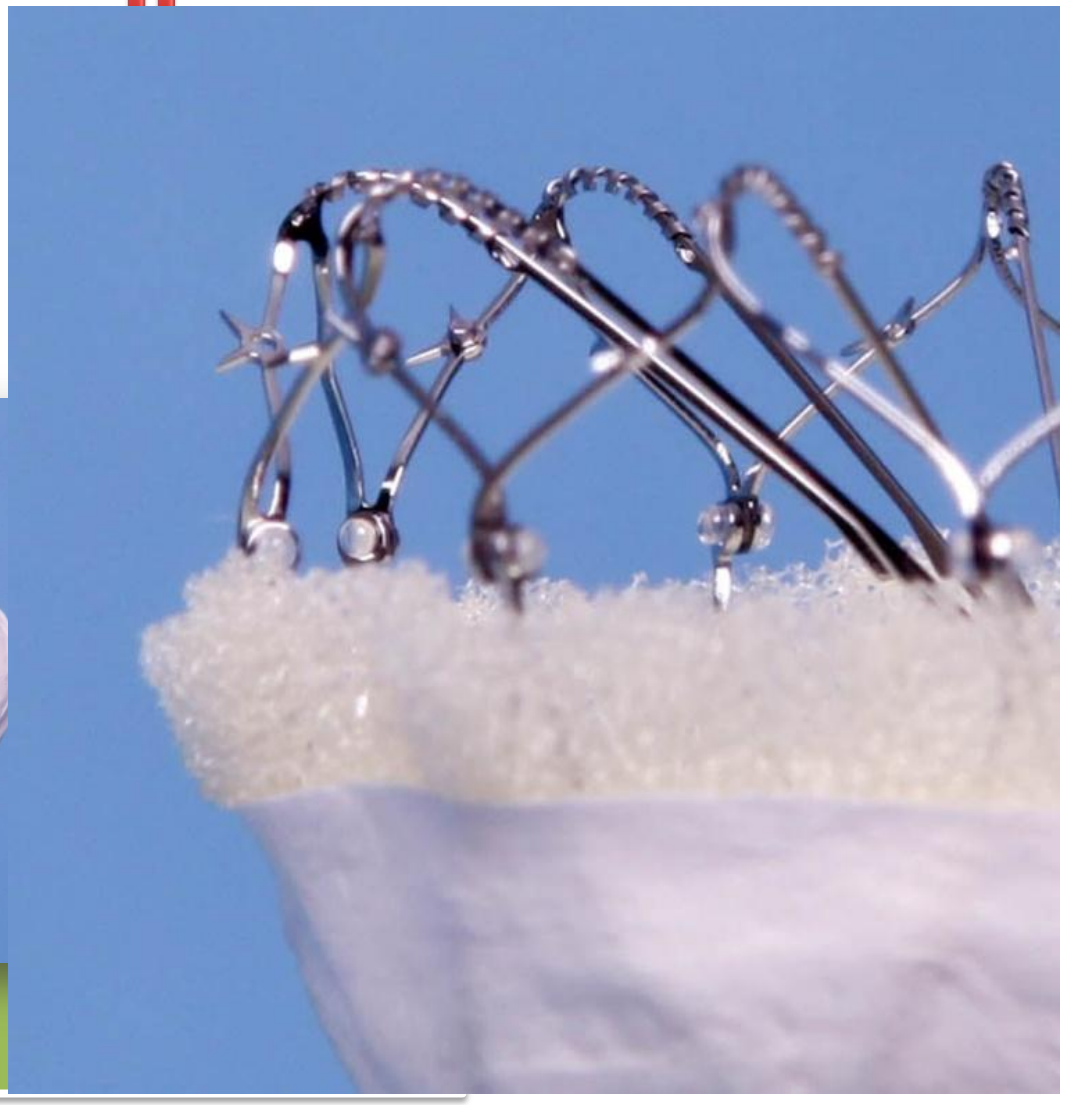
	ACP	Watchman
Device diameters	16,18,20,22,24,26,28,30 mm (in 2 mm increments)	21,24,27,30,33 mm
Sizing	Measure LAA orifice/landing zone follow sizing chart instructions	20% compression to nominal diameter (range LAA utile: 17-31 mm)
Device		

LAA *percutaneous* occluder devices

II







- Coherex W
- Occlusion System

Watchman clinical evidences: Overview

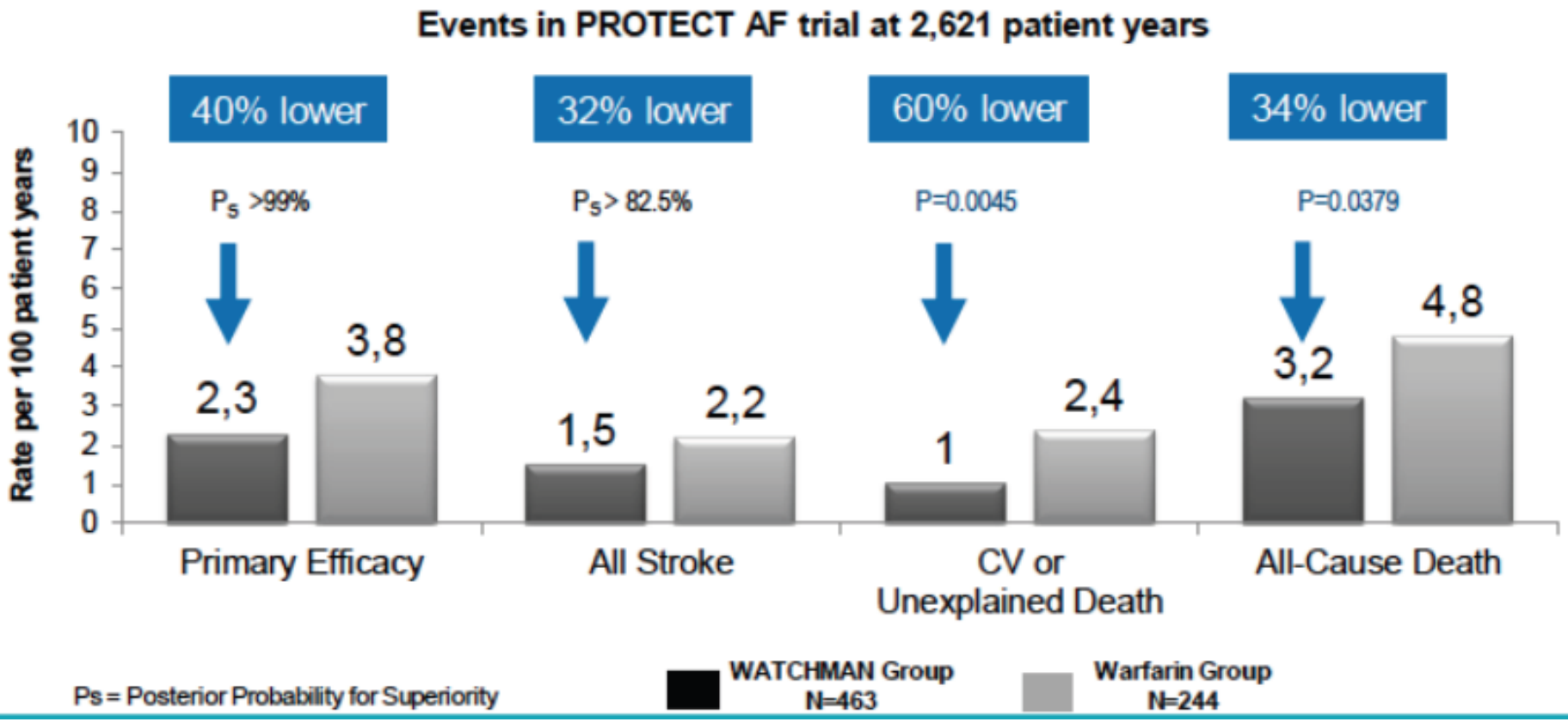
Studi	PROTECT-AF[1]	CAP[2]	ASAP[3]	PREVAIL
Disegno	Multicentrico, Random WM vs warf	Multicentrico, non random, sicurezza/efficacia WM a lungo termine	Multicentrico, non random, studio fattibilità per impianto di WM in paz controindicati al warfarin	Multicentrico, Random WM vs warf, conferma endpoint di efficacia di P-AF
Endpoint Primario	Stroke, embolie sistemiche, morti cardiovascolari	Stroke, embolie sistemiche, morti cardiovascolari	Studio di fattibilità	Stroke, embolie sistemiche, morti cardiovascolari
Età media /$CHADS_2$	72 / 2.2	74 / 2.4	72.4 / 2.8	In corso
Pazienti Arruolati	800	460	150	461
Pazienti Impiantati	542[2]	437	142	
Successo d'impianto	89.5%	95%	94.7%	
Interruz warfarin 45gg	86.6%	94.9%	No uso di warfarin	
Stroke Periprocedurali	0.9%	0%	0%	
Stroke (100pz/anno)	2.3 WM vs 3.2 warf → riduz 29%	Riduz vs P-AF (p=0.04)	2.3% , 1.7% stroke ischemici → riduz 77% vs eventi att	
Versam pericardici	4.8%[1] (6.3% early, 3.7% late[2])	2.2% → riduzione 32% vs PROTECT-AF	2.0%	
Embolizz Device	0.6%	0%	ND	
Riepilogo	• WM non inferiore a warf su efficacia primaria (>99.9%) • Riduz 90% stroke emorraggici • Interruzione warf a 6M 92% → no incremento rischio di stroke	• > successo d'impianto e miglior outcome efficacia/sicurezza con esperienza operatore	• Riduzione 77% stroke ischemici vs tasso atteso • Sicurezza/efficacia WM in paz controindicati a warf	

[1] Holmes, D.R.; Lancet 2009; 374: 534-542
[2] Reddy, V.Y.; Circulation 2011; 123; 417-424
[3] Reddy, V.Y.; HRS 2012

