Uzávěr ouška LS a PFO – kdy a komu?

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Uzávěr ouška LS a PFO – kdy a komu?

Ouško levé síně:

- Starší, více nemocní pacienti
- Vyšší riziko recidivy SE
- Kratší předpokládaná doba prevence
- Uzávěr ouška LS = náročnější výkon

PFO:

- Mladší, „zdraví“, aktivní pacienti
- Nižší četnost recidivy SE
- Další důvody pro uzávěr PFO vedle SE
- Dlouhá předpokládaná doba prevence
- Uzávěr PFO = jednoduchý výkon

Indikace katetrizačního uzávěru ouška levé síně

Ouško levé síně:

Je zbytečná struktura? Je možné ji „beztrestně“ odstranit ?

- Zásadní podíl na systol. aktivitě LS
- Zlepšuje plnění LK; ⇧CO
- Vyrovnává tlaky v LSS, udržování objemu tekutin *(žízeň; navození diurézy)*
- Endokrinní aktivita *(síňový i mozkový ? Natruretický peptid)*

  XX
- Nejčastější místo vzniku trombů v LS

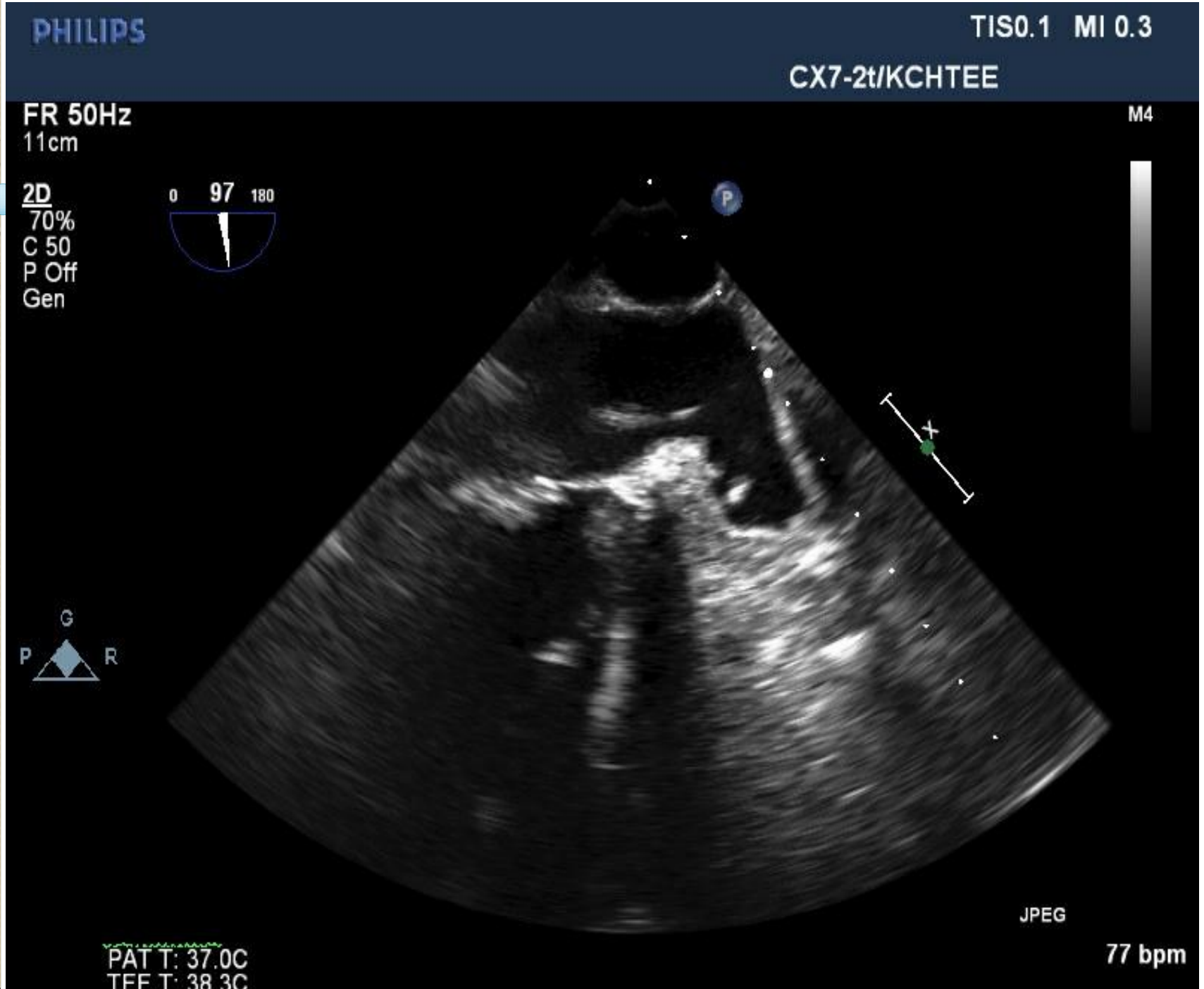
Indikace katetrizačního uzávěru ouška levé síně

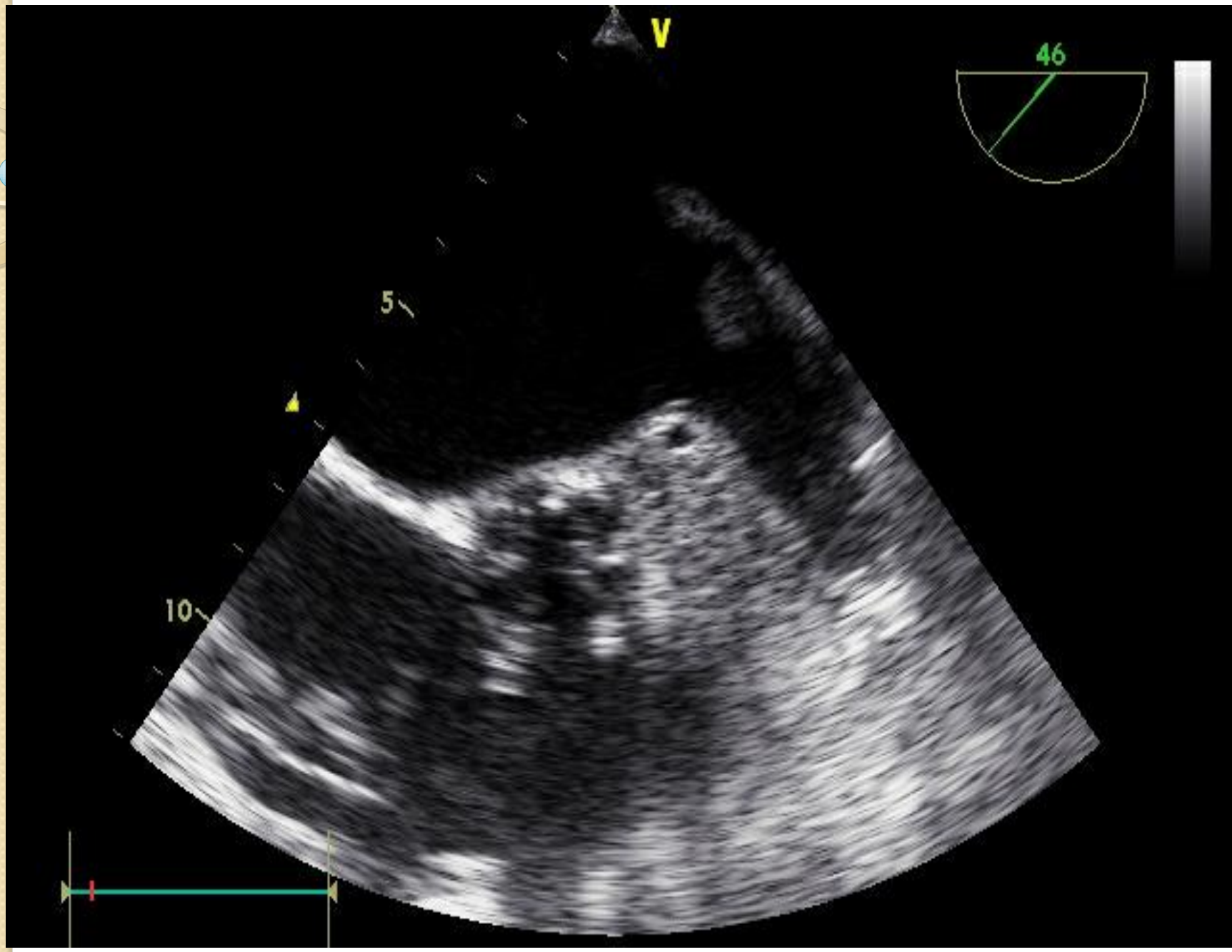
Fibrilace síní:

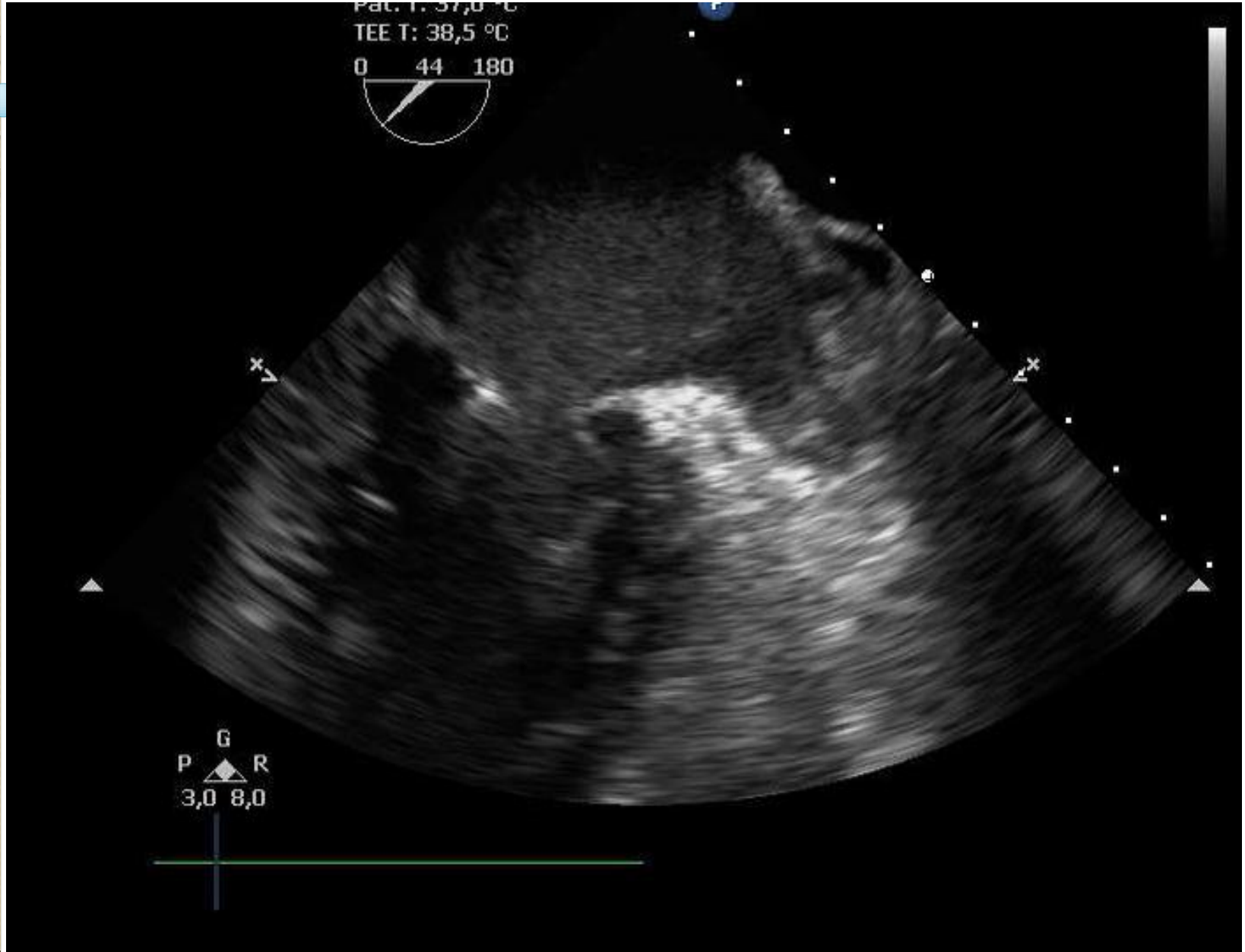
- 3 – 5% nad 65 let věku
- Příčina 15 – 20% ischem. CMP/TIA
- Průměrné riziko CMP 5%/rok

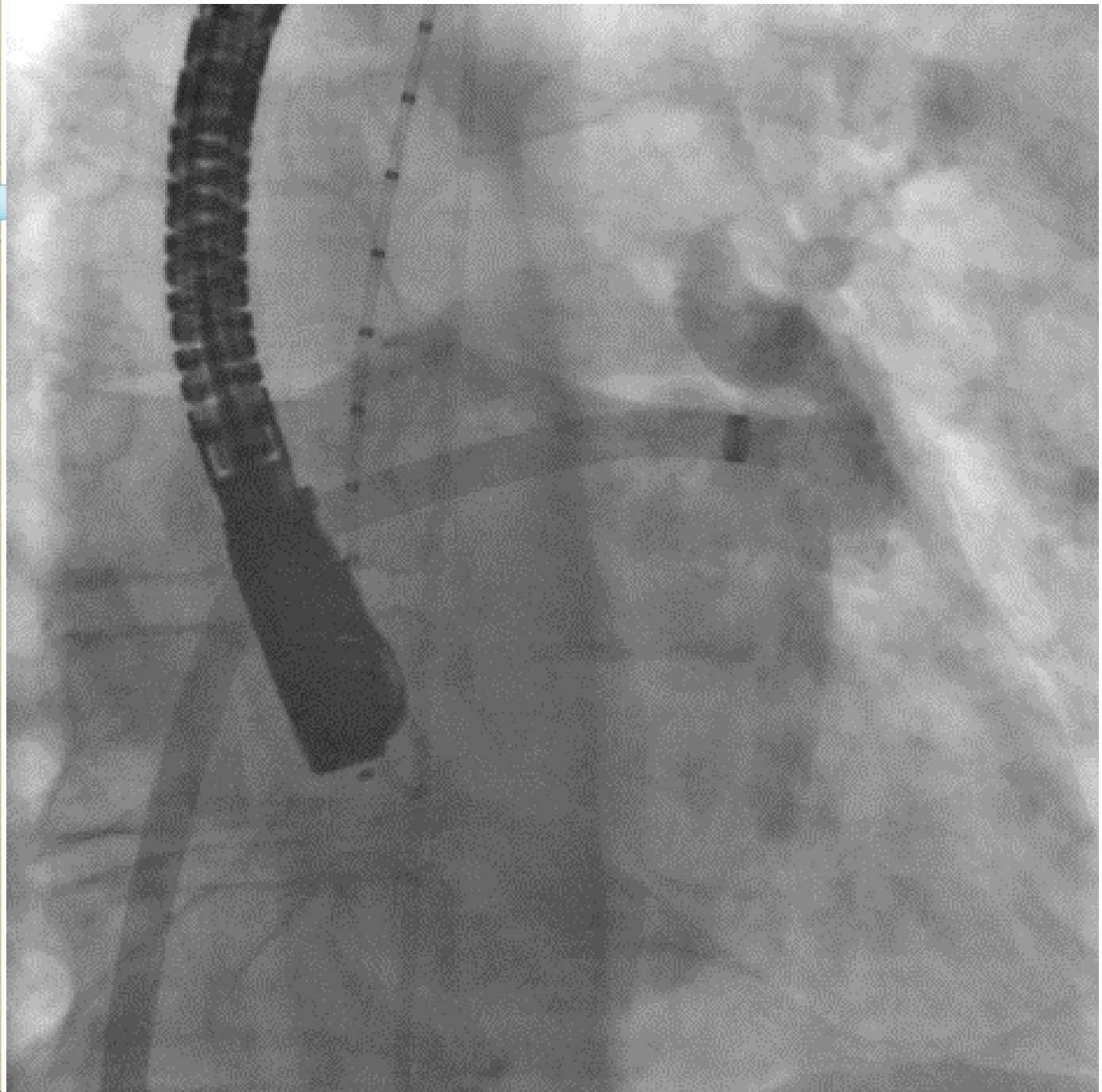
  > 30% nad 80 let
- Méně jak 50% FIS a $CHADS_2 \geq 1$ přežije

  5 let
- **Více jak 90% !! lokalizace trombů v oušku LS u nevalvulárních FiS**


PHILIPS
TIS0.1 MI 0.3
CX7-2t/KCHTEE
FR 50Hz
11cm
M4
2D
70%
C 50
P Off
Gen
0 97 180
P
G
P R
JPEG
PAT T: 37.0C
TEE T: 38.3C
77 bpm


V
46
5
10


TEE T: 38,5 °C
0 44 180
G
P R
3,0 8,0



Indikace katetrizačního uzávěru ouška levé síně

Chirurgická eliminace ouška LS :

- Obecně akceptovaná(od 1930), ale málo dat
- Riziko reziduálního leaku
- Možnosti chirurgické eliminace

  - excize
  - sutura/ligace
  - stapler

    (Kanderin JACC 2008 134 p.= úspěch 73%x23x0;

    LAAOS st. - sutura 45%, stapler 72%; ligace 36%

  - torakoskopicky

Indikace katetrizačního uzávěru ouška levé síně

Možnosti katetrizační eliminace ouška LS :

- Uzavření ouška LS transseptálním přístupem

  - (*PLATOO systém*)

  - WATCHMAN systém

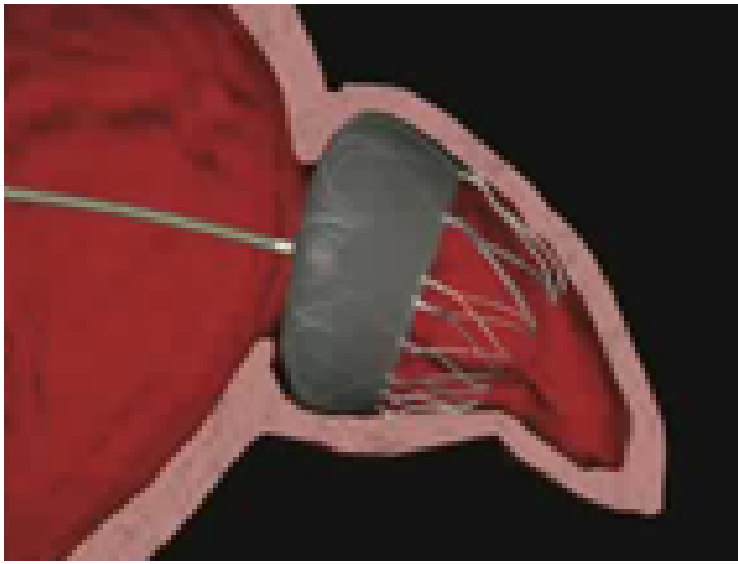
  - Amplatzer cardiac plug (ACP)

  - Aplatzer Amulet systém

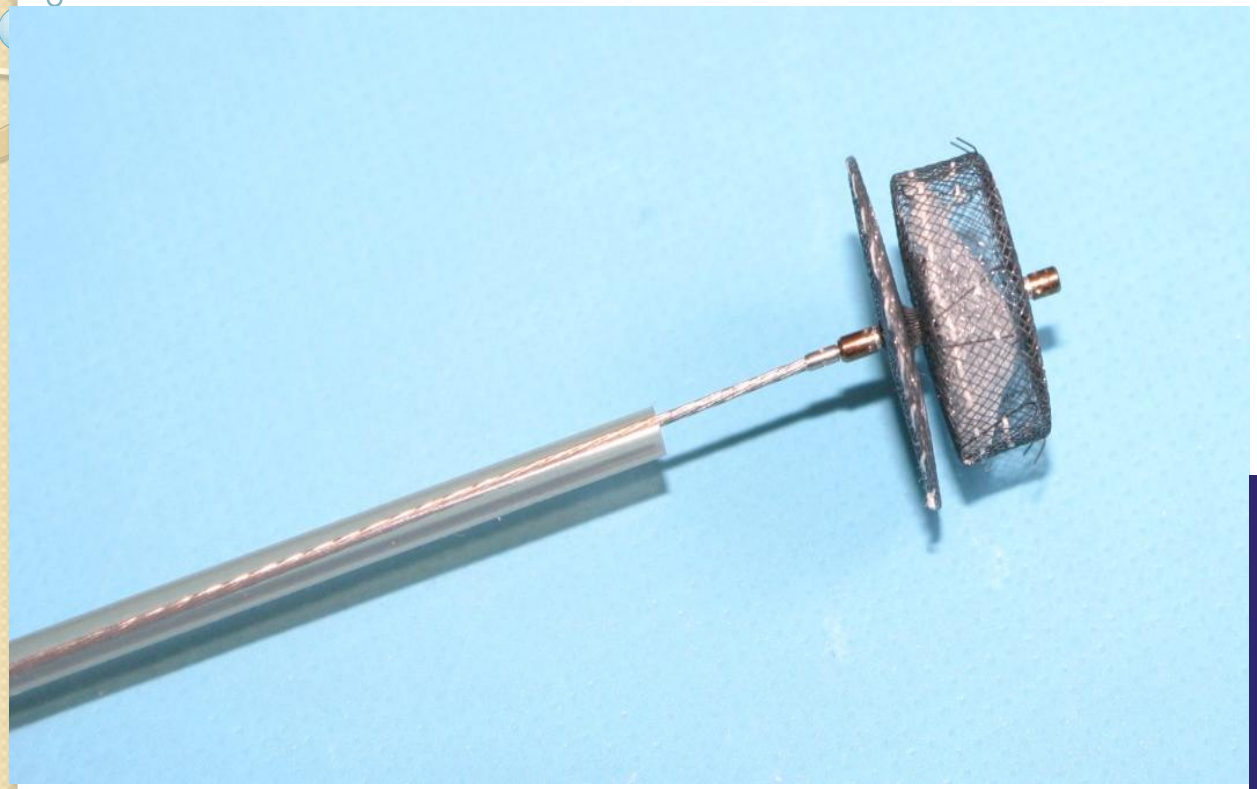
  další vstupují na trh

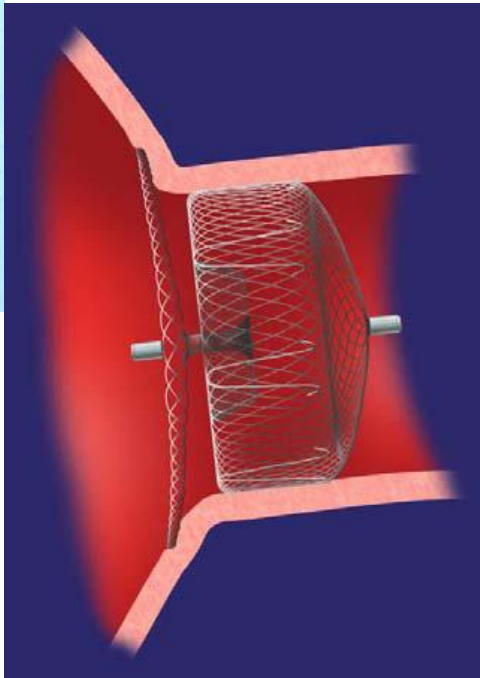
  - kombinovaná technika transseptální s transperikardiální

