LAA closure is best done with surgery

Sacha P. Salzberg, MD, PD
Cardiovascular Surgeon
Heart Clinic, Hirslanden Hospital
Zurich, Switzerland

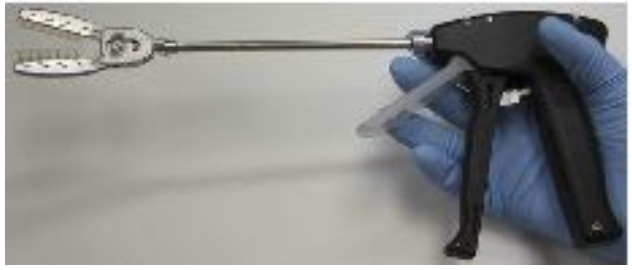
HEART CLINIC ZURICH

hirslanden

Disclosures:

Consultant & Proctor for

Atricure, Maquet and St. Jude Medical



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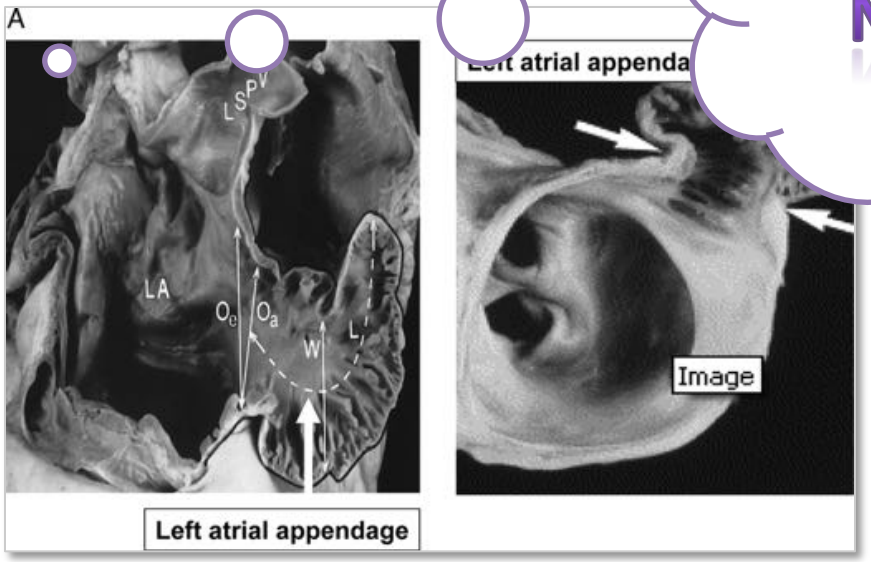
LAA Amputation first described in 1949 by J. Madden (a Surgeon) in the JAMA

NO NEW-NEWS !!!



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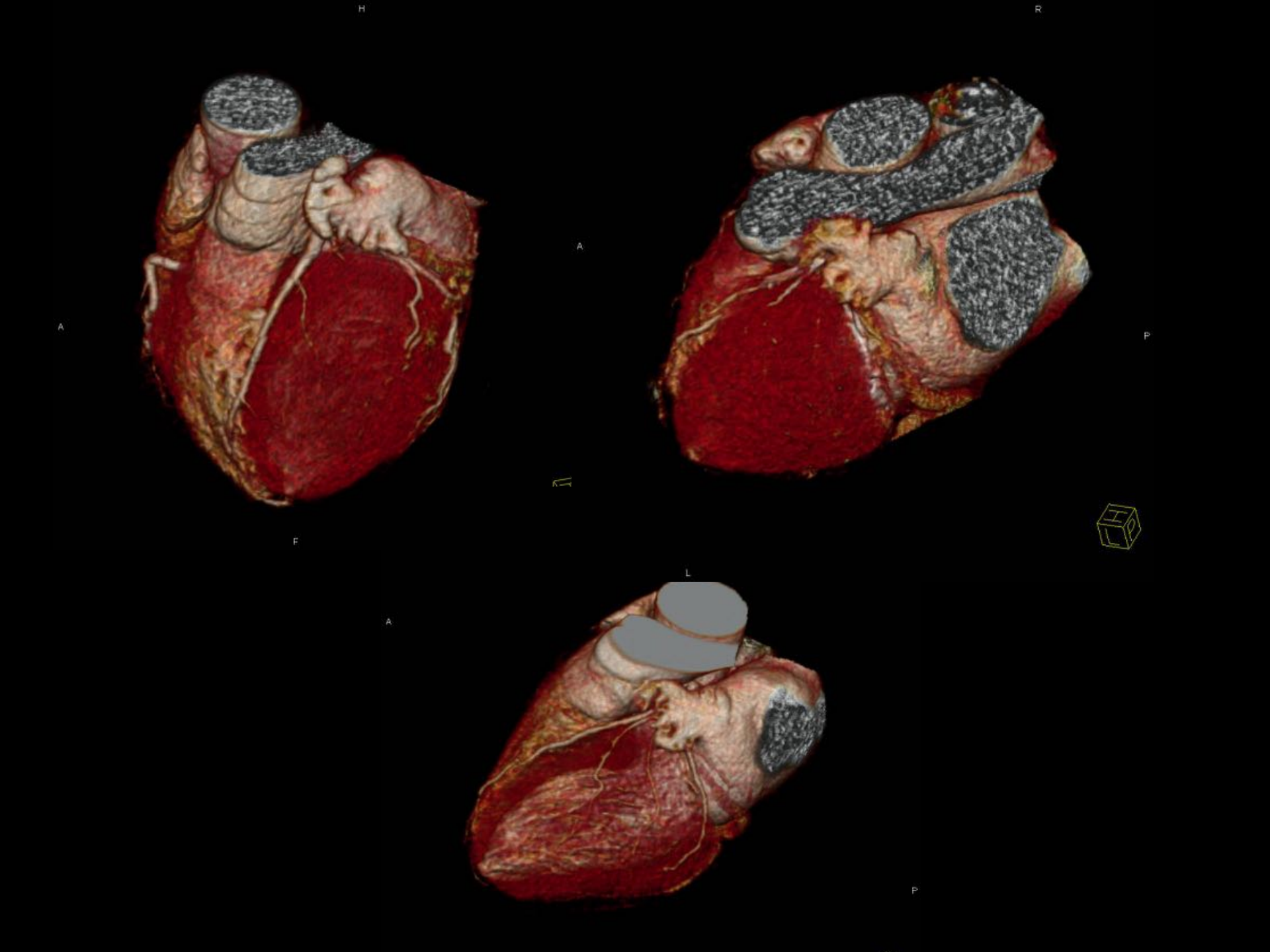
Landmesser U and Holmes D R Eur Heart J 2012;33:698-704