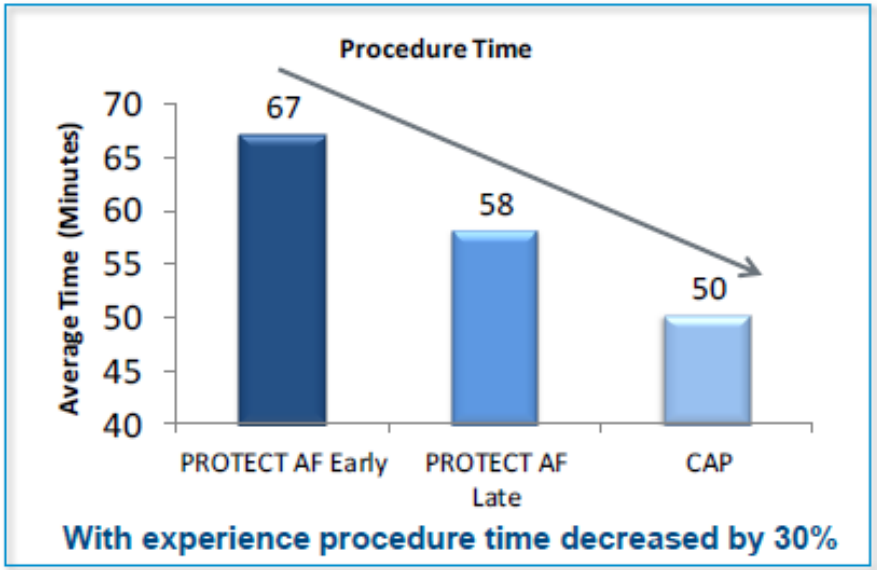
PROTECT-AF

"Local" therapy with WATCHMAN was **superior** to Warfarin

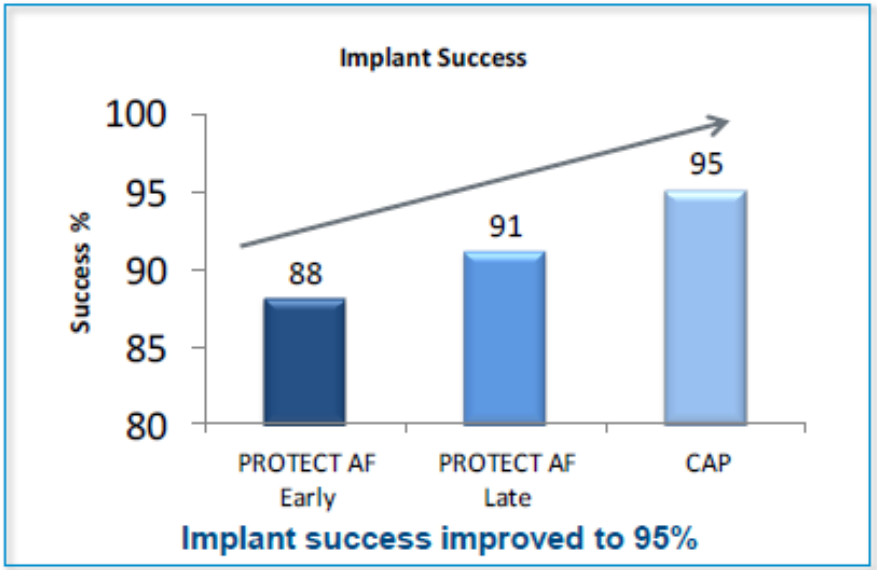
- ✓ 40% reduction of stroke / systemic embolism / CV death
- ✓ 60% reduction in Cardiovascular Mortality
- ✓ 34% reduction in All-Cause Mortality



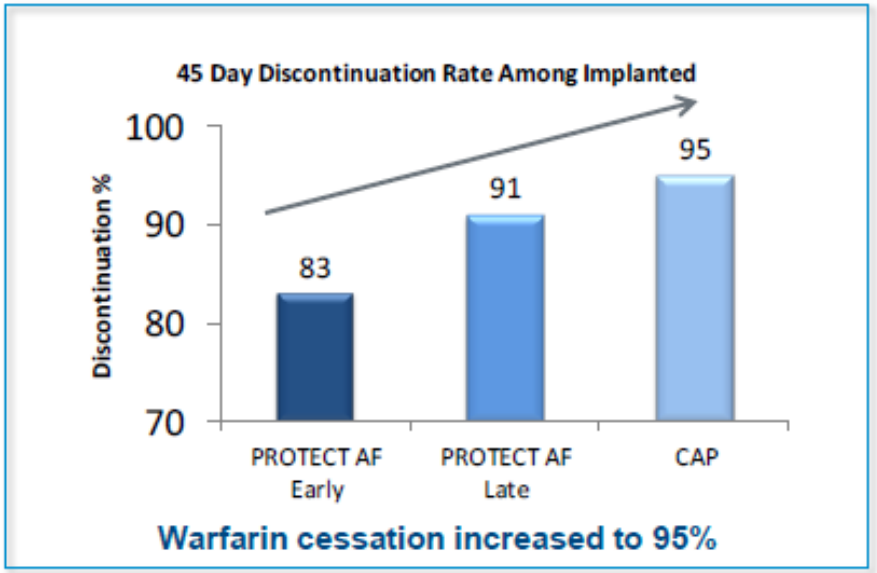
CAP



With experience procedure time decreased by 30%



Implant success improved to 95%



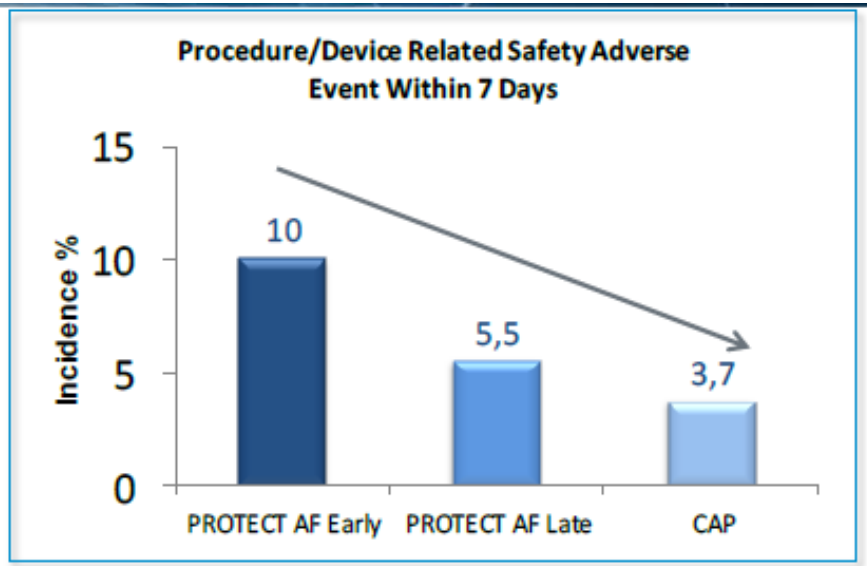
Warfarin cessation increased to 95%

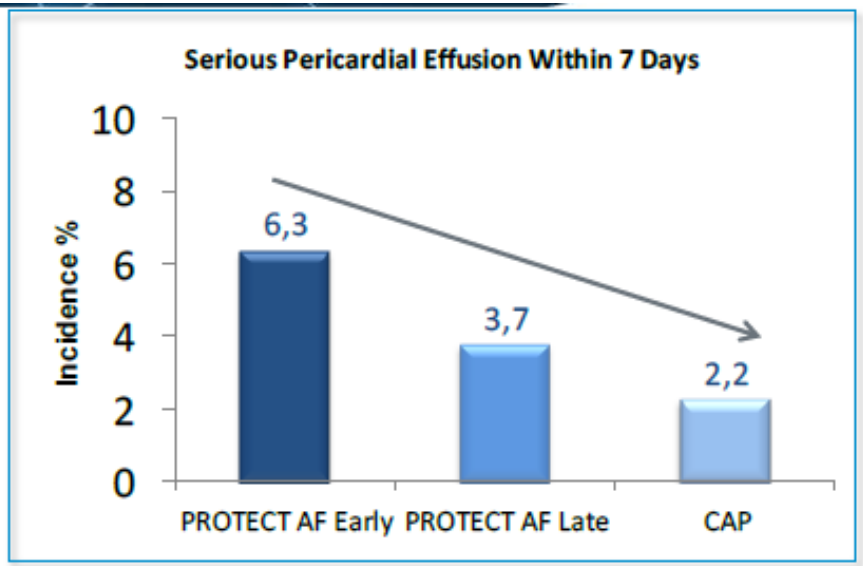
With increased operator experience

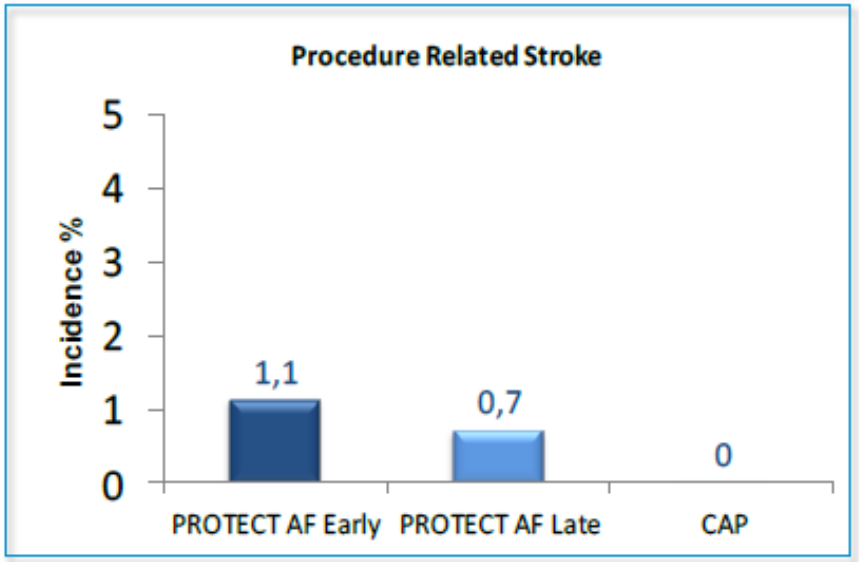
- ✓ The average procedure time reduced from 67 minutes to 50 minutes
- ✓ Implant success improved from 88% to 95%
- ✓ Discontinuation of Warfarin improved from 83% to 95% of patients