Indikace katetrizačního uzávěru ouška levé síně

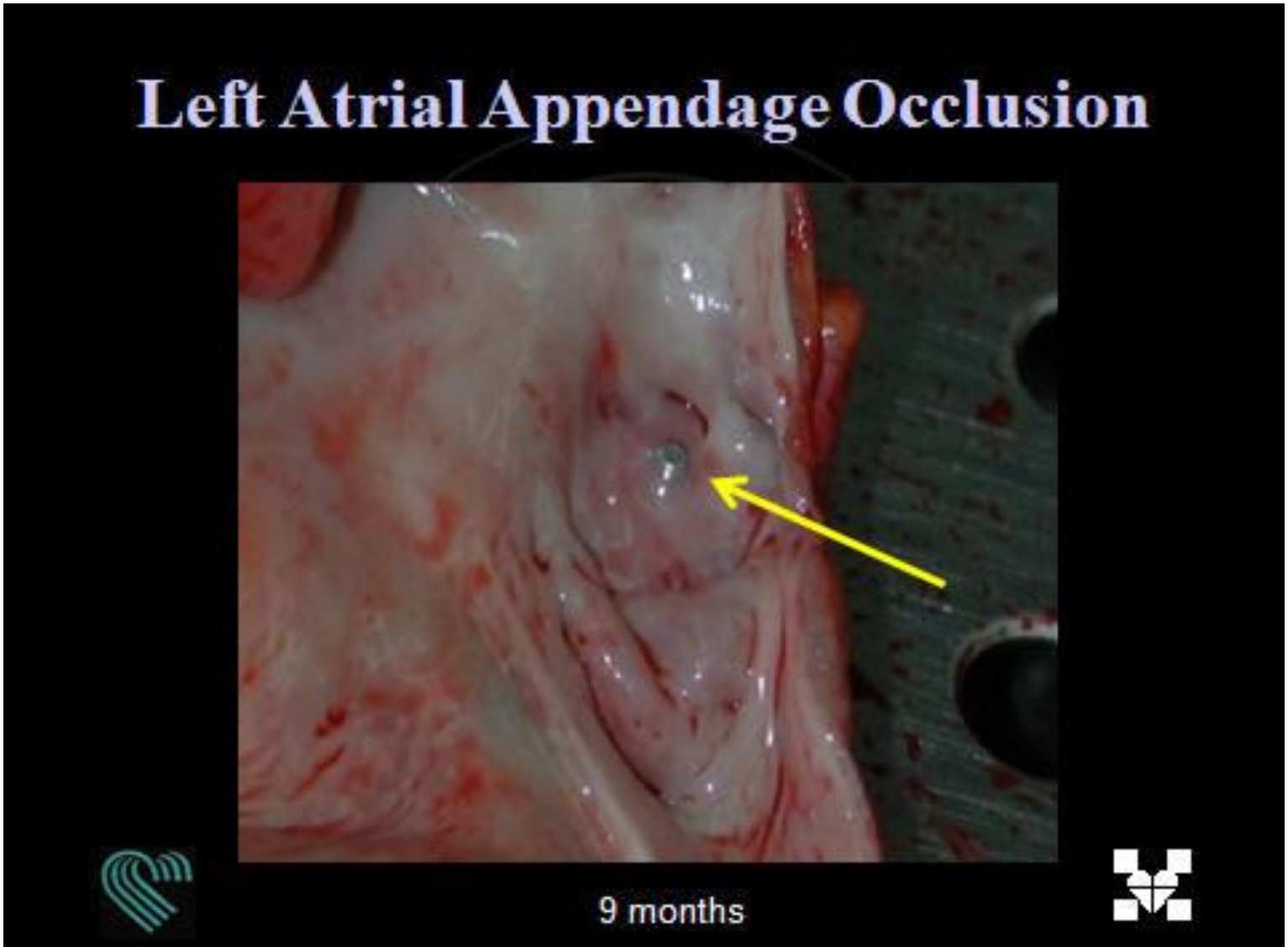


Indikace katetrizačního uzávěru ouška levé síně





Indikace katetrizačního uzávěru ouška levé síně



Možnosti katetrizační eliminace ouška LS :

- Výsledky studií:

  - PLATOO systém

    Ostermayer JACC 2005

    111 pac., 97,3% úspěšnost implantace

    90-100 % kompletní = uzavření dle TEE

    65% redukce CMP proti předpokladu

    7 MAEs *(1x úmrtí, perikardiální v., hemothorax)*

Možnosti katetrizační eliminace ouška LS :

- Výsledky studií:

  - Amplatzer cardiac plug (ACP)

    není randomizovaná studie

    Park (*Catheter Cardiovasc Interv.* 2011)

    Lam (*Catheter Cardiovasc Interv.* 2011)

    Urena (*J Am Coll Cardiol.* 2013)

    Tzikas (EuroIntervention 2015)

ACP = bezpečný, efektivní

Možnosti katetrizační eliminace ouška LS :

- Výsledky studií:

  - Amplatzer Amulet

    randomizovaná studie Amulet IDE – běží

    více jak 1600 pacientů

  Landmesser (EuroIntervention 2017)

  observační studie 1088 pacientů

  - vysoká úspěšnost – 99%
  - obdobné komplikace – MAE 3,2%;
  - SAED 5,6%

Indikace katetrizačního uzávěru ouška levé síně

- Výsledky studií:

  - WATCHMAN systém

PROTECT AF – studie noniferiority 707 pac.

random. 2 : 1 proti Warfarinu (2005-2008)

sledování 18 měsíců = > noninferiority

sledování 3,8 roku = > superiority

(Circulation. 2013;127; 720-729; JAMA. 2014; 312(19),1988 1998)

PREVAIL

407 pacientů , sledování 18 měsíců

pokles komplikací (CAP)

(J Am Coll Cardil 2014; 64:1-12)

EWOLUTION registry

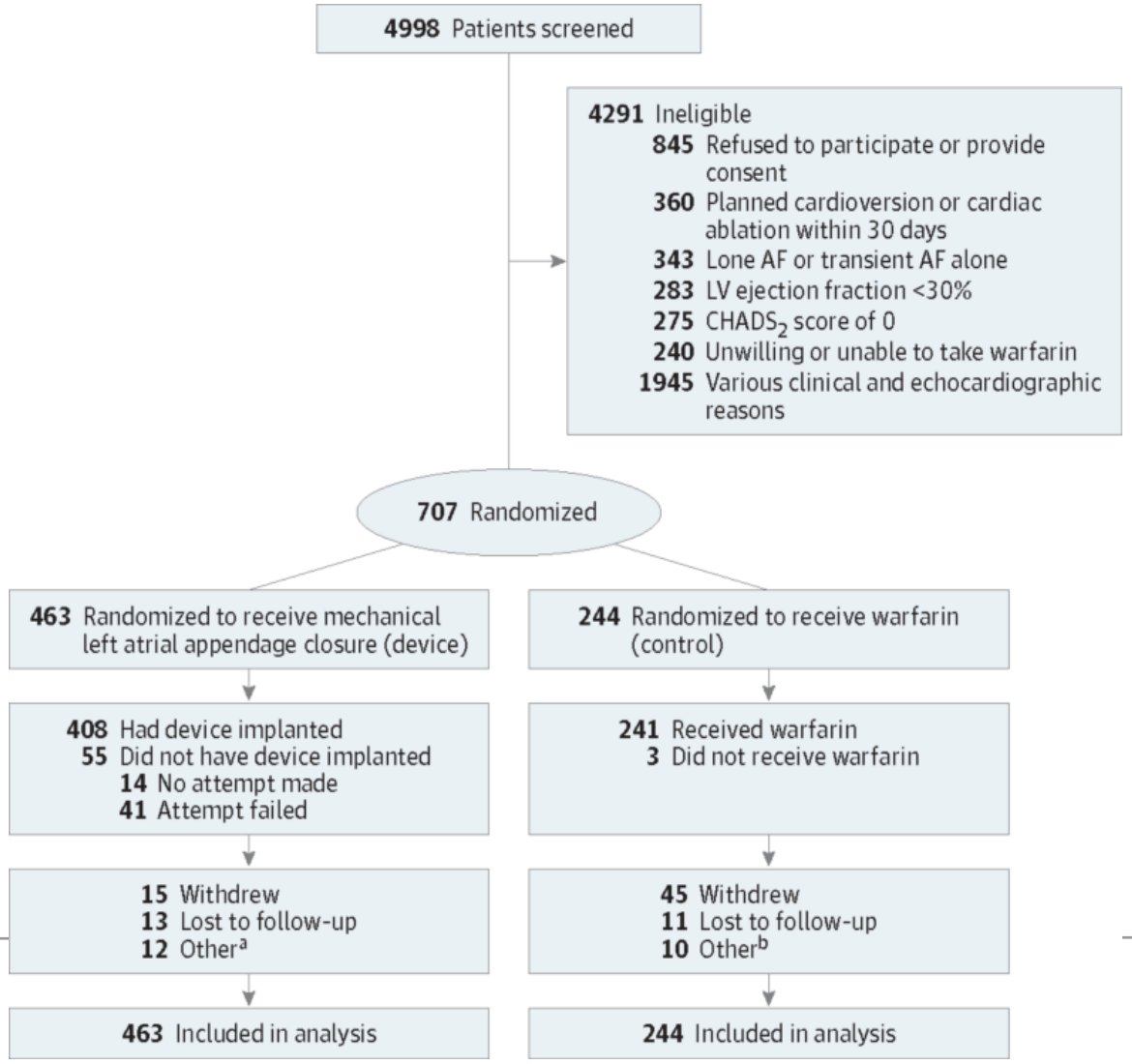
observační studie 1021

(European Heart Journal (2016,37; 2465-2474)

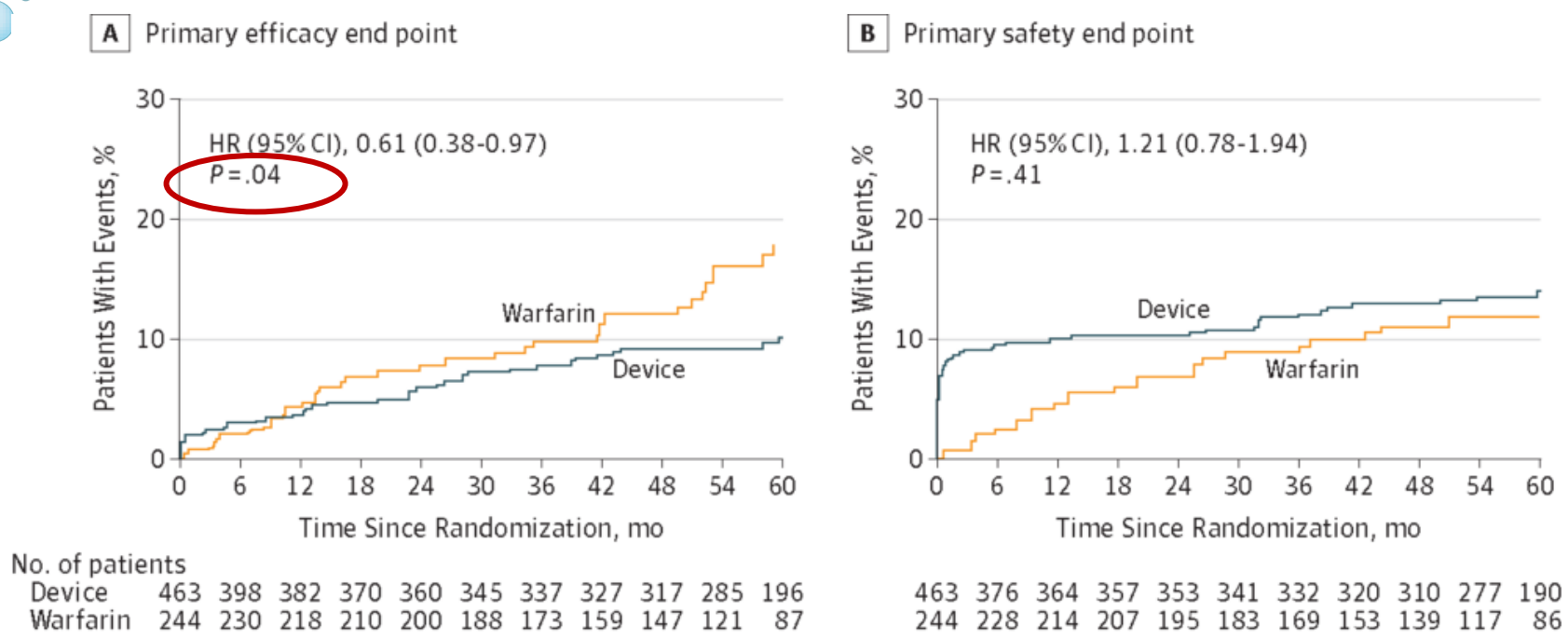
From: **Percutaneous Left Atrial Appendage Closure vs Warfarin for Atrial Fibrillation: A Randomized Clinical Trial**

JAMA. 2014;312(19):1988-1998. doi:10.1001/jama.2014.15192

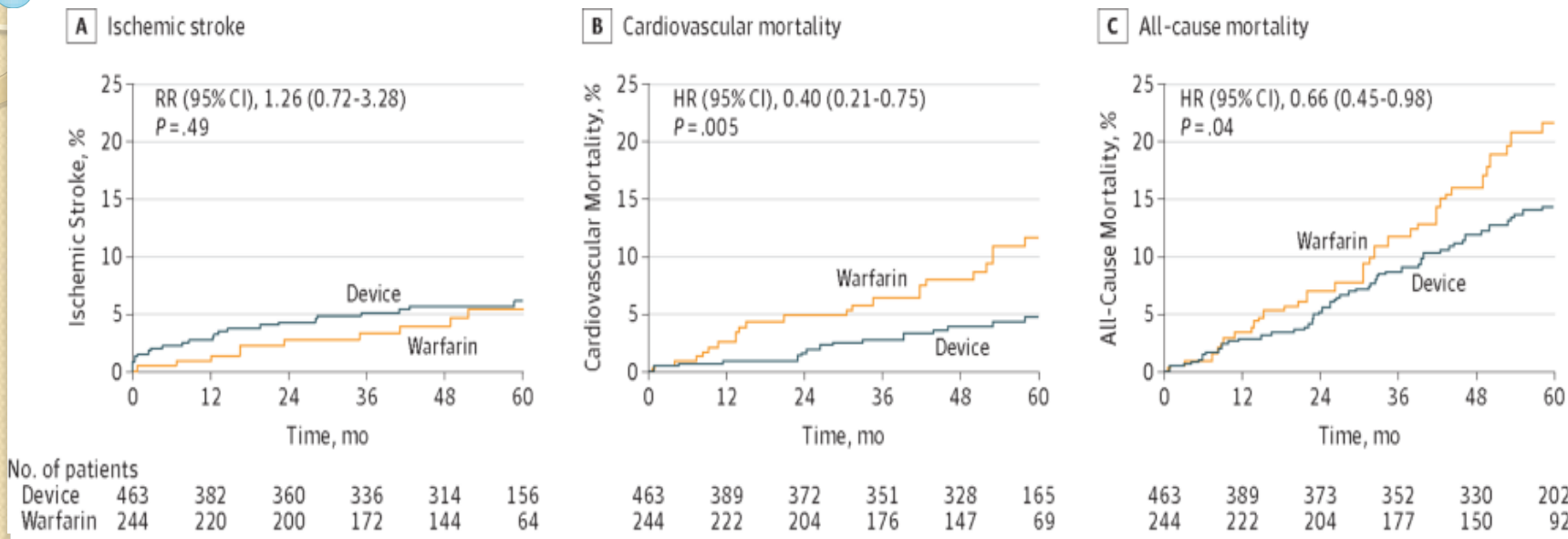
overseas.



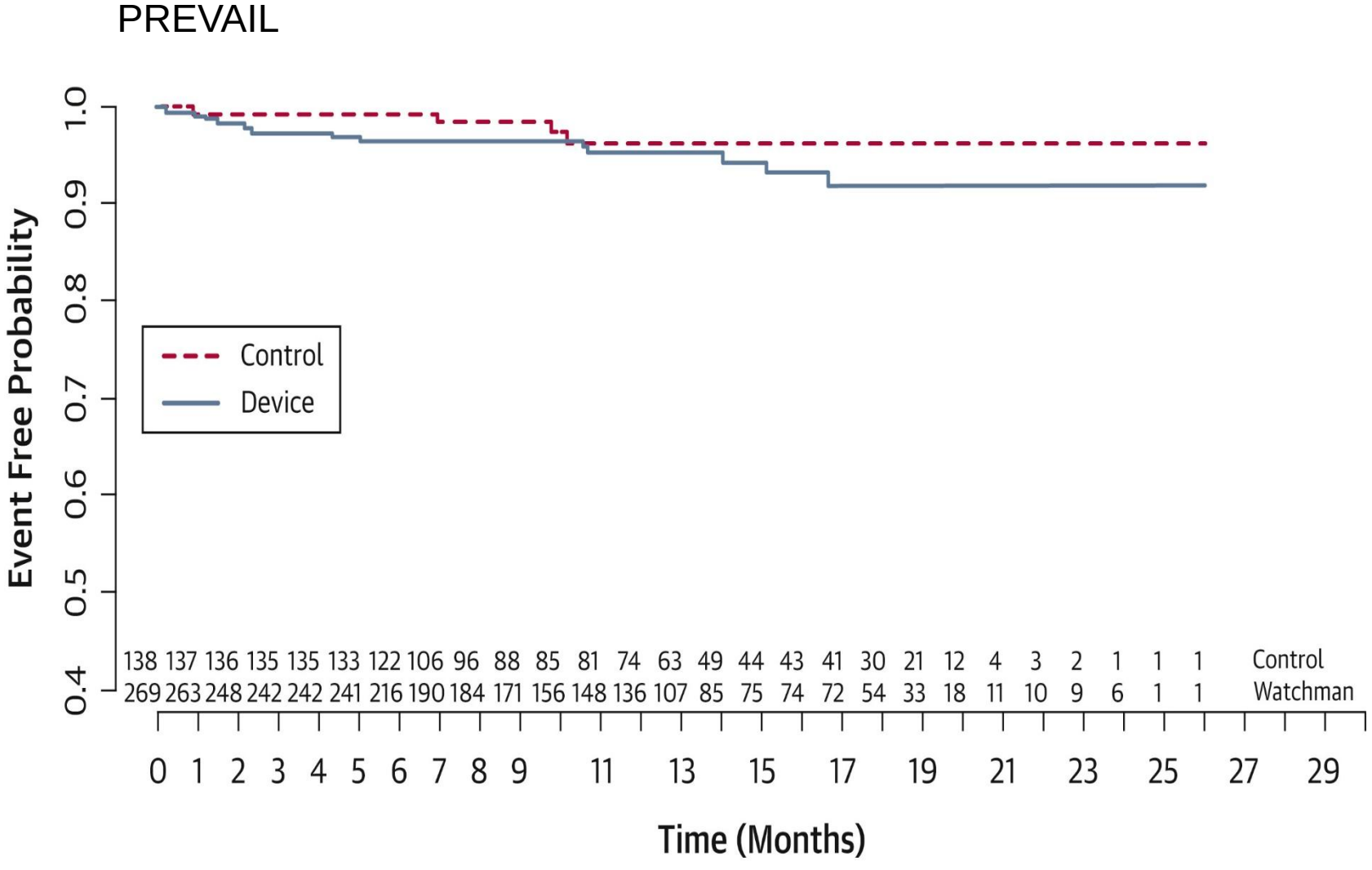
Indikace katetrizačního uzávěru ouška levé síně