LAA closure is best done with surgery

Recommendations for LAA closure/occlusion/excision

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	

LAA = left atrial appendage.
[a]Class of recommendation.
[b]Level of evidence.
[c]References.


H
R
A
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P
F
L
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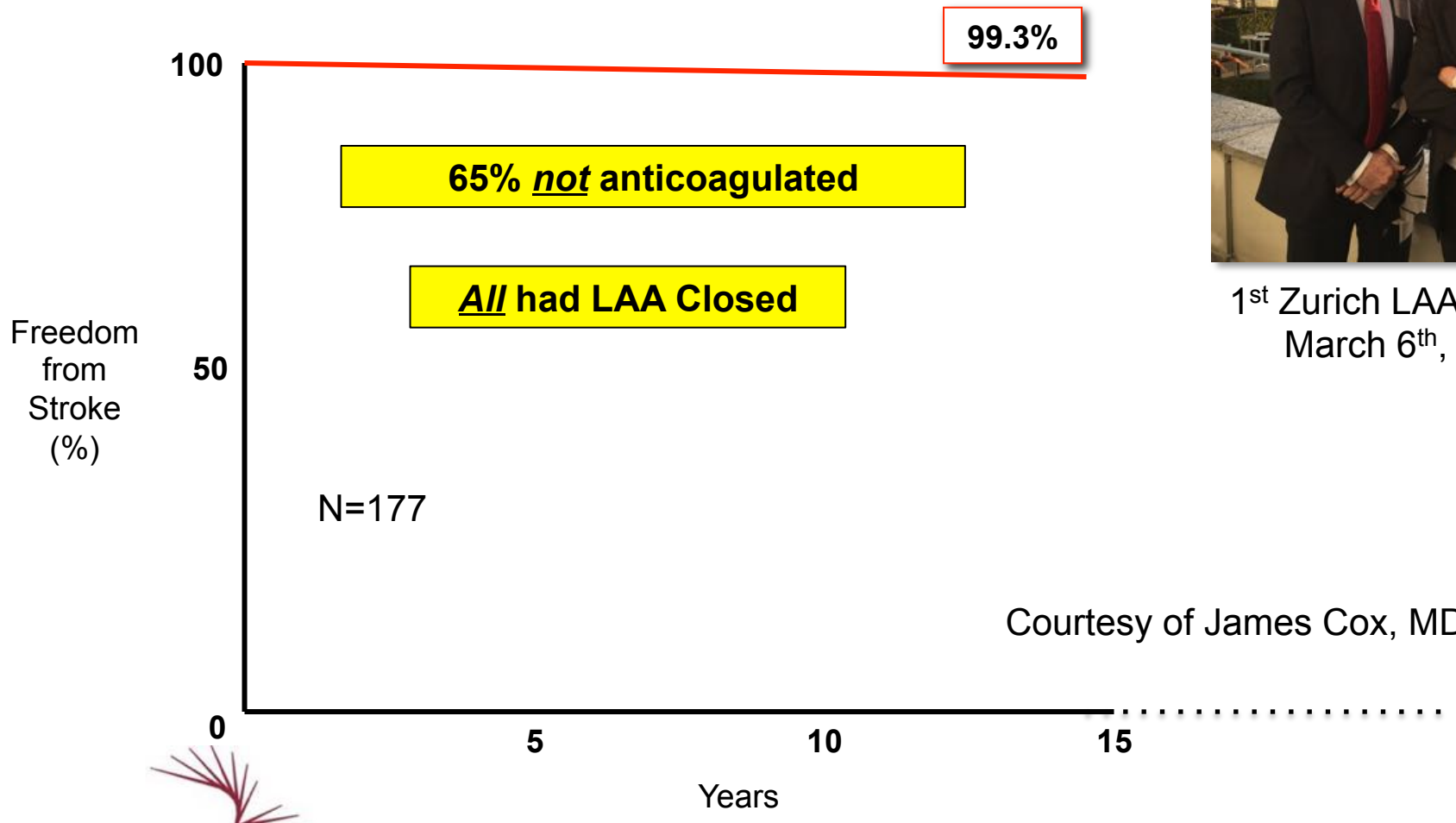
P