Reddy VY et al. *Circulation*. 2011;123:417-424

CAP





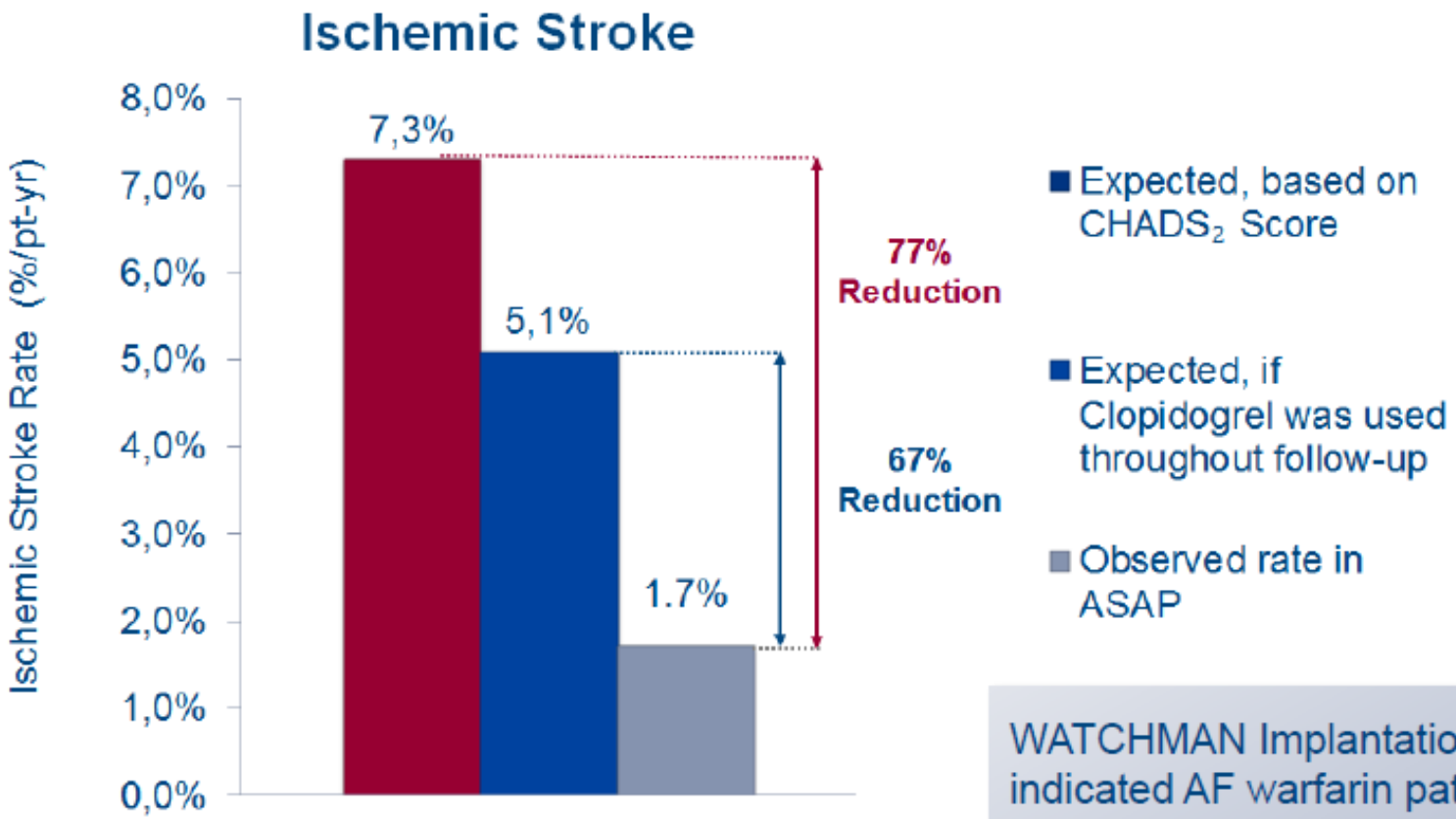


With increased operator experience

- ✓ Procedure related adverse events and serious pericardial effusions were reduced significantly
- ✓ Peri-procedural strokes were eliminated

Reddy VY et al. *Circulation*. 2011;123:417-424

ASAP



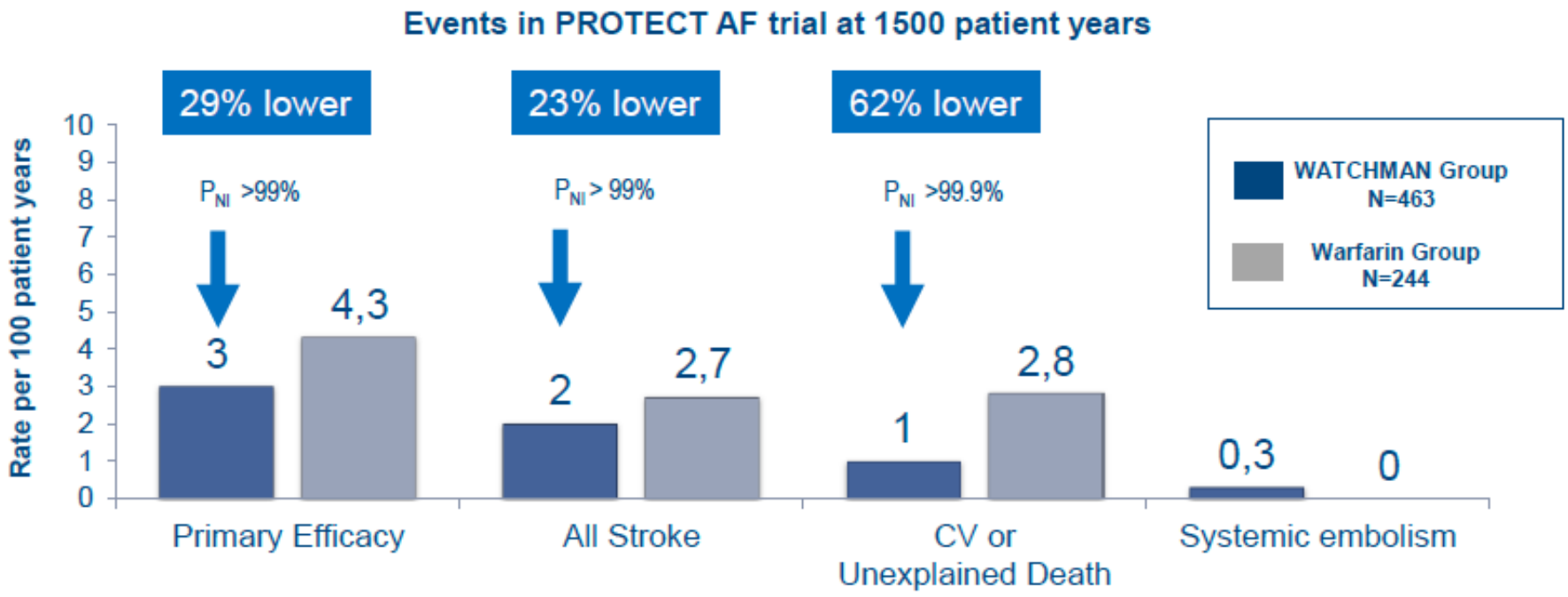
WATCHMAN Implantation for contra-indicated AF warfarin patients is:

- ✓ Feasible
- ✓ Low, but manageable, rate of device thrombus
- ✓ Decreases the rate of stroke by 77%

Reddy VY HRS 2012

PROTECT-AF >75yrs

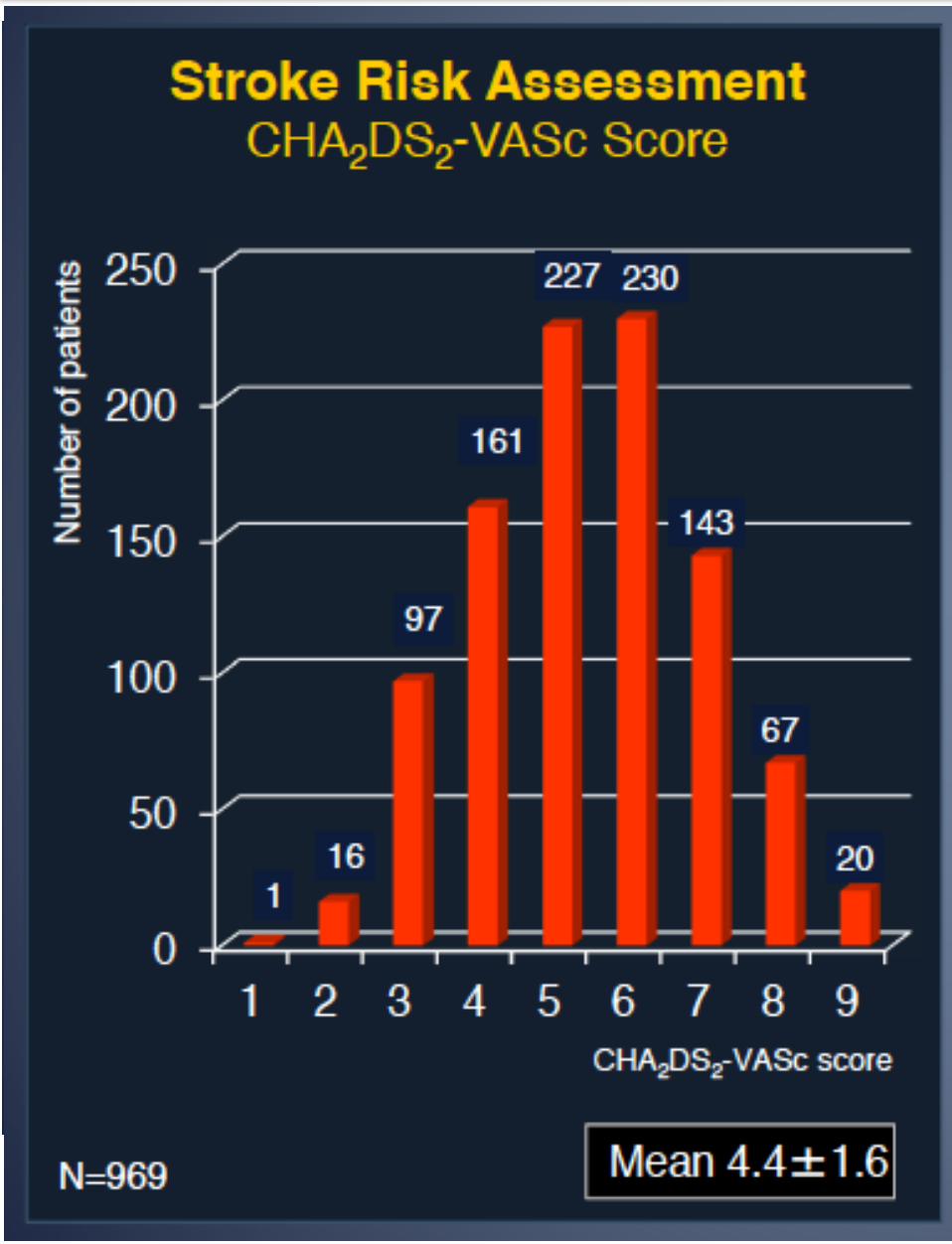
- ✓ WATCHMAN therapy results in a 29% reduction in efficacy events (all strokes, CV death and systemic embolism) when compared to warfarin therapy
- ✓ In 1500 patient years of follow-up, WATCHMAN continues to provide significant reductions in events when compared to warfarin