Indikace katetrizačního uzávěru ouška levé síně

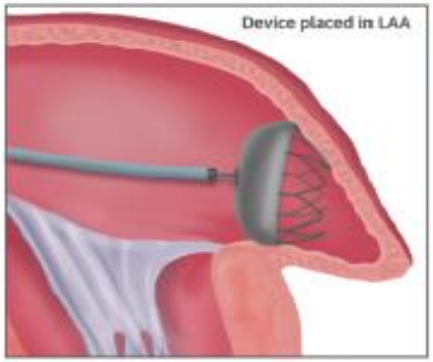


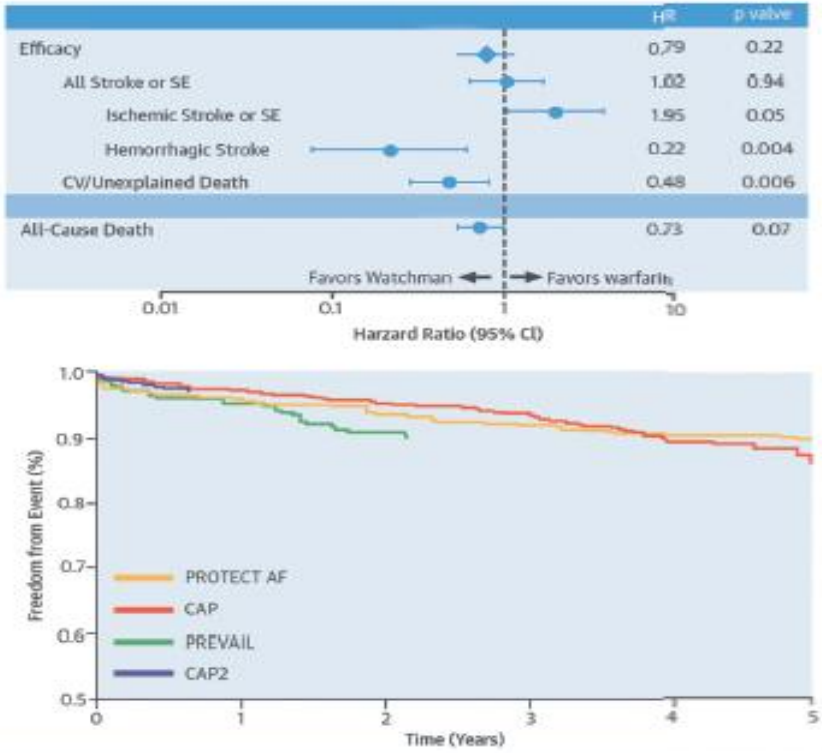
Indikace katetrizačního uzávěru ouška levé síně



Indikace katetrizačního uzávěru ouška levé síně

CENTRAL ILLUSTRATION **Stroke Prevention in Nonvalvular Atrial Fibrillation With LAA Closure**



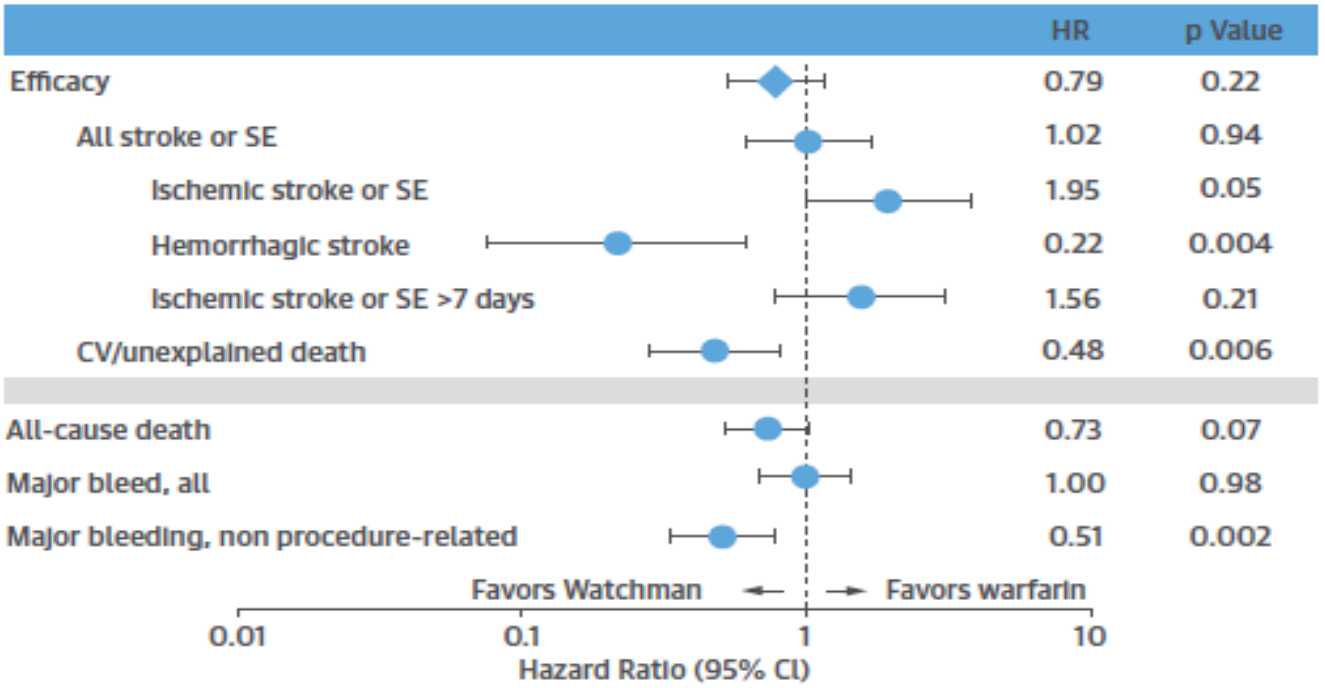


Holmes, Jr., D.R. et al. J Am Coll Cardiol. 2015; 65(24):2614–23.

(Upper Panel) Combination of PROTECT AF (Watchman Left Atrial Appendage System for Embolic Protection in Patients with Atrial Fibrillation) and PREVAIL (Prospective Randomized Evaluation of the Watchman LAA Closure Device in Patients With Atrial Fibrillation Versus Long Term Warfarin Therapy) trial patients receiving the Watchman device, compared with patients receiving chronic warfarin for overall stroke, ischemic stroke, and all-cause death. **(Bottom Panel)** Watchman performance consistent across all 4 data sets. Although the duration of follow-up varied by trial enrollment periods, being shortest for the Continued Access to PREVAIL registry (CAP2), overall freedom from event was similar in all 4 groups treated with Watchman. CAP = Continued Access to PROTECT AF registry; CI = confidence interval; CV = cardiovascular; HR = hazard ratio; LAA = left atrial appendage; SE = systemic embolism.

Indikace katetrizačního uzávěru ouška levé síně

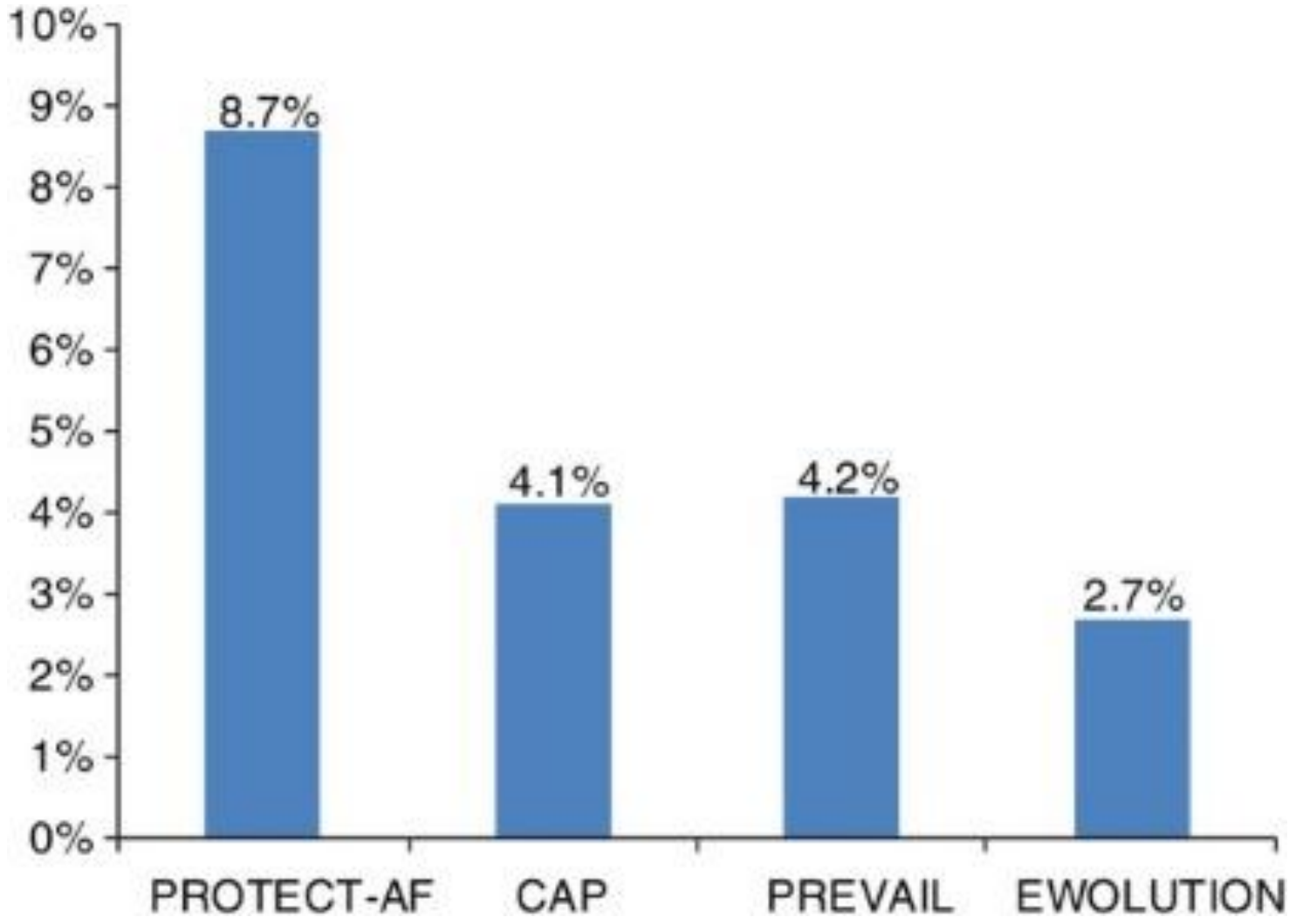
FIGURE 2 PROTECT AF/PREVAIL Combined: Meta-Analysis Shows Comparable Primary Efficacy Results to Warfarin



The combined data set of all PROTECT AF and PREVAIL Watchman patients versus chronic warfarin patients documented: 1) similarity in overall stroke or systemic embolism; 2) ischemic stroke slightly increased with Watchman but hemorrhagic stroke significantly decreased with warfarin; and 3) all-cause mortality and major nonprocedural bleeding both significantly improved with Watchman. CI = confidence interval; CV = cardiovascular; HR = hazard ratio; SE = systemic embolism; other abbreviations as in Figure 1.

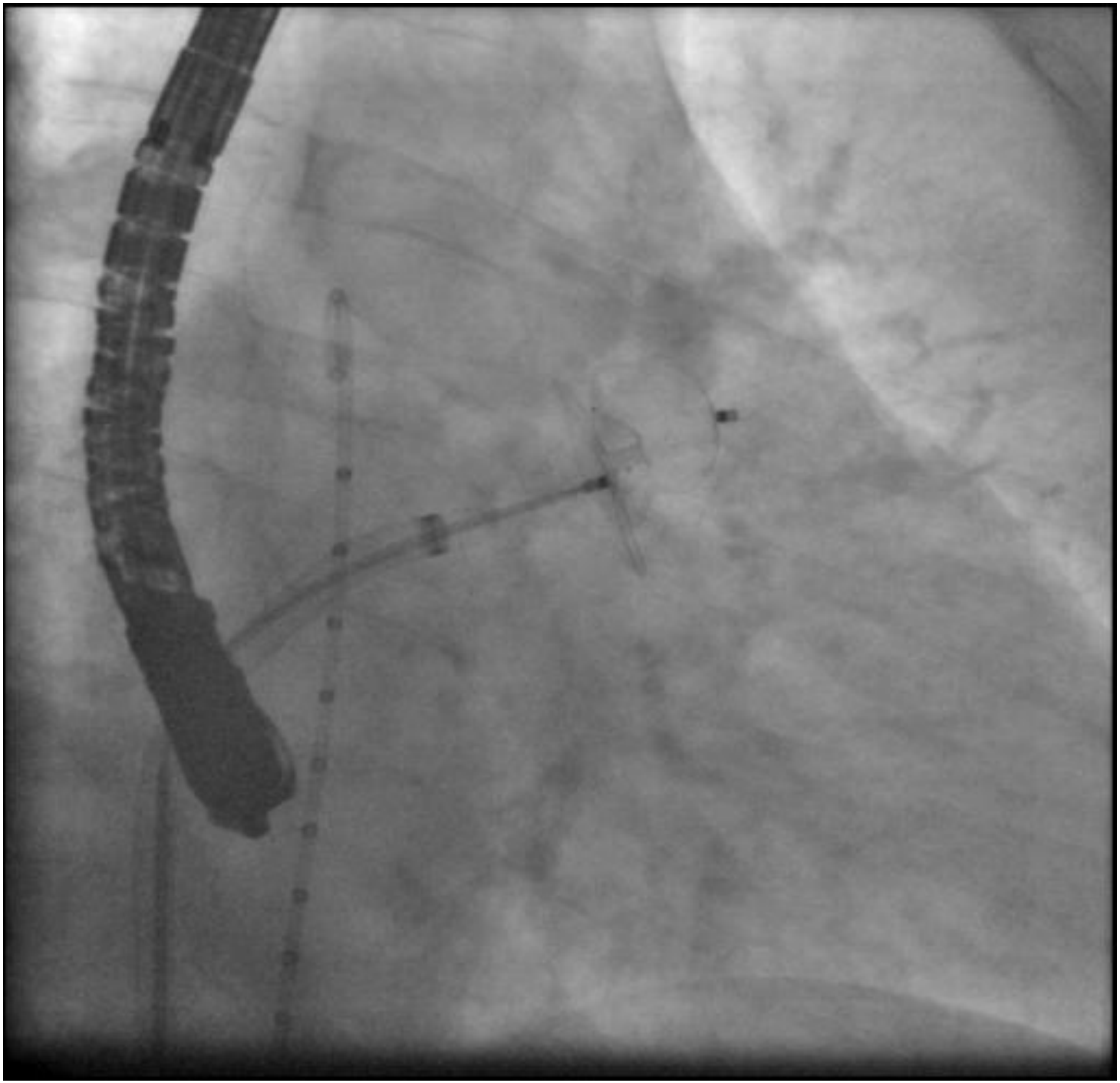
Indikace katetrizačního uzávěru ouška levé síně

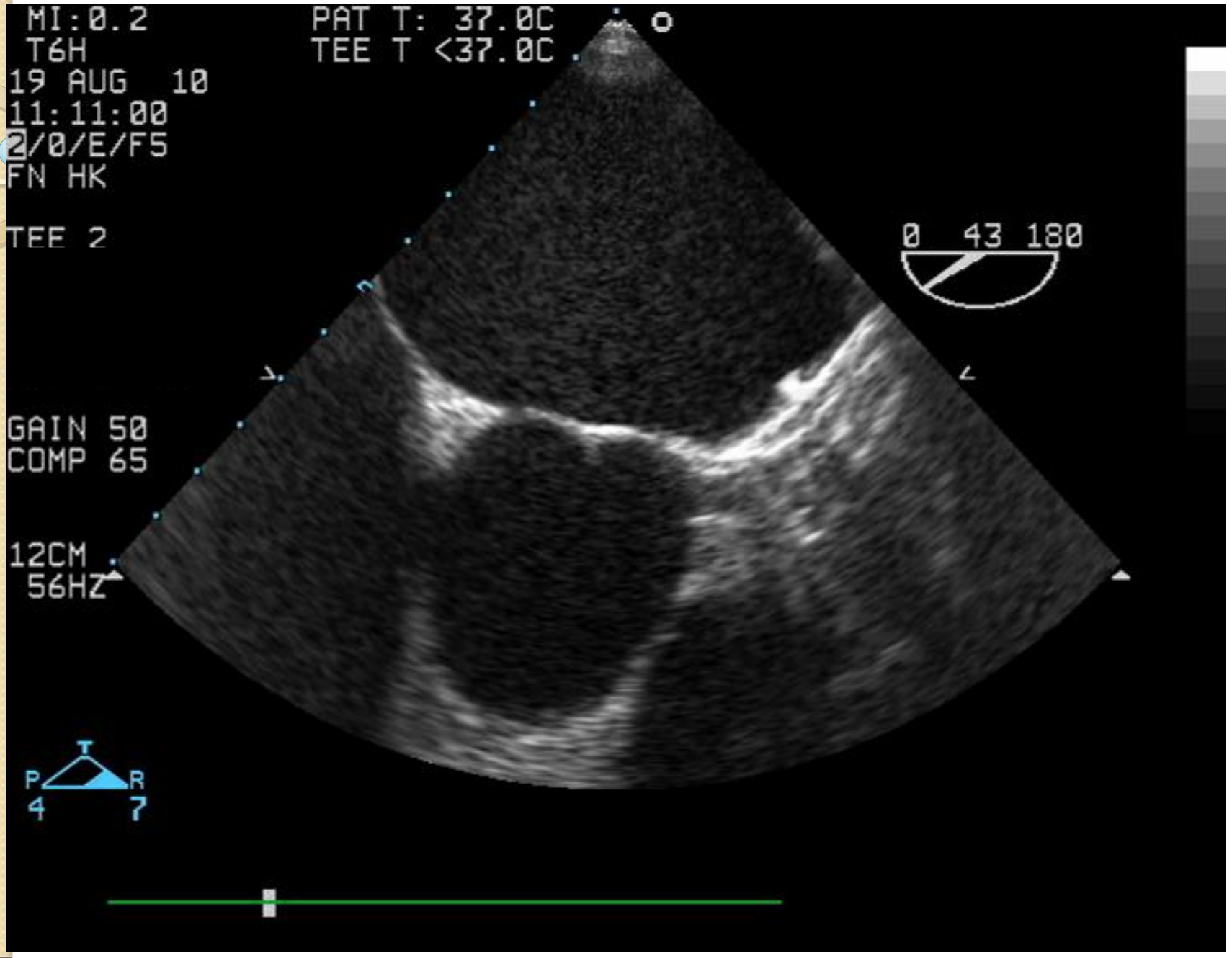
- SAED through 7 days

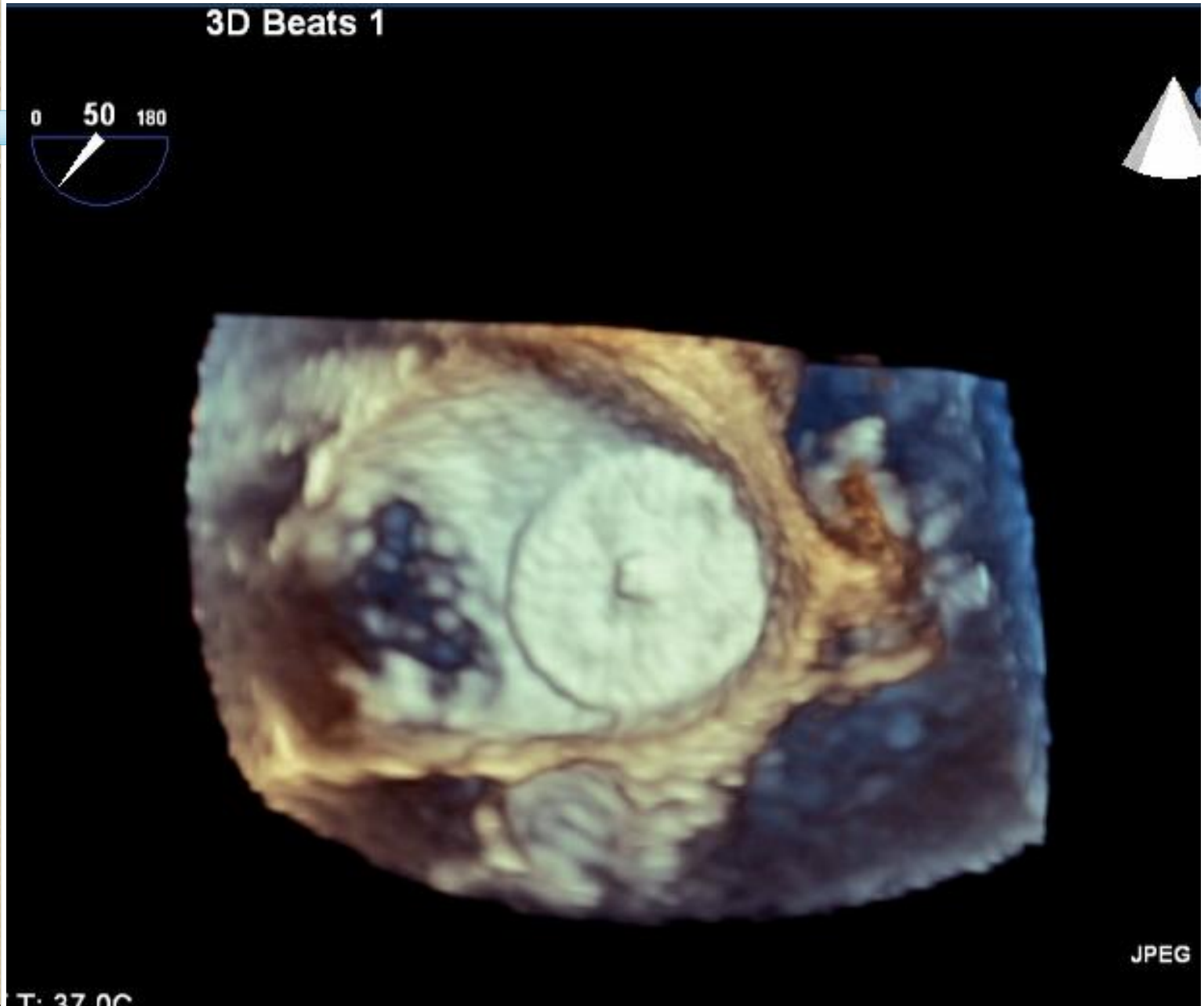


Indikace katetrizačního uzávěru ouška levé síně

??? Studie PRAGUE 17 ???