Long-term freedom from stroke

1st Zurich LAA Summit
March 6th, 2015



Courtesy of James Cox, MD

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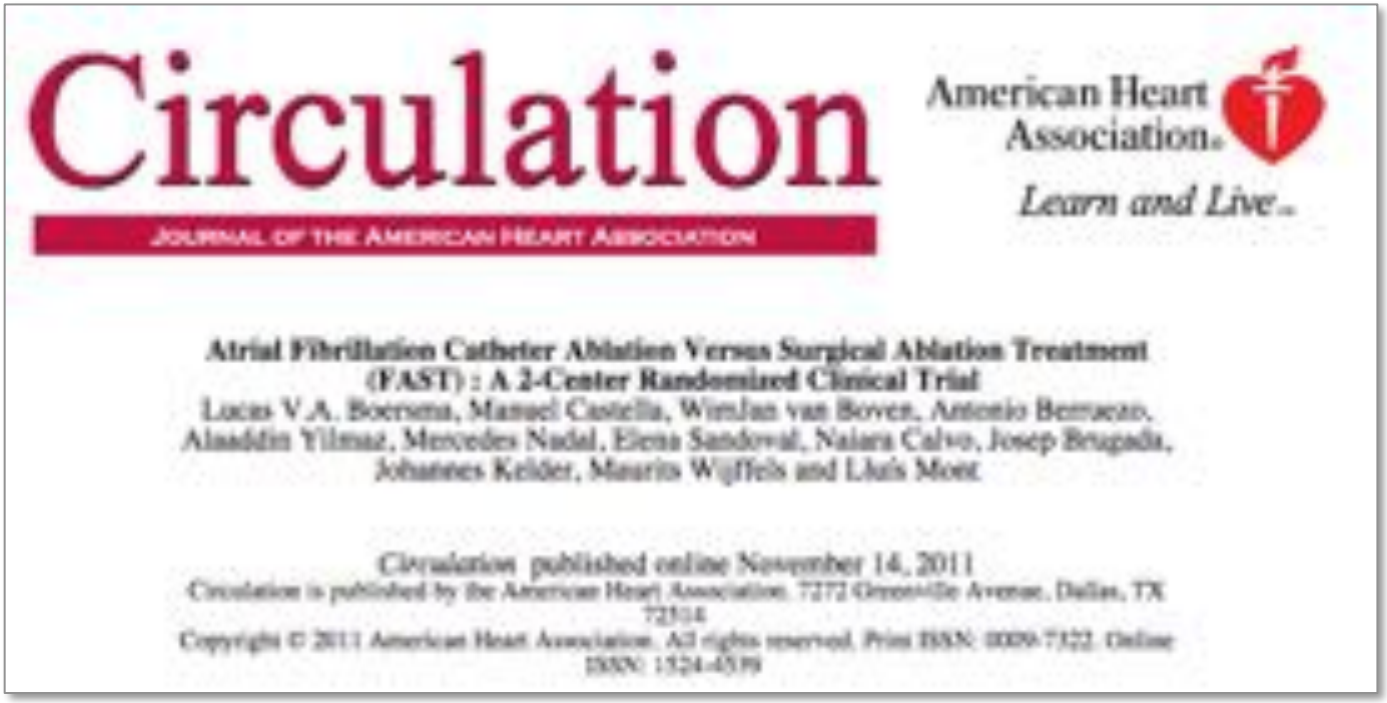
Damiano, et al: JTCVS, 2003

LAA closure is best done with surgery



Circulation

JOURNAL OF THE AMERICAN HEART ASSOCIATION

American Heart Association.

Learn and Live.

Atrial Fibrillation Catheter Ablation Versus Surgical Ablation Treatment (FAST): A 2-Center Randomized Clinical Trial

Lucas V.A. Boersma, Manuel Castella, Wim-Jan van Boven, Antonio Berruezo, Alaaddin Yilmaz, Mercedes Nadal, Elena Sandoval, Naiara Calvo, Josep Brugada, Johannes Kelder, Maurits Wijffels and Lluis Mont

Circulation published online November 14, 2011

Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 72514

Copyright © 2011 American Heart Association. All rights reserved. Print ISSN: 0009-7322. Online ISSN: 1524-4539

- Prospective randomized, multicenter
- n=124 either Catheter- or Thoracoscopic Ablation
- Freedom from AF @12mo:

  35 vs 65% (P<0.0005) in favor of Thoracoscopic ablation

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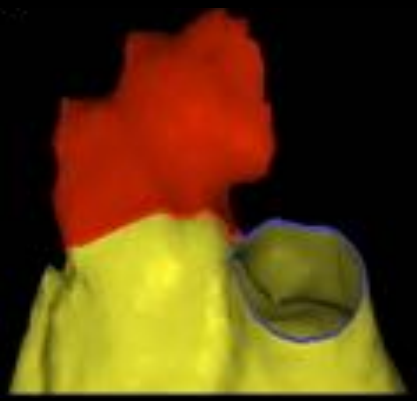
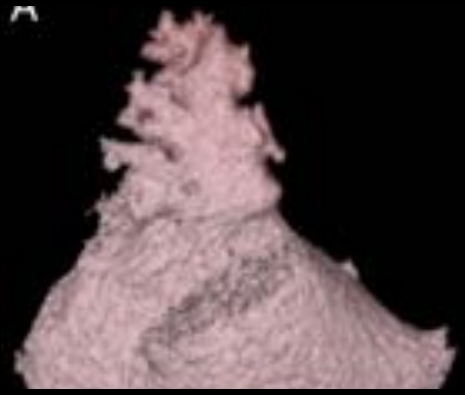
Safety after 12 months