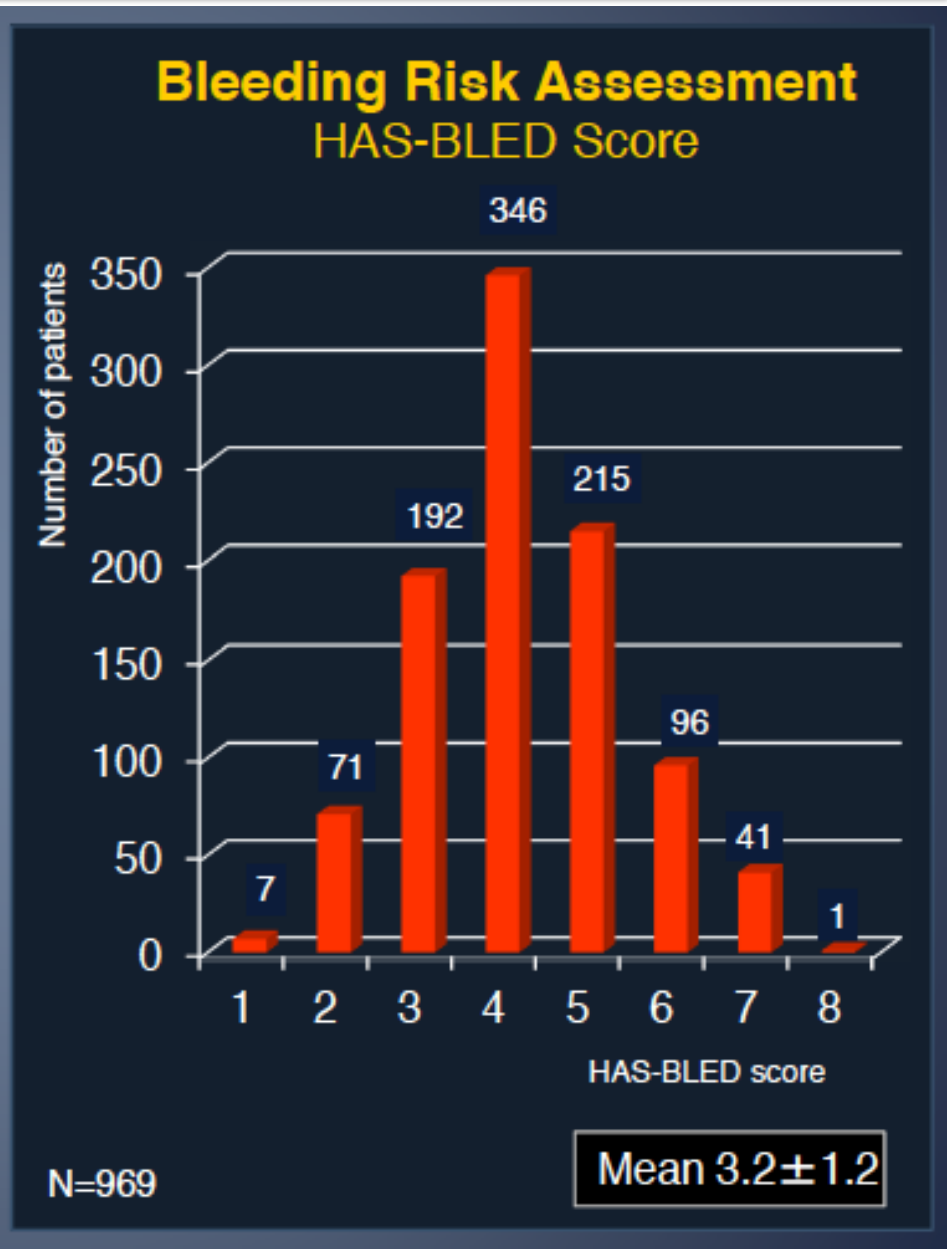


P_{NI} = Posterior non inferiority Probabilities

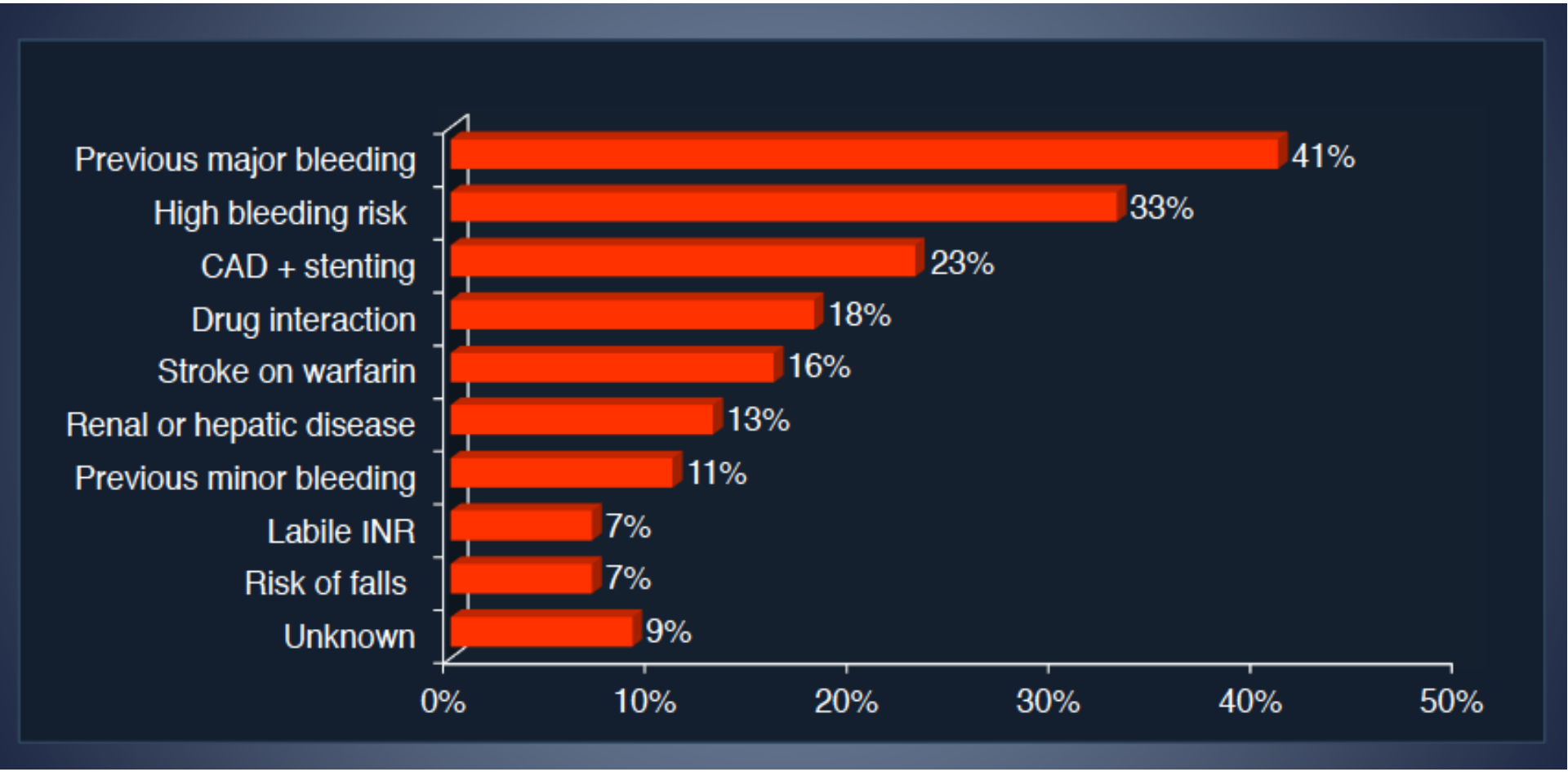
Reddy, et al., Circ 2013; in Press

Amplatzer Cardiac Plug - Multicenter experience

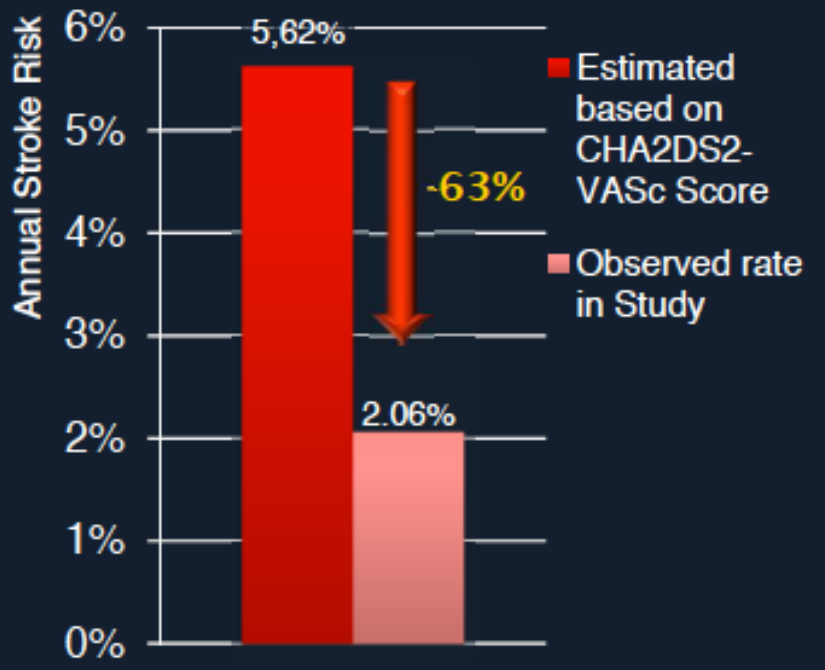




Indicazioni



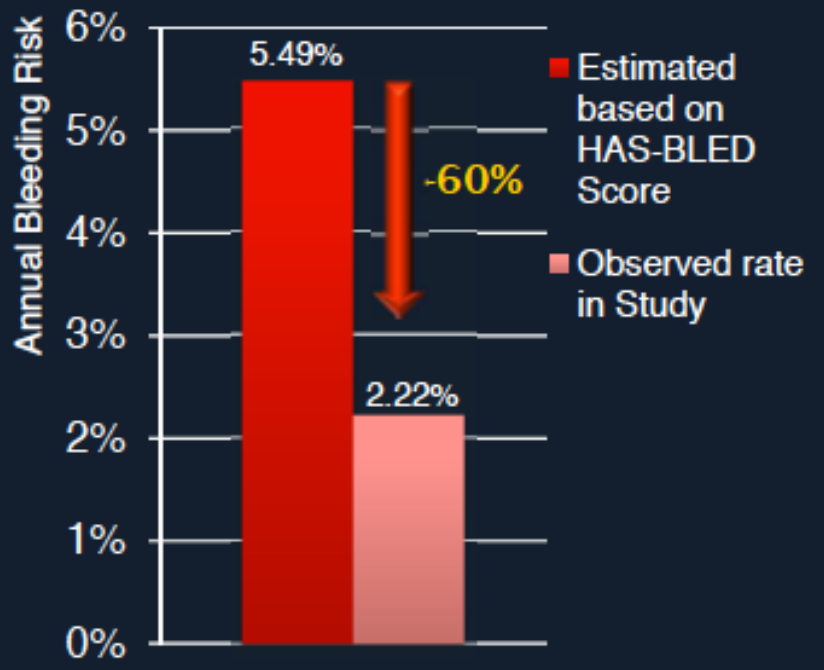
Effectiveness in Stroke Reduction vs estimated



Total Patients	Total Patient Years	CHA_2DS_2-VASc score