MI:0.2
T6H
19 AUG 10
11:11:00
2/0/E/F5
FN HK
TEE 2
PAT T: 37.0C
TEE T <37.0C
0 43 180
GAIN 50
COMP 65
12CM
56HZ
T
P
R
4
7


3D Beats 1
0
50
180
JPEG

Indikace katetrizačního uzávěru ouška levé síně

Doporučení pro okluzi nebo exkluzi ouška levé síně		
Doporučení	**Třída[a]**	**Úroveň[b]**
Po chirurgické okluzi nebo exkluzi LAA se doporučuje pokračovat u rizikových pacientů s FS za účelem zajištění prevence ischemické CMP v antikoagulaci.	I	B
Okluze LAA může být zvážena jako prevence ischemické CMP u pacientů s FS a kontraindikacemi dlouhodobé antikoagulační léčby (např. u pacientů, kteří prodělali život ohrožující krvácení bez řešitelné příčiny).	IIb	B
Chirurgickou okluzi nebo exkluzi LAA jako prevenci ischemické CMP lze zvážit u pacientů s FS podstupujících kardiochirurgickou operaci.	IIb	B
Chirurgickou okluzi nebo exkluzi LAA jako prevenci ischemické CMP lze zvážit u pacientů s FS podstupujících thorakoskopickou operaci pro FS.	IIb	B

Indikace katetrizačního uzávěru ouška levé síně

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

INDICATIONS

The main indication for LAA occlusion today is ***a relative or absolute contraindication to (N)OACs in patients with AF and a CHADS$_2$ score of ≥1 or CHA$_2$-DS$_2$-VASc score ≥2.*** It is important to realize that this recommendation is based on observational studies and registries only. With increasing thromboembolic risk, the use of LAA occlusion becomes more attractive.

Euro**Intervention** 2015;10:**1109-1125**

Indikace katetrizačního uzávěru ouška levé síně

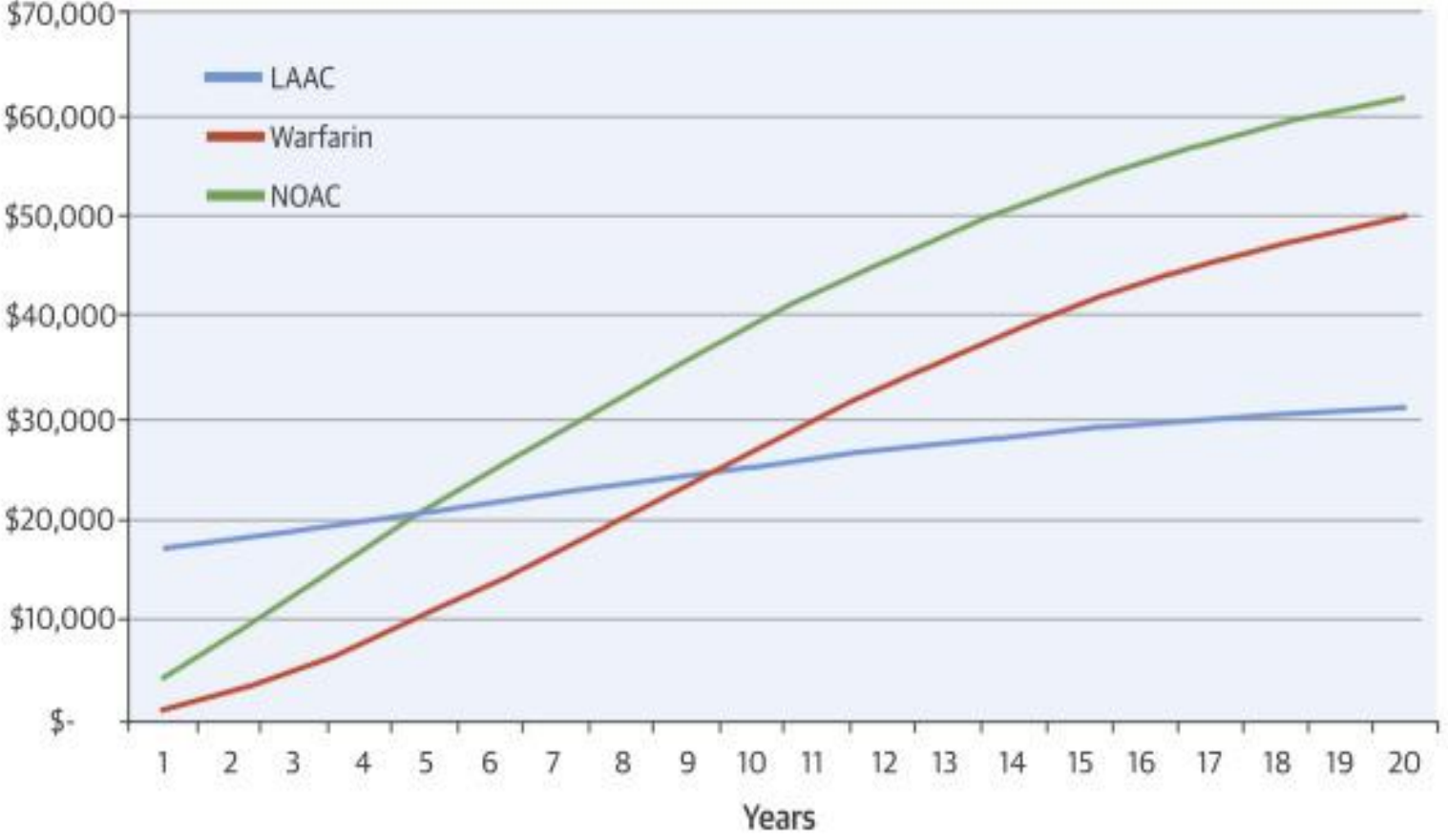
- **Nemocní s vysokým rizikem systémové embolizace s FiS kteří:**
  - ***mají kontraindikaci AKL***
  - ***prodělali závažné krvácení při AKL***
  - ***zásadní problémy s nastavením dávky AKL***

Problémy katetrizační eliminace ouška LS :

- Rutinní zvládnutí transseptální punkce
- Manipulace v tenkostěnné struktuře LA a ouška LS (0.4- 1,5 mm)
- „Bizardní“ anatomie ouška LS
- Cena instrumentária

Komplikace katetrizační eliminace ouška LS :

- Komplikace transseptální punkce
- Riziko perforace ouška LS (Ø 1mm)
- **Tamponáda srdeční**
- Embolizace instrumentária
- Vzduchová embolizace
- Lokální komplikace v třísle



	Time to Clinical Effectiveness (Incremental QALYs)	Time to Cost-Effectiveness (Cost per QALY)	Time to Dominance (More Effective, Less Costly)
LAAC vs. warfarin	Year 3 (0.015)	Year 7 ($42,994/QALY)	Year 10
NOACs vs. warfarin	Year 1 (0.008)	Year 16 ($48,446/QALY)	N/A
LAAC vs. NOACs	Year 5 (0.007)	Year 5 (Dominant)	Year 5

Reddy, V.Y. et al. J Am Coll Cardiol. 2015; 66(24):2728-39.

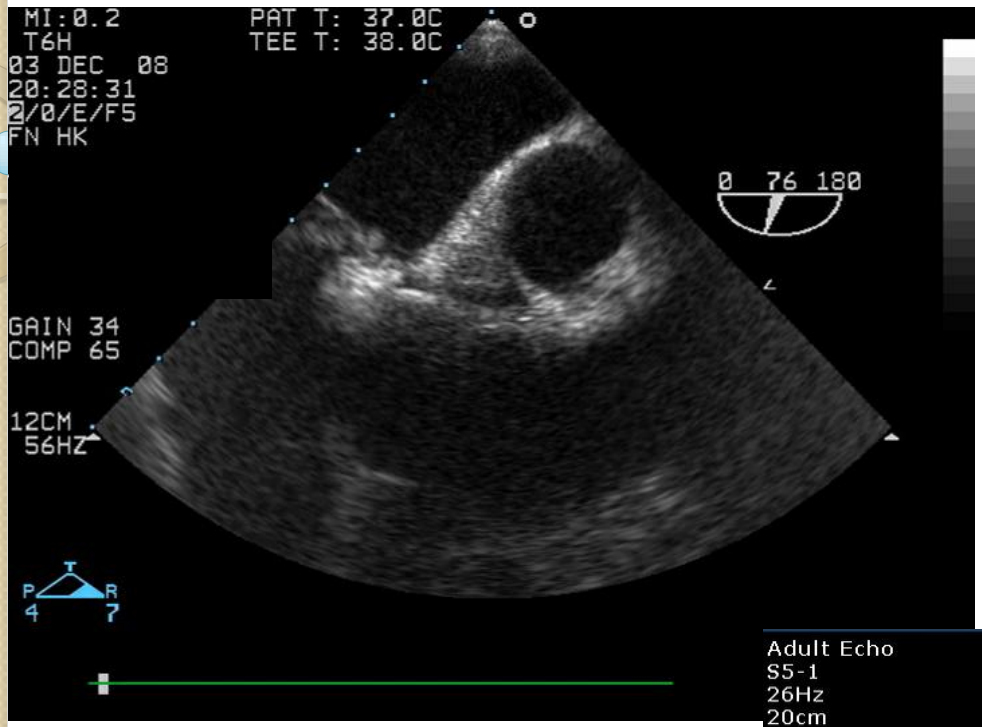
Perzistující foramen ovale

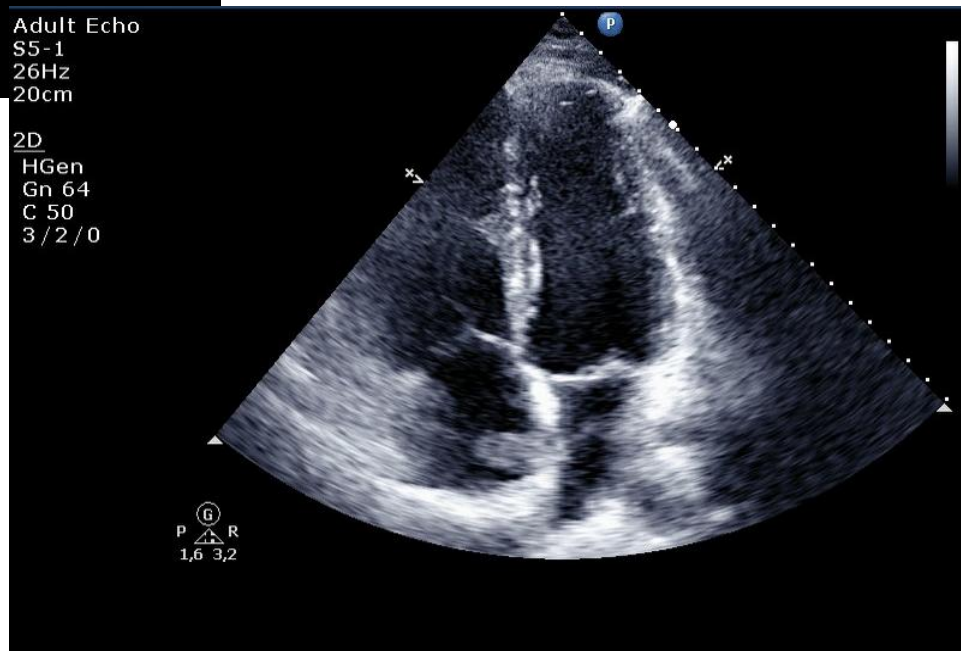
- není srdeční vada, pouze abnormalita
- nemá „žádný“ hemodynamický význam

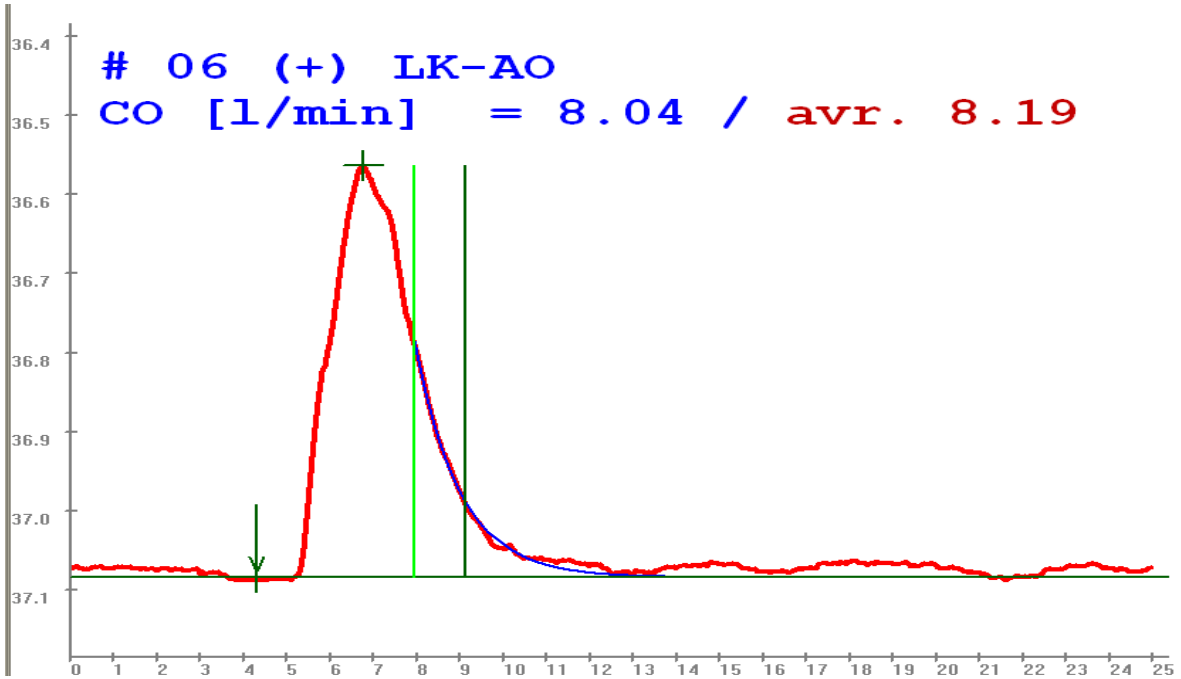
Potenciální cesta pro paradoxní systémové embolizace