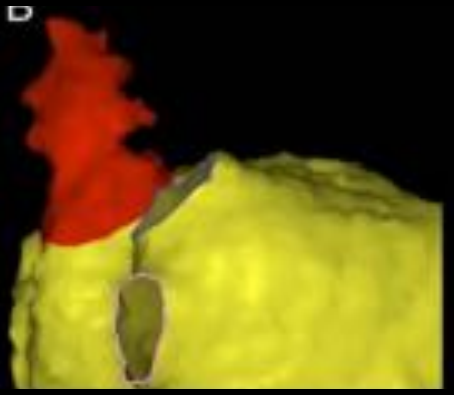
Major	CA N=63	SA N=61	P-value
Stroke	1	-	
TIA			
Pneumonia			
Hydrothorax			
Heart failure			
SAB caused			
Pericarditis			
Fever unknown			
Ileus			
PV stenosis>70%/symptomatic	-	-	
Total	8 (13.1%)	7 (11.5%)	p=1.0
Minor			
Groin hematoma/bleed	2 (3.2%)	-	

LAA excluded by stapler in all Thoracoscopic ablations

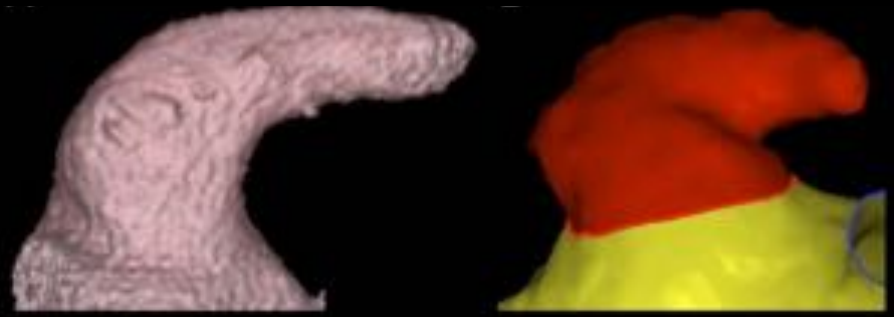


Coliflower

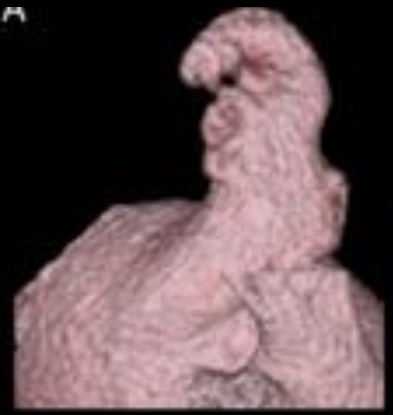


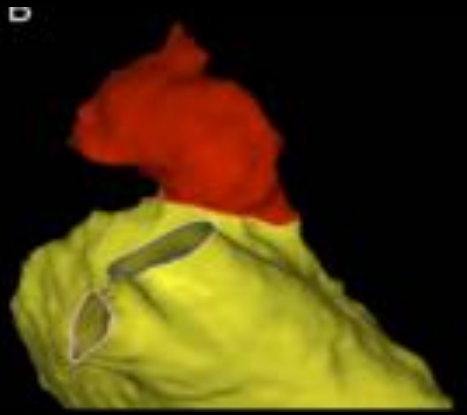


Kaktus



Chicken Wing

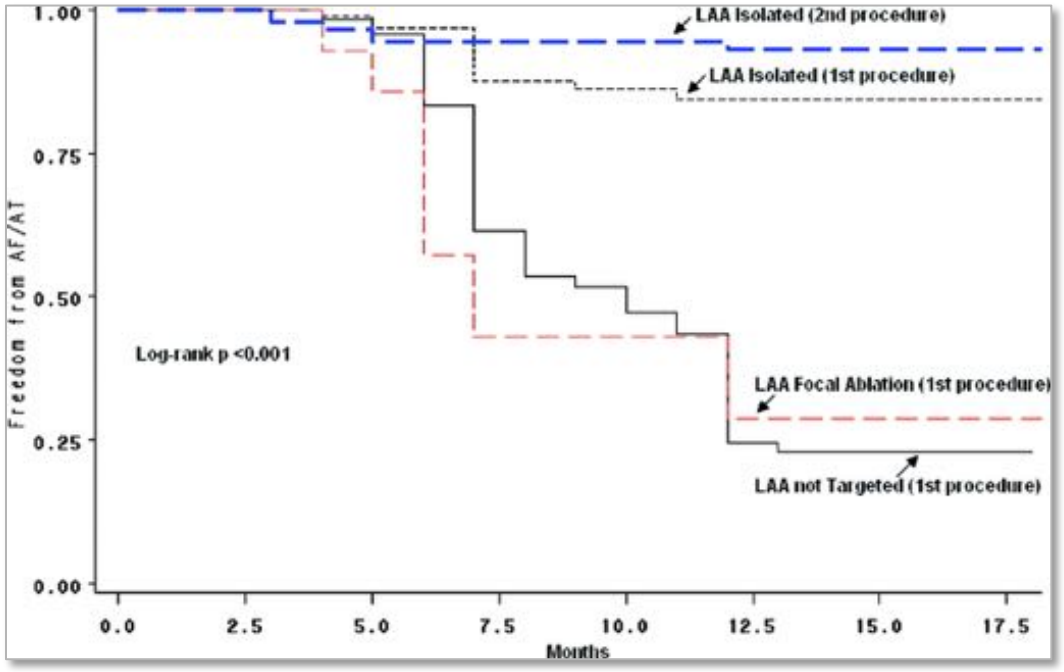




Windsock

Di Biase et al., JAVCC Volume 60, Issue 6 2012 531 – 538

Electrical Isolation during ablation



- RCT
- N=173 – LSP AF
- Ablation w and w/o LAA
- Success at 24 months