928	1216.2	4.41

Estimated Stroke Rate per $CHA2DS_2$-VASc	Actual Annual Stroke Rate (N strokes + TIA)
5.62%	2.06% (25)

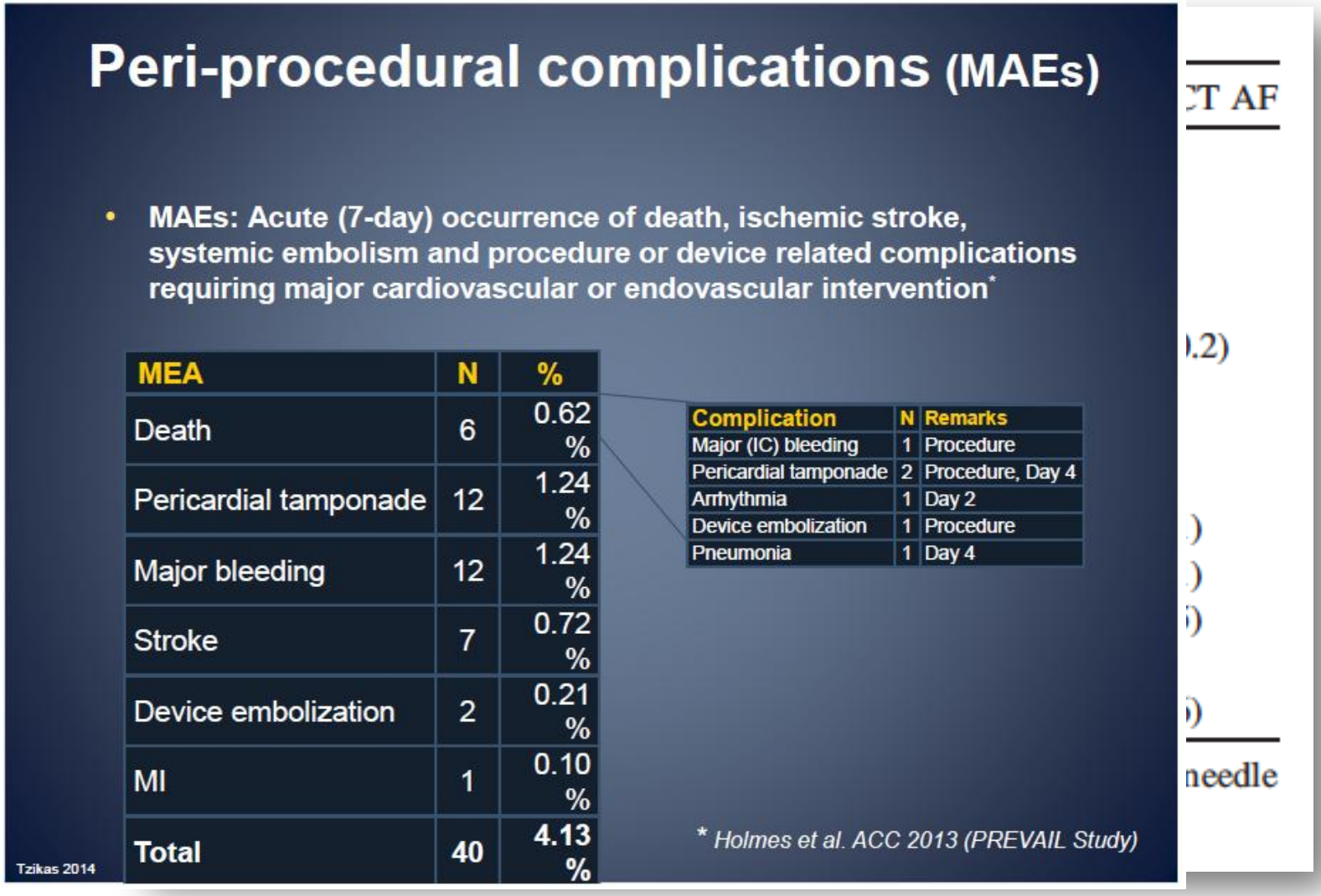
Effectiveness in Bleeding Reduction vs estimated



Total Patients	Total Patient Years	HAS-BLED score
928	1216.2	3.18

Estimated Bleeding Rate per HAS-BLED	Actual Annual Bleeding Rate (N major bleeds)
5.49%	2.22% (27)