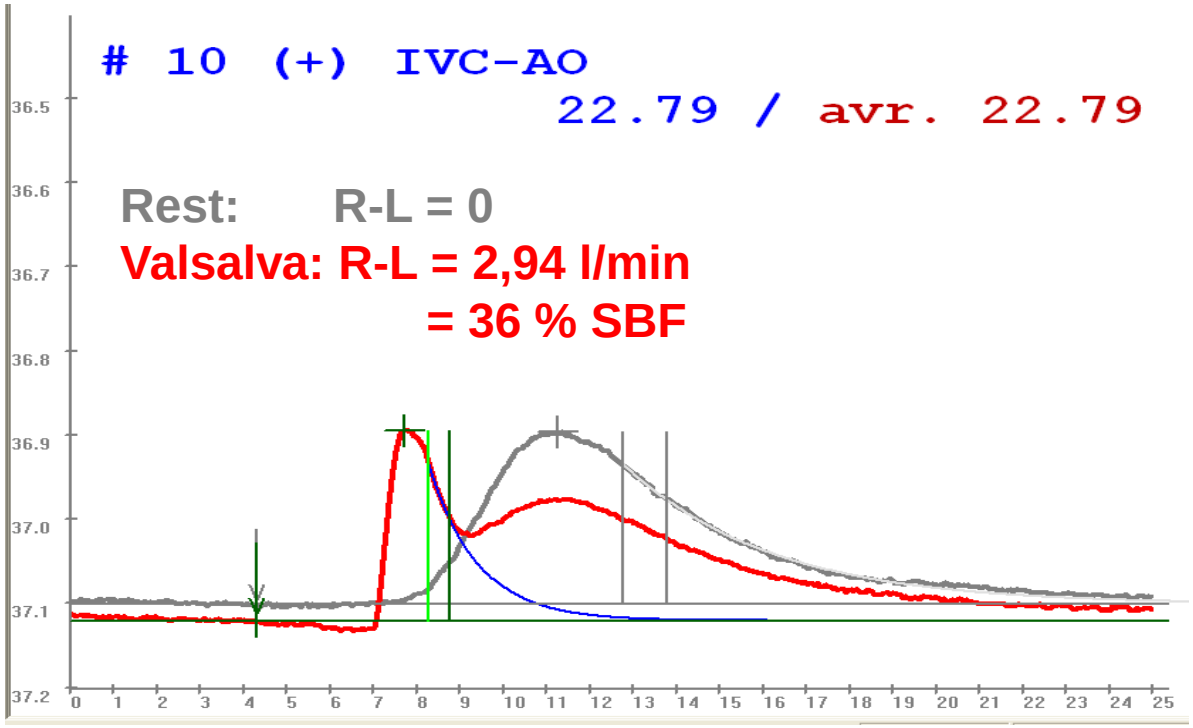
Ale i pro desaturační syndromy

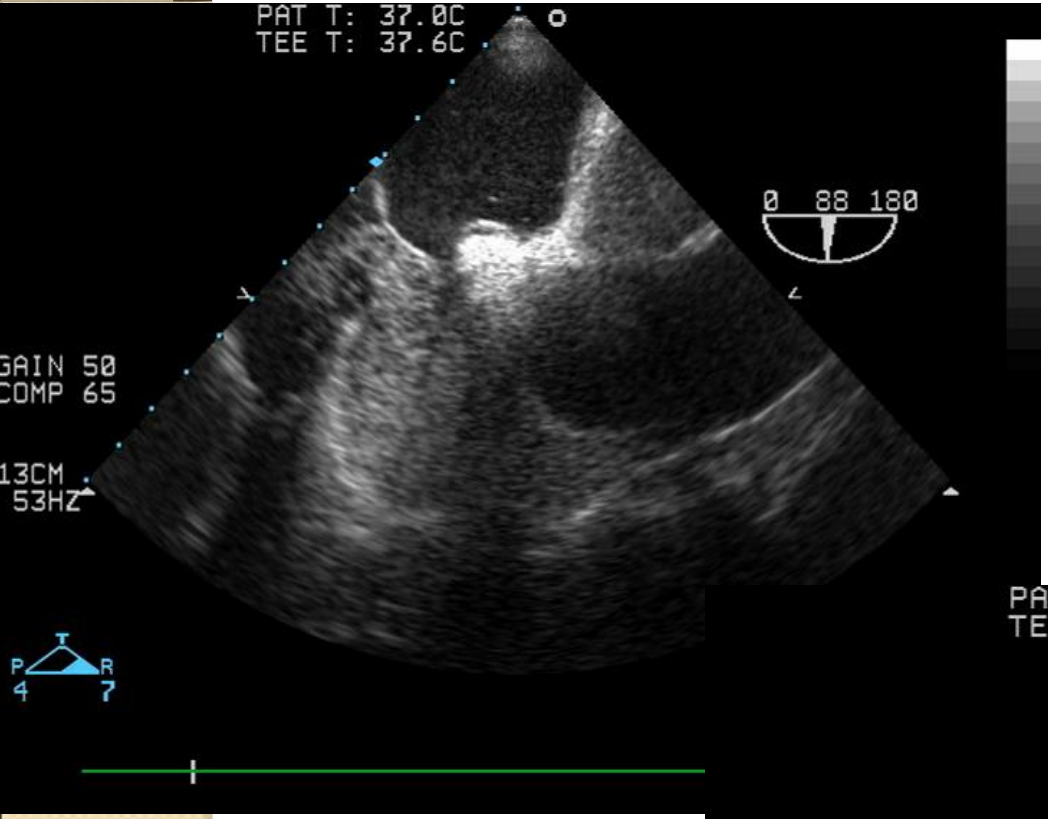
Dekompresní postižení, výšková nemoc…

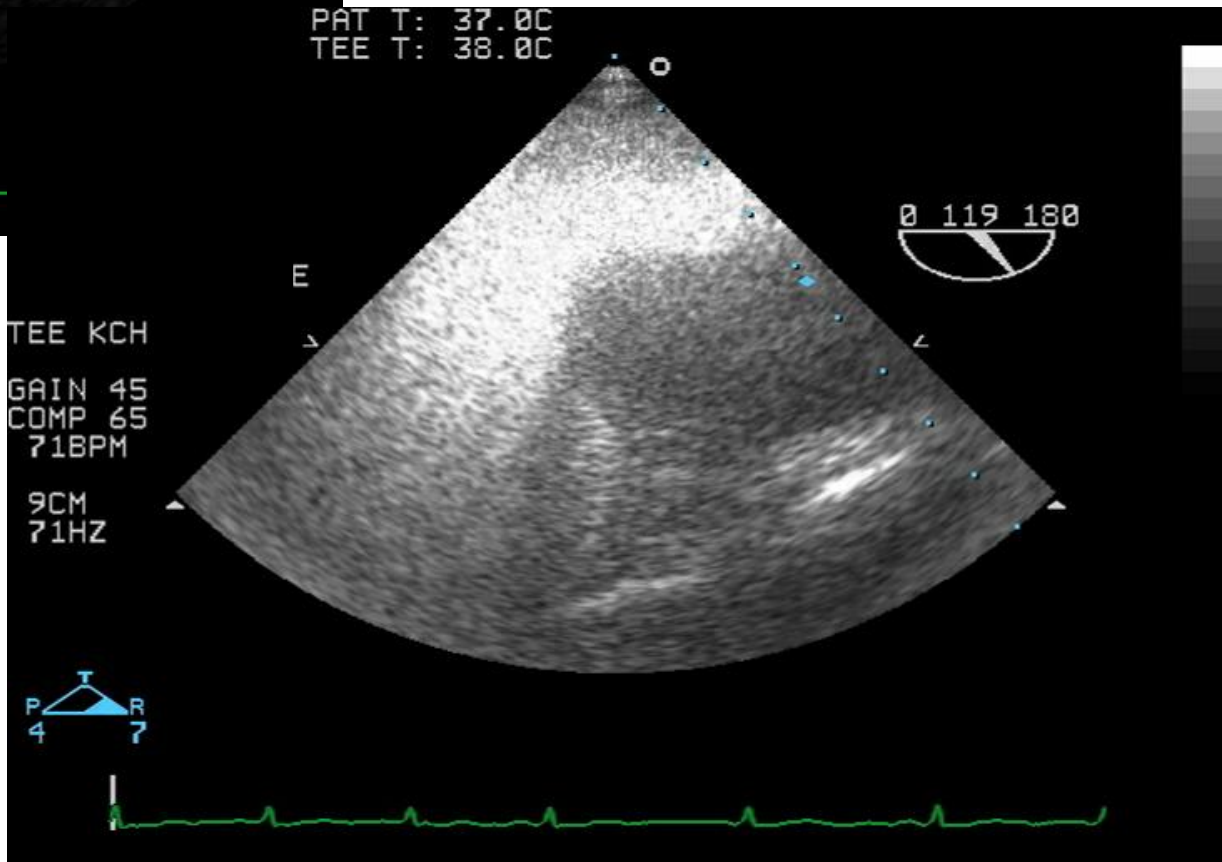

MI:0.2
T6H
03 DEC 08
20:28:31
2/0/E/F5
FN HK
PAT T: 37.0C
TEE T: 38.0C
0 76 180
GAIN 34
COMP 65
12CM
56HZ
P R
4 7

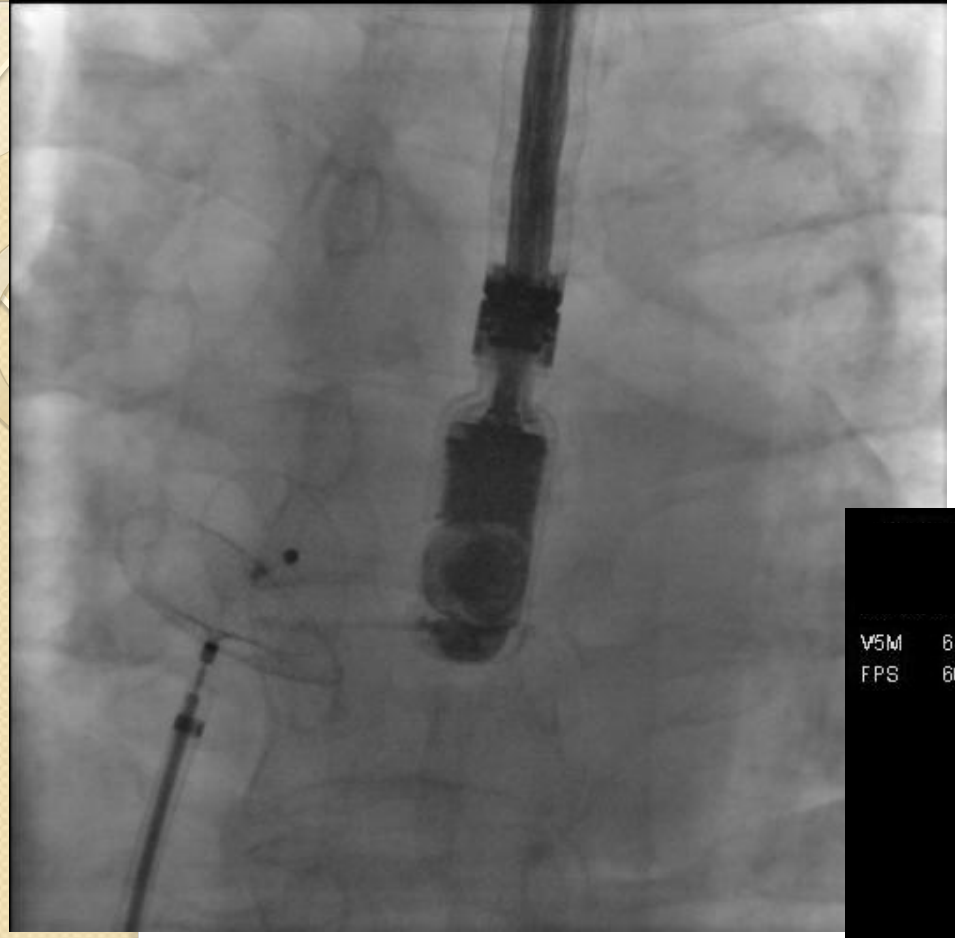

Adult Echo
S5-1
26Hz
20cm
2D
HGen
Gn 64
C 50
3/2/0
P
P R
1,6 3,2

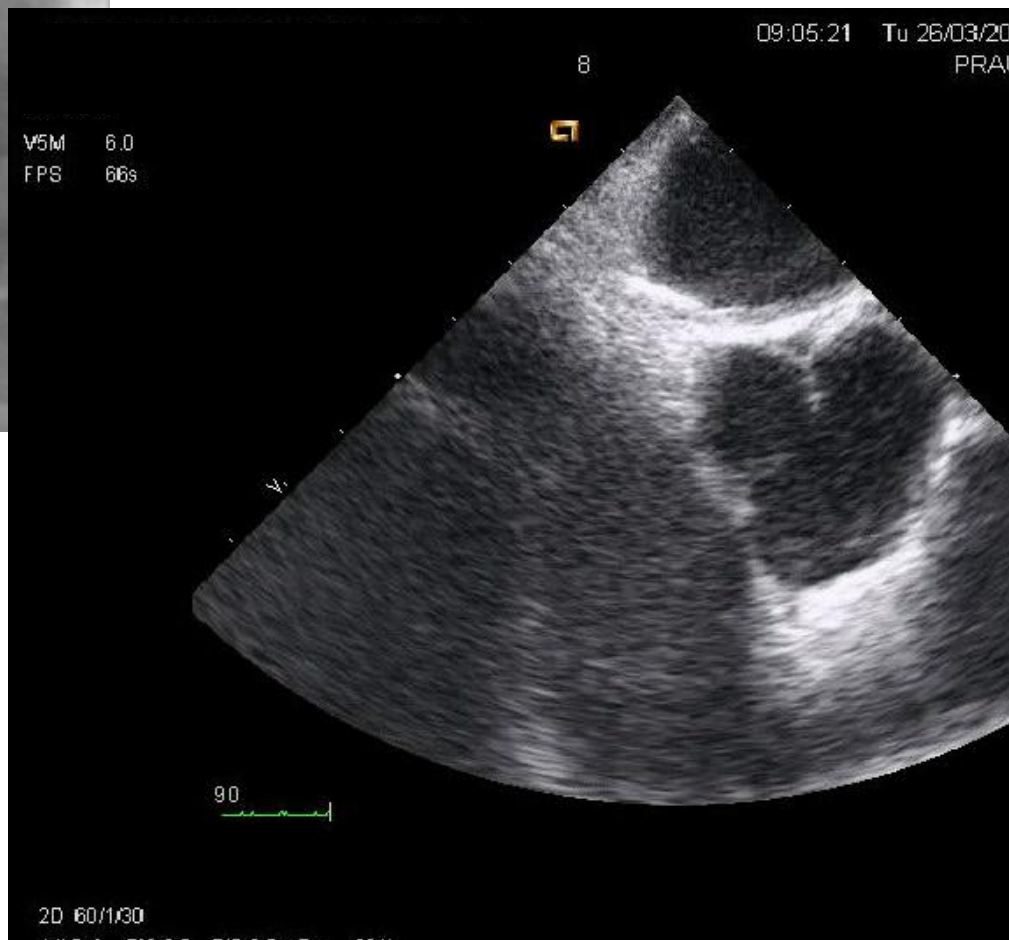

06 (+) LK-AO
CO [l/min] = 8.04 / avr. 8.19
36.4
36.5
36.6
36.7
36.8
36.9
37.0
37.1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25


10 (+) IVC-AO
22.79 / avr. 22.79
Rest: R-L = 0
Valsalva: R-L = 2,94 l/min
= 36 % SBF
36.5
36.6
36.7
36.8
36.9
37.0
37.1
37.2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25


PAT T: 37.0C
TEE T: 37.6C
0 88 180
GAIN 50
COMP 65
13CM
53HZ
T
P
R
4
7


PAT T: 37.0C
TEE T: 38.0C
0 119 180
E
TEE KCH
GAIN 45
COMP 65
71BPM
9CM
71HZ
T
P
R
4
7




09:05:21
8
V5M 6.0
FPS 66s
90
2D 60/1/30

Katetrizační uzávěr perzistujícího foramen ovale

Důvody současných nejasností

- důkazy pro embolizační příhody související s PFO jsou většinou **nepřímé**
- jiné související abnormality (dysfunkce LS, arytmie..)
- výskyt PFO u CS může být často incidnetální a naopak
- soubory mapující výskyt a léčebné postupy jsou nesourodé
- instrumentária k uzávěru PFO nejsou stejně ef.
- randomizované studie trpí řadou nedostatků

RESPECT

- 980 pacientů s kryptogenní CMP, 69 center
- Uzávěr Amplatzer (n=499) x protidestičková (74,8%) nebo Warfarin (25,2%) – (n=481), FU 2,6 roku (median 2,1)
- vyšší ztráta pacientů v medik. skupině

Stroke rate per 100 patient-years	Closure	Medical Therapy	HR (95% CI)	P Value
Intention to Treat	0.66	1.38	0.49 (0.22-1.11)	0.08
Per Protocol	0.46	1.30	0.37 (0.14-0.96)	0.03
As Treated	0.39	1.45	0.27 (0.10-0.75)	0.007

Carroll et al. NEJM 2013

RESPECT Efficacy Analyses

46.6%-72.7% risk reduction of stroke in favor of device

RESPECT CLINICAL TRIAL

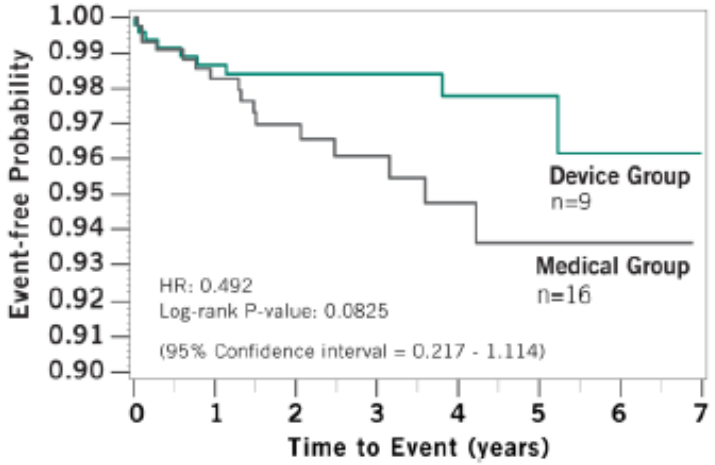
Totality of Evidence

46.6% - 72.7% risk reduction of stroke in favor of device

Analysis	Risk Reduction	P-value [1]
Intent to Treat Raw Count	46.6%	0.157
Intent to Treat KM	50.8%	0.083
Per Protocol KM	63.4%	0.032
As Treated KM	72.7%	0.007

