

New technologies for the heart

Left atrial appendage occlusion: the documented performance of Watchman

Dr. Patrizio Mazzone

*EP-lab coordinator,
Arrhythmology and Electrophysiology Unit,
Ospedale San Raffaele, Milano*

Disclosures

- **Boston Scientific proctor for LAA appendage Watchman® device**

Evidence in LAA occlusion

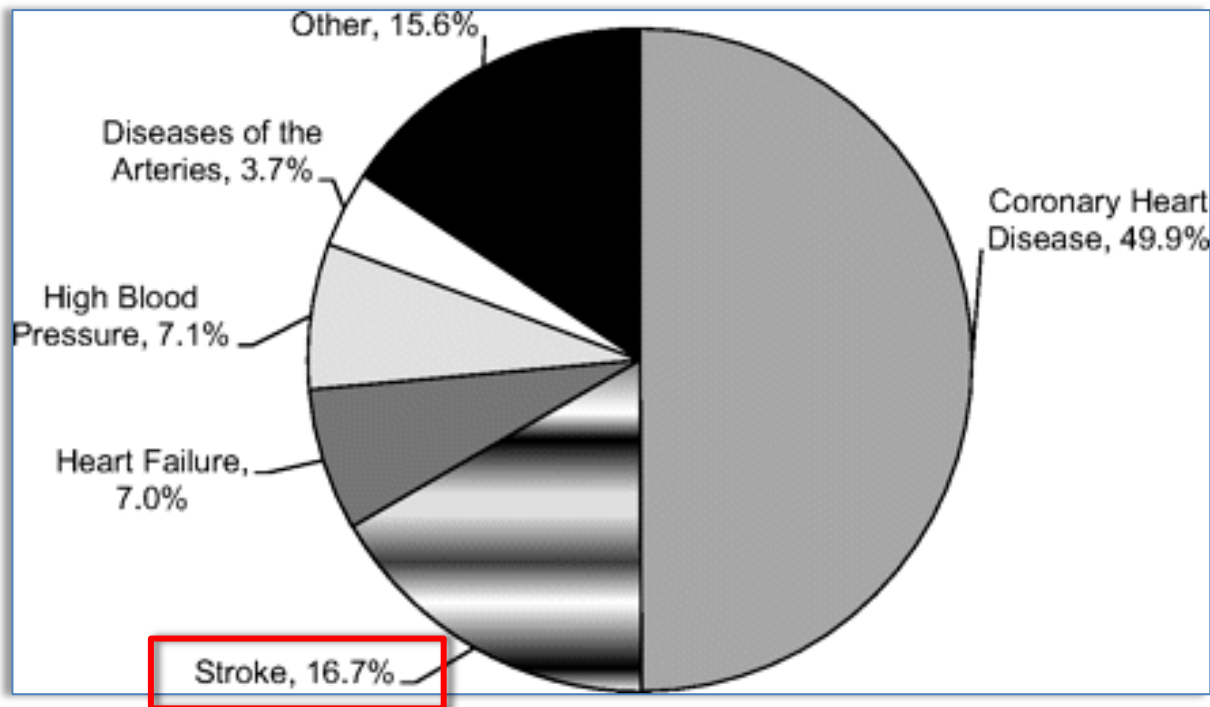
- Background and rationale
- PROTECT AF
- After PROTECT AF:
 - ✓ CAP Registry, Prevail, CAP 2
 - ✓ ASAP
- 2012 guidelines
- After the guidelines:
 - ✓ EHRA/EAPCI consensus
 - ✓ GISE/AIAC position statement
- Beyond the guidelines

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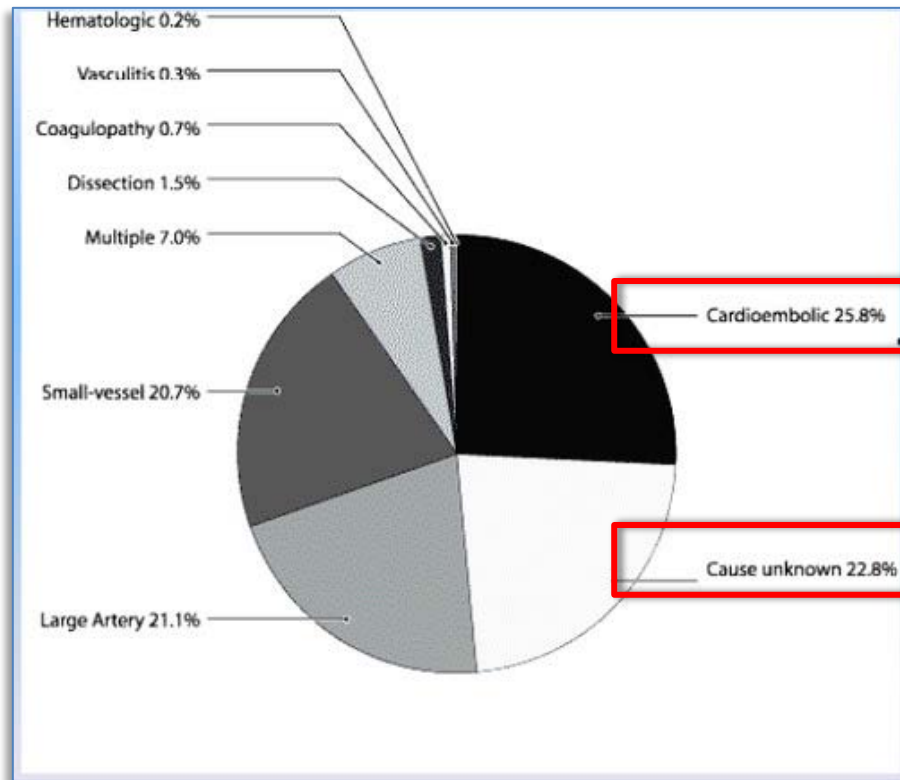
Ischemic stroke



Stroke is the third most common death cause (after CAD and cancer) and the first cause of disability

Background

Stroke's cause



Cardioembolic stroke:

- More severe
- Often multiple strokes
- Hemorrhagic evolution

Background

Cause of cardioembolic stroke

- Myxoma and fibroelastoma
- Infective endocarditis
- Apical thrombus after STEMI
- PFO / IAD / aortic atheroma
- Mitral valve stenosis
- AFib

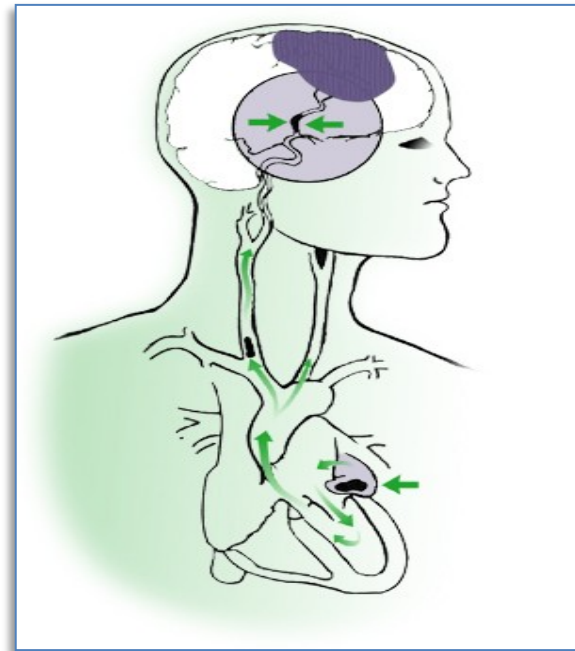
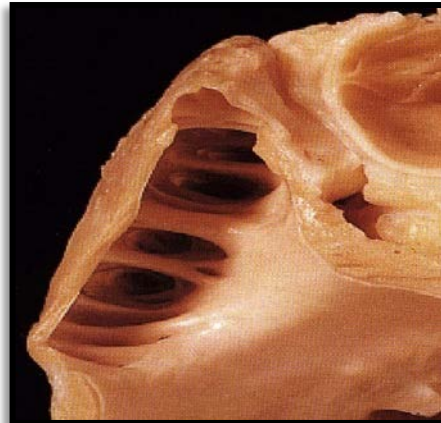


Background

Origin of the thrombus



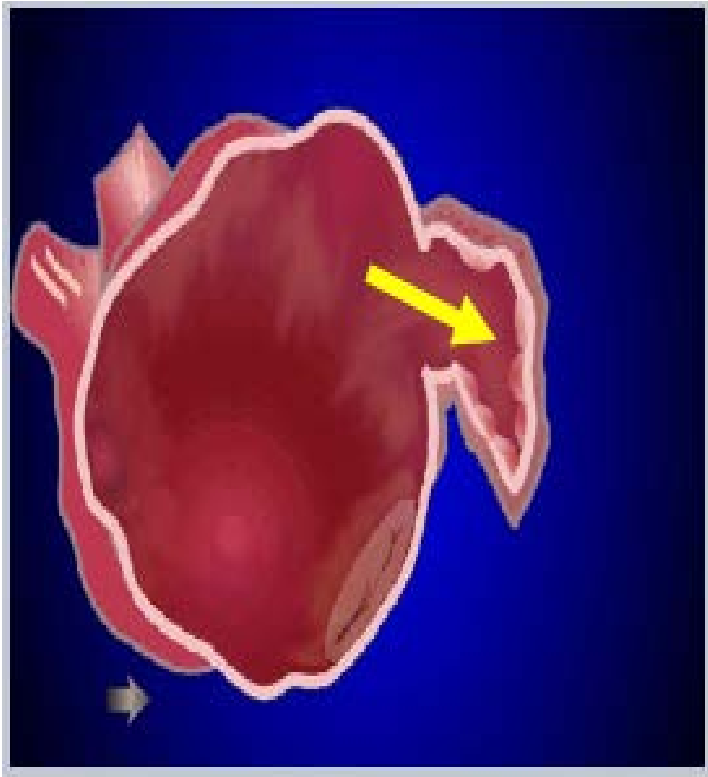
LAA thrombus is found in 15% of patients with AFib



N Engl J Med 1993;328:750-755

Background

Role of LAA



LAA is the source of the greatest share of atrial thrombosis:

- > 90% in non valvular AFib
- 70% in valvular AFib

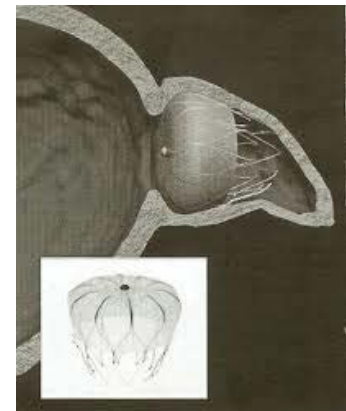
Background

LAA occlusion

Therefore it is indicated to *“resect LAA in order to reduce postoperative thrombotic events”* during cardiac surgery ...

ACC/AHA 2006 Guidelines for valvular heart disease

...and subsequently a minimally invasive approach to perform a complete LAA occlusion was developed...



Background

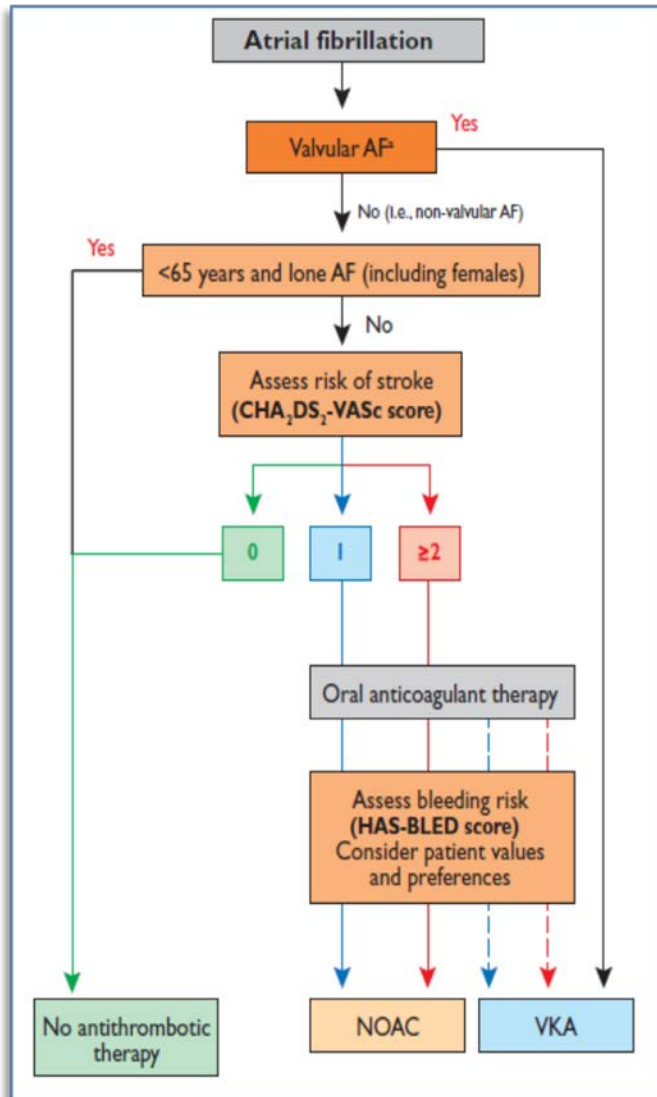
Thrombotic risk assessment

(a) Risk factors for stroke and thrombo-embolism in non-valvular AF	
'Major' risk factors	'Clinically relevant non-major' risk factors
Previous stroke, TIA, or systemic embolism Age ≥ 75 years	Heart failure or moderate to severe LV systolic dysfunction (e.g. LV EF $\leq 40\%$) Hypertension - Diabetes mellitus Female sex - Age 65–74 years Vascular disease ^a
(b) Risk factor-based approach expressed as a point based scoring system, with the acronym CHA ₂ DS ₂ -VASc (Note: maximum score is 9 since age may contribute 0, 1, or 2 points)	
Risk factor	Score
Congestive heart failure/LV dysfunction	1
Hypertension	1
Age ≥ 75	2
Diabetes mellitus	1
Stroke/TIA/thrombo-embolism	2
Vascular disease ^a	1
Age 65–74	1
Sex category (i.e. female sex)	1
Maximum score	9

CHA ₂ DS ₂ -VASc score	Patients (n = 7329)	Adjusted stroke rate (%/year) ^b
0	1	0%
1	422	1.3%
2	1230	2.2%
3	1730	3.2%
4	1718	4.0%
5	1159	6.7%
6	679	9.8%
7	294	9.6%
8	82	6.7%
9	14	15.2%

Background

Thrombotic risk assessment



According to guidelines, a great share of patients must start antithrombotic patients (NOAC = VKA)

Background

Hemorrhagic risk assessment

Letter	Clinical characteristic ^a	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 (e.g. age >65 years)	1
D	Drugs or alcohol (1 point each)	1 or 2
		Maximum 9 points

HAS-BLED Score	Major Bleeding Rate, %/y $\pm$
0	0
1	1.2
2	2.2
3	5.9
4	7.0
5–6	19.4

Background

“high risk patients”

(a) Risk factors for stroke and thrombo-embolism in non-valvular AF	
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Age ≥ 75	2
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Stroke/TIA/thrombo-embolism	2
Vascular disease ^a	1
Age 65–74	1
Sex category (i.e. female sex)	1
Maximum score	9

Table 10 Clinical characteristics comprising the HAS-BLED bleeding risk score

Letter	Clinical characteristic ^a	Points awarded
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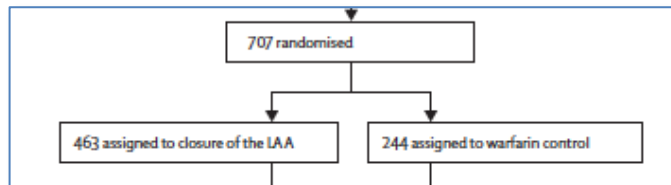
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Ischemic risk reduction

➤ Percutaneous closure of the left atrial appendage versus warfarin therapy for prevention of stroke in patients with atrial fibrillation: a randomised non-inferiority trial

*David R Holmes, Vivek Y Reddy, Zoltan G Turi, Shephal K Doshi, Horst Sievert, Maurice Buchbinder, Christopher M Mullin, Peter Sick, for the PROTECT AF Investigators**



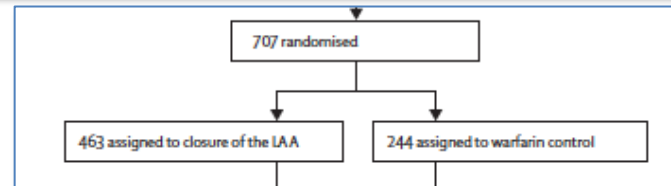
Patients with atrial fibrillation with any ischemic risk (CHADS 1-6) were randomly assigned to Watchman or VKA

	Intervention group (n=463)	Control group (n=244)
Characteristics		
Age (years)	71.7 (8.8;46.0-95.0)	72.7 (9.2;41.0-95.0)
Male	326 (70.4%)	171 (70.1%)
Race/ethnicity		
Asian	4 (0.9%)	1 (0.4%)
Black/African-American	6 (1.3%)	5 (2.0%)
White	425 (91.8%)	222 (91.0%)
Hispanic/Latin American	25 (5.4%)	15 (6.1%)
Hawaiian/Pacific Islander	1 (0.2%)	1 (0.4%)
Other	2 (0.4%)	0
Risk factors		
CHADS ₂ score*		
1	157 (33.9%)	66 (27.0%)
2	158 (34.1%)	88 (36.1%)
3	88 (19.0%)	51 (20.9%)
4	37 (8.0%)	24 (9.8%)
5	19 (4.1%)	10 (4.1%)
6	4 (0.9%)	5 (2.0%)