  (Freedom from AF off AAD)

  76 vs. 56% for Ablation with LAA

Di Biase, L. et al. Circulation 2010;122:109-118

Di Biase et al. ESC 2015

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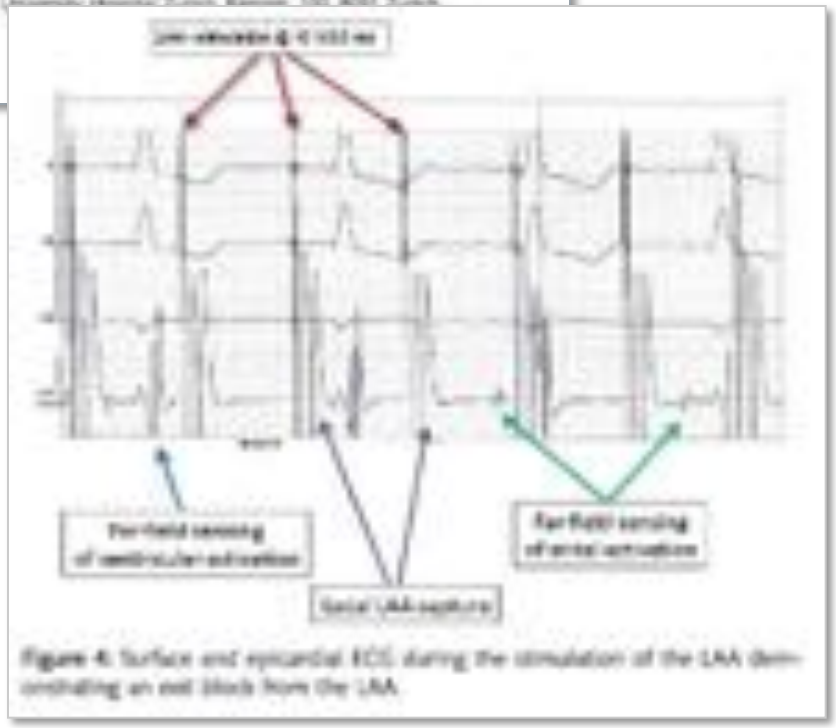
LAA closure is best done with surgery

ORIGINAL ARTICLE

Epicardial left atrial appendage clip occlusion also pr
the electrical isolation of the left atrial appenda

Christoph T. Starck*, Jan Steffel*, Maximilian Y. Emmert*, Andre Plass*, Srijoy Ma
Volkmar Falk* and Sacha P. Salzberg*

- N=10 patients in Sinus
- OPCAB, PVI & **LAA Clip**
- Intraoperative Testing (before/after Clipping)



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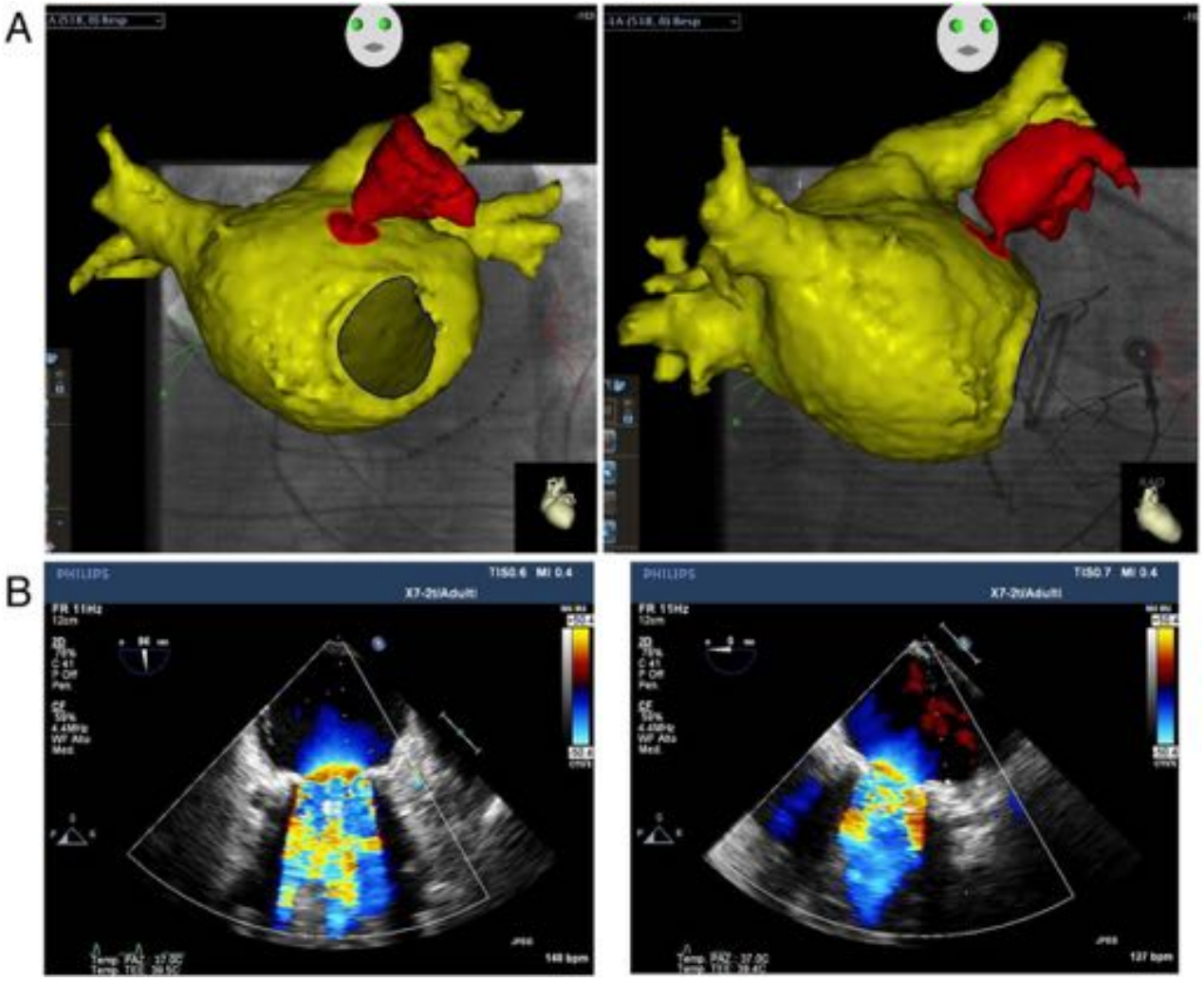