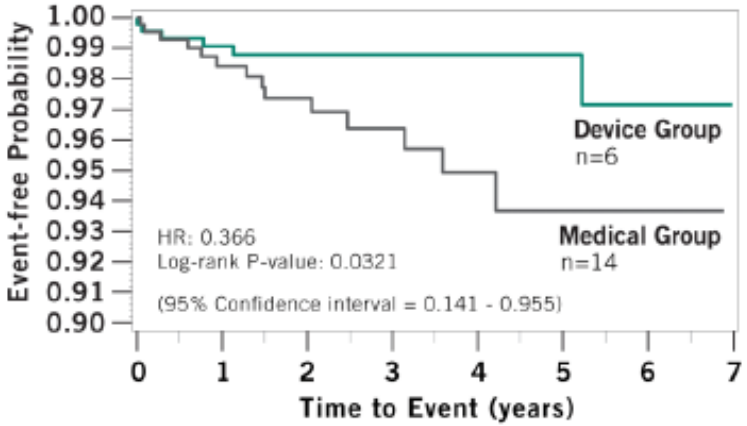
Primary Endpoint Analyses – ITT Cohort

50.8% risk reduction of stroke in favor of device



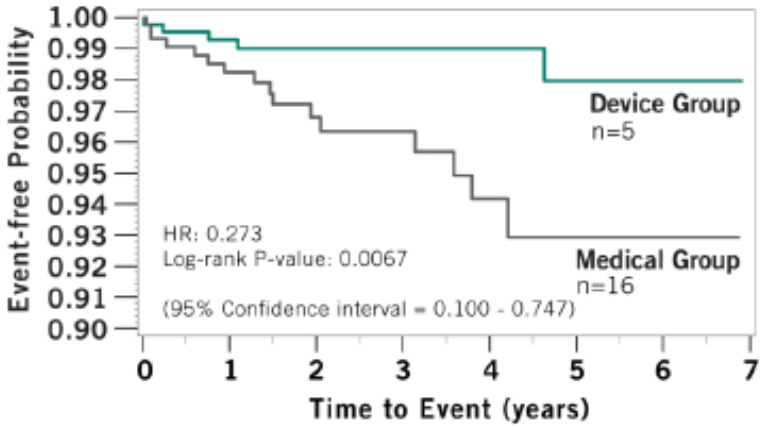
Primary Endpoint Analyses – PP Cohort

63.4% risk reduction of stroke in favor of device



Primary Endpoint Analyses – AT Cohort

72.7% risk reduction of stroke in favor of device

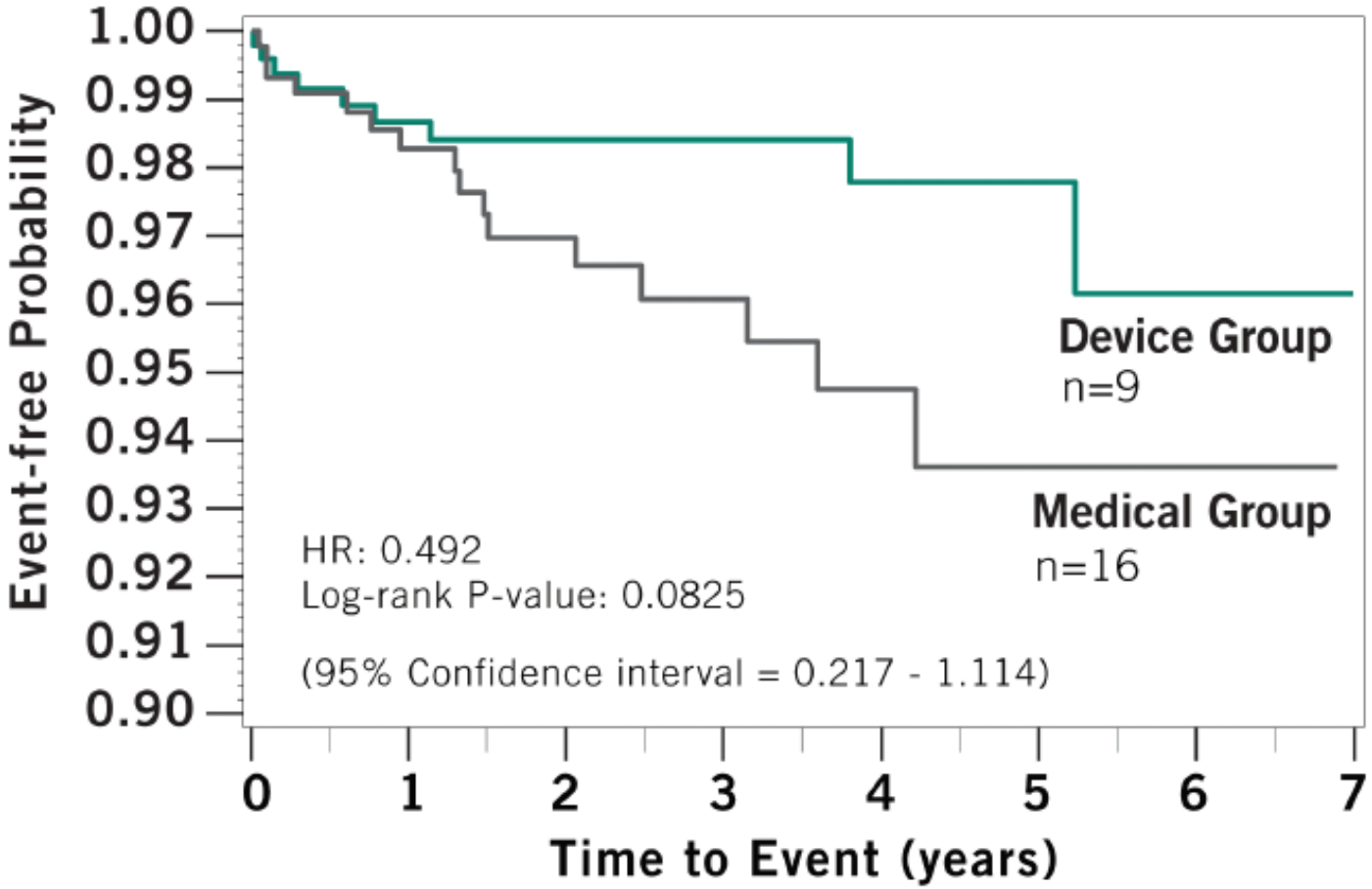


1. P-values ITT Raw Count are calculated using Fisher's Exact Test; all other P-values are calculated Log-Rank Test

Primary Endpoint Analysis – ITT Cohort

50.8% risk reduction of stroke in favor of device

RESPECT CLINICAL TRIAL

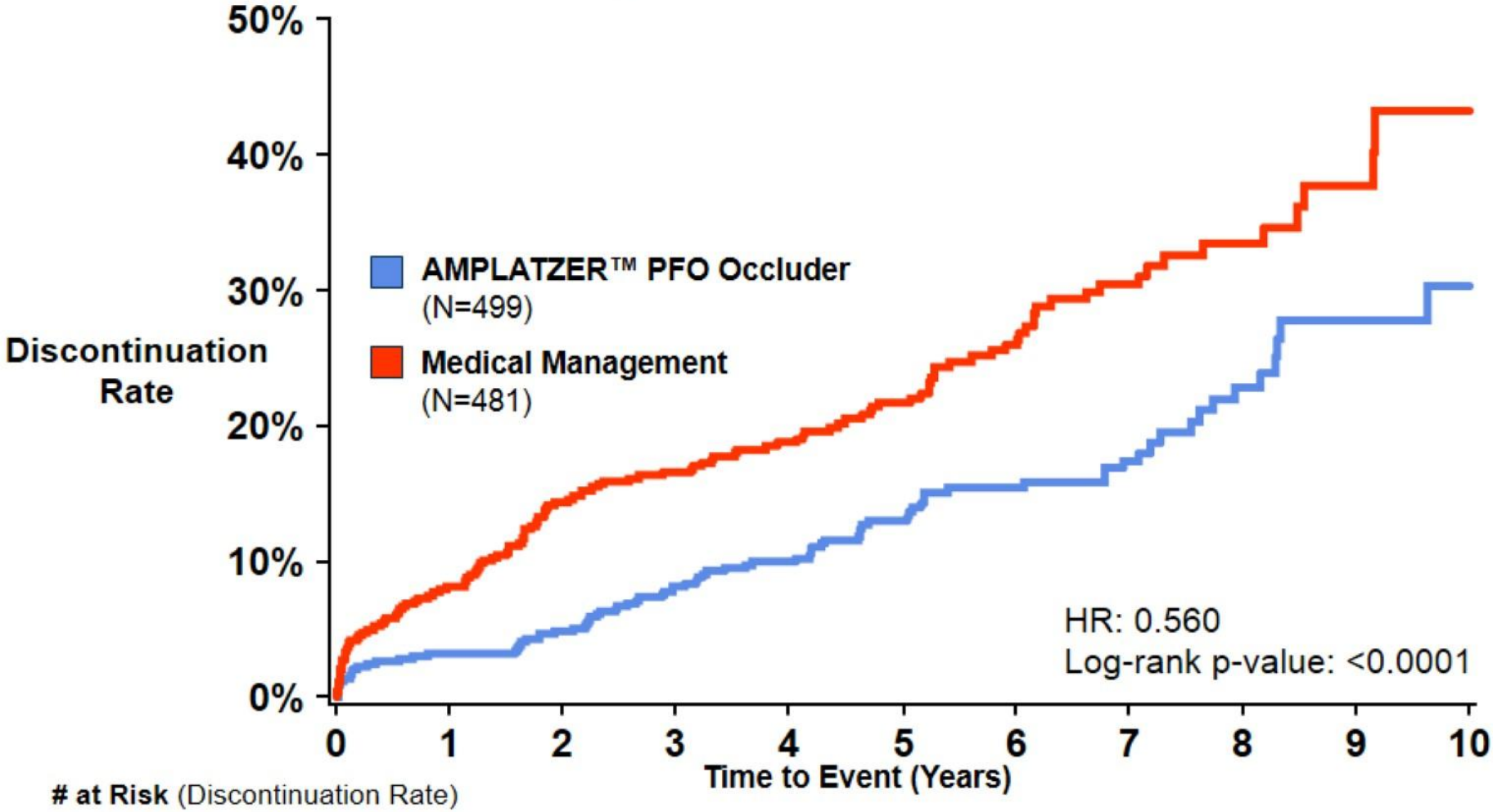


- **3/9** device group patients did not have a device at time of endpoint stroke

1. Cox model used for analysis

Higher Discontinuation Rate in MM Arm

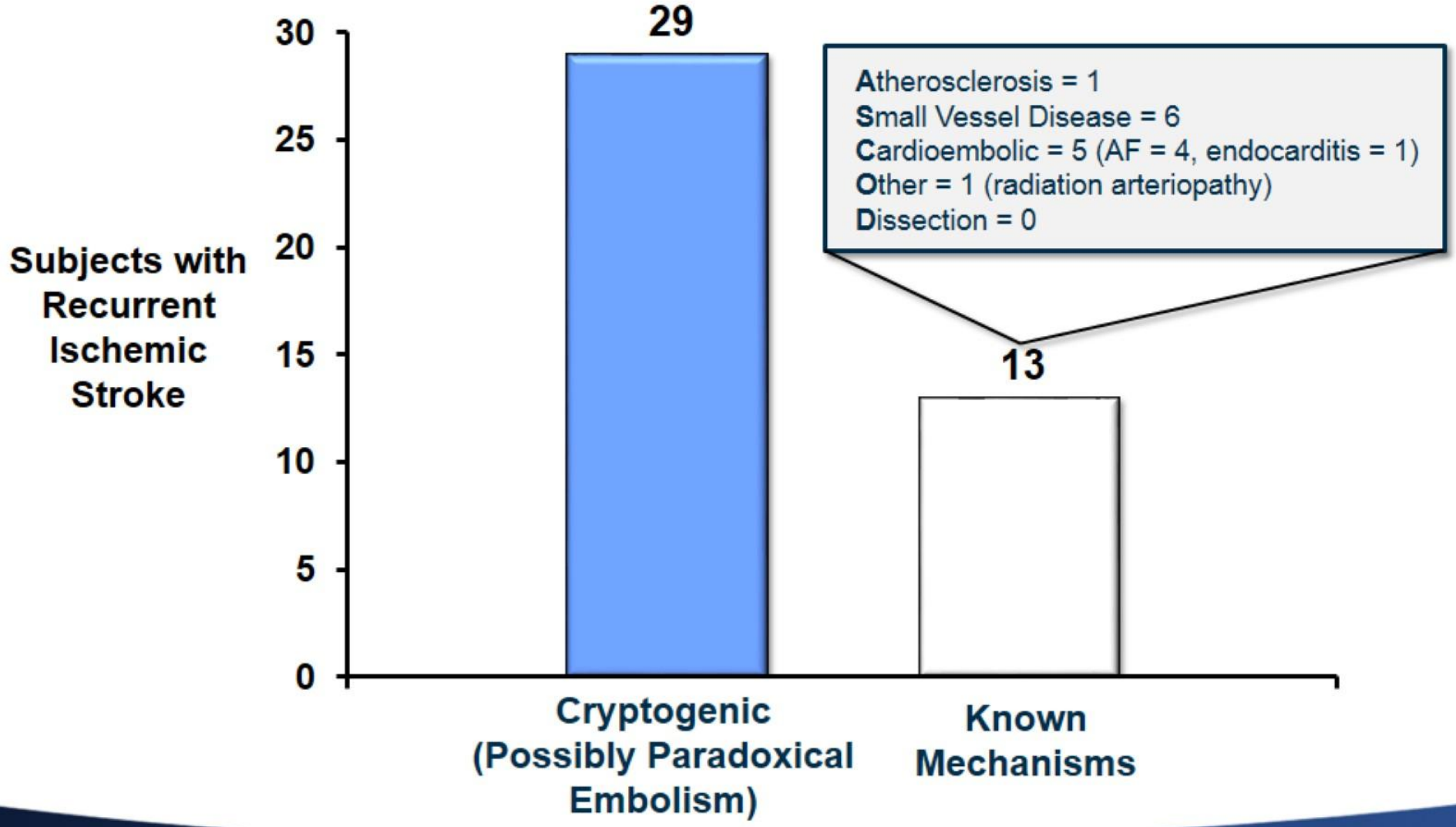
11% of MM Subjects: Off-Label PFO Closure



 # at Risk (Discontinuation Rate)

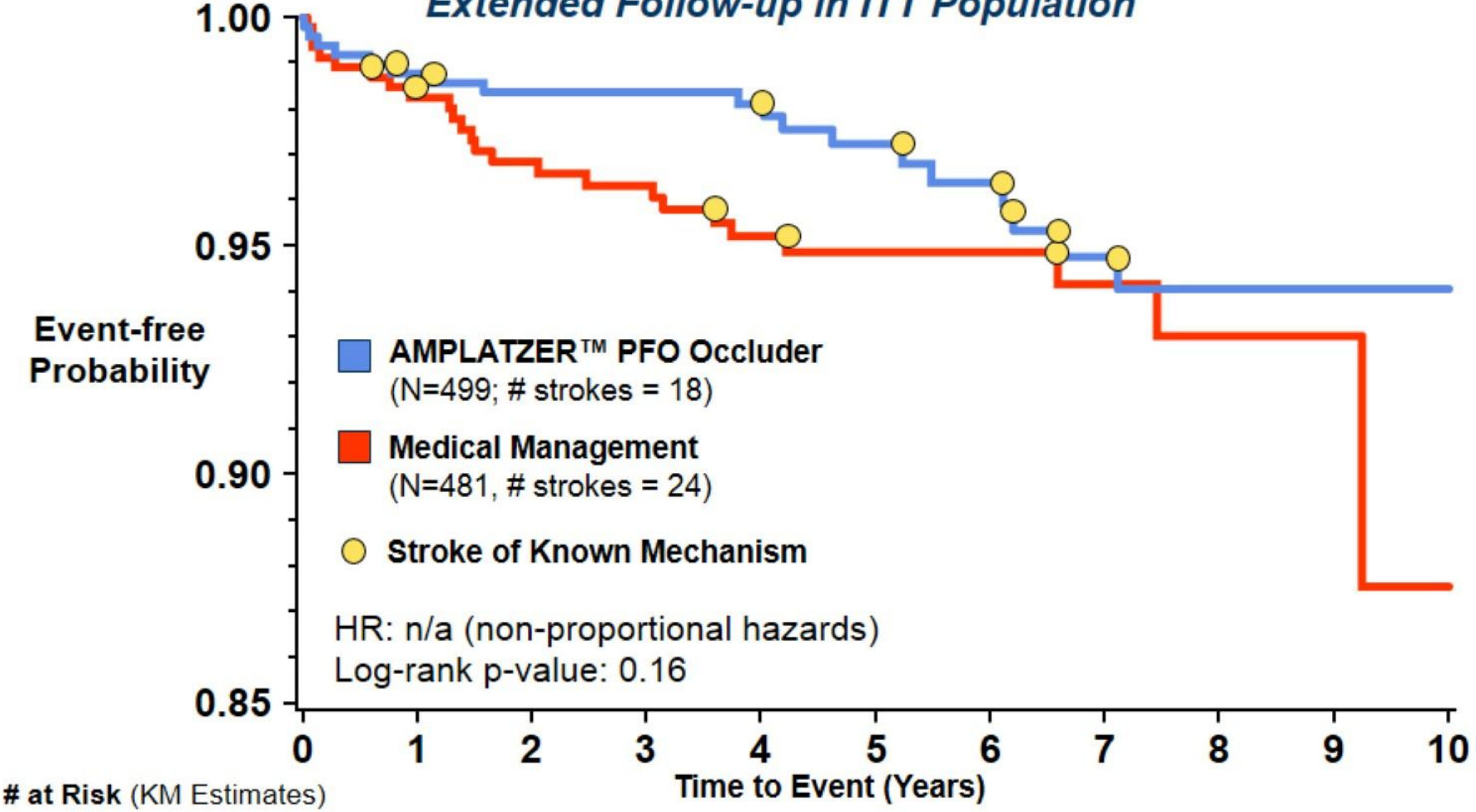
AMPLATZER	**499** (0%)	**463** (4.9%)	**369** (10.0%)	**212** (15.4%)	**86** (22.8%)	**20** (30.3%)
MM	**481** (0%)	**394** (14.4%)	**307** (18.8%)	**168** (26.5%)	**71** (33.5%)	**10** (43.3%)

Nearly 1/3 of Recurrent Strokes in Extended Follow-up Are of Known Mechanism



1 out of 3 Recurrent Strokes Had Mechanism That PFO Closure Cannot Prevent

Extended Follow-up in ITT Population

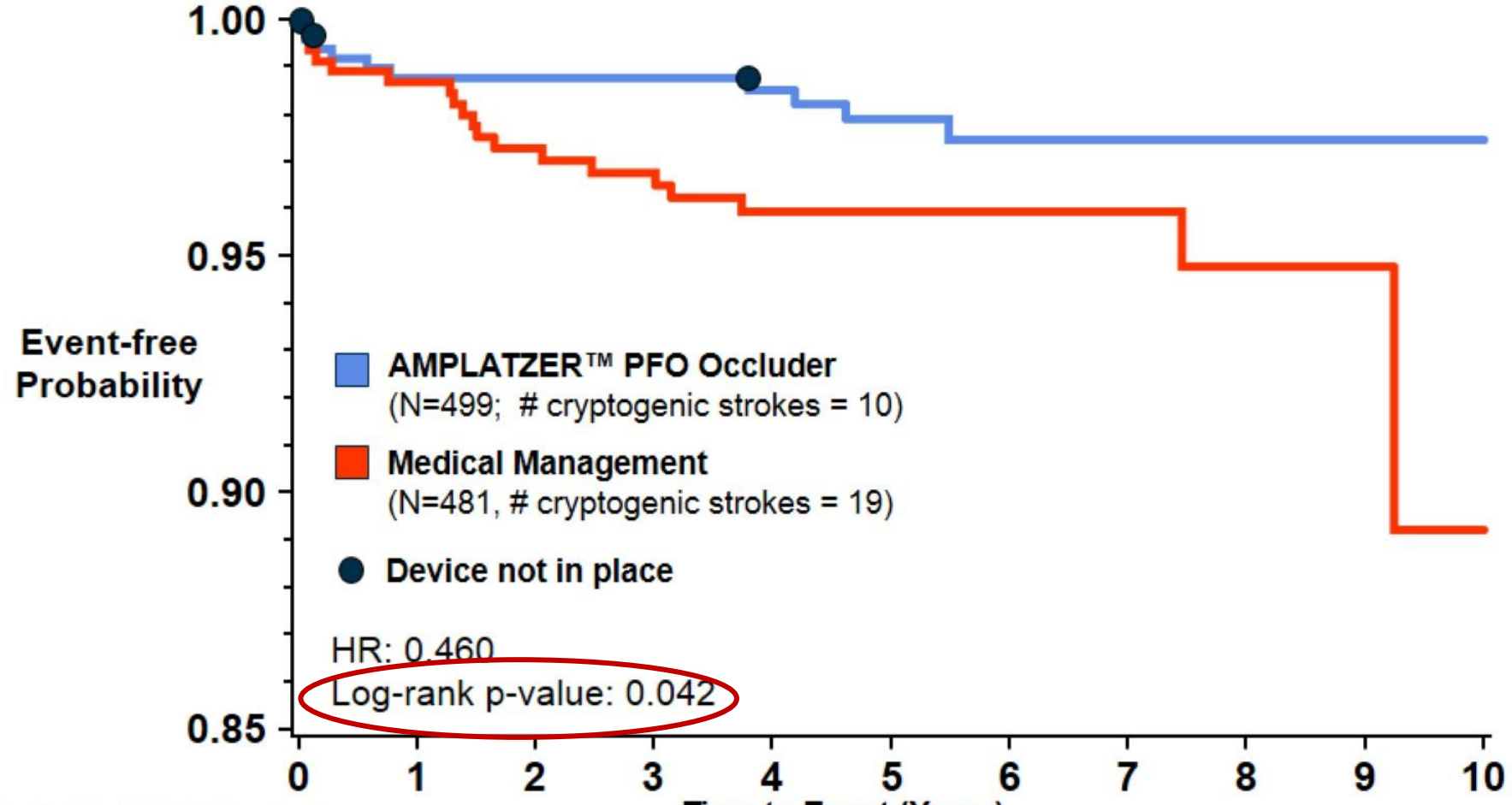


 # at Risk (KM Estimates)

AMPLATZER	**499** (0%)	**463** (1.6%)	**369** (1.9%)	**212** (3.6%)	**86** (6.0%)	**20** (6.0%)
MM	**481** (0%)	**394** (3.2%)	**307** (4.8%)	**168** (5.1%)	**71** (7.0%)	**10** (12.4%)

Significant Reduction in Recurrent Cryptogenic Stroke

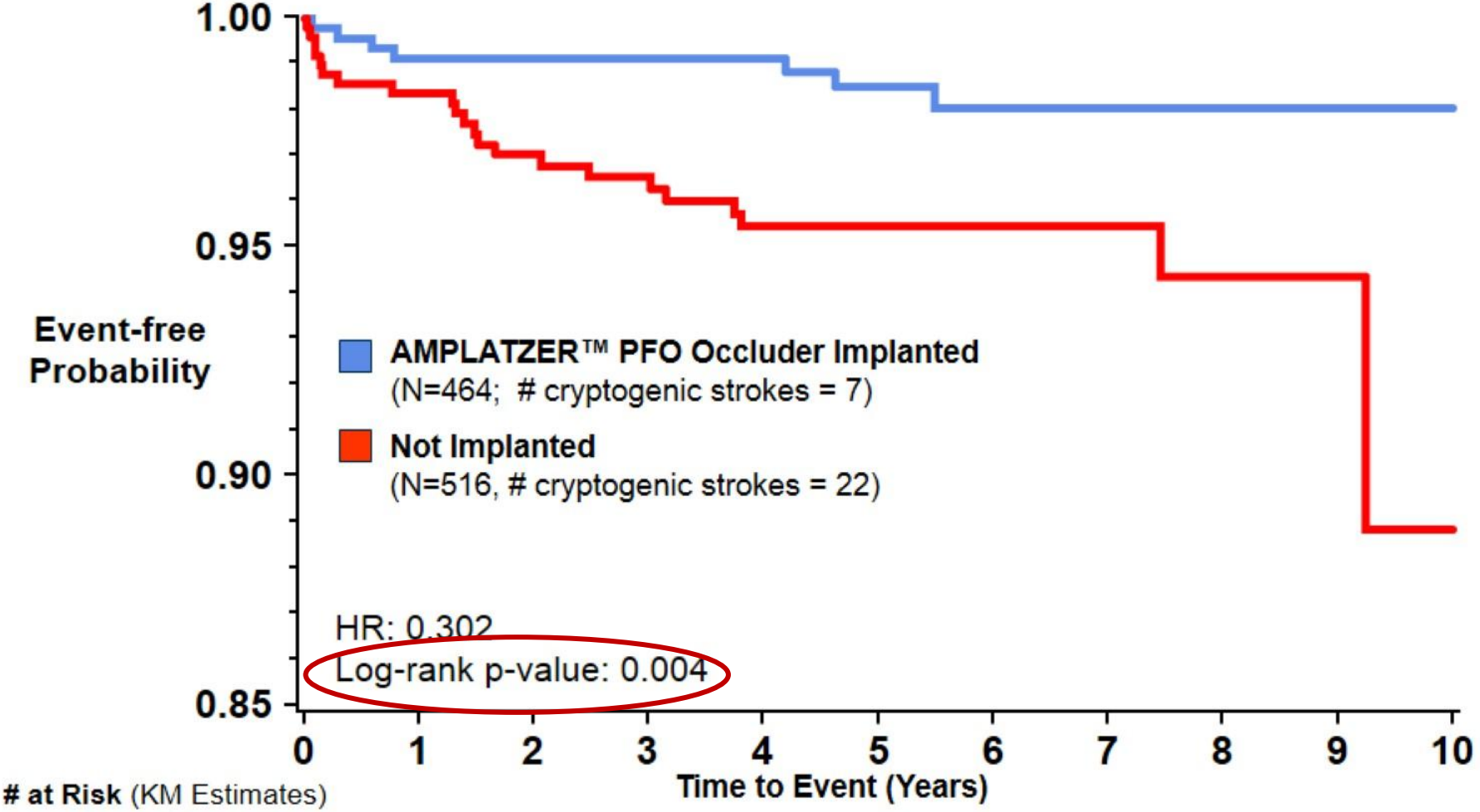
54% Relative Risk Reduction in ITT Population



 # at Risk (KM Estimates)

AMPLATZER	**499** (0%)	**463** (1.2%)	**369** (1.5%)	**212** (2.5%)	**86** (2.5%)	**20** (2.5%)
MM	**481** (0%)	**394** (2.7%)	**307** (4.1%)	**168** (4.1%)	**71** (5.2%)	**10** (10.8%)

70% Relative Risk Reduction in Recurrent Cryptogenic Stroke With Device In Place

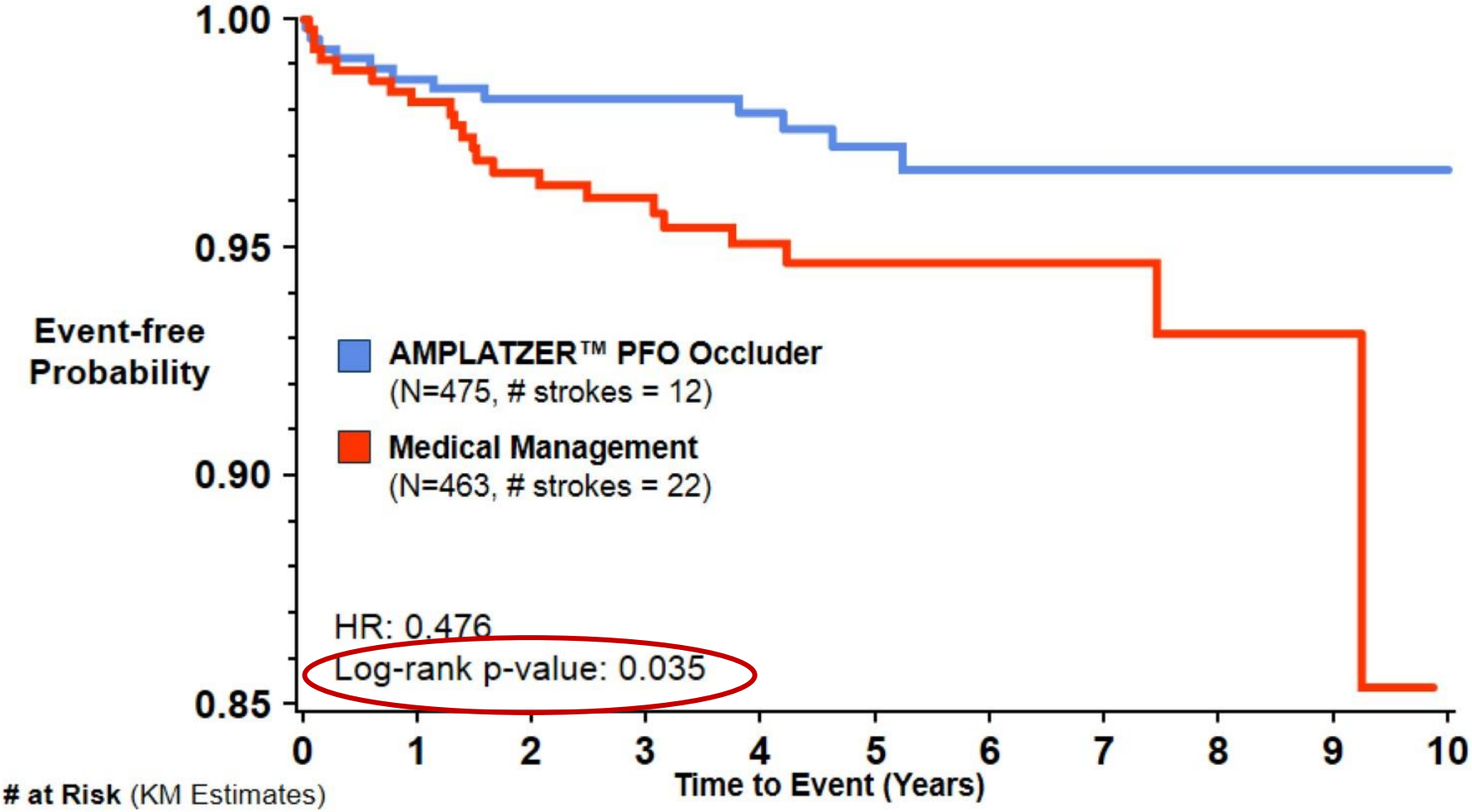


 # at Risk (KM Estimates)

AMPLATZER	**464** (0%)	**445** (0.9%)	**357** (0.9%)	**206** (1.9%)	**82** (1.9%)	**20** (1.9%)
Not Implanted	**516** (0%)	**412** (3.0%)	**319** (4.6%)	**174** (4.6%)	**75** (5.7%)	**10** (11.2%)