LAA closure complications *(Watchman+ACP)*



Holmes DR, Reddy VY, et al Lancet 2009

Park JW, et al CCI 2011

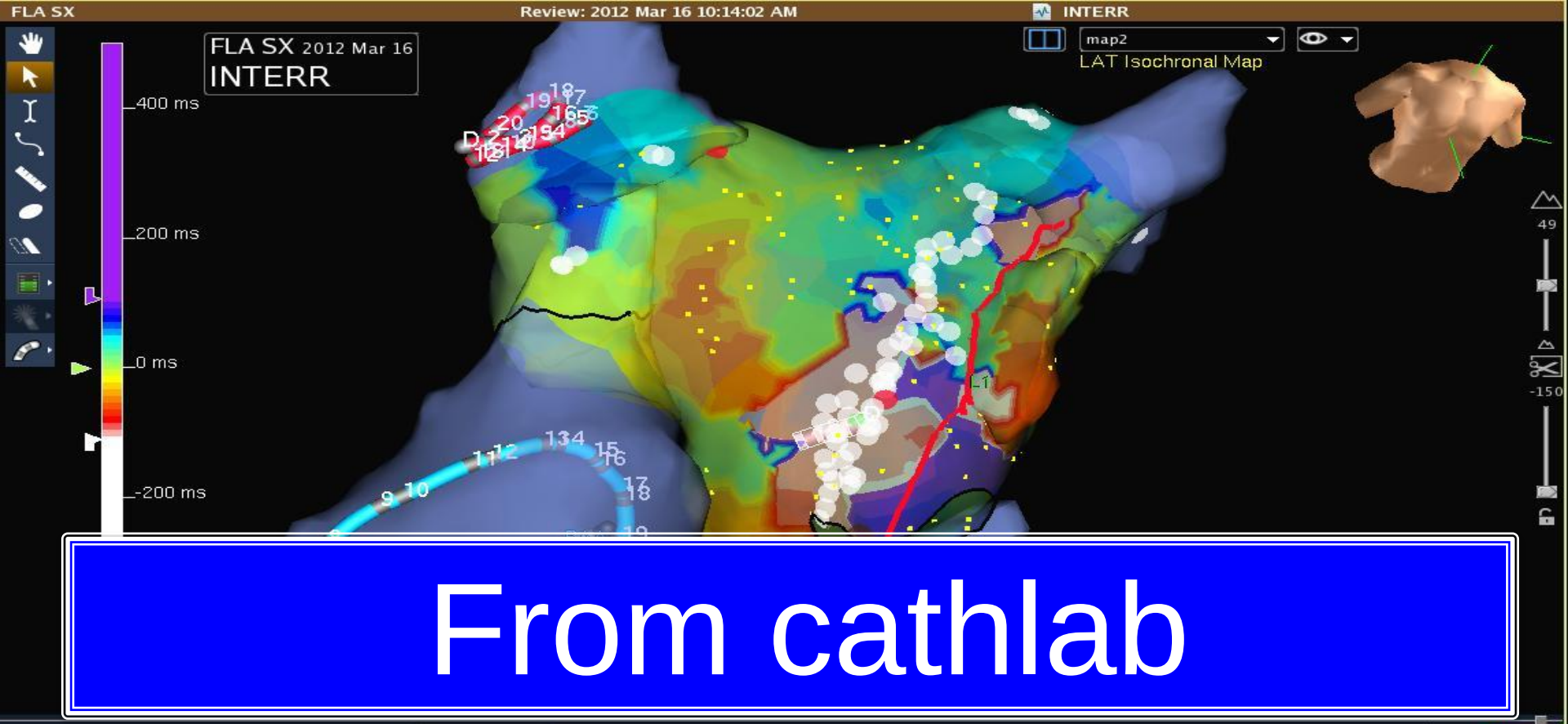
Dimensioni del campione…

Braccio Warfarin: solo il 55% in terapia con corretto range

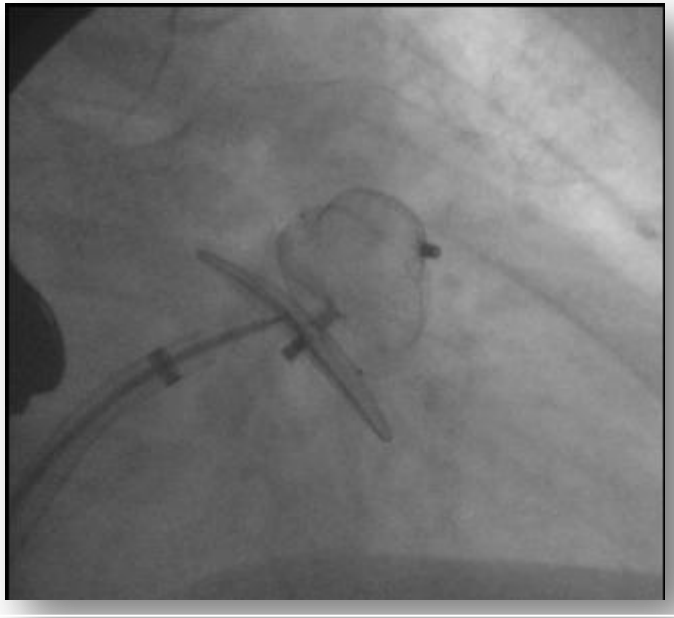
Efficacia e MAE….

Left Atrial Appendage Occlusion — Closure or Just the Beginning?

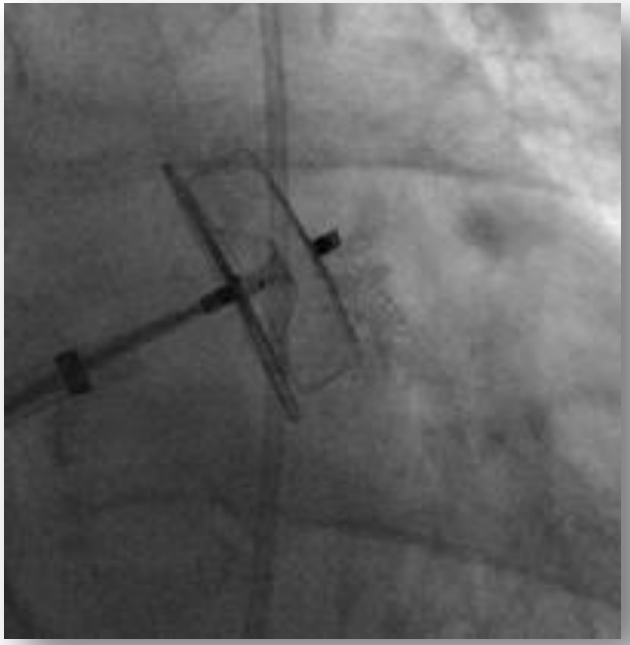
William H. Maisel, M.D., M.P.H.



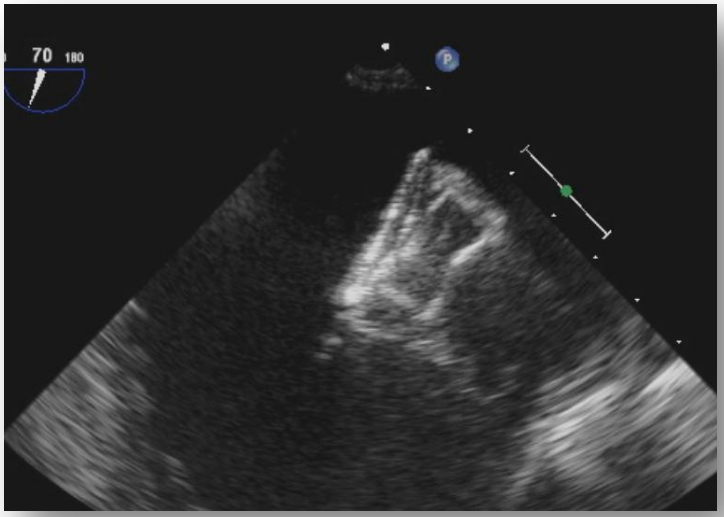
From cathlab



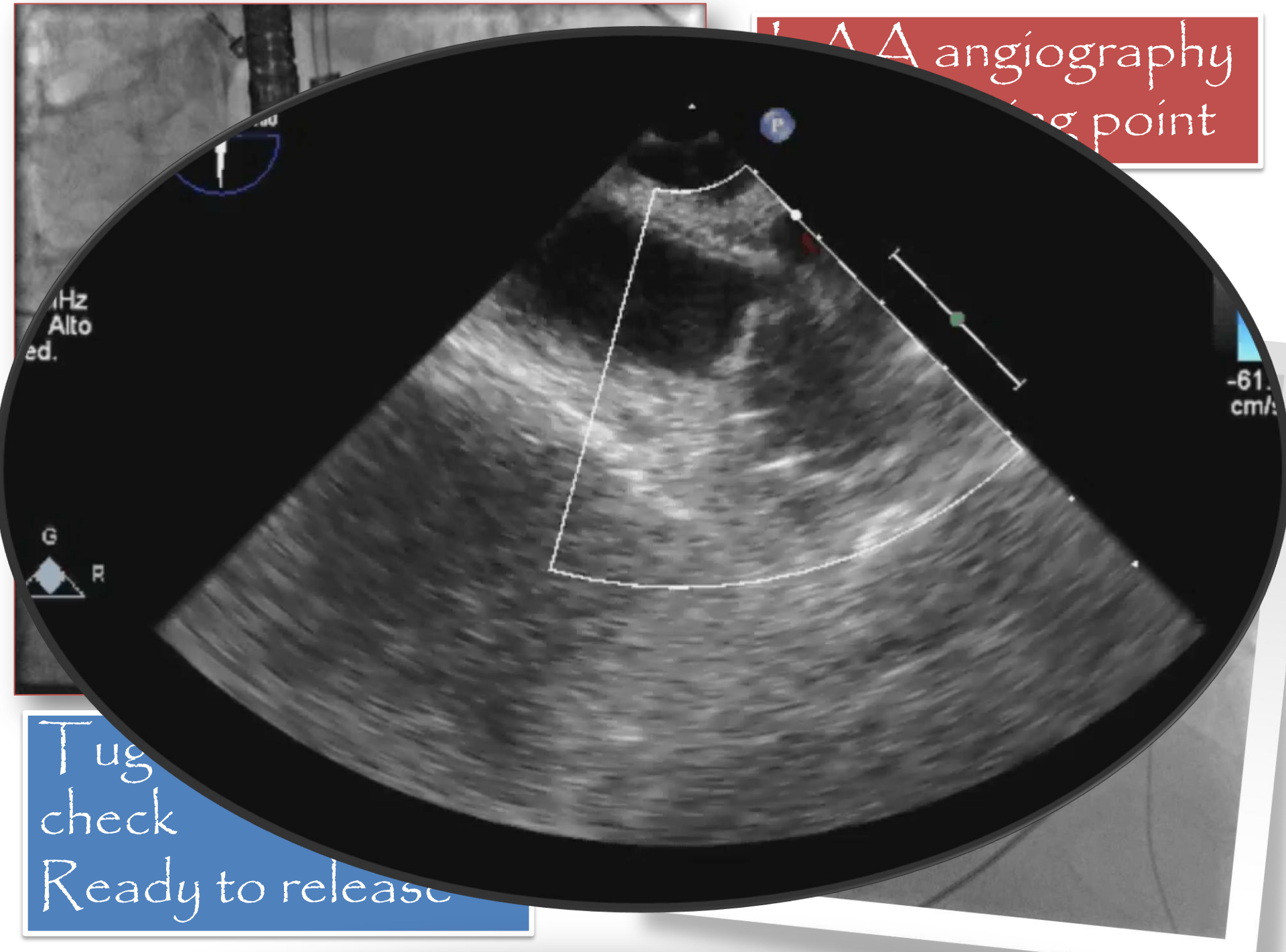
Aspetto a fragola quando il device è sovradimensionato