Alberto Pozzoli et al. Eur Heart J 2015;eurheartj.ehv424

European Heart Journal

LAA closure is best done with surgery

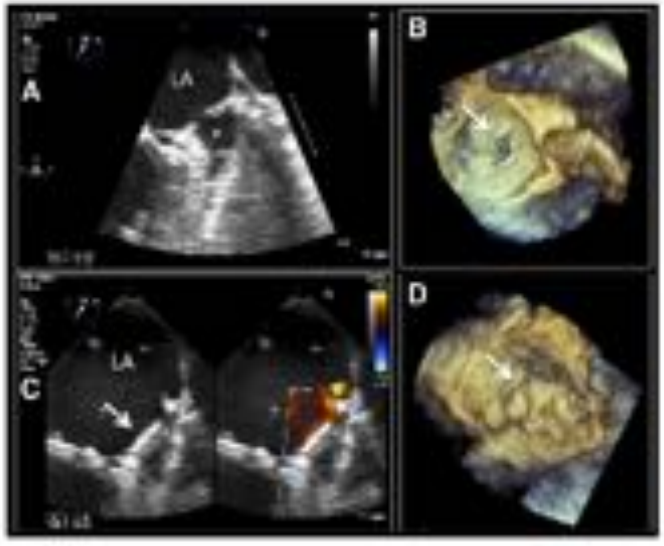
IMAGES IN INTERVENTION

Transcatheter Left Atrial Appendage Closure After Incomplete Surgical Ligation

Takashi Matsumoto, MD, Mamoo Nakamura, MD, Wen-Loong Yeow, MD, Robert J. Siegel, MD, Saibal Kar, MD
Los Angeles, California

An 82-year-old woman with chronic atrial fibrillation on full anticoagulation with warfarin was referred for a repair attempt to close the left atrial appendage (LAA) with a transcatheter, transseptal approach. In April 2011, she underwent surgical mitral and tricuspid repair, ligation of the LAA, and unsuccessful MAZE procedure. A subsequent transesophageal echocardiogram (TEE) demonstrated residual communication (asterisk and white arrow) between the left atrium and LAA by pulsed and color flow Doppler (Figs. 1A, 1B).

Following successful transseptal puncture under general anesthesia and TEE guidance, the baseline LAA angiogram was performed (Fig. 2A). Given its antithrombogenic property and the sufficient