Freedom from Recurrent Stroke of Any Mechanism: <60 Yrs

52% Relative Risk Reduction in ITT Sensitivity Analysis

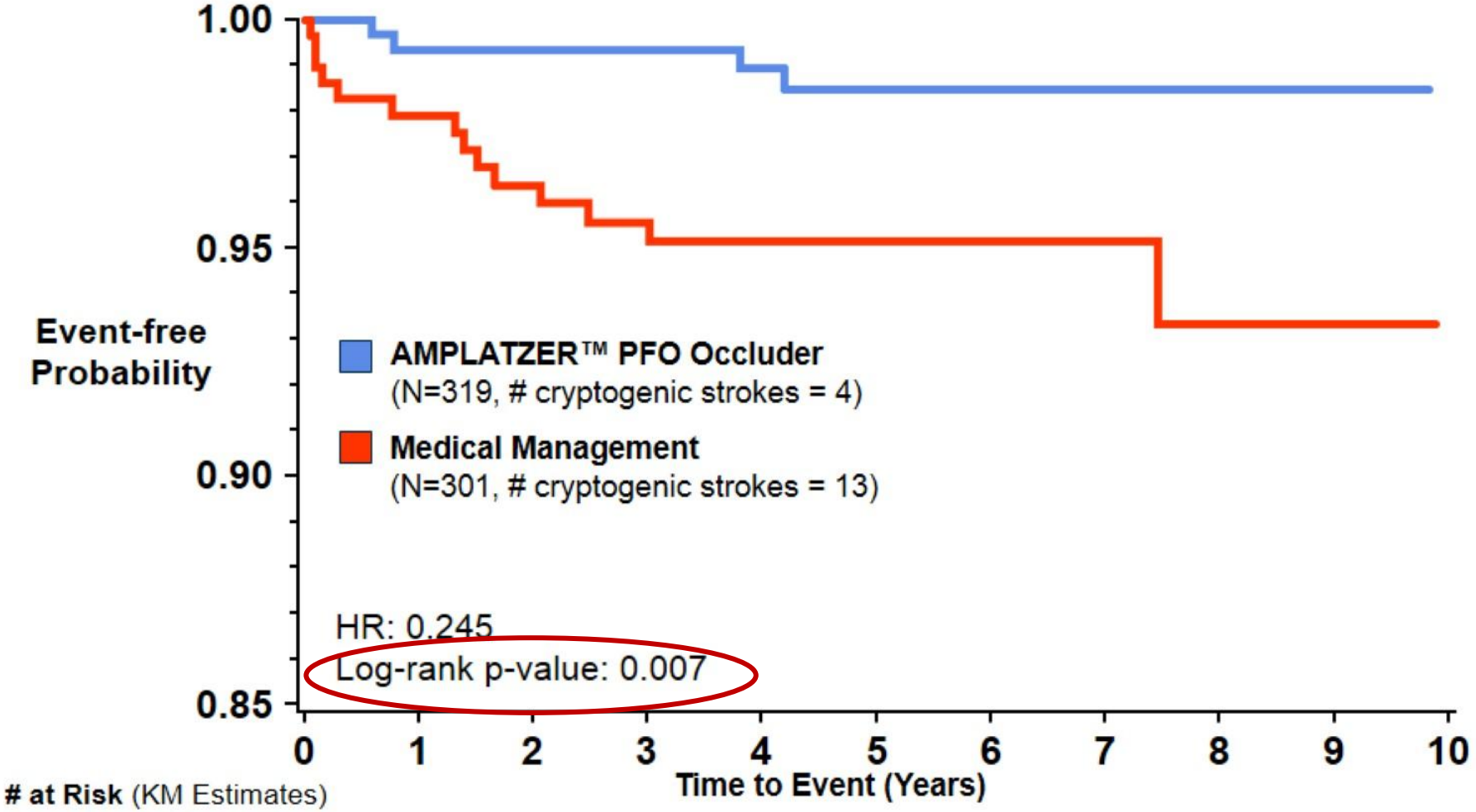


 # at Risk (KM Estimates)

AMPLATZER	**475** (0%)	**417** (1.8%)	**308** (2.1%)	**166** (3.3%)	**69** (3.3%)	**15** (3.3%)
MM	**463** (0%)	**353** (3.4%)	**254** (4.9%)	**124** (5.4%)	**51** (6.9%)	**9** (14.7%)

Greater Benefit in Substantial Shunt or ASA Subgroup

75% Relative Risk Reduction in Recurrent Cryptogenic Stroke in ITT Population



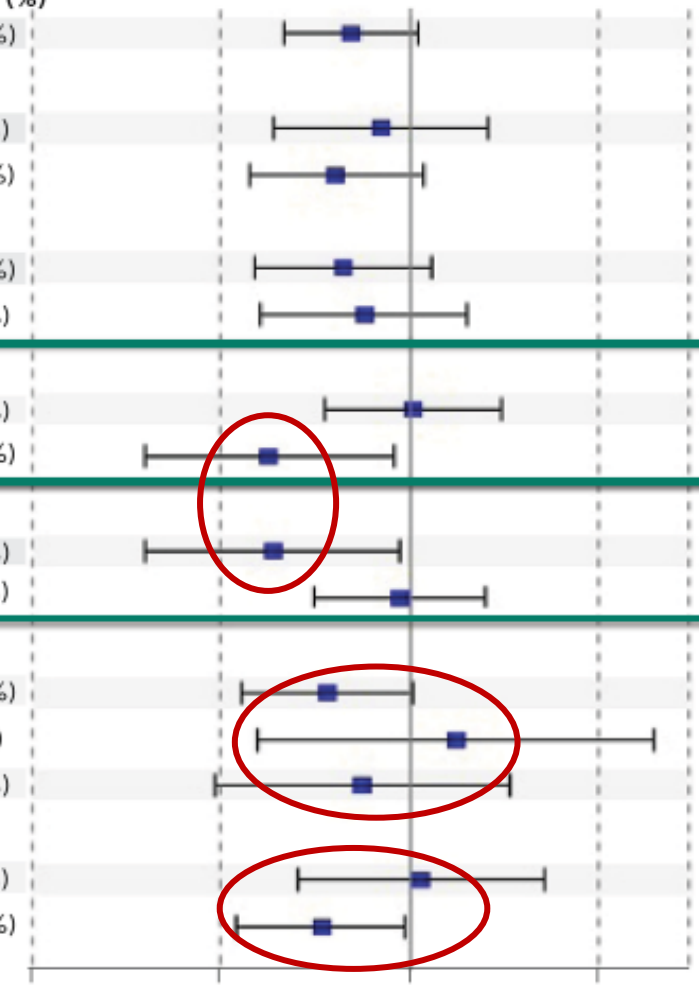
 # at Risk (KM Estimates)

AMPLATZER	**319** (0%)	**299** (0.6%)	**229** (1.0%)	**134** (1.5%)	**52** (1.5%)	**11** (1.5%)
MM	**301** (0%)	**243** (3.6%)	**186** (4.8%)	**105** (4.8%)	**45** (6.6%)	**7** (6.6%)

Subpopulation Differential Treatment Effect

RESPECT CLINICAL TRIAL

Subgroup	Device Group	Medical Group	Hazard Ratio and 95% CI		Pvalue (Log Rank)	Interaction Pvalue
	no. of patients/total number (%)					
Overall	9/499 (1.8%)	16/481 (3.3%)		0.492 (0.217, 1.114)	0.0825	
Age						0.5156
- 18-45	4/230 (1.7%)	5/210 (2.4%)		0.698 (0.187, 2.601)	0.5901	
- 46-60	5/262 (1.9%)	11/266 (4.1%)		0.405 (0.140, 1.165)	0.0828	
Sex						0.7312
- Male	5/268 (1.9%)	10/268 (3.7%)		0.448 (0.153, 1.311)	0.1321	
- Female	4/231 (1.7%)	6/213 (2.8%)		0.571 (0.161, 2.024)	0.3789	
Shunt Size						0.0667
- None, trace or moderate	7/247 (2.8%)	6/244 (2.5%)		1.034 (0.347, 3.081)	0.9527	
- Substantial	2/247 (0.8%)	10/231 (4.3%)		0.178 (0.039, 0.813)	0.0119	
Atrial septal aneurysm						0.1016
- Present	2/180 (1.1%)	9/169 (5.3%)		0.187 (0.040, 0.867)	0.0163	
- Absent	7/319 (2.2%)	7/312 (2.2%)		0.889 (0.312, 2.535)	0.8259	
Index infarct topography						0.3916
- Superficial	5/280 (1.8%)	12/269 (4.5%)		0.366 (0.129, 1.038)	0.0487	
- Small Deep	2/57 (3.5%)	1/70 (1.4%)		1.762 (0.156, 19.93)	0.6429	
- Other	2/157 (1.3%)	3/139 (2.2%)		0.558 (0.093, 3.340)	0.5167	
Planned medical regimen						0.1966
- Anticoagulant	4/132 (3.0%)	3/121 (2.5%)		1.141 (0.255, 5.098)	0.8628	
- Antiplatelet	5/367 (1.4%)	13/359 (3.6%)		0.336 (0.120, 0.944)	0.0299	



Recurrent Cerebral Infarct Size[1]

Methods pre-specified; analysis post-hoc

RESPECT CLINICAL TRIAL

Event	Device Group n/N (%)	Medical Group n/N (%)	P-value[2]
Larger infarct >1.5cm	1/7 (14%)	9/13 (69%)	P=0.0573
Smaller infarct ≤ 1.5cm	6/7 (86%)	4/13 (31%)	

- This exploratory analysis of site-reported recurrent cerebral infarct size is provocative in suggesting that recurrent ischemic strokes in the medical versus device group are not only more frequent but also larger

1. Recurrent infarct size reported on primary endpoint population
2. P-value based on Fisher's Exact test

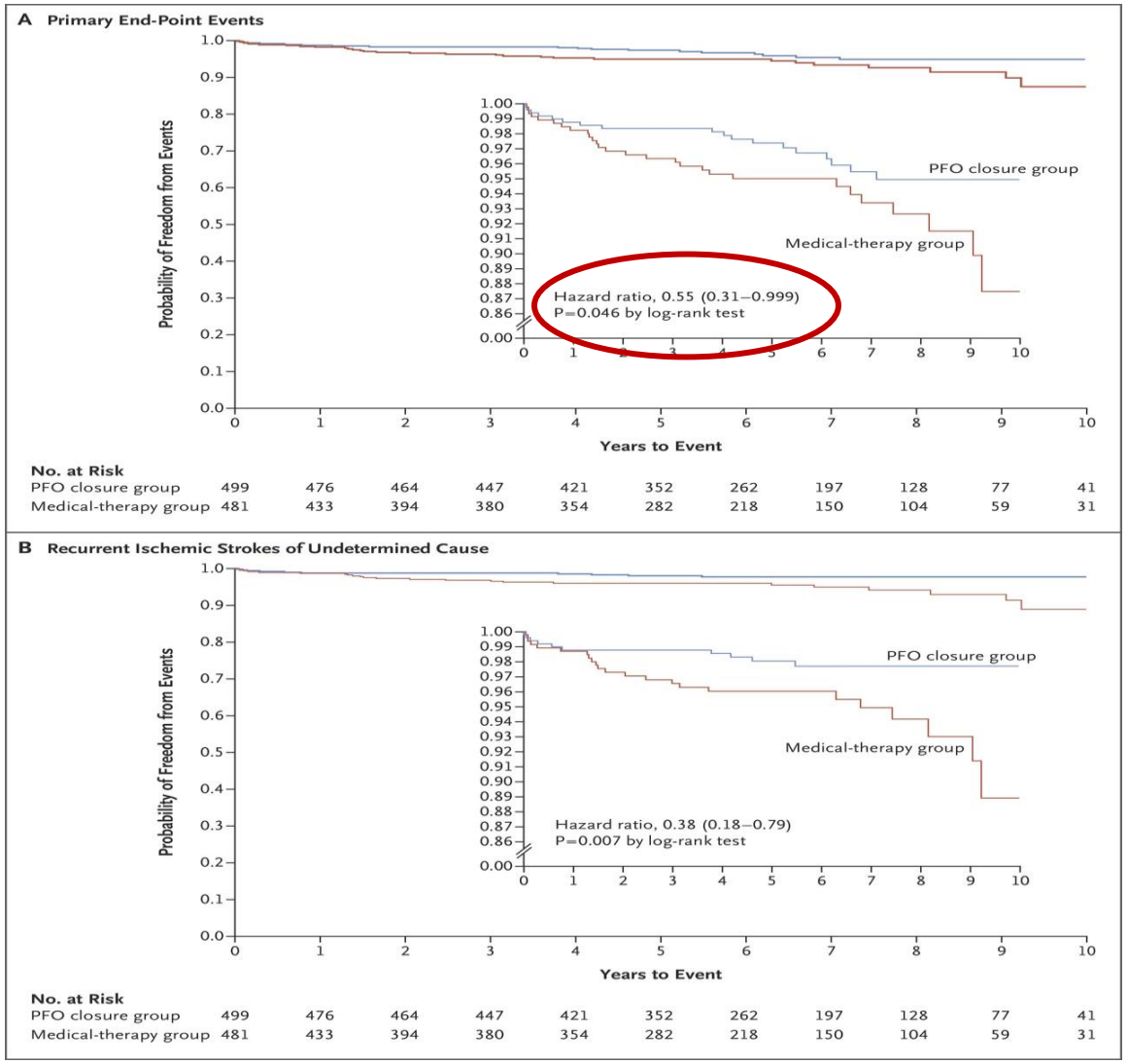
RESPECT

- 980 patients who had had a cryptogenic stroke,

  69 center
- Patients who had had a cryptogenic stroke and had a PFO were randomly assigned to medical therapy or PFO closure.
- At a **median of 5.9 years**, the rate of recurrent ischemic strokes was lower in the PFO closure group than in the medical-therapy group

Saver JL et al. N Engl J Med 2017;377:1022-1032

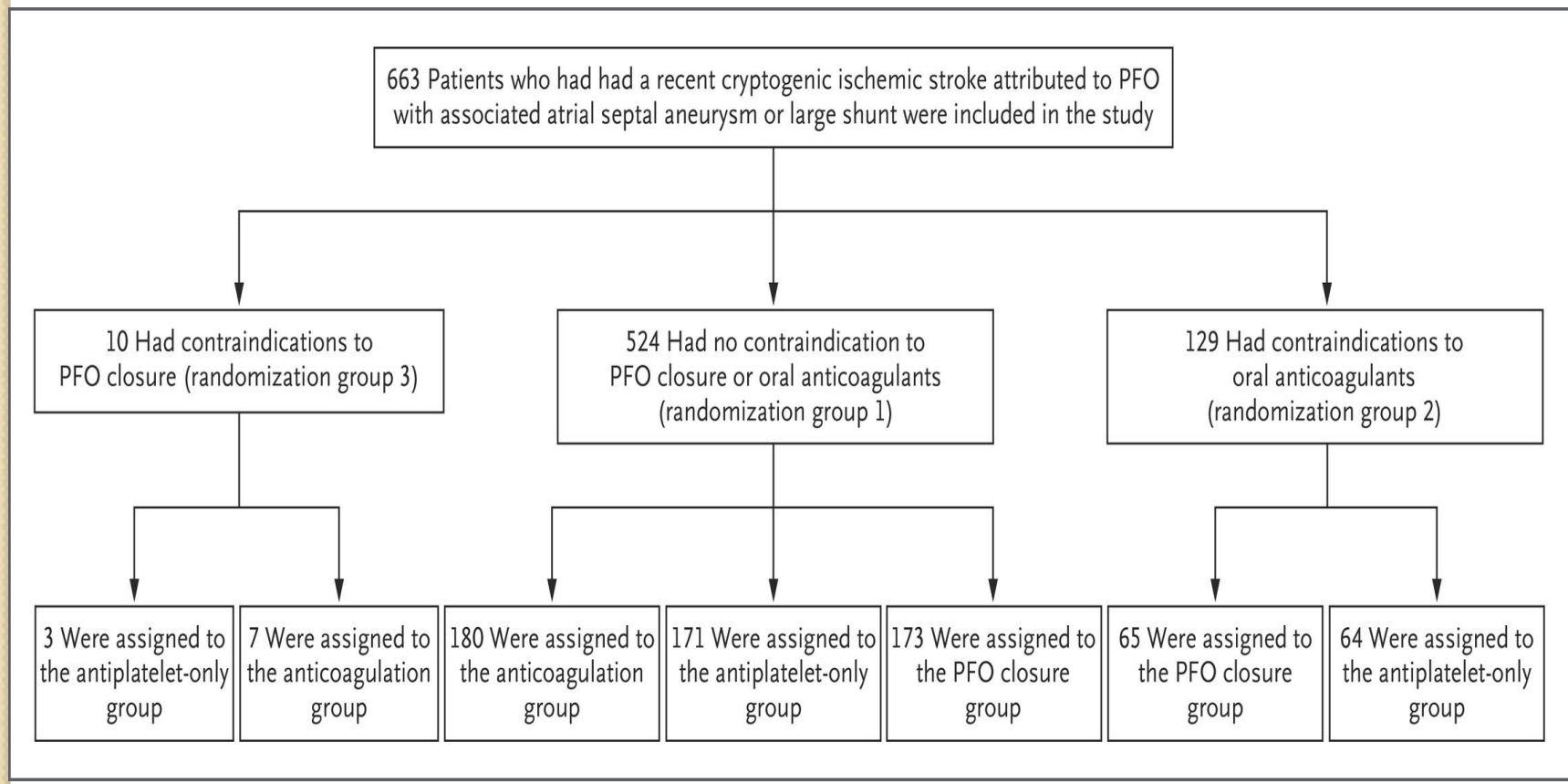
RESPECT



Saver JL et al. N Engl J Med 2017;377:1022-1032

CLOSE

- 11 různých typů okluderů



Mas J-L et al. N Engl J Med 2017;377:1011-1021

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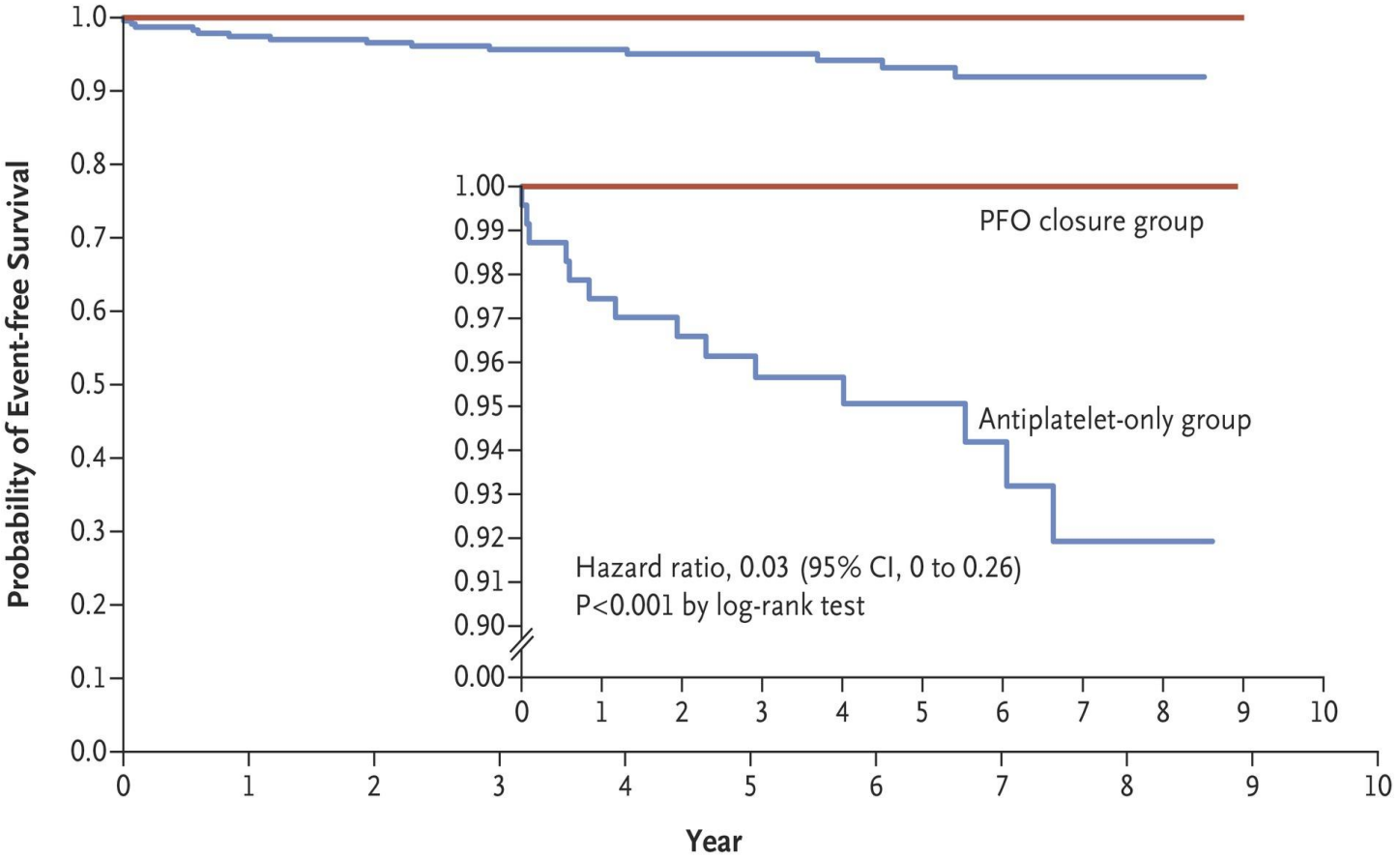


No. at Risk											
PFO closure group	238	238	232	200	179	141	99	64	20	0	0
Antiplatelet-only group	235	229	223	198	160	130	96	55	19	0	0

Mas J-L et al. N Engl J Med 2017;377:1011-1021

CLOSE

Table 2. Efficacy Outcomes.*

Outcome	Randomization Groups 1 and 2				Randomization Groups 1 and 3		
	PFO Closure Group (N=238)	Antiplatelet-Only Group (N=235)	Hazard Ratio (95% CI)†	P Value	Anticoagulant Group (N=187)	Antiplatelet-Only Group (N=174)	Hazard Ratio (95% CI)‡
Primary efficacy outcome							
Stroke in the intention-to-treat population — no. of patients	0	14§	0.03 (0.00–0.26)	<0.001	3¶	7§	0.44 (0.11–1.48)
Stroke in the per-protocol population — no./total no. of patients	0/217	14/223§	0.04 (0.00–0.27)	<0.001	2/143¶	7/164§	0.37 (0.07–1.38)
Secondary efficacy outcomes‖							
Disabling stroke**	0	1	0.33 (0.00–6.18)	0.63	1	1	0.96 (0.08–11.85)
Cerebral hemorrhage	0	0	NA	NA	0	0	NA
Ischemic stroke, transient ischemic attack, or systemic embolism	8	21	0.39 (0.16–0.82)	0.01	8	12	0.64 (0.26–1.50)
Transient ischemic attack	8	8	0.97 (0.37–2.56)	0.96	5	6	0.80 (0.25–2.52)
Systemic embolism	0	0	NA	NA	0	0	NA
Death from any cause	0	0	NA	NA	1††	0	2.84 (0.15–414.86)
Success of device implantation — no./total no. (%)‡‡	234/235 (99.6)	NA	NA	NA	NA	NA	NA
Success of PFO closure — no./total no. (%)§§	202/228 (88.6)	NA	NA	NA	NA	NA	NA

* NA denotes not applicable. The intention-to-treat cohort included all patients who were randomly assigned to a treatment. The per-protocol cohort included patients who received the randomly assigned treatment, adhered to the protocol-mandated medical treatment until the end of the trial, and did not have a major protocol violation.
† The hazard ratio was calculated for the PFO closure group as compared with the antiplatelet-only group.
‡ The hazard ratio was calculated for the anticoagulant group as compared with the antiplatelet-only group. Statistical significance was not analyzed because the study was not adequately powered to compare outcomes in these groups.
§ No patient had an alternative explanation for recurrent stroke.
¶ One patient had an alternative cause of stroke (aneurysmal subarachnoid hemorrhage complicated by vasospasm and ischemic strokes).
‖ Secondary efficacy outcomes were analyzed in the intention-to-treat cohort.
** Disabling stroke was defined as a modified Rankin scale score of 3 or higher.
†† The one death was due to pancreatic cancer.
‡‡ Success of device implantation was defined as deployment of the device in the appropriate place and removal of the placement system.
§§ Success of PFO closure was defined as successful implantation with no complication before the patient's discharge and no or minimal residual shunt.