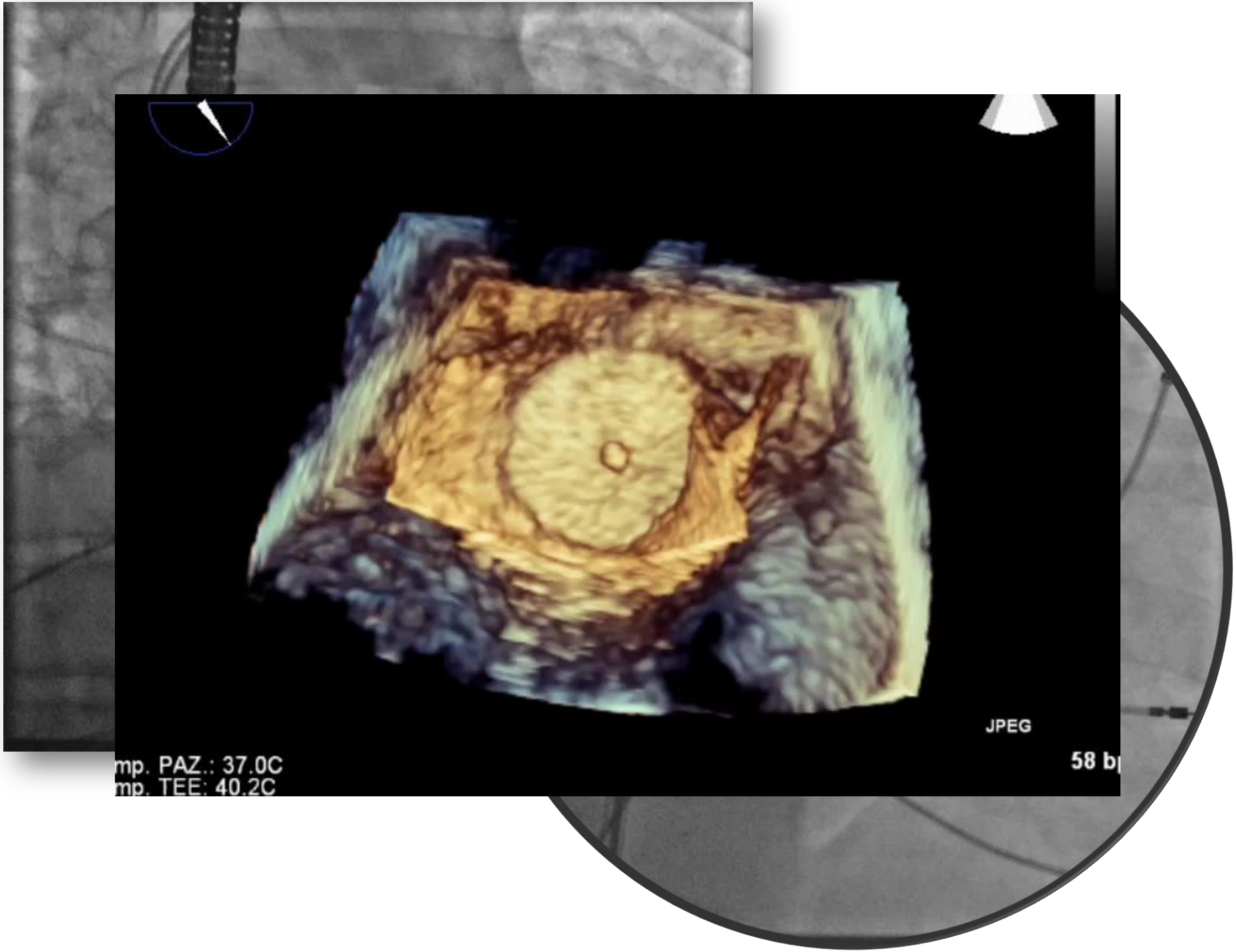


Aspetto”squadrato” quando il device è sottodimensionato

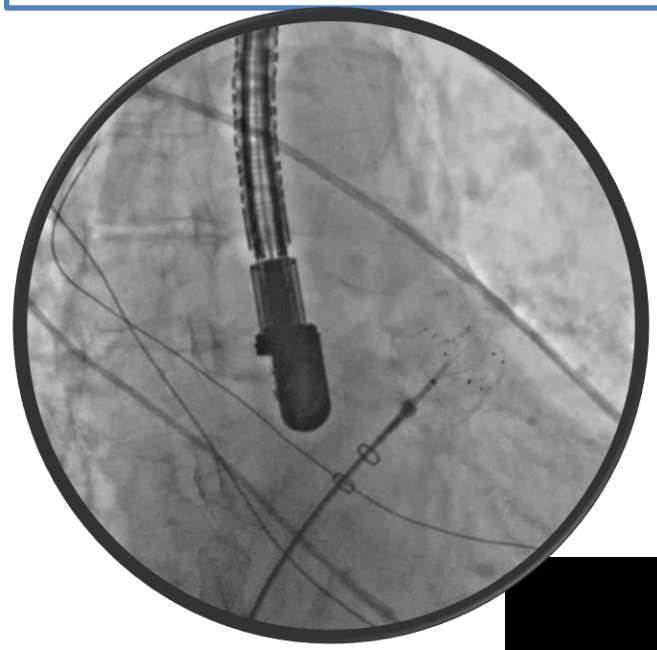


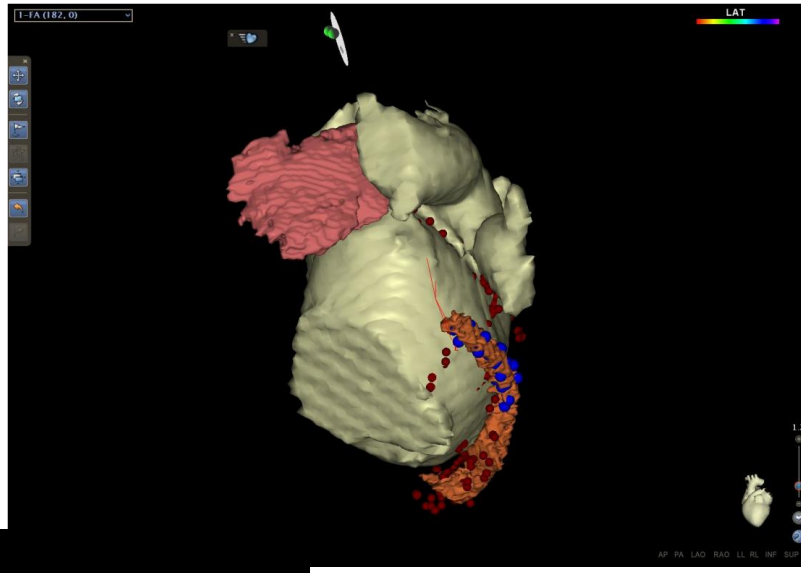
Aspetto a “pneumatico” del device correttamente dimensuonato
Spazio libero tra il lobo e il disco, che deve avere aspetto concavo
Il lobo deve essere per almeno 2/3 sotto la circonflessa