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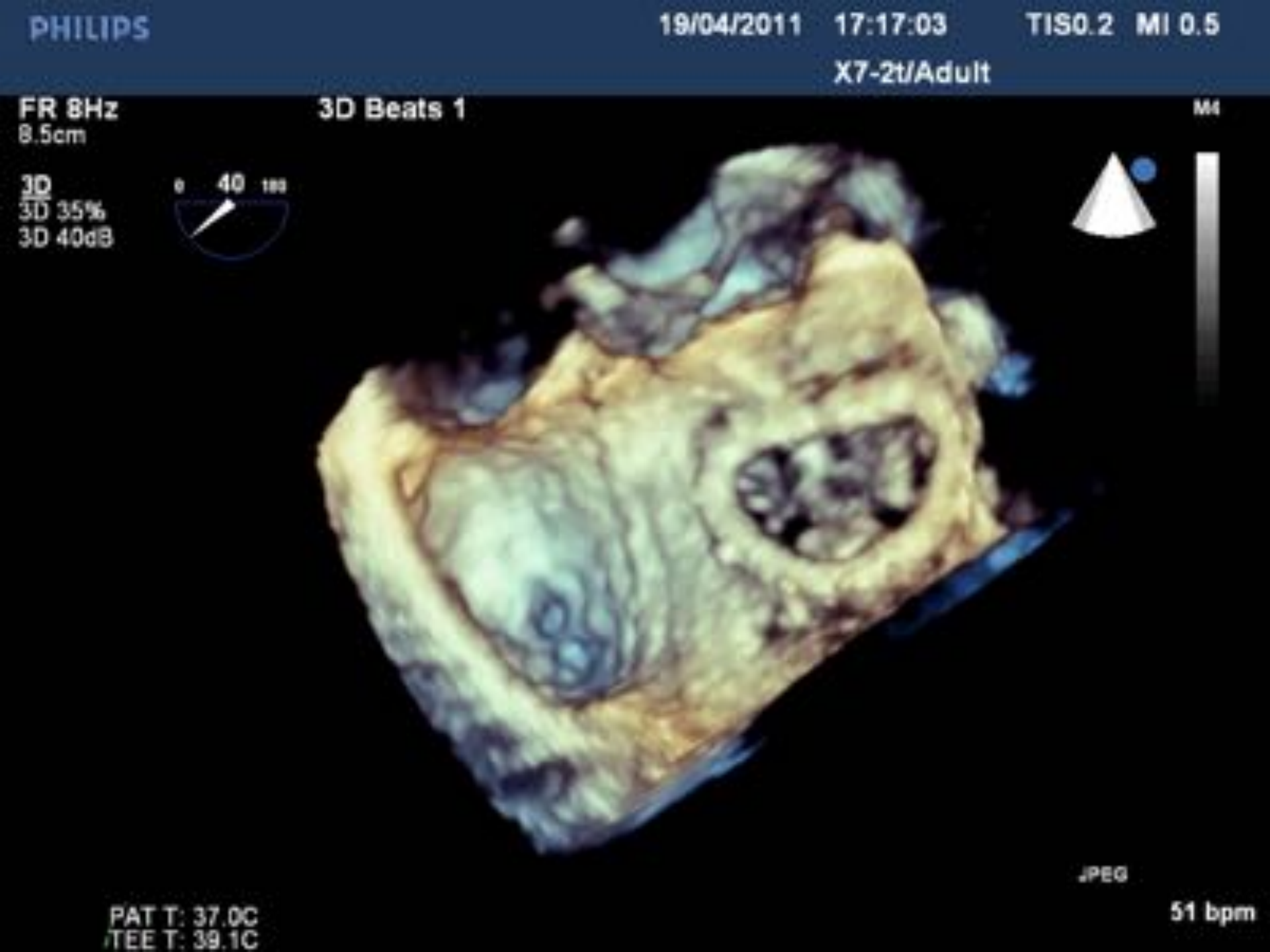
PHILIPS
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FR 8Hz
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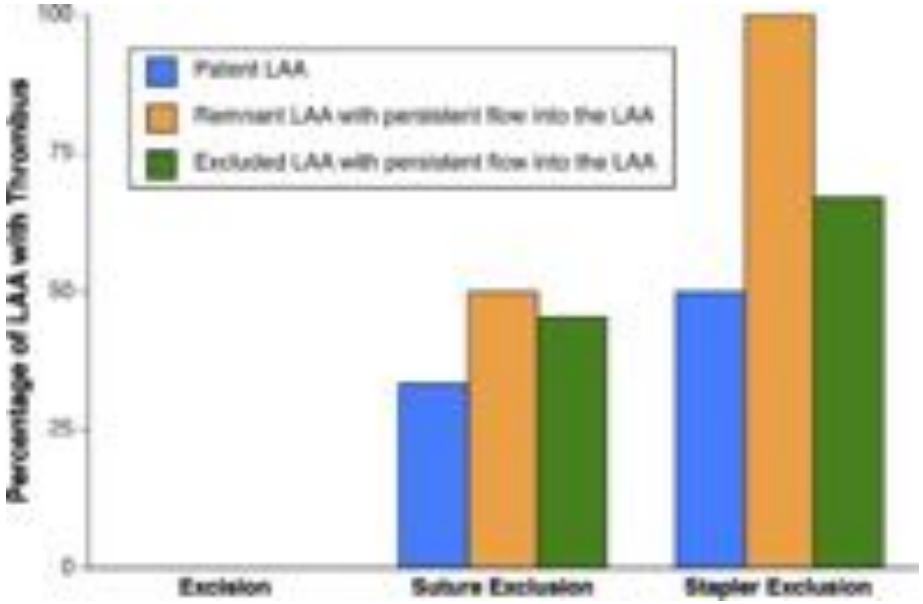
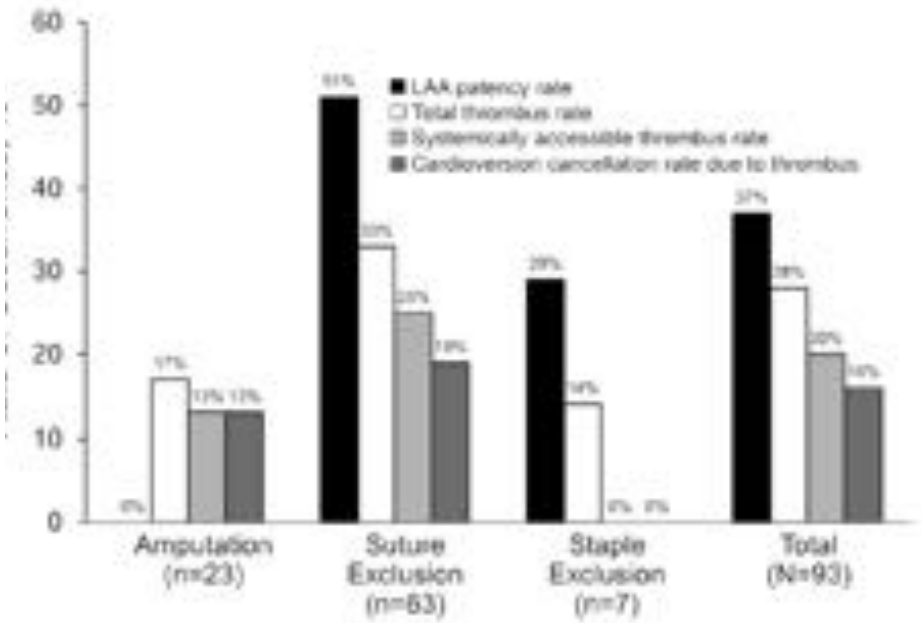
3D Beats 1
M4
3D
3D 35%
3D 40dB
0 40 100
JPEG
51 bpm
PAT T: 37.0C
TEE T: 39.1C

“Surgical closure” doesn’t work!



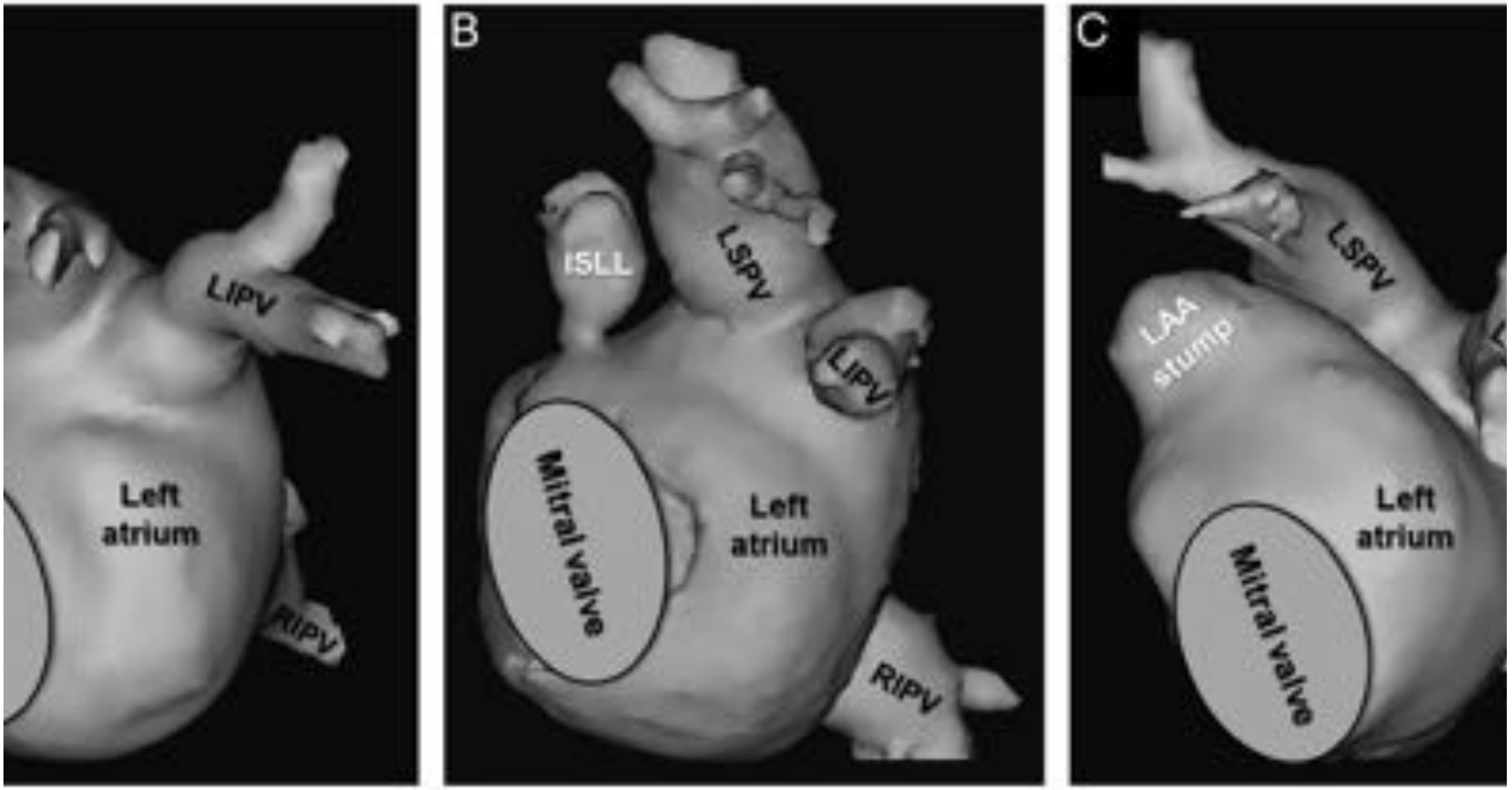
Kanderian et al, JACC 2008



Cullen et al, Ann Thorac Surg 2015

Mode of Failure

N=72 concomitant LAAc Amputation vs. Ligation