Mas J-L et al. N Engl J Med 2017;377:1011-1021

CLOSE

Table 3. Procedural Complications and Serious Adverse Events.*

Complication or Event	Randomization Groups 1 and 2			Randomization Groups 1 and 3		
	PFO Closure Group (N=238)	Antiplatelet-Only Group (N=235)	P Value	Anticoagulant Group (N=187)	Antiplatelet-Only Group (N=174)	P Value
	no. of patients (%)			*no. of patients (%)*		
Major or fatal device-related or procedure-related complication†	14 (5.9)	NA	NA	NA	NA	NA
Major or fatal bleeding complication	2 (0.8)	5 (2.1)	0.28	10 (5.3)	4 (2.3)	0.18
Atrial fibrillation or flutter‡	11 (4.6)§	2 (0.9)	0.02	0	2 (1.1)	0.23
Death	0	0	NA	1 (0.5)¶	0	0.65
At least one serious adverse event	85 (35.7)	78 (33.2)	0.56	62 (33.2)	59 (33.9)	0.88

* Definitions of major or fatal device-related or procedure-related complications, definitions of major or fatal bleeding complications, and a full list of serious adverse events are provided in the Supplementary Appendix.

† Major or fatal device-related or procedure-related complications in the PFO closure group are listed for those that occurred within 30 days after the procedure and included atrial fibrillation (9 patients), atrial flutter (1 patient), supraventricular tachycardia (2 patients), air embolism (1 patient), and hyperthermia resulting in prolongation of hospitalization (1 patient).

‡ Atrial fibrillation or flutter was classified as cases that required treatment for more than 1 month.

§ In 10 patients, atrial fibrillation or flutter occurred within 30 days after the procedure.

¶ The one death was due to pancreatic cancer.

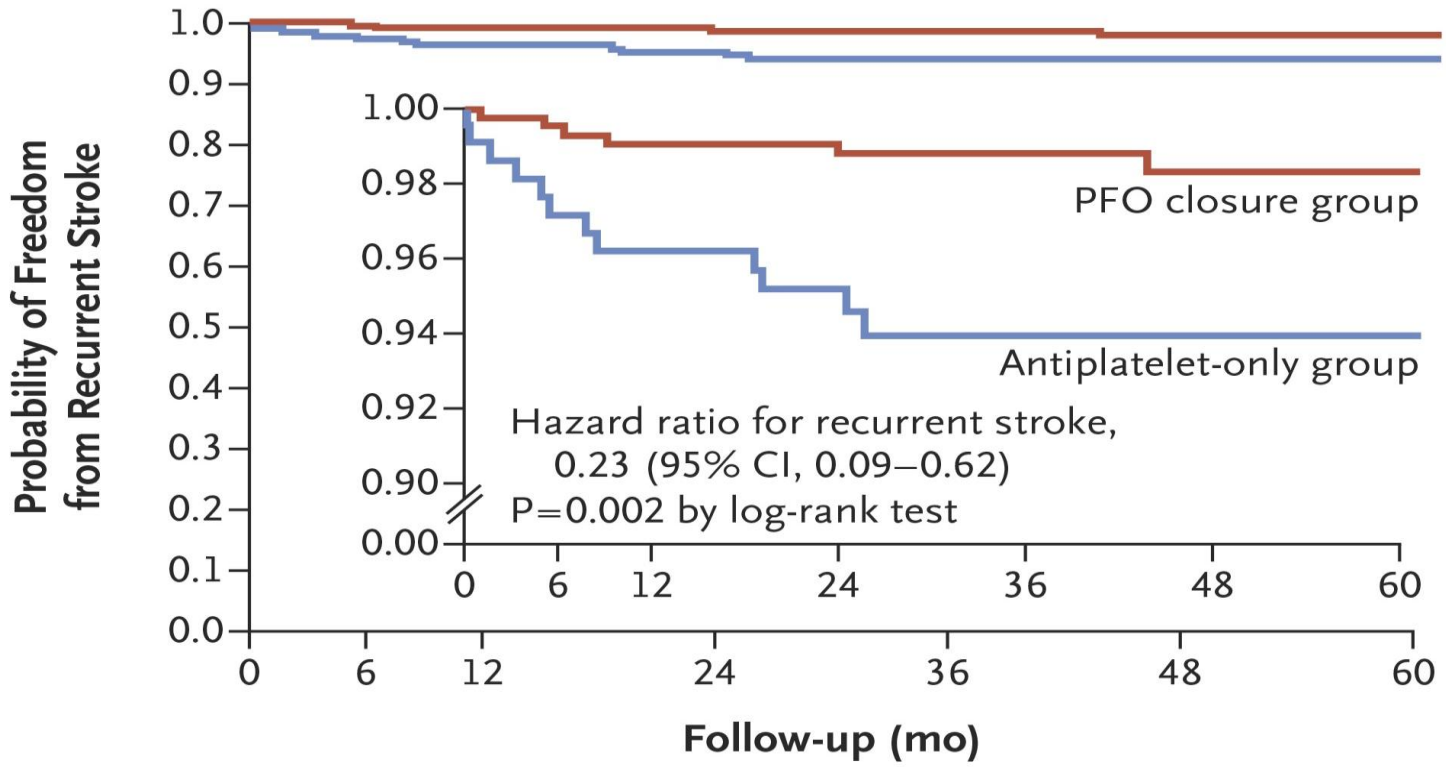
Mas J-L et al. N Engl J Med 2017;377:1011-1021

REDUCE

- **In a randomized trial involving 664 patients who had had a cryptogenic stroke, closure of a PFO combined with antiplatelet therapy resulted in significantly lower rates of subsequent stroke than antiplatelet therapy alone over a median follow-up of 3.2 years.**
- **Gore device – Helax, GSO**

Søndergaard L et al. N Engl J Med 2017;377:1033-1042

REDUCE



No. at Risk							
PFO closure group	441	422	417	398	278	182	102
Antiplatelet-only group	223	202	194	173	116	78	30

Søndergaard L et al. N Engl J Med 2017;377:1033-1042

REDUCE

Table 2. Coprimary End Points of Freedom from Clinical Ischemic Stroke and Incidence of New Brain Infarction.*

End Point	PFO Closure Group	Antiplatelet-Only Group	Effect Size	P Value
	no. of patients/total no. (%)			
Clinical ischemic stroke†	6/441 (1.4)	12/223 (5.4)	0.23 (0.09–0.62)‡	0.002§
New brain infarction¶	22/383 (5.7)	20/177 (11.3)	0.51 (0.29–0.91)‖	0.04**
Recurrent clinical ischemic stroke	5/383 (1.3)	12/177 (6.8)	0.19 (0.07–0.54)‖	0.005**
Silent brain infarction only	17/383 (4.4)	8/177 (4.5)	0.98 (0.43–2.23)‖	0.97**

* Freedom from clinical ischemic stroke is reported here as the number of recurrent strokes through at least 24 months. New brain infarction was a composite of clinical ischemic stroke or silent brain infarction detected on imaging at 24 months.

† Clinical evidence of ischemic stroke was reported through the time of available follow-up, with a minimum of 2 years, maximum of 5 years, and median of 3.2 years.

‡ Data are presented as a hazard ratio with a 95% confidence interval in the PFO closure group as compared with the antiplatelet-alone group.

§ The P value was calculated with the use of a log-rank test.

¶ One additional clinical stroke occurred in the PFO closure group after 2 years and therefore was not included in the composite new brain infarction end point at 24 months. Recurrent clinical ischemic stroke and silent brain infarction are the two components of the second coprimary end point.

‖ Data are presented as a relative risk with a 95% confidence interval in the PFO closure group as compared with the antiplatelet-alone group.

** The P value was calculated with the use of a binomial proportions test.

Søndergaard L et al. N Engl J Med 2017;377:1033-1042

Katetrizační uzávěr perzistujícího foramen ovale

Co chceme vědět od:

1/ neurologa

- pokud možno přesné určení etiologie CMP

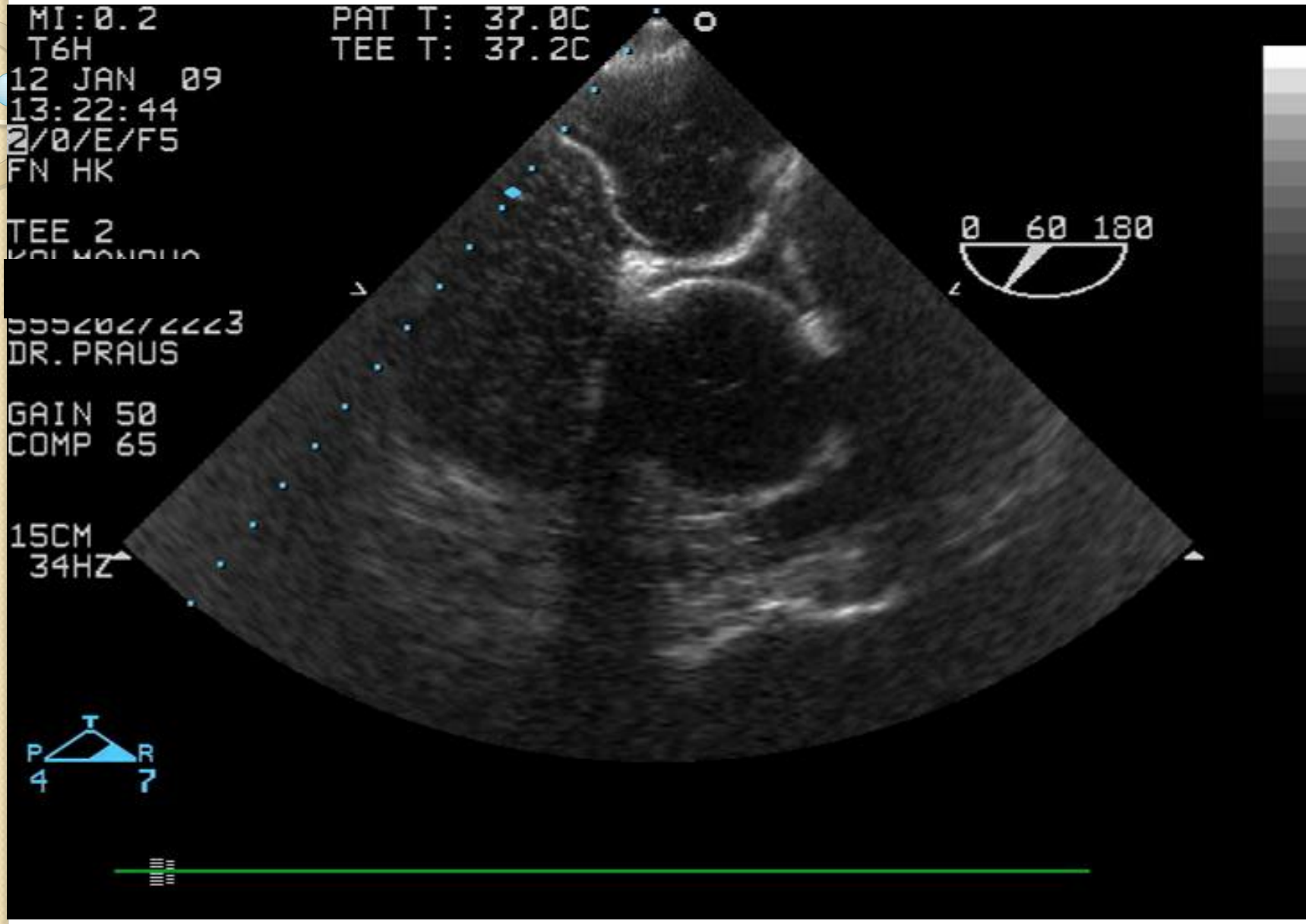
2/ klinika

- pokud možno přesné určení etiologie SE

2/ kardiologa (ECHO)

- nejen průkaz PFO

- pokud možno nejlepší zobrazení morfologie síňového septa v klidu a při zátěži (Vlsalva m.)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FN HK
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COMP 65
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34HZ
PAT T: 37.0C
TEE T: 37.2C
0 60 180
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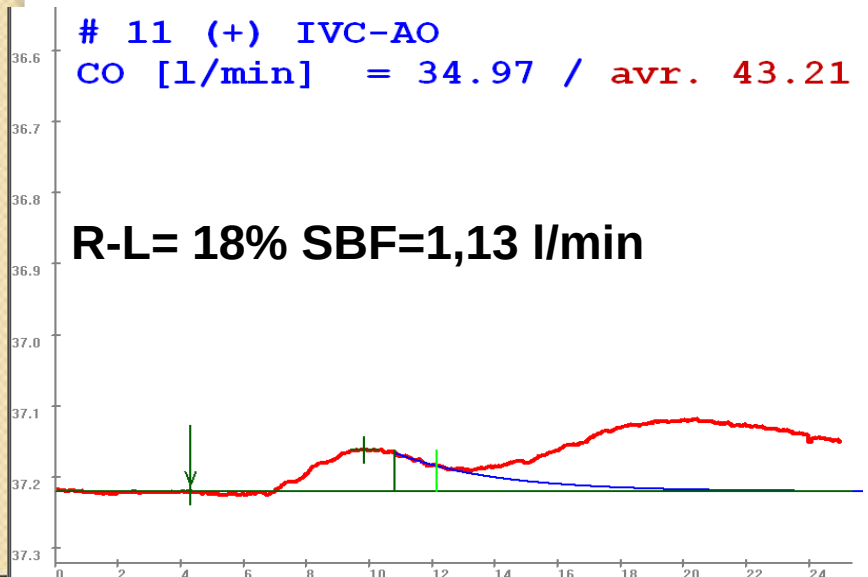
7

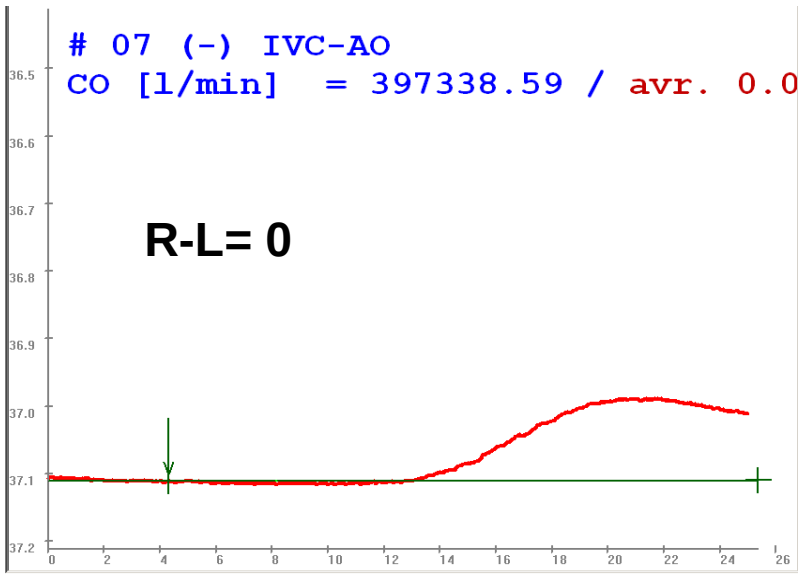
Embolizace DK - TEN - plicní hypertenze - desaturace

Vyšetření

	před	uzávěr PFO	FU
• Saturace O2%	81,7%	91,2 %	95,9%

- Tlaky: PS 15/9/7 (a/v/m) mmHg
  LS 17/9/7 (a/v/m) mmHg
  AP 91/35/51 (s/d/m) mmHg





Platypnea-ortodeoxia

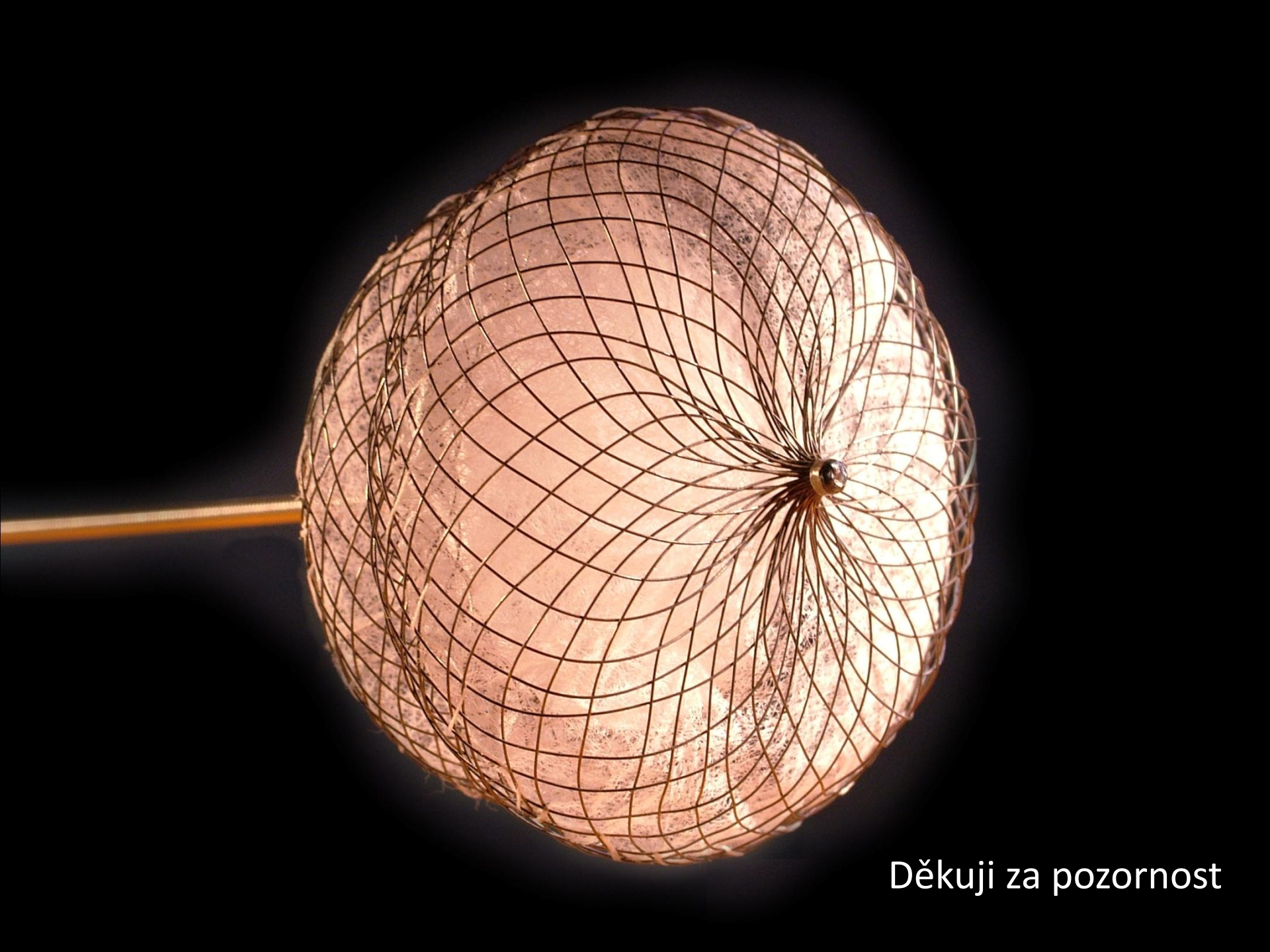
Vyšetření

	vleže	sed	po postavení
Saturace O2%	98	84	57!!!
pO2	16	6,6	4!!!

- Tlaky: PS 5/4/4 (a/v/m) LS 9/5/4 (a/v/m) mmHg
  AP 21/7/12 (a/v/m) !!!
- 23.3. 07: ASD okluder
- 24.3. 07: normálně chodí, saturace O2 97-100%
- 29.3. 07: dimise

Závěr:

- U pacientů s kryptogenní CMP uzavření PFO snižuje výskyt opakovaných CMP proti medikamentózní léčbě (antiagregace)
- Vysoká úspěšnost uzávěru PFO, nízký výskyt komplikací
- Vyšší výskyt FIS (periprocedurální období)
- Maximální snaha o průkaz souvislosti mezi PFO a SE-CMP
- Efekt u rizikových PFO, max. přesné posouzení rizikovosti PFO –TEE
- Individuální přístup uzávěru v jiných indikacích


Děkuji za pozornost