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Treatment group:

LAA occlusion followed by 6 weeks of VKA, than DAPT or VKA (clinical decision) for 6 months, than ASA

Control group:

Long term VKA with a good time in therapeutic range (TTR 70%)

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12 months

	Intervention group		Control group		Rate ratio (intervention/ control [95% CrI])	Posterior probabilities	
	Events/ patient- years	Observed rate (events per 100 patient-years [95% CrI])	Events/ patient- years	Observed rate (events per 100 patient-years [95% CrI])		Non-inferiority	Superiority
ITT population*							
Primary efficacy†	21/694.1	3.0 (1.9-4.5)	18/370.8	4.9 (2.8-7.1)	0.62 (0.35-1.25)	>99.9%	90.0%
Ischaemic stroke	15/694.6	2.2 (1.2-3.5)	6/372.3	1.6 (0.6-3.0)	1.34 (0.60-4.29)	71.8%	20.1%
Cardiovascular/ unexplained death	5/708.4	0.7 (0.2-1.5)	10/374.9	2.7 (1.2-4.4)	0.26 (0.08-0.77)	>99.9%	99.3%
Haemorrhagic stroke	1/708.4	0.1 (0.0-0.5)	6/373.4	1.6 (0.6-3.1)	0.09 (0.00-0.45)	>99.9%	99.8%
Systemic embolism	2/707.8	0.3 (0.0-0.8)	0/374.9	0	..	..	..
All stroke	16/694.6	2.3 (1.3-3.6)	12/370.8	3.2 (1.6-5.2)	0.71 (0.35-1.64)	99.3%	76.9%

Ischemic risk reduction

Stroke

Percutaneous Left Atrial Appendage Closure for Stroke Prophylaxis in Patients With Atrial Fibrillation 2.3-Year Follow-up of the PROTECT AF (Watchman Left Atrial Appendage System for Embolic Protection in Patients With Atrial Fibrillation) Trial

Vivek Y. Reddy, MD; Shephal K. Doshi, MD; Horst Sievert, MD; Maurice Buchbinder, MD; Petr Neuzil, MD, PhD; Kenneth Huber, MD; Jonathan L. Halperin, MD; David Holmes, MD; on behalf of the PROTECT AF Investigators

27 months

	Device		Control		Rate Ratio (Intervention/Control) (95% CrI)	Posterior Probabilities	
	Events/ Patient-Years	Observed Rate: Events per 100 Patient-Years (95% CrI)	Events/Patient- Years	Observed Rate: Events per 100 Patient-Years (95% CrI)		Noninferiority	Superiority
Primary efficacy	31/1025.7	3.0 (2.1–4.3)	24/562.7	4.3 (2.6–5.9)	0.71 (0.44–1.30)	>0.99	0.88
Ischemic stroke	19/1026.3	1.9 (1.1–2.9)	8/564.9	1.4 (0.6–2.4)	1.30 (0.66–3.60)	0.76	0.18
Cardiovascular/unexplained death	11/1050.4	1.0 (0.5–1.8)	16/573.2	2.8 (1.5–4.2)	0.38 (0.18–0.85)	>0.99	0.99
Hemorrhagic stroke	3/1050.3	0.3 (0.1–0.7)	7/571.0	1.2 (0.5–2.3)	0.23 (0.04–0.79)	>0.99	0.99
Systemic embolism	3/1049.8	0.3 (0.1–0.7)	0/573.2	0	...	...	...
All stroke	21/1026.3	2.0 (1.3–3.1)	15/562.7	2.7 (1.5–4.1)	0.77 (0.42–1.62)	>0.99	0.73
All-cause mortality	34/1050.4	3.2 (2.3–4.5)	26/573.2	4.5 (2.8–6.2)	0.71 (0.46–1.28)	>0.99	0.85
Primary safety	54/979.9	5.5 (4.2–7.1)	20/554.6	3.6 (2.2–5.3)	1.53 (0.95–2.70)	...	...

Protect AF

Hemorrhagic risk reduction

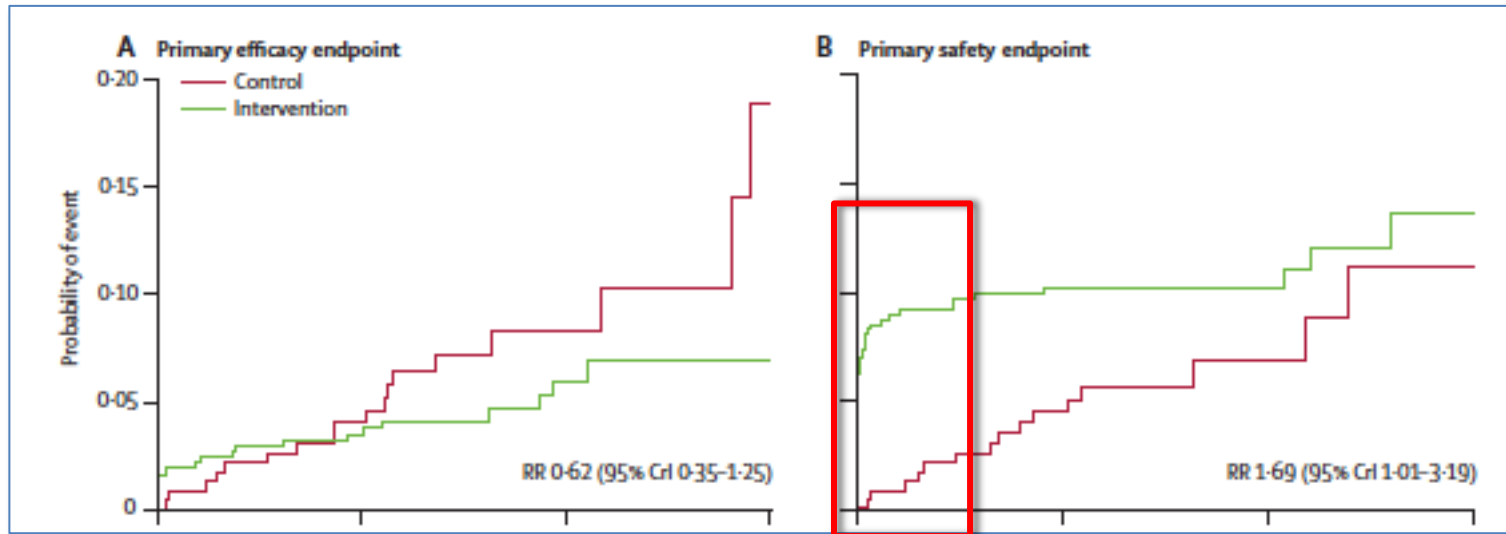
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All-cause mortality	21/708.4	3.0 (1.9-4.5)	18/374.9	4.8 (2.8-7.1)	0.62 (0.34-1.24)	>99.9%	90.7%
Primary safety‡	49/658.8	7.4 (5.5-9.7)	16/364.2	4.4 (2.5-6.7)	1.69 (1.01-3.19)	..	..
Successfully treated populations§							
Primary efficacy	11/593.6	1.9 (1.0-3.2)	17/370.2	4.6 (2.6-6.8)	0.40 (0.19-0.91)	>99.9%	98.6%
Primary safety	9/592.1	1.5 (0.7-2.8)	16/363.6	4.4 (2.5-6.7)	0.35 (0.15-0.80)	..	..

12 months

27 months

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Hemorrhagic risk reduction

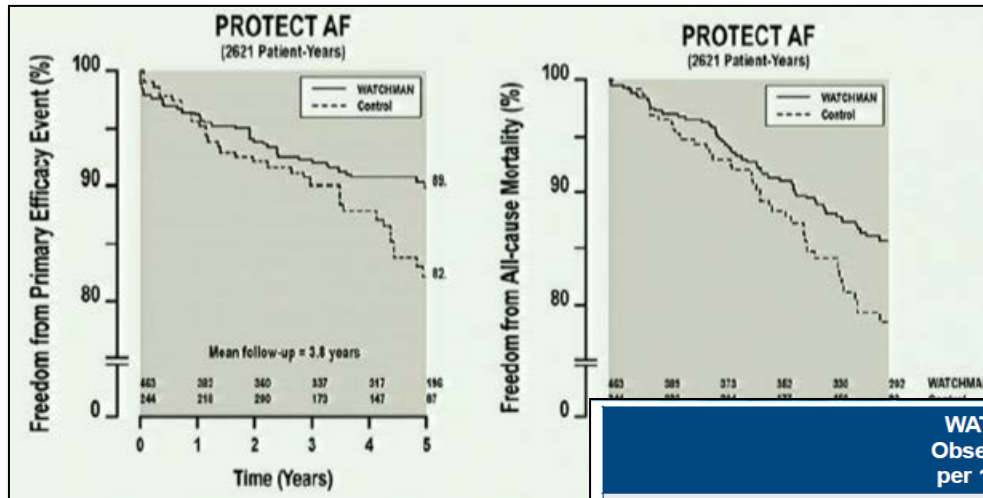


	Intervention (n=463)	Control (n=244)
Serious pericardial effusion*	22 (4.8%)	0
Major bleeding†	16 (3.5%)	10 (4.1%)
Procedure-related ischaemic stroke	5 (1.1%)	0
Device embolisation	3 (0.6%)	0
Haemorrhagic stroke‡	1 (0.2%)	6 (2.5%)
Other§	2 (0.4%)	0

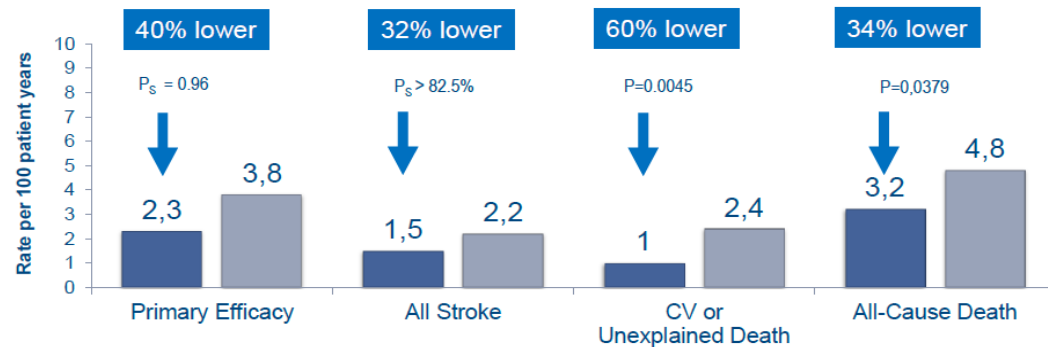
The difference between groups is in the periprocedural period, mostly due to procedural adverse events

Protect AF

Long term results



	WATCHMAN Observed Rate per 100 pt-yrs	Warfarin Observed Rate per 100 pt-yrs	% Reduction (vs Warfarin)	
Primary Efficacy Endpoint	2.3	3.8	40%	Superior
CV Death	1.0	2.4	60%	Superior
All-cause Death	3.2	4.8	34%	Superior



P_s = Posterior Probability for Superiority

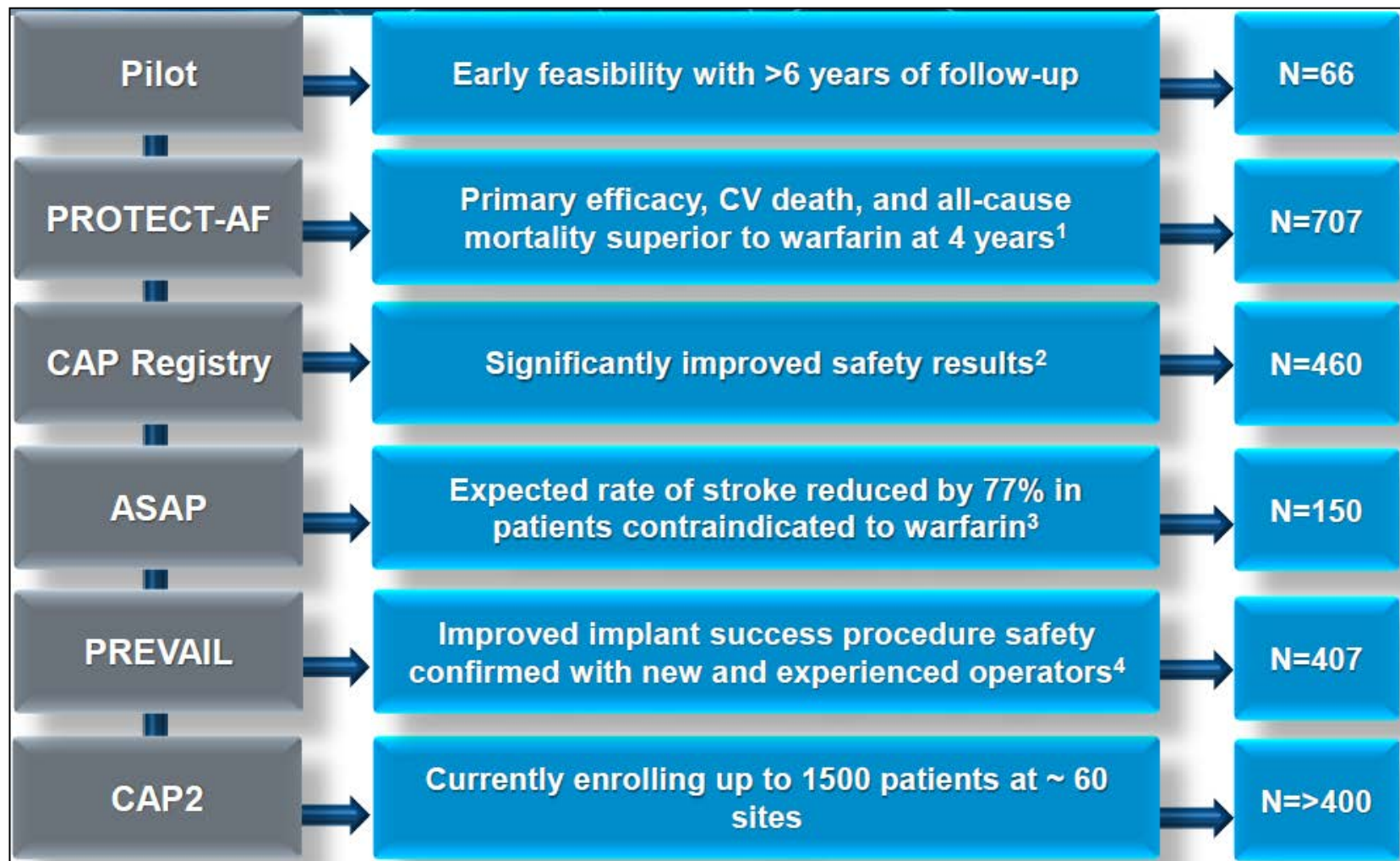
WATCHMAN Group
N=463

Warfarin Group
N=244

Evidence in LAA occlusion

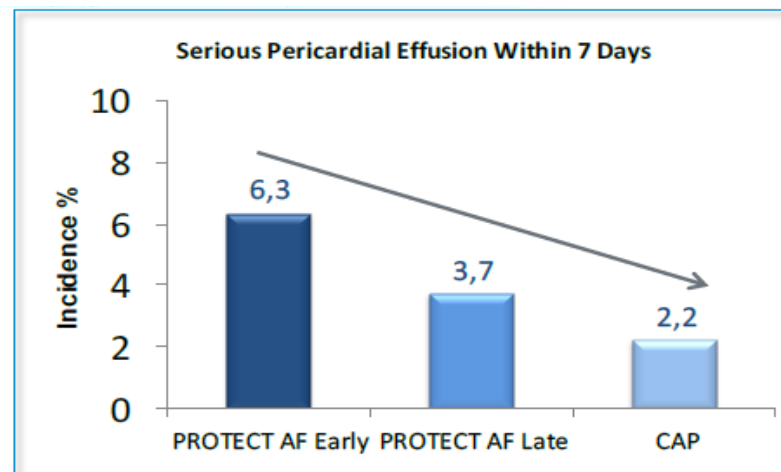
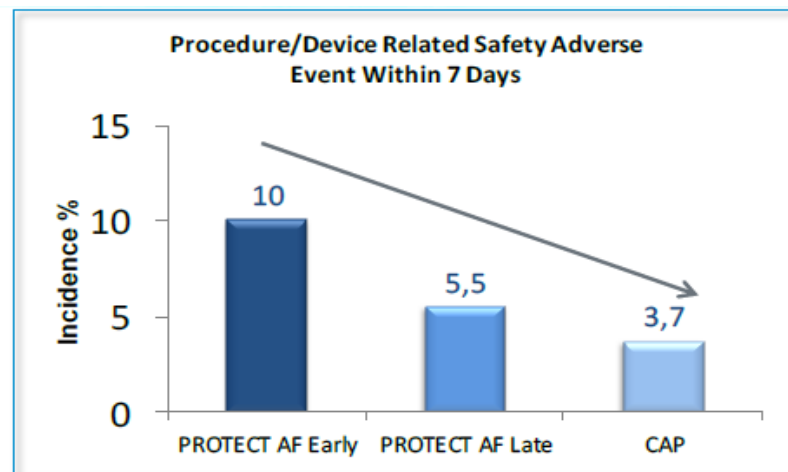
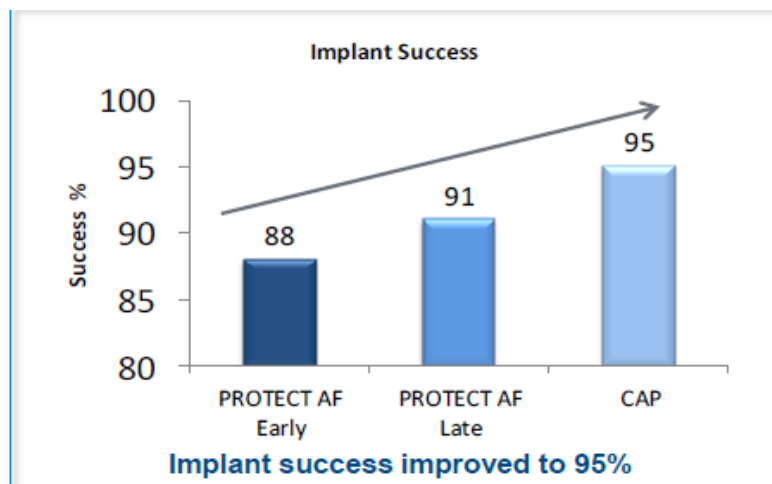
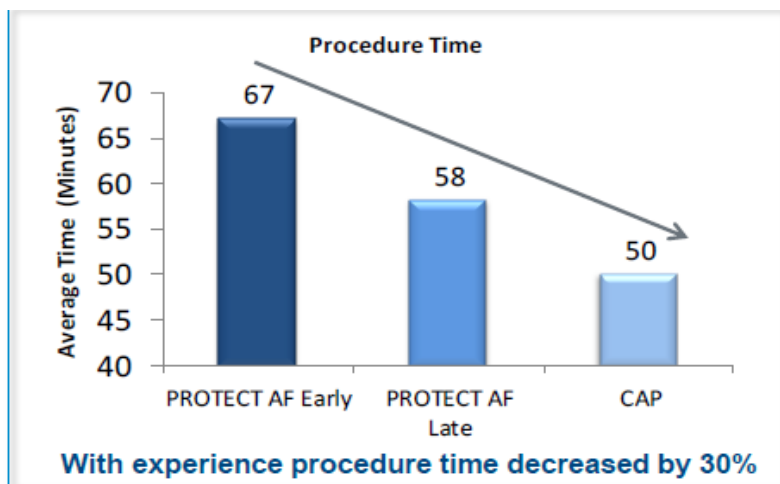
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Watchman portfolio



After Protect AF

CAP



After Protect AF

Prevail

ORIGINAL INVESTIGATIONS

Prospective Randomized Evaluation of the Watchman Left Atrial Appendage Closure Device in Patients With Atrial Fibrillation Versus Long-Term Warfarin Therapy



The PREVAIL Trial

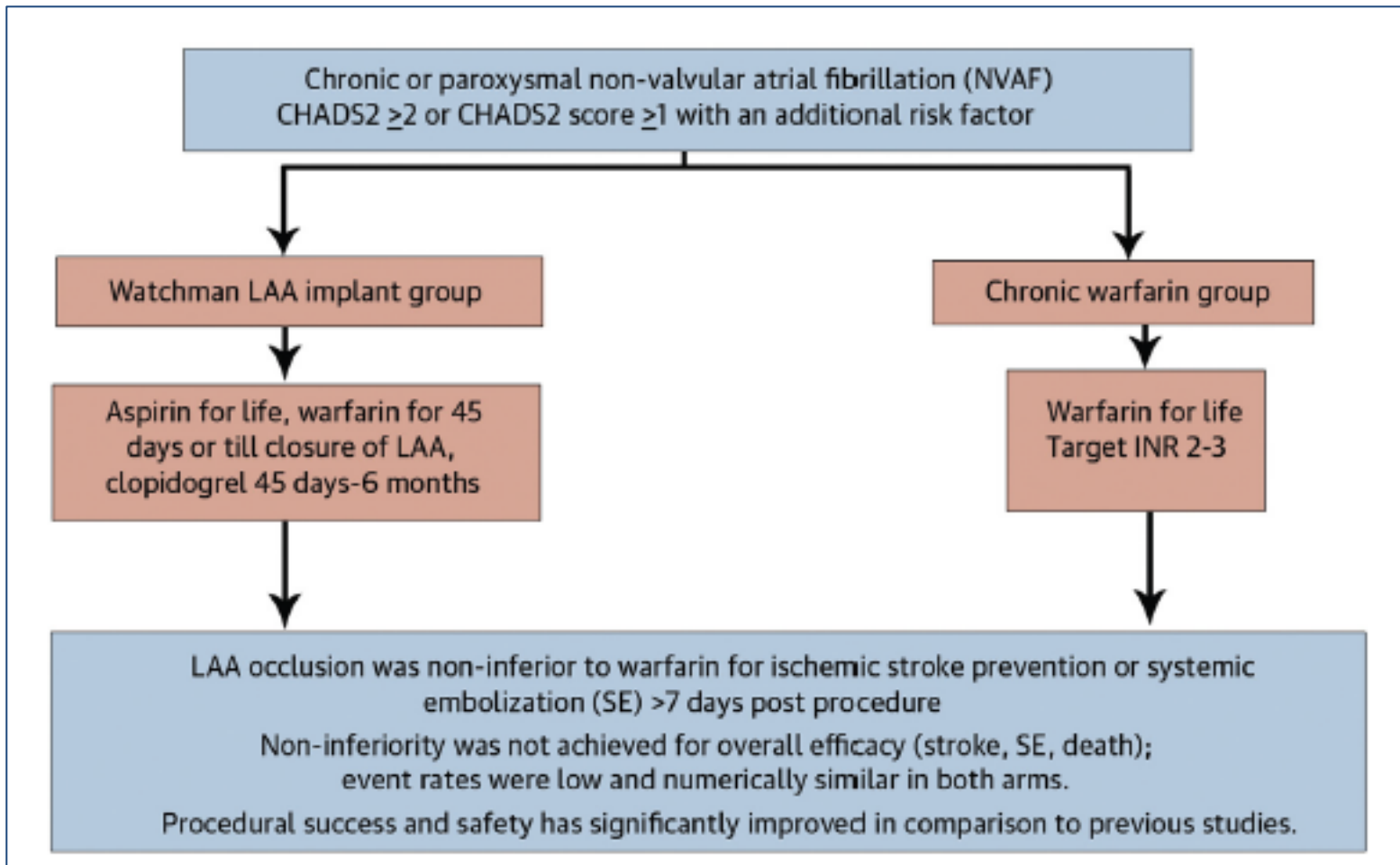
David R. Holmes Jr, MD,* Saibal Kar, MD,† Matthew J. Price, MD,‡ Brian Whisenant, MD,§ Horst Sievert, MD,||
Shephal K. Doshi, MD,¶ Kenneth Huber, MD,# Vivek Y. Reddy, MD**

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After Protect AF

Prevail

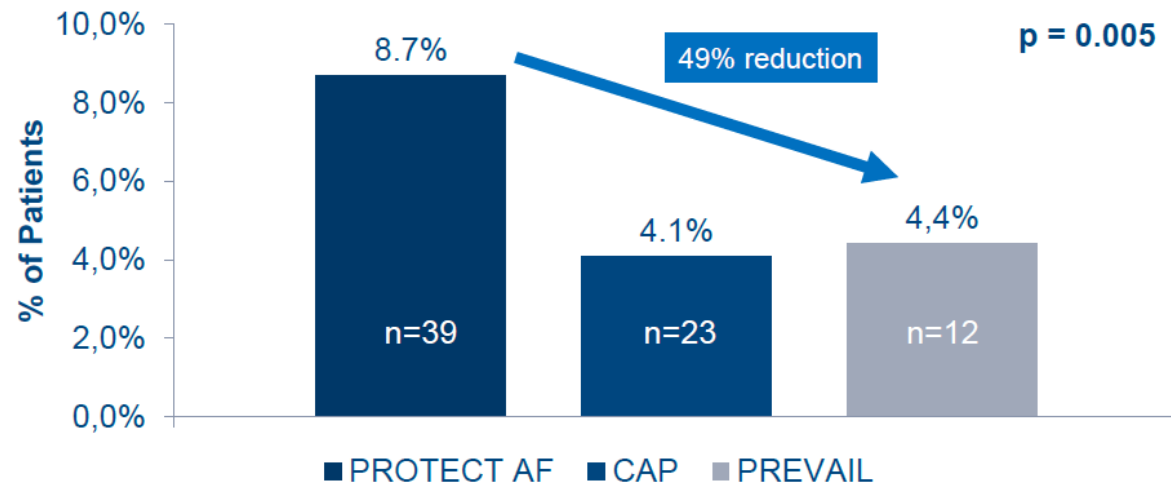


After Protect AF

Prevail

Study Design	Prospective, 2:1 randomized to either the WATCHMAN device or warfarin therapy using a Bayesian analysis
Primary Endpoint	• <u>1st co-primary endpoint</u>: The occurrence of all-cause death, ischemic stroke, systemic embolism, or device or procedure related events requiring open cardiac surgery or major endovascular intervention. (randomization up to 7 days post procedure or by hospital discharge, whichever is later) • <u>2nd co-primary endpoint</u>: Comparison of composite of stroke, systemic embolism, and cardiovascular/unexplained death at 18 months follow-up. • <u>3rd co-primary endpoint</u>: Comparison of ischemic stroke of systemic embolism occurring from greater than 7 days post randomization to 18 months follow-up
Patient Population	n = 461 enrolled with 407 randomized Mean Age = 74.9 ± 7.4 Mean CHA ₂ DS ₂ -VASc = 2.4 ± 1.4

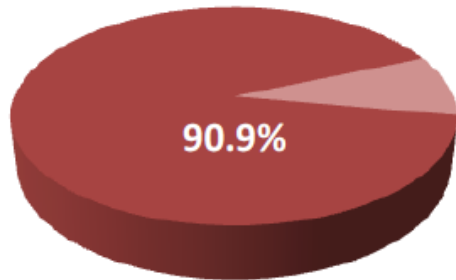
Composite of vascular complications includes cardiac perforation, pericardial effusion with tamponade, ischemic stroke, device embolization, and other vascular complications¹



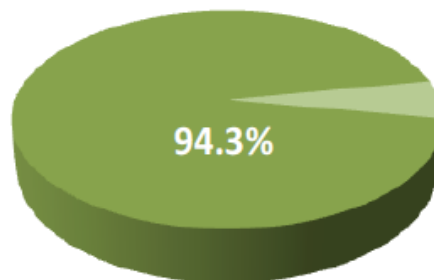
After Protect AF

Prevail

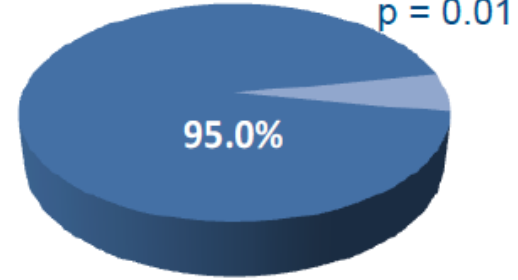
PROTECT AF Implant Success



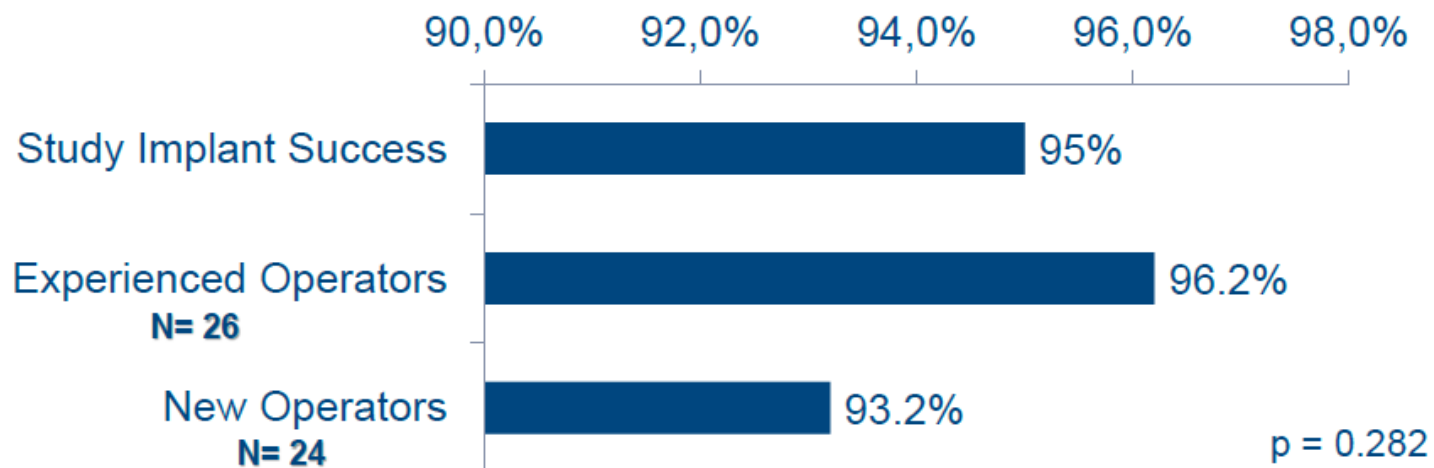
CAP Implant Success



PREVAIL Implant Success



% of Successful Implants (PREVAIL)



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ASAP trial

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Atrial Fibrillation

Left Atrial Appendage Closure With the Watchman Device in Patients With a Contraindication for Oral Anticoagulation

The ASAP Study (ASA Plavix Feasibility Study With Watchman Left Atrial Appendage Closure Technology)

Vivek Y. Reddy, MD,* Sven Möbius-Winkler, MD,† Marc A. Miller, MD,* Petr Neuzil, MD, PhD,‡
Gerhard Schuler, MD,† Jens Wiebe, MD,§ Peter Sick, MD,|| Horst Sievert, MD§

New York, New York; Leipzig, Frankfurt, and Regensburg, Germany; and Prague, Czech Republic

ASAP trial

Study design

Study Objective	To evaluate the safety and feasibility of the WATCHMAN® Left Atrial Appendage Closure device for the treatment of non-valvular atrial fibrillation in patients with a contraindication to warfarin
Study Design	Multicenter, nonrandomized, feasibility study
Primary Endpoint	The primary efficacy endpoint was defined as the combined events of ischemic stroke, hemorrhagic stroke, systemic embolism, and cardiovascular/unexplained death.
Patient Population	n = 150 Mean age 72.5 ± 4 yrs. Mean CHADS2=2.8 Mean CHA2DS2-VASc=4.4
Mean Follow-Up	14.4 months
Number of Sites	4 centers (Prague, Leipzig, Regensburg, and Frankfurt)

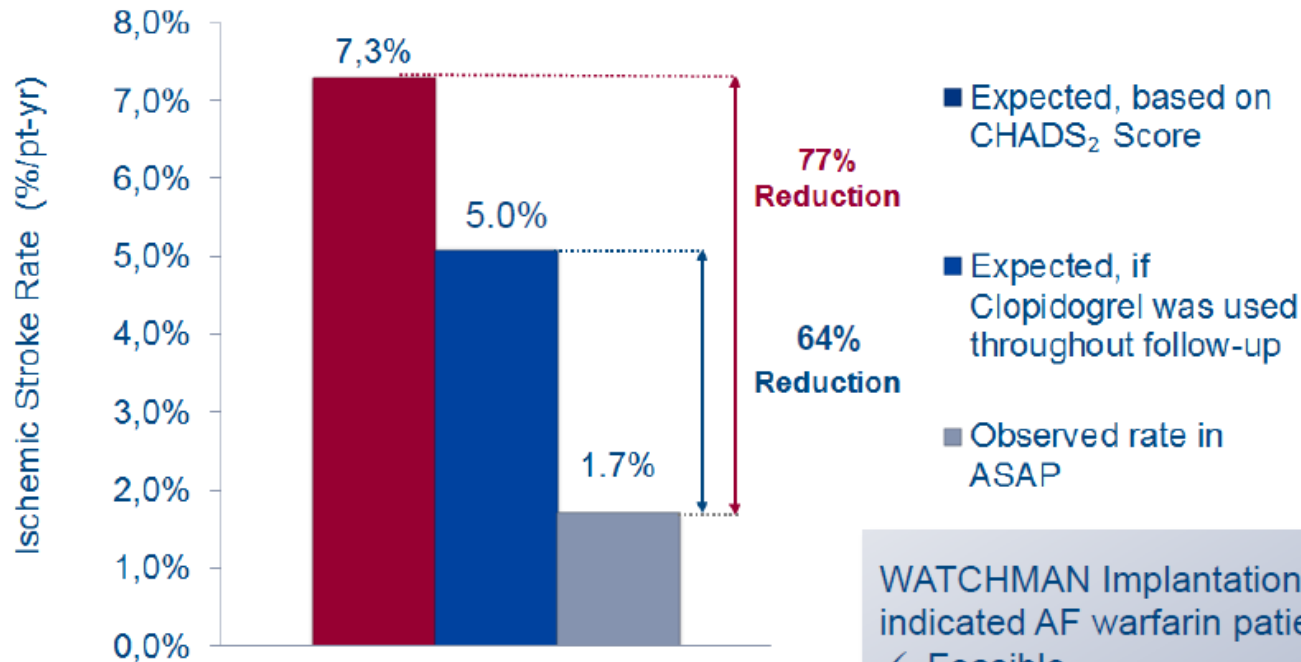
150 patients with VKA absolute contraindications.

6 weeks of DAPT, lifelong ASA alone

ASAP trial

Thrombotic risk reduction in DAPT/APT

Ischemic Stroke



WATCHMAN Implantation for contra-indicated AF warfarin patients is:

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

ASAP trial

What can be learned by ASAP trial

- Ischemic stroke reduction is secondary to LAA occlusion by Watchman device rather than to antithrombotic therapy (DAPT = VKA)
- First study to introduce a taylor made antithrombotic therapy
- Allows “early discontinuation” of the second antiplatelet agent after device implant

Evidence in LAA occlusion

- Background and rationale
- PROTECT AF
- After PROTECT AF:
 - ✓ CAP Registry, Prevail, CAP 2
 - ✓ ASAP
- **2012 guidelines**
- After the guidelines:
 - ✓ EHRA/EAPCI consensus
 - ✓ GISE/AIAC position statement
- Beyond the guidelines

2012 guidelines

For AFib patients



European Heart Journal (2012) 33, 2719–2747
doi:10.1093/eurheartj/ehs253

ESC GUIDELINES

2012 focused update of the ESC Guidelines for the management of atrial fibrillation

An update of the 2010 ESC Guidelines for the management of atrial fibrillation

Developed with the special contribution of the European Heart Rhythm Association

Authors/Task Force Members: A. John Camm (Chairperson) (UK)*, Gregory Y.H. Lip (UK), Raffaele De Caterina (Italy), Irene Savelieva (UK), Dan Atar (Norway), Stefan H. Hohnloser (Germany), Gerhard Hindricks (Germany), Paulus Kirchhof (UK)

Recommendations	Class ^a	Level ^b	Ref ^c
Interventional, percutaneous LAA closure may be considered in patients with a high stroke risk and contraindications for long-term oral anticoagulation.	IIb	B	115, 118
Surgical excision of the LAA may be considered in patients undergoing open heart surgery.	IIb	C	

2012 guidelines

For AFib patients

Recommendations	Class ^a	Level ^b	Ref ^c
Interventional, percutaneous LAA closure may be considered in patients with a high stroke risk and contraindications for long-term oral anticoagulation.	IIb	B	
Surgical excision of the LAA may be considered in patients undergoing open heart surgery.	IIb	C	

**PROTECT AF and
PREVAIL are both
RCT**

?

**PROTECT AF results are in a
population without
contraindications to VKA/NOAC**

Evidence in LAA occlusion

- Background and rationale
- PROTECT AF
- After PROTECT AF:
 - ✓ CAP Registry, Prevail, CAP 2
 - ✓ ASAP
- 2012 guidelines
- **After the guidelines:**
 - ✓ EHRA/EAPCI consensus
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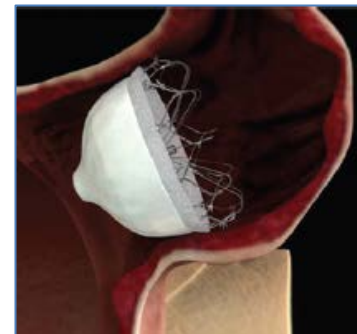
Europace
doi:10.1093/europace/euu174

EHRA/EAPCI CONSENSUS STATEMENT

EHRA/EAPCI expert consensus statement on catheter-based left atrial appendage occlusion

Bernhard Meier (EAPCI Chairperson) (Switzerland)¹, Yuri Blaauw (The Netherlands)², Ahmed A. Khattab (Switzerland)¹, Torsten Lewalter (Germany)³, Horst Sievert (Germany)⁴, Claudio Tondo (Italy)⁵, Michael Glikson (EHRA Chairperson) (Israel)^{6*}

Document Reviewers: Gregory Y. H. Lip (UK), Jose Lopez-Minguez (Spain), Marco Roffi (Switzerland), Carsten Israel (Germany), Dariusz Dudek (Poland), Irene Savelieva (on behalf of EP-Europace, UK)



Is it time to extend indications?

Indication for implant

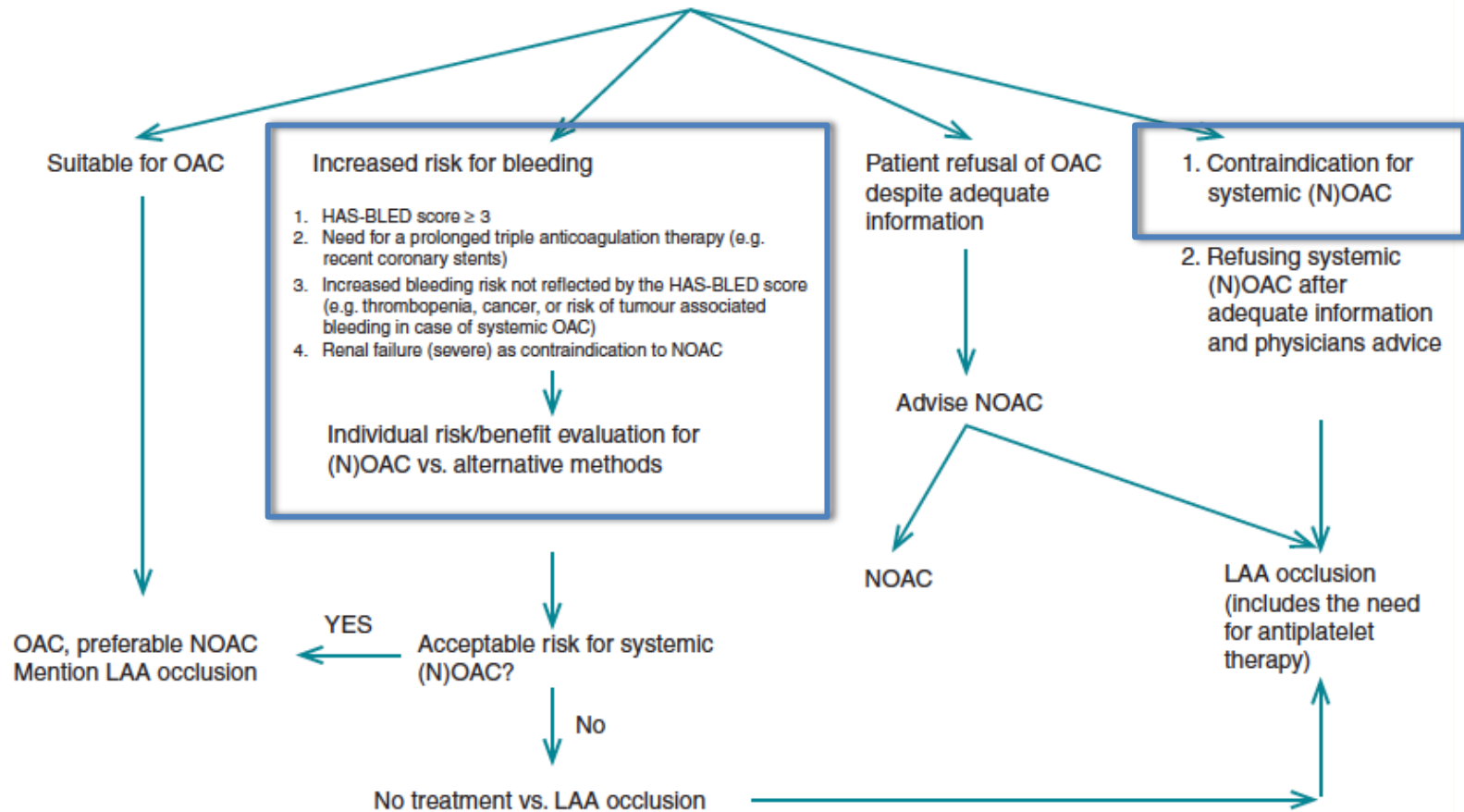
Low compliance

- * History of intracranial bleeding (intracerebral and subdural)
- * History of urinary tract bleeding
- * History of spontaneous bleeding other than intracranial or urinary tract bleeding (i.e. retroperitoneal haematoma)
- Recurrent falls
- Cognitive impairment
- * Use of non-steroidal anti-inflammatory drugs, steroids
- Personal preference

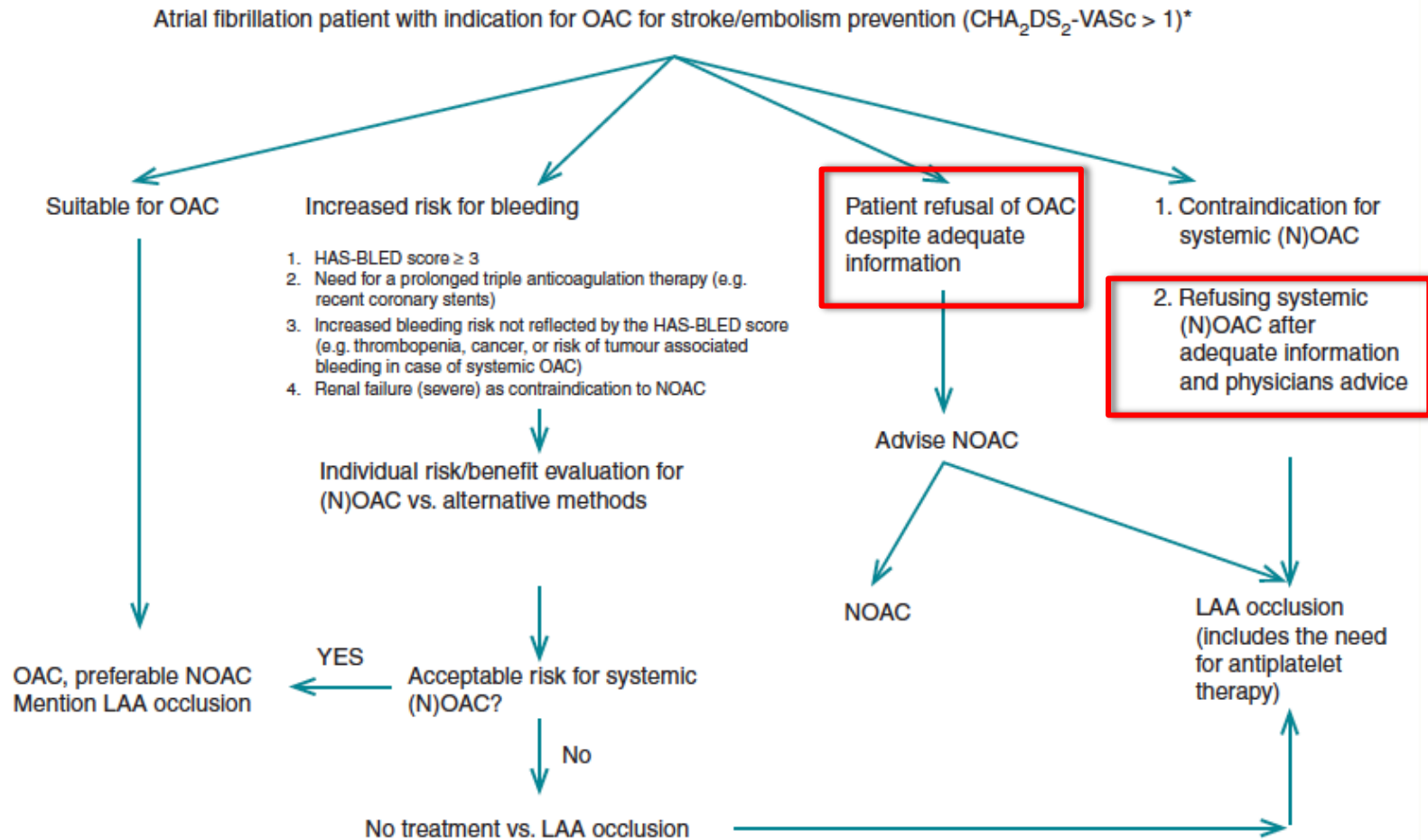
* = “Classic” indications (2012 guidelines)

Traditional indications

Atrial fibrillation patient with indication for OAC for stroke/embolism prevention ($\text{CHA}_2\text{DS}_2\text{-VASc} > 1$)*



Extended indications



“VKA/NOAC failure”

As a complement to anticoagulation

The combination of LAA occlusion and OAC is discussed and occasionally performed in patients with embolic events despite adequate OAC provided no other plausible cause (e.g. carotid disease, severe mobile aortic arch atheromata) can be identified. The ESC guidelines¹⁰⁷ recommended approach is increasing the international normalized ratio (INR) target 2.5–3.5 in this situation, when it occurs while taking warfarin. Another discussed option is the switch from VKA to one of the NOACs.^{118–121} Adding an antiplatelet agent to OAC is performed in the clinical arena, especially when embolism occurred at elevated INRs or while taking NOACs; however,

First international paper to consider LAA occlusion also for patients with high thrombotic risk and antithrombotic therapy failure (ischemic stroke in VKA, auricular thrombosis in VKA, systemic embolism...)

Antithrombotic therapy

ASA	Warfarin	Clopidogrel	Comments
Load 500 mg prior to procedure if not on ASA, continue 100–325 mg/day indefinitely	Start after procedure INR 2–3 till 45 days or continue till adequate occlusion ^a by TOE	Start when warfarin stopped continue till 6 months after the procedure	Some centres do not withhold warfarin and perform procedure on therapeutic INR (no data to support or dispute this approach)

- Low bleeding-risk patients: 6m ASA + VKA, then ASA + clopidogrel
- Intermediate risk: 6m ASA + clopidogrel, then ASA
- High bleeding risk: DAPT < 6 m

Evidence in LAA occlusion

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 - ✓ GISE/AIAC position statement
- Beyond the guidelines

Documento di posizione GISE/AIAC sui requisiti di processo diagnostico ed interventistico riferiti al trattamento della chiusura percutanea dell'auricola sinistra in pazienti affetti da fibrillazione atriale non valvolare

Sergio Berti^{1*} (Chairman), Sakis Themistoclakis^{2§} (Co-Chairman), Gennaro Santoro^{3*}, Roberto De Ponti^{4§}, Paolo Danna^{5*}, Massimo Zecchin^{6§}, Francesco Bedogni^{7*}, Luigi Padeletti^{8§}

¹*U.O. Cardiologia Diagnostica ed Interventistica, Fondazione Toscana "Gabriele Monasterio", Ospedale del Cuore, Massa*

²*Dipartimento Cardio-Toraco-Vascolare, Ospedale dell'Angelo, Venezia-Mestre*

³*Cardiologia, Azienda Ospedaliero-Universitaria Careggi, Firenze*

⁴*Dipartimento Cardiovascolare, Ospedale di Circolo e Fondazione Macchi, Università dell'Insubria, Varese*

⁵*Unità di Cardiologia Interventistica, Ospedale Luigi Sacco, Milano*

⁶*Cardiologia, Azienda Ospedaliero-Universitaria "Ospedali Riuniti", Trieste*

⁷*U.O.C. Cardiologia Interventistica, Istituto Clinico Sant'Ambrogio, Milano*

⁸*Cattedra di Cardiologia, Facoltà di Medicina e Chirurgia, Università degli Studi, Firenze*

^{*}*Società Italiana di Cardiologia Invasiva (GISE)*

[§]*Associazione Italiana di Aritmologia e Cardioritmologia (AIAC)*

Center requirements

1. è fortemente raccomandato che ogni struttura coinvolta in tale procedura abbia un Team Cardiovascolare in grado di garantire al paziente, affetto da FA, ogni tipo di trattamento, sia esso farmacologico che ablativo (transcatetere o chirurgico);
2. compito del Team Cardiovascolare deve essere l'attivazione delle procedure di buona pratica clinica, con particolare riguardo alla scelta della procedura da applicare nello specifico paziente;
3. la scelta della corretta strategia d'intervento individuale dovrebbe sempre essere effettuata dal Team Cardiovascolare, a meno che le indicazioni allo specifico trattamento siano chiaramente stabilite da documenti di consenso e/o linee guida;
4. poiché le strategie di trattamento sono molteplici è necessario che nel Team Cardiovascolare convergano, a seconda delle necessità del paziente, gli esperti in campo clinico/aritmologico, interventistico e di imaging cardiovascolare;
5. fanno parte del Team Cardiovascolare:
 - cardiologo/aritmologo clinico
 - ecocardiografista
 - cardiologo interventista
 - elettrofisiologo
 - cardiochirurgo
 - anestesista.

**Cardiovascular Team =
Heart Team for TAVI and
Mitraclip**

Indications

- **Confirmed 2012 guidelines indications (CHA2DS2-VASc >2 with VKA/NOAC contraindications)**
- **Absolute contraindications to VKA (high risk of fall, alcohol consumption...)**
- **Possible indication for patients in with indications for VKA (AFib) and DAPT (stent)**
- **Ischemic stroke during VKA/NOAC**

Evidence in LAA occlusion

- Background and rationale
- PROTECT AF
- After PROTECT AF:
 - ✓ CAP Registry, Prevail, CAP 2
 - ✓ ASAP
- 2012 guidelines
- After the guidelines:
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 - ✓ GISE/AIAC position statement
- **Beyond the guidelines**

Beyond guidelines

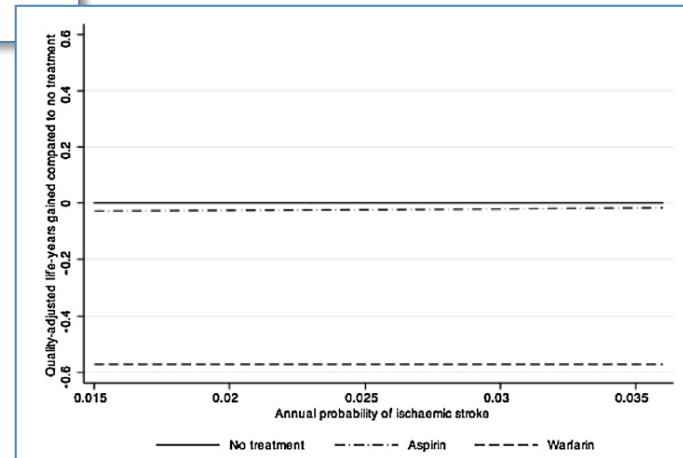
“Special populations”: RRT

Anti-coagulation, anti-platelets or no therapy in haemodialysis patients with atrial fibrillation: A decision analysis

MELANIE LR WYLD,^{1,2} PHILIP A CLAYTON,^{1,2,3} RACHAEL L MORTON^{4,5} and STEVEN J CHADBAN^{1,2,3}

AF treatment	Life expectancy (years)†	Incremental life expectancy	QALY†	Incremental QALY
No therapy	2.39		1.61	
Aspirin	2.38	−0.01	1.61	0.00
Warfarin	2.37	−0.02	1.47	−0.14

†All outcomes are discounted.



Beyond guidelines

“Special populations”: RRT

Warfarin Use and the Risk for Stroke and Bleeding in Patients With Atrial Fibrillation Undergoing Dialysis

Mitesh Shah, Meytal Avgil Tsadok, Cynthia A. Jackevicius, Vidal Essebag, Mark J. Eisenberg, Elham Rahme, Karin H. Humphries, Jack V. Tu, Hassan Behloul, Helen Guo and Louise Pilote

Dialysis Patients N=1626		Nondialysis Patients N=204 210	
Warfarin Users n=756	No-Warfarin Users, n=870	Warfarin Users, n=103 473	No-Warfarin Users, n=100 737

Bleeding§	275	8.89
According to warfarin prescription (within 30 days postdischarge)		
Yes	149	10.88
No	126	7.31

Dialysis Patients N=1626		
	No. of Events	Incidence* Rate per 100 Person-Years
Stroke†	107	3.12
According to warfarin prescription (within 30 days postdischarge)		
Yes	52	3.37
No	55	2.91

In a population in which VKA doesn't reduce ischemic risk but increases bleeding risk and NOACs are contraindicated, role of LAA occlusion can grow

Beyond guidelines

Special populations: absolute contraindications to VKA/NOACs

Left atrial appendage occlusion with the Watchman device in a patient with paroxysmal atrial fibrillation and intolerance of all forms of anticoagulation due to hereditary haemorrhagic telangiectasia

R. Spina and B. Gunalingam

Internal Medicine Journal © 2014 Royal Australasian College of Physicians

Bleeding and Coagulopathies in Critical Care

Beverley J. Hunt, M.D.

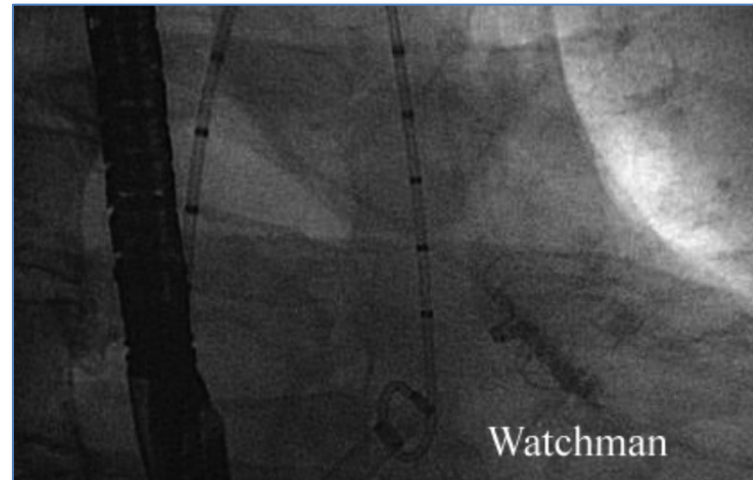
N ENGL J MED 370;9 NEJM.ORG FEBRUARY 27, 2014

Beyond guidelines

Special populations: device after NOACs

Percutaneous Left Atrial Appendage
Occlusion with a Watchman Device
Following Recurrent Stroke on Warfarin
and Rivaroxaban in Patient with
Paroxysmal Atrial Fibrillation

Roberto Spina, MBBS, MSc^a, Rajesh Subbiah, PhD, FRACP^{a,c},
Romesh Markus, PhD, FRACP^{b,c}, Brendan Gunalingam, FRACP^{a*}



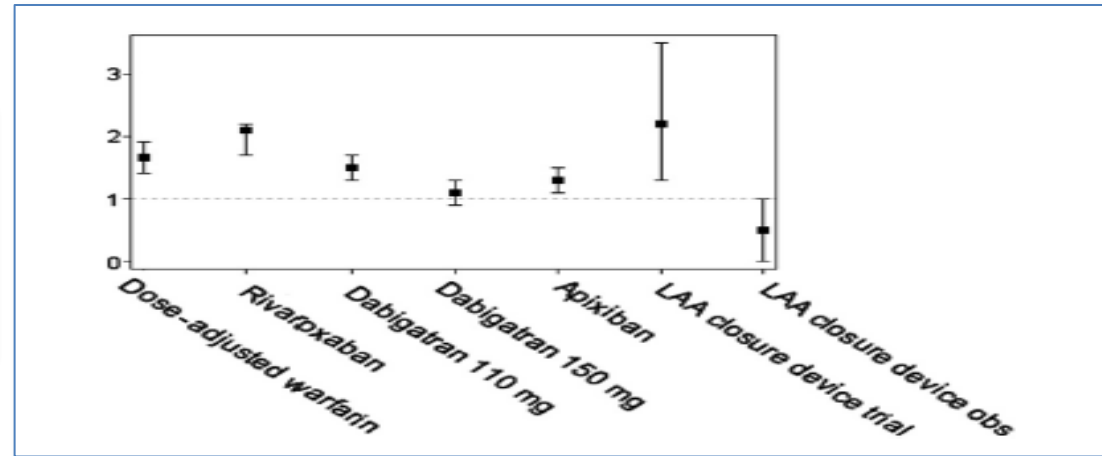
Beyond guidelines

Device vs. NOACs

Percutaneous Left Atrial Appendage Occlusion for Stroke Prophylaxis in Nonvalvular Atrial Fibrillation

A Systematic Review and Analysis of Observational Studies

Navkaranbir Singh Bajaj, MD,* Akhil Parashar, MD,† Shikhar Agarwal, MD, MPH,‡
Nishtha Sodhi, MD,‡ Kanhaiya Lal Poddar, MD,† Aatish Garg, MD,‡
E. Murat Tuzcu, MD,† Samir R. Kapadia, MD†



ARISTOTLE

1.60

ROCKET AF

2.20

RE-LY

1.70

PREVAIL

0.70

0.1

1

10

Rate Per Patient-years

ORIGINAL INVESTIGATIONS

Prospective Randomized Evaluation of the Watchman Left Atrial Appendage Closure Device in Patients With Atrial Fibrillation Versus Long-Term Warfarin Therapy

The PREVAIL Trial

David R. Holmes Jr, MD,* Saibal Kar, MD,† Matthew J. Price, MD,‡ Brian Whisenant, MD,§ Horst Sievert, MD,||
Shephal K. Doshi, MD,¶ Kenneth Huber, MD,‡ Vivek Y. Reddy, MD**

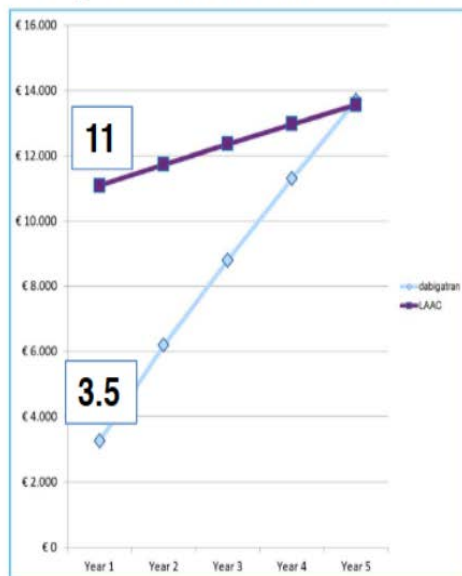
Beyond guidelines

Device vs. NOACs

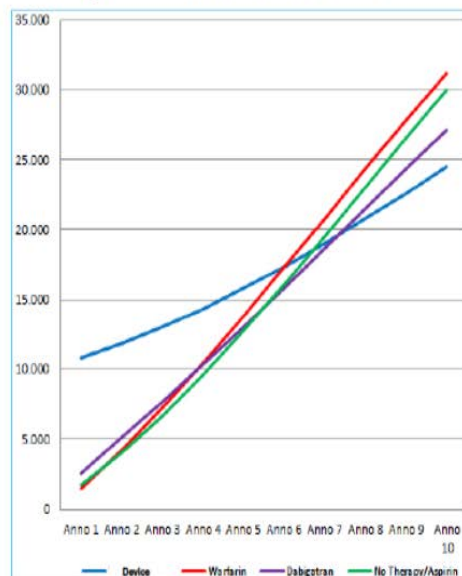
The budget impact of left atrial appendage closure compared with adjusted-dose warfarin and dabigatran etexilate for stroke prevention in atrial fibrillation

Stacey L. Amorosi¹, Shannon Armstrong^{2*}, Lisa Da Deppo³, Susan Garfield², and Kenneth Stein⁴

5-yrs cumulative costs

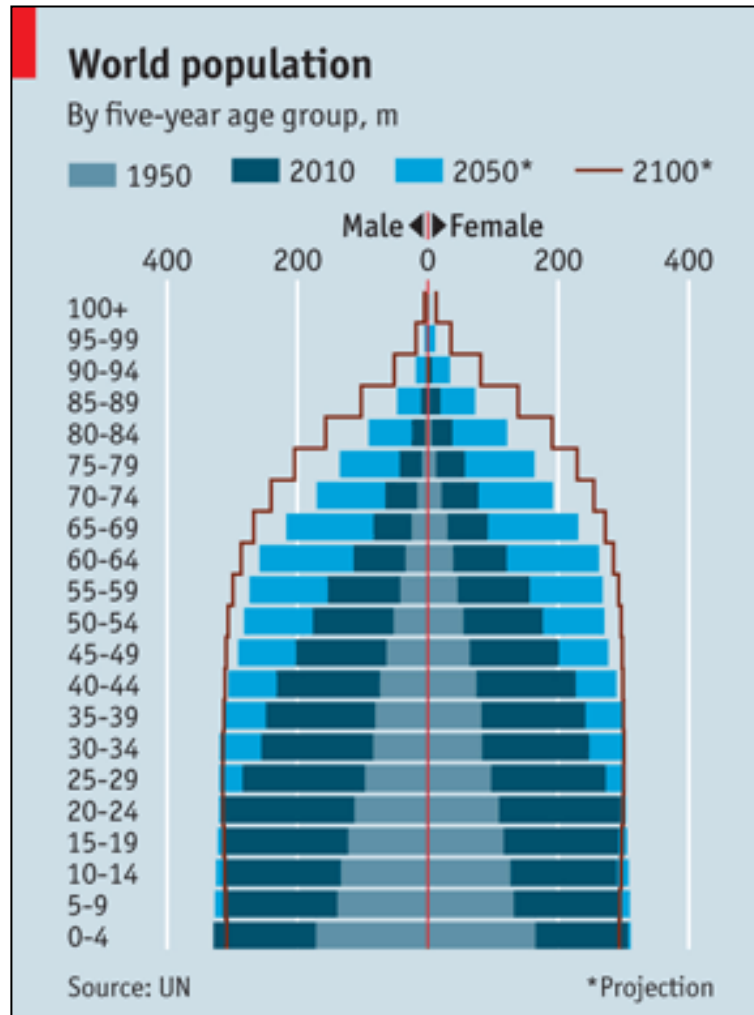


10-yrs cumulative costs



Beyond guidelines

Device vs. NOACs



Beyond guidelines

Growing interest

Circulation

JOURNAL OF THE AMERICAN HEART ASSOCIATION

CONTROVERSIES IN CARDIOVASCULAR MEDICINE



Novel Anticoagulants Eliminate the Need for Left Atrial Appendage Exclusion Devices
Michael D. Ezekowitz and Anthony P. Kent

Circulation. 2014;130:1505-1514

doi: 10.1161/CIRCULATIONAHA.114.008139

Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231

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Print ISSN: 0009-7322. Online ISSN: 1524-4539

Left Atrial Appendage Occlusion Addresses the Tremendous Unmet Needs of Stroke Prevention in Atrial Fibrillation That Persist Despite Recent Advances in Anticoagulation Therapy

Brian Whisenant, Saibal Kar and T. Jared Bunch

Circulation. 2014;130:1516-1523

doi: 10.1161/CIRCULATIONAHA.114.008140

Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231

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Print ISSN: 0009-7322. Online ISSN: 1524-4539

Thank you for your attention



Dr. Patrizio Mazzone



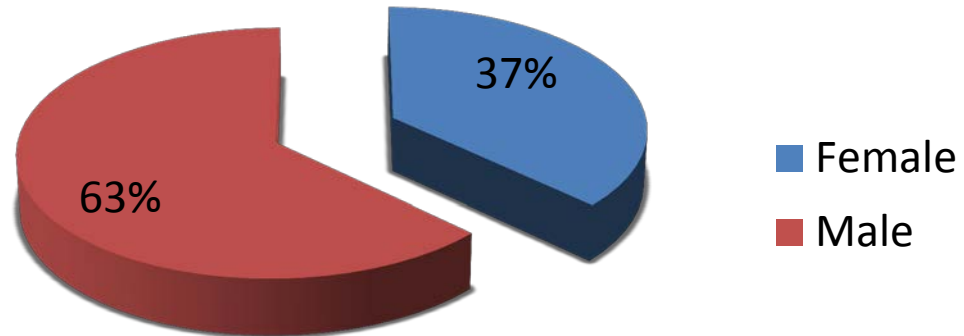
LAA occlusion: San Raffaele experience

**Patrizio Mazzone, Francesco Ancona, Damiano Regazzoli,
Fabrizio Guarracini, Michele Oppizzi, Andrea Aurelio,
Antonio Mangieri, Eustachio Agricola, Alessandra Marzi,
Alberto Margonato, Paolo Della Bella**

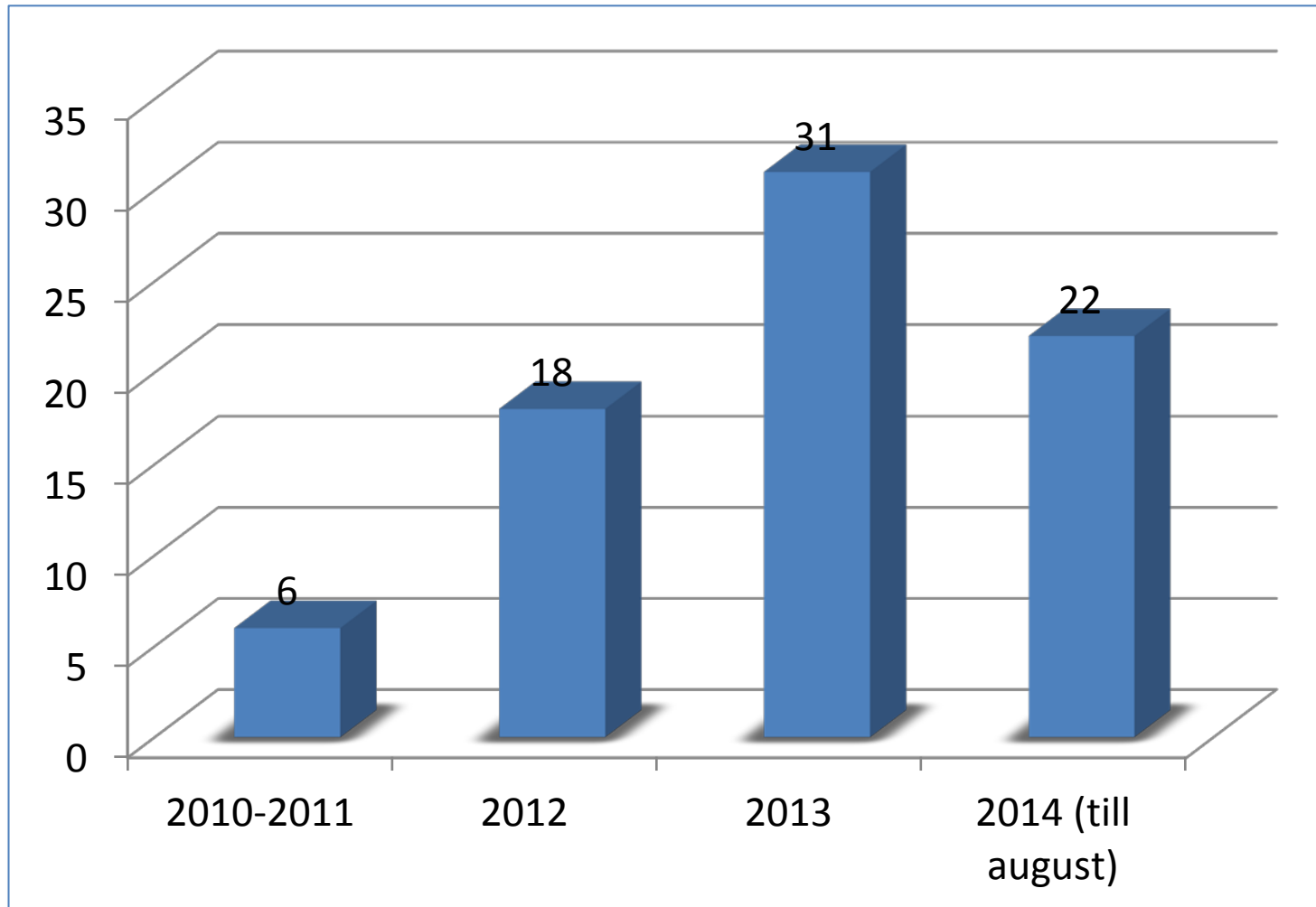
*Dipartimento cardio-toraco-vascolare
Ospedale San Raffaele Milano*

Population data

**77 patients
between August
2010 and August
2014**



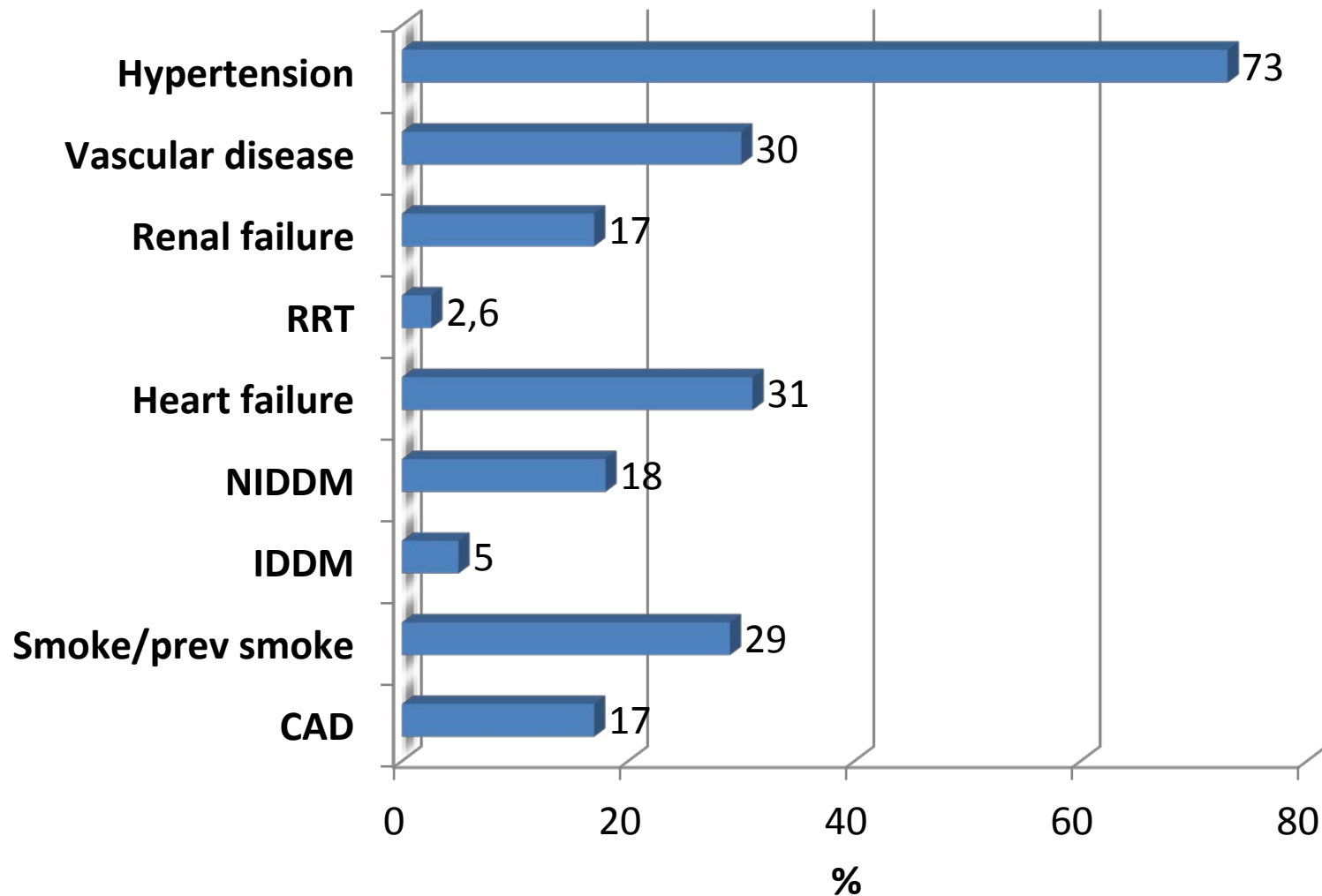
Population data



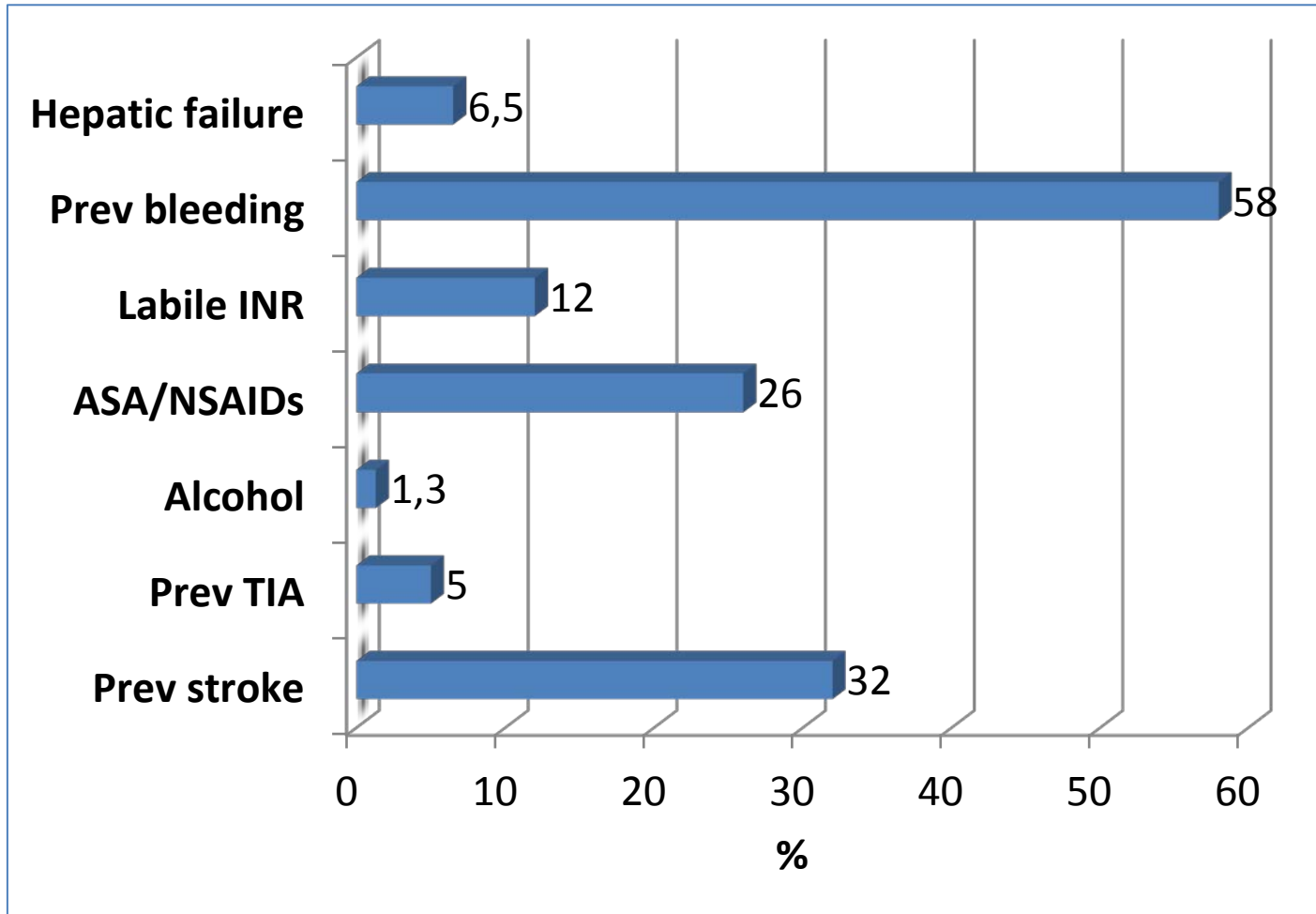
Population data

Mean age $71,2 \pm 8,5$ y

LVEF 52 ± 10 %



Population data

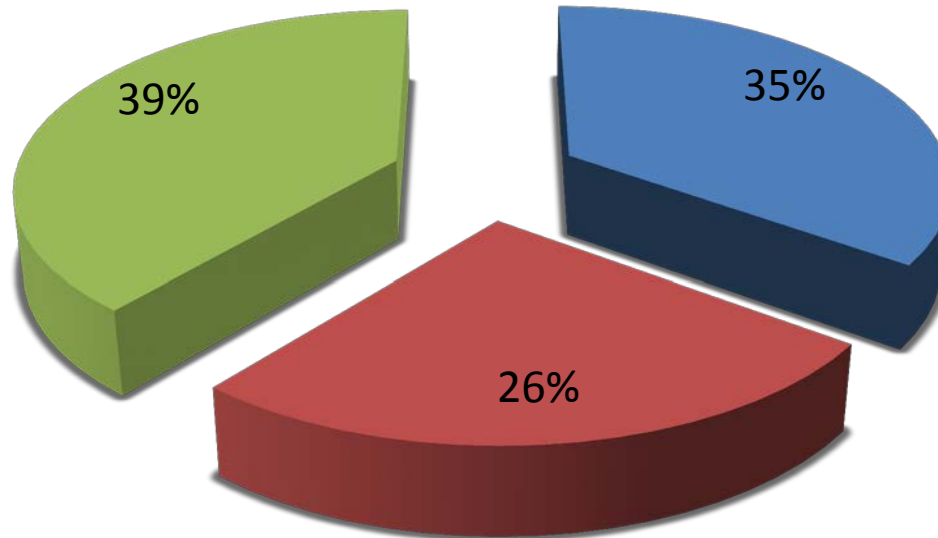


CHA₂DS₂-VASC: 3,6 ± 1,7

HAS-BLED: 3,2 ± 1,3

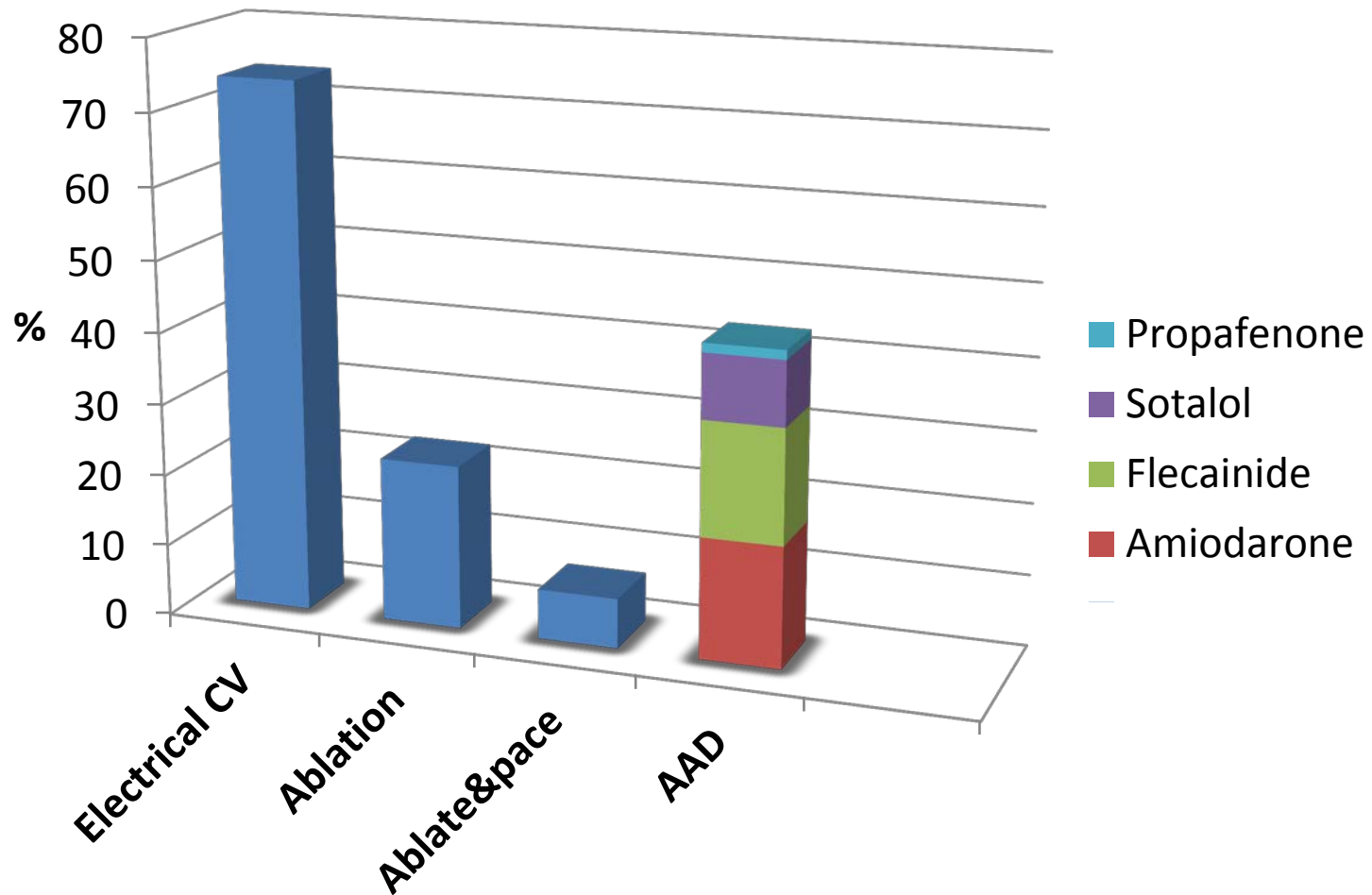
AFib data

■ Paroxysmal ■ Persisten ■ Permanent



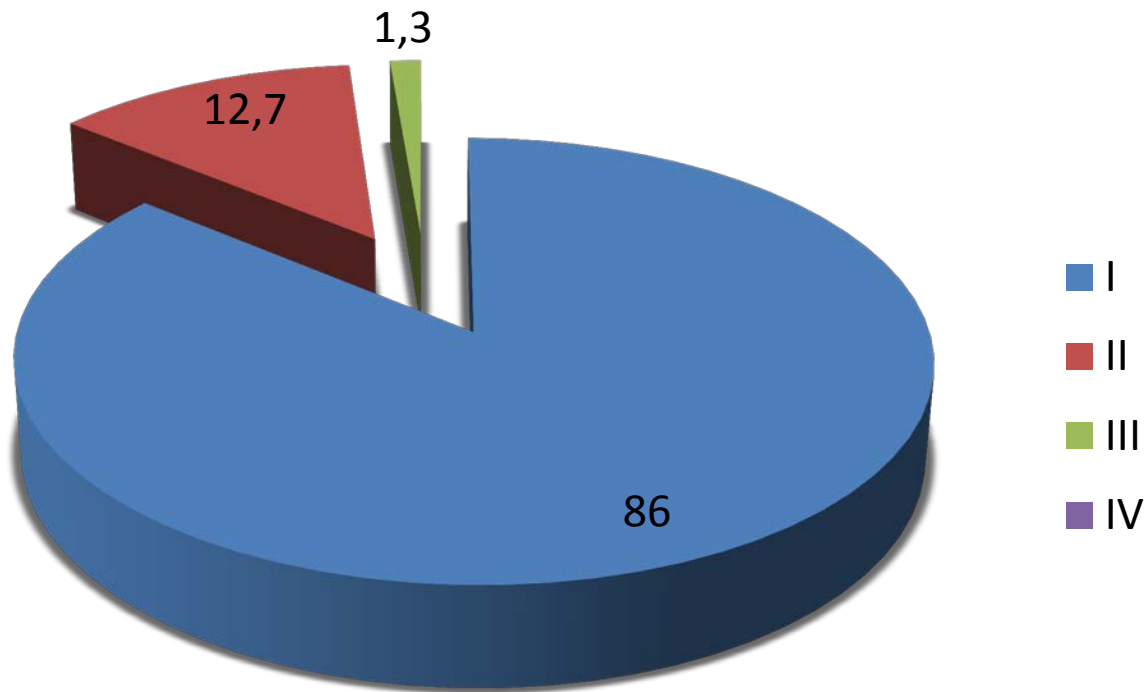
**Mean AFib
duration: $48 \pm$
50 months**

AFib data

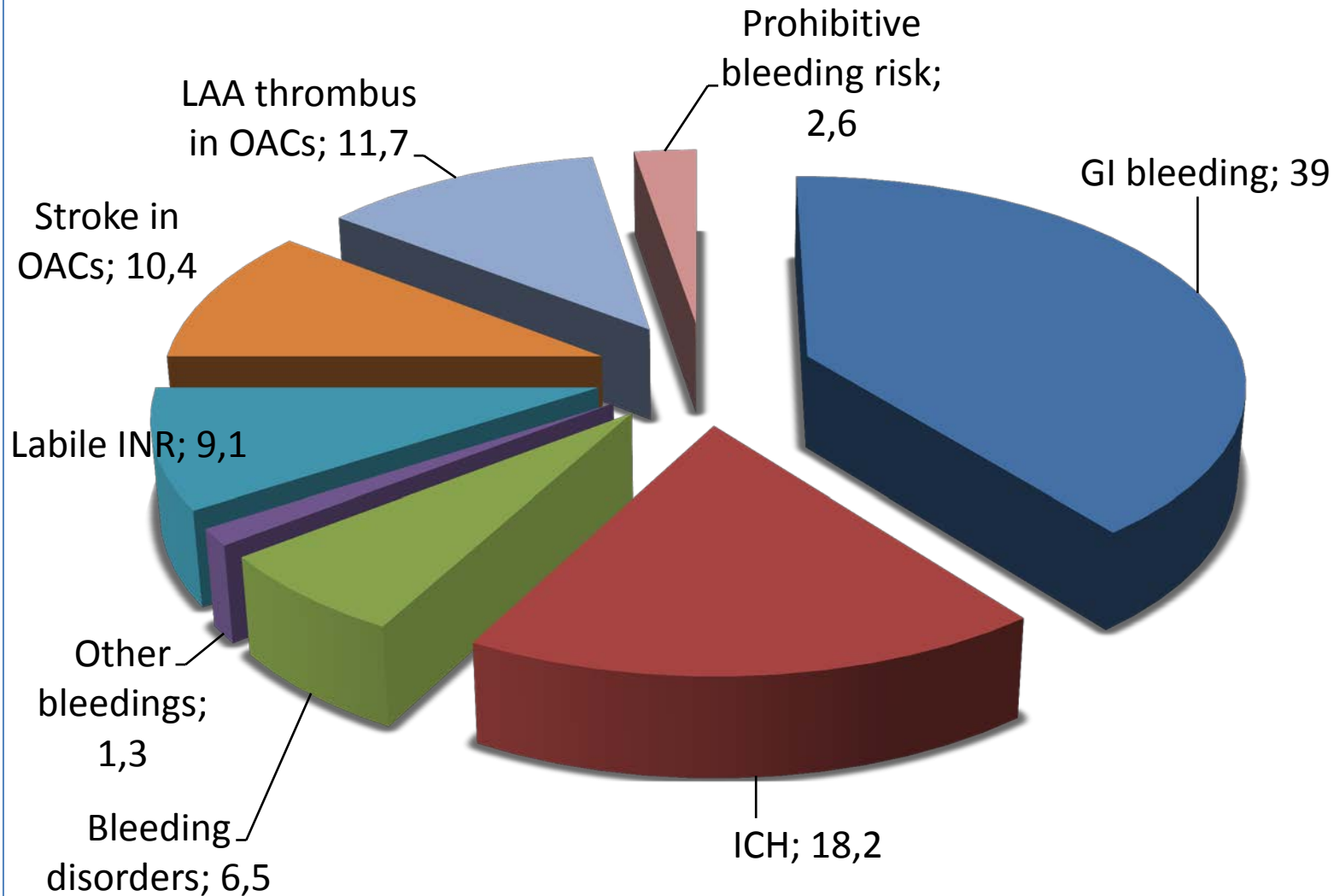


AFib data

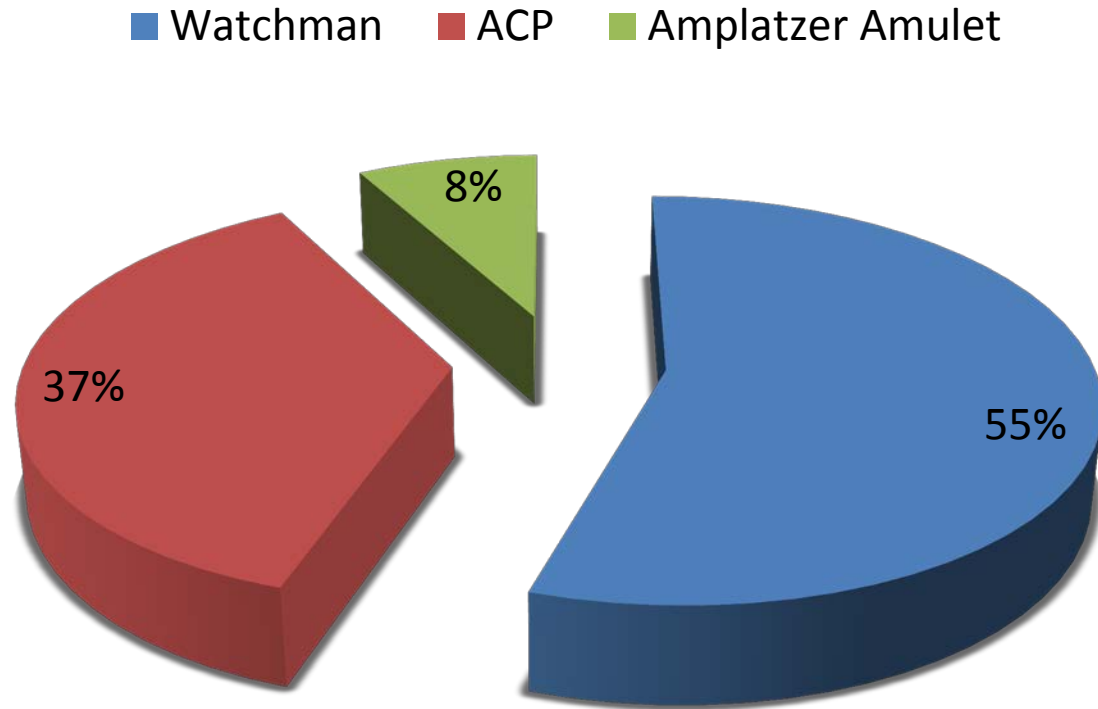
EHRA Class



Indications



Devices



Mean device size: $23,7 \pm 2,7$ mm
Most implanted size: 24 > 20-21 mm

Procedural data

Mean procedural time (door-to-door): **98 ± 33 min**

Mean contrast dose: **52 ± 32 ml**

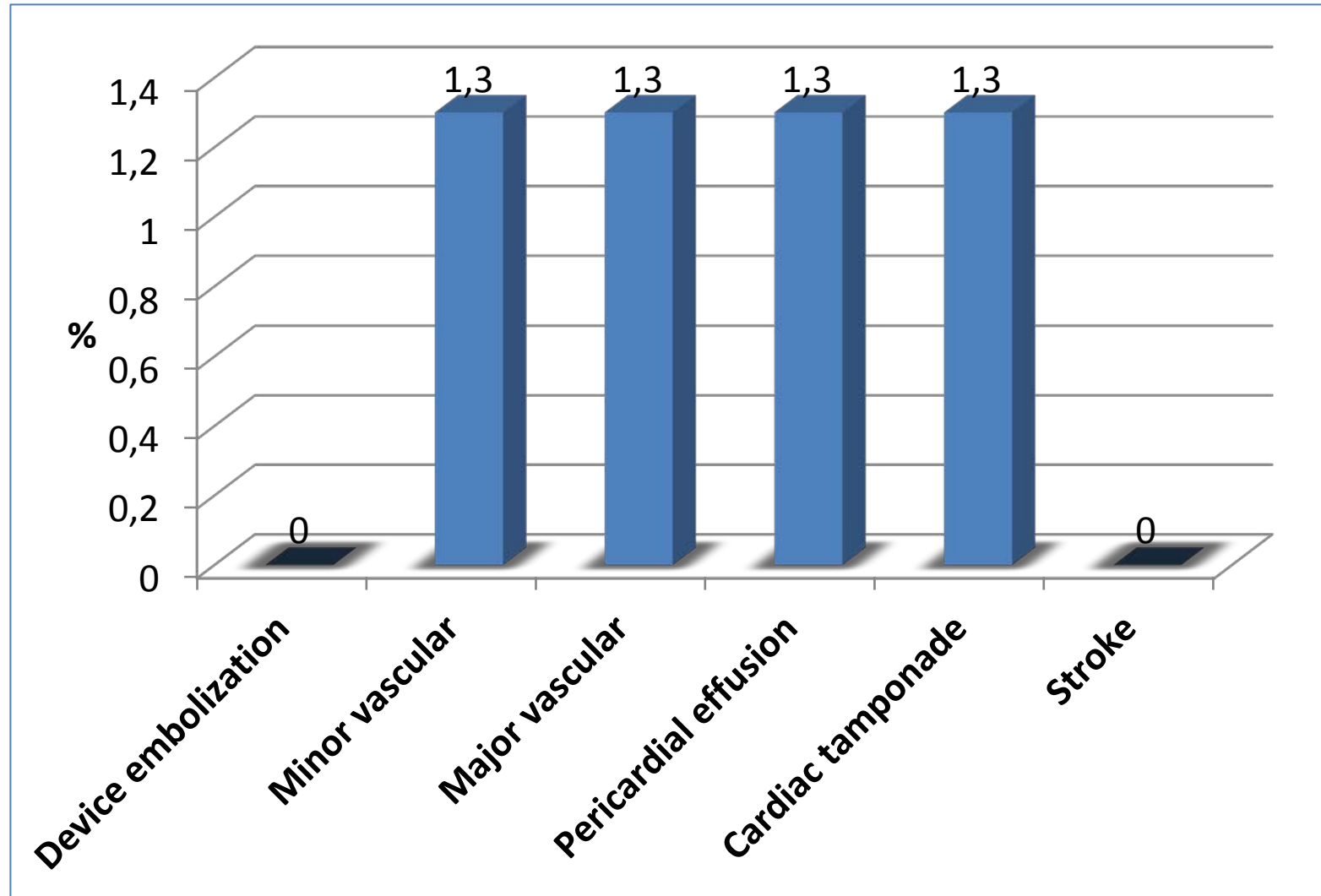
Mean length of stay: **$2,3 \pm 1,5$**
days

Mean radiological exposure: **68 ± 57**
Gycm²

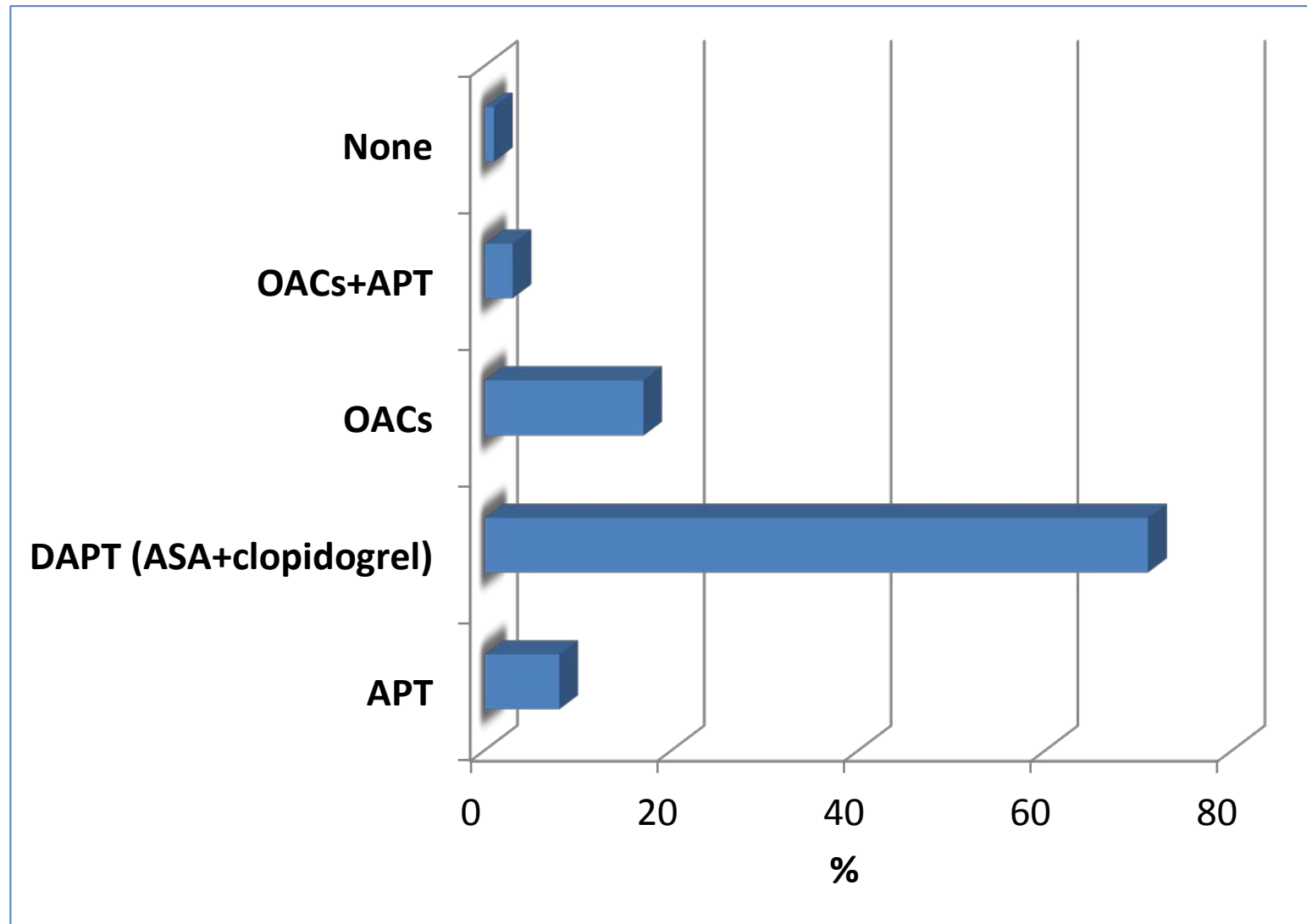
Procedural success (correct device position without leaks or with leaks < 3mm): **100%**

In 2 pts the device size wan changed during the procedure

InH events



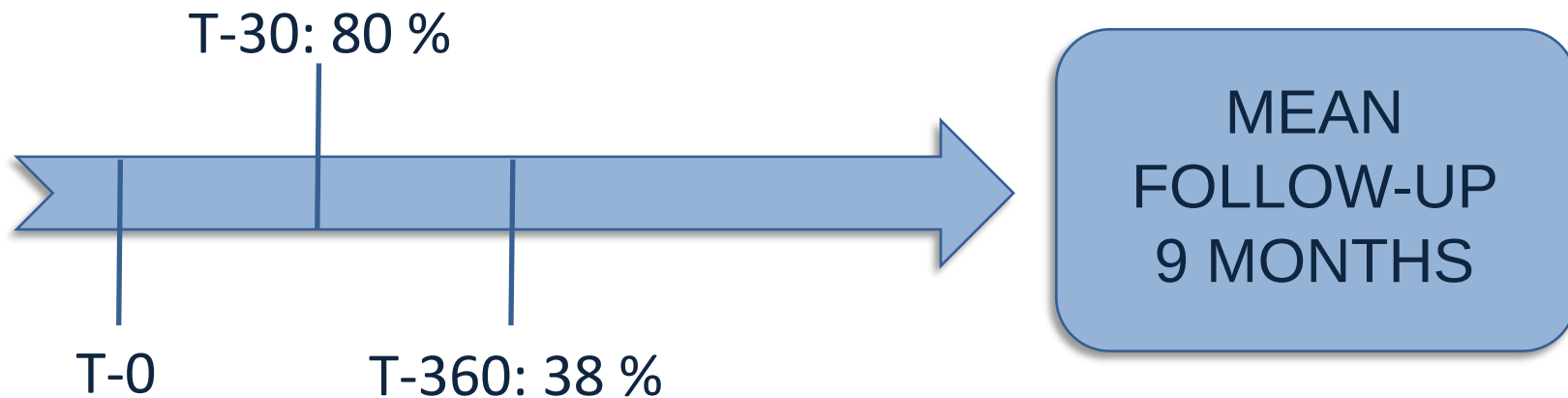
Dismission therapy



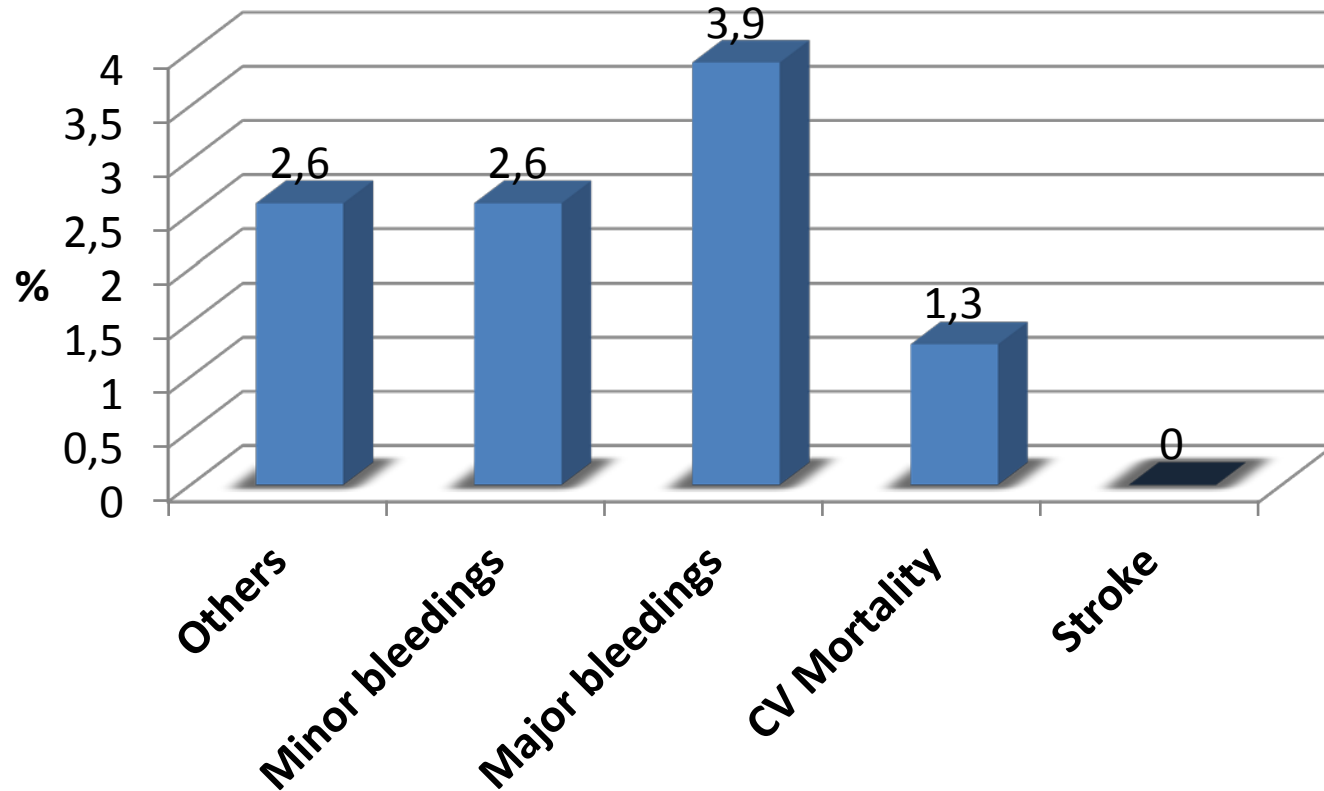
Follow up

Follow-up schedule:

- 30-45 days: 1st transesophageal echo
- 45-60 days: outpatient visit
- 120-180 days: 2nd (*if necessary*) transesophageal echo
- every 180 days: telephonic interviews

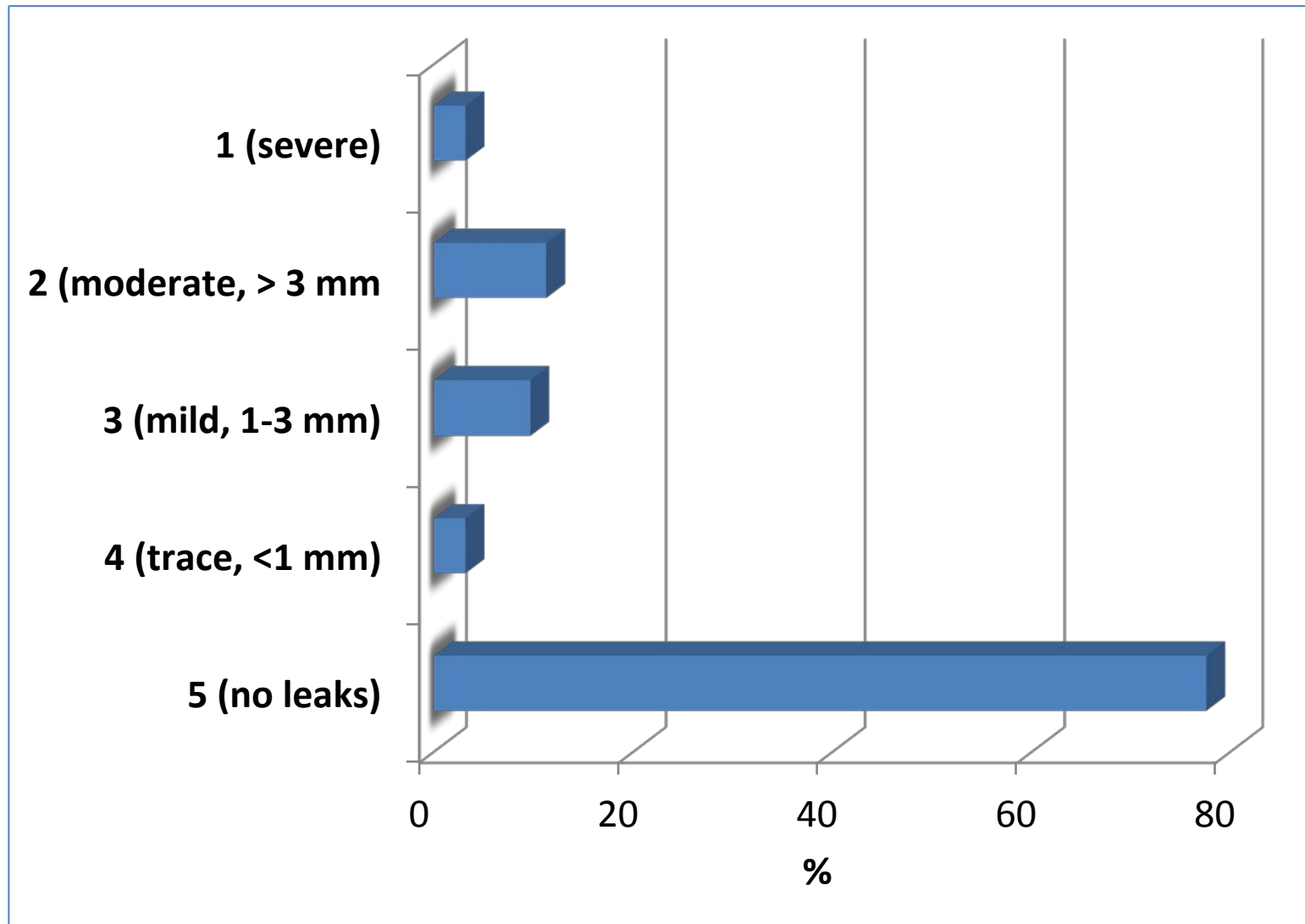


Follow-up



-CV death: infective endocarditis on BAV
-Other events: 1 ventricular arrhythmia
1 MitraClip implant

Follow-up: leaks



Echocardiographic Leak predictors:

- No differences between “leak” and “no-leak” groups in:
 - Mean LAA ostium diameter (20.9 vs 19.6 mm)
 - Mean device size (24 vs 24 mm)
 - Mean oversizing (3.4 vs 4.5 mm)
- Other possible predictors:
 - Ostium and LAA morphology?
 - LAP and AFib duration?
 - Mitral valve disease?
 - 3D TEE or CT scan?

Antithrombotic protocol?

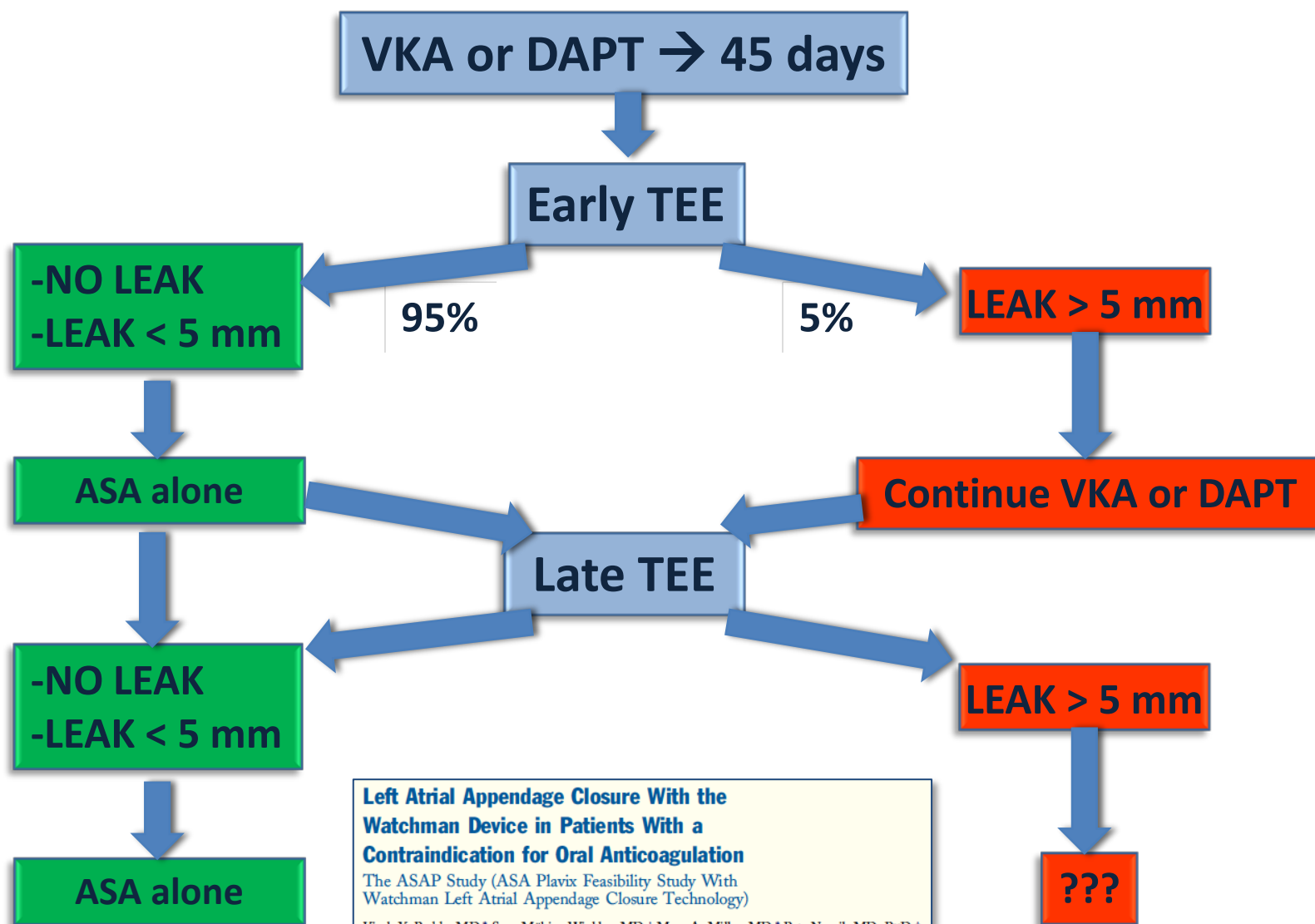
Tailor-made protocol



**Minimize
thrombo-embolic
events**

**Minimize
bleedings
(> sub-acute period)**

Antithrombotic protocol?



Left Atrial Appendage Closure With the Watchman Device in Patients With a Contraindication for Oral Anticoagulation

The ASAP Study (ASA Plavix Feasibility Study With Watchman Left Atrial Appendage Closure Technology)

Vivek Y. Reddy, MD,* Sven Möbius-Winkler, MD,† Marc A. Miller, MD,* Petr Neuzil, MD, PhD,‡ Gerhard Schuler, MD,† Jens Wiebe, MD,§ Peter Sick, MD,|| Horst Sievert, MD§

New York, New York; Leipzig, Frankfurt, and Regensburg, Germany; and Prague, Czech Republic

Antithrombotic protocol?

Leak > 5 mm

Leak > 5 mm

Indication for LAA closure

Hemorrhagic risk

Ischemia

Hemorrhage

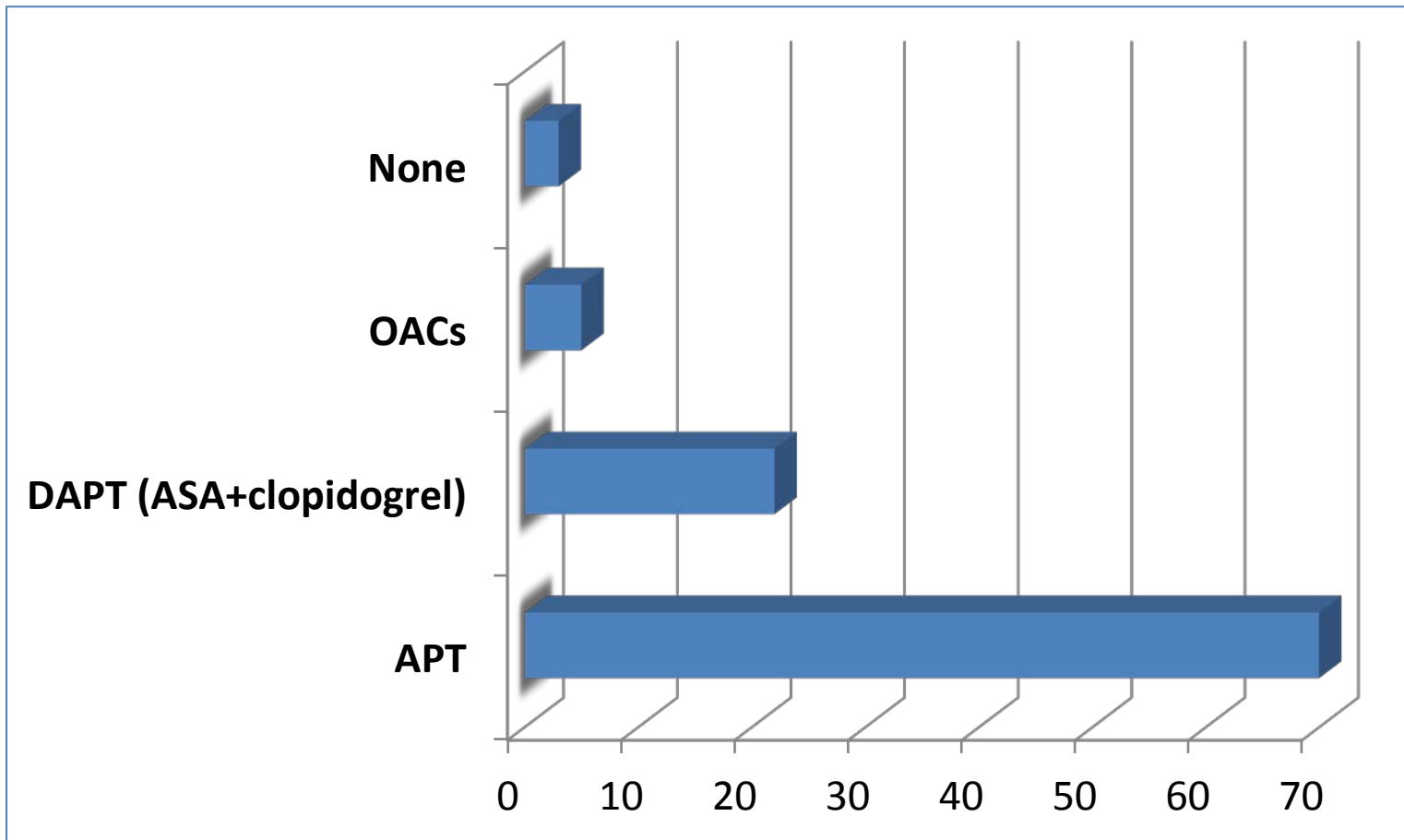
High/CI to VKA

Low



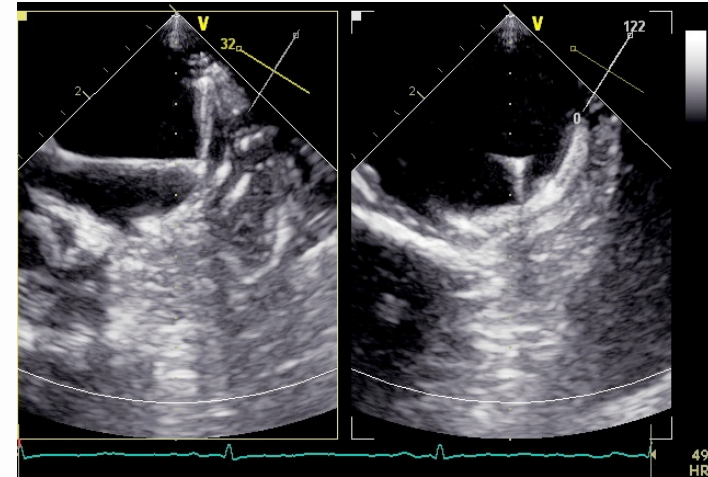
VKA
DAPT
ASA
NONE

60 days therapy



Absolute indications for OACs: 2 prosthetic valves, 1 previous pulmonary embolism

Grazie per l'attenzione



Grazie per l'attenzione



Dr. Patrizio Mazzone