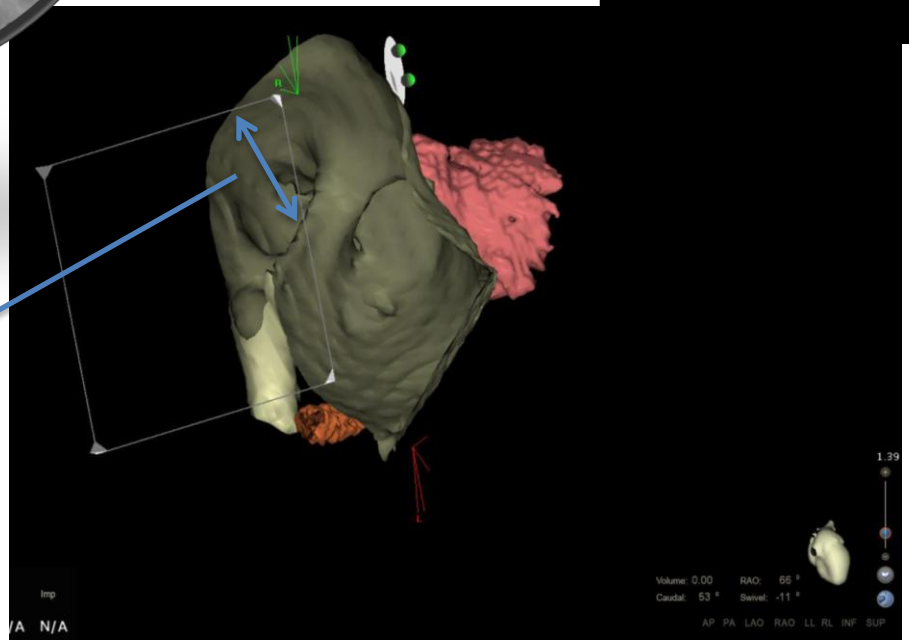

angiography
point
Tug
check
Ready to release


JPEG
58 bp
mp. PAZ.: 37.0C
mp. TEE: 40.2C

CT scan (Carto-integrated) + Angiography+TEE

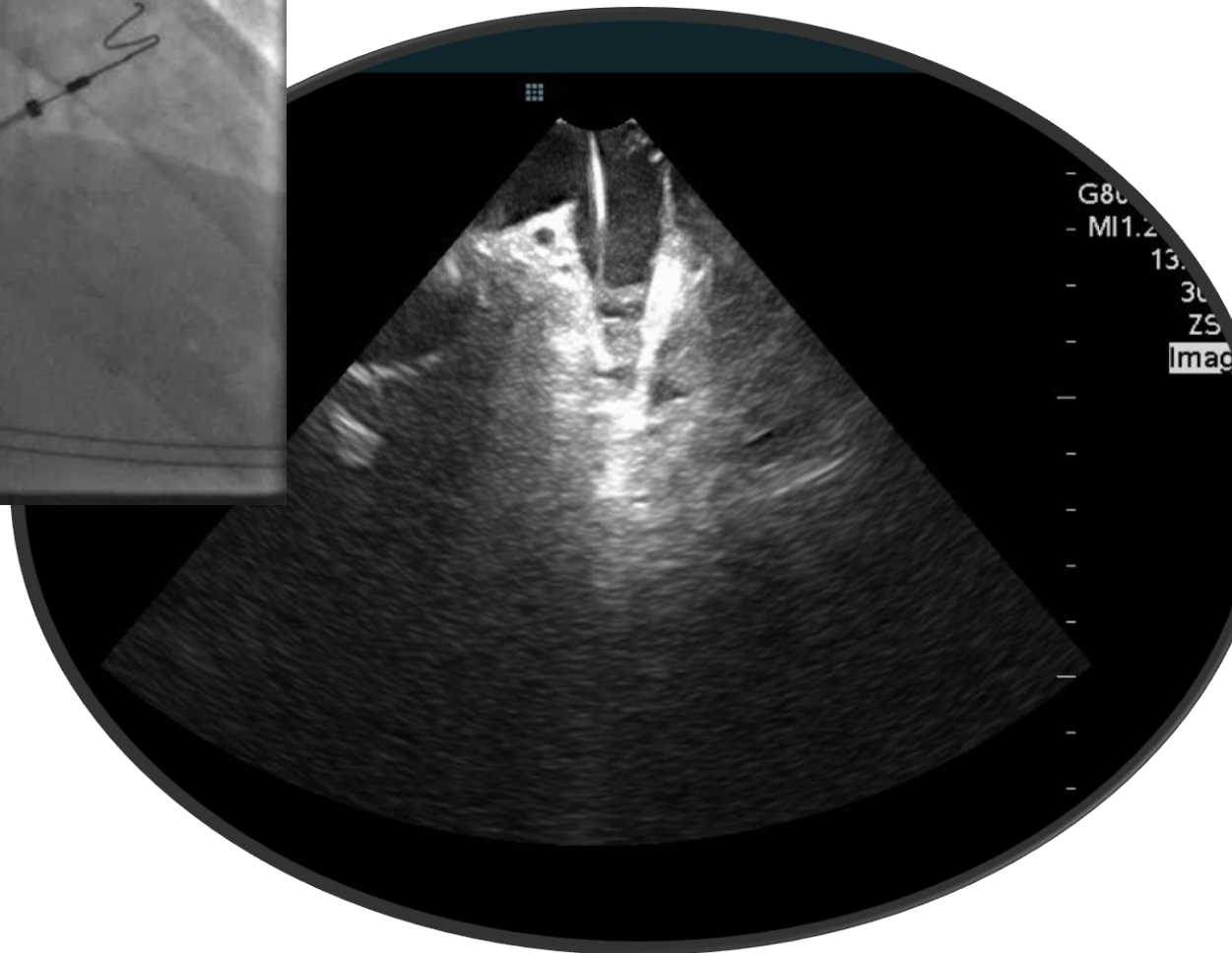






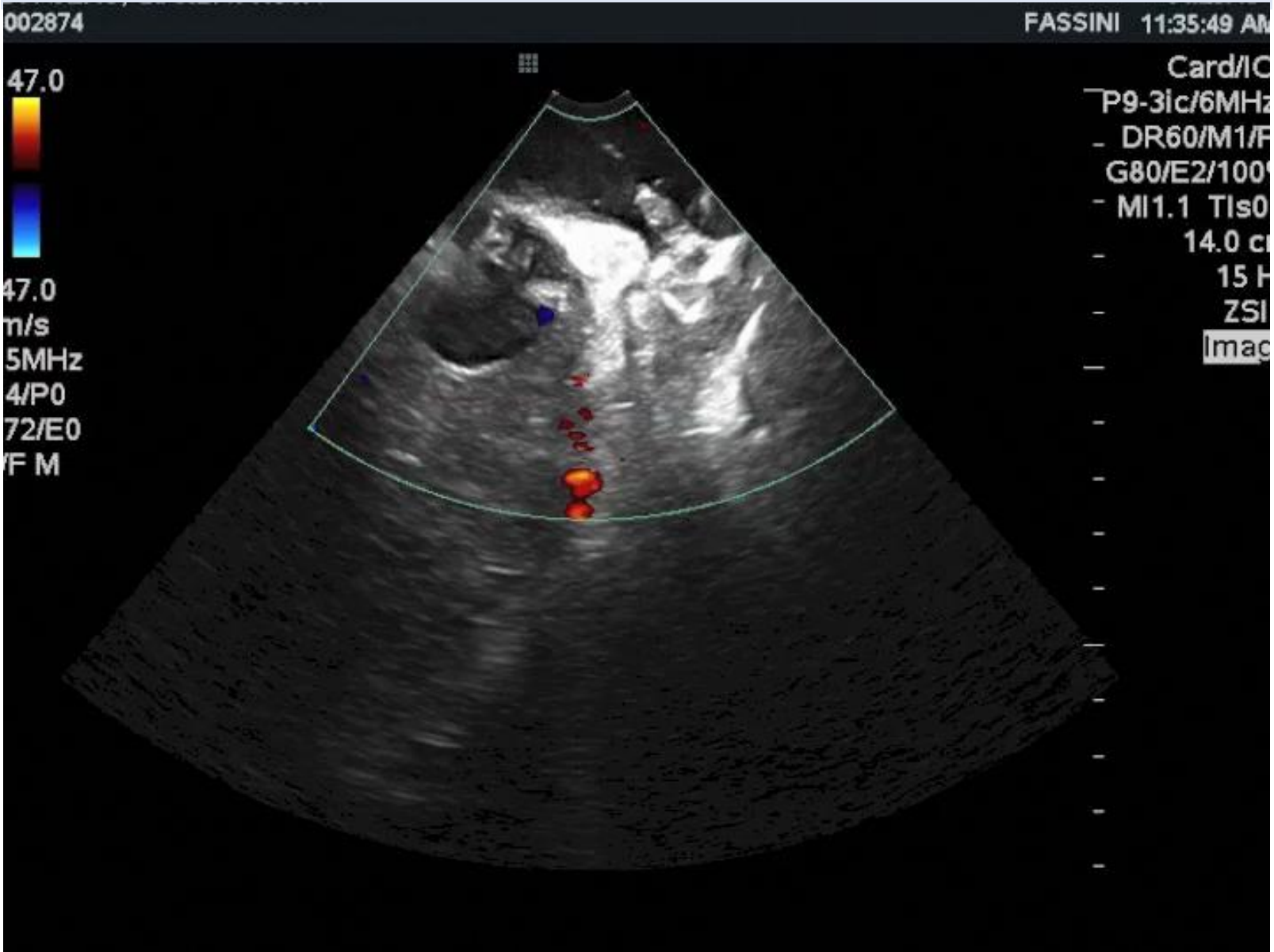
22 mm CT
20±1 mm Angio
TEE 18-23 mm

- Patient affected by atypical atrial flutter and Afib
- Major bleeding on OAT
- Oesophageal varices contraindicating TEE



Case # 3

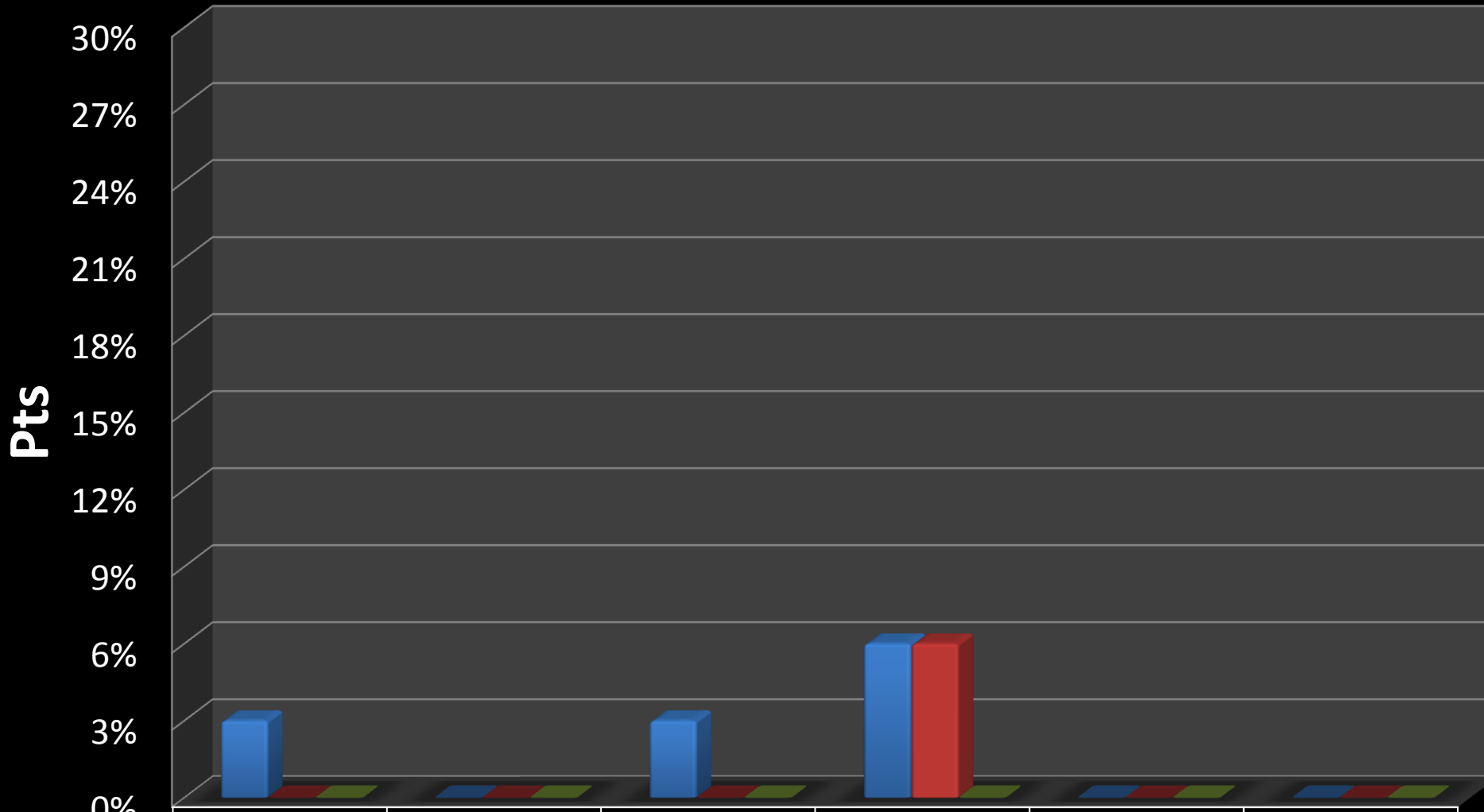
RF and LAA closure ICE guided (Amplatezer device)



Case # 3

RF and LAA closure ICE guided (Amplatezer device)

LAAo in 57 Pts - Major findings



	thrombus inFU	Tamponade	P effusion	Minor leak (<2mm)	Major leak	Device emboliz
ACP	3%	0	3%	6%	0	0
WAT	0	0	0	6%	0	0*
WAV	0	0	0	0	0	0

Chiusura percutanea auricola
Prevenzione stroke in pazienti con F.A.N.V.

Quali Pazienti?

1. Elevato Chadvasc e controindicazione assoluta alla TAO
2. Pazienti anziani; insufficienza renale
3. Pazienti con indicazione a triplice terapia
4. *…Pazienti con elevato chadsvasc, pregresso TIA/stroke in TAO/NOACs e/o riscontro di trombosi auricolare…..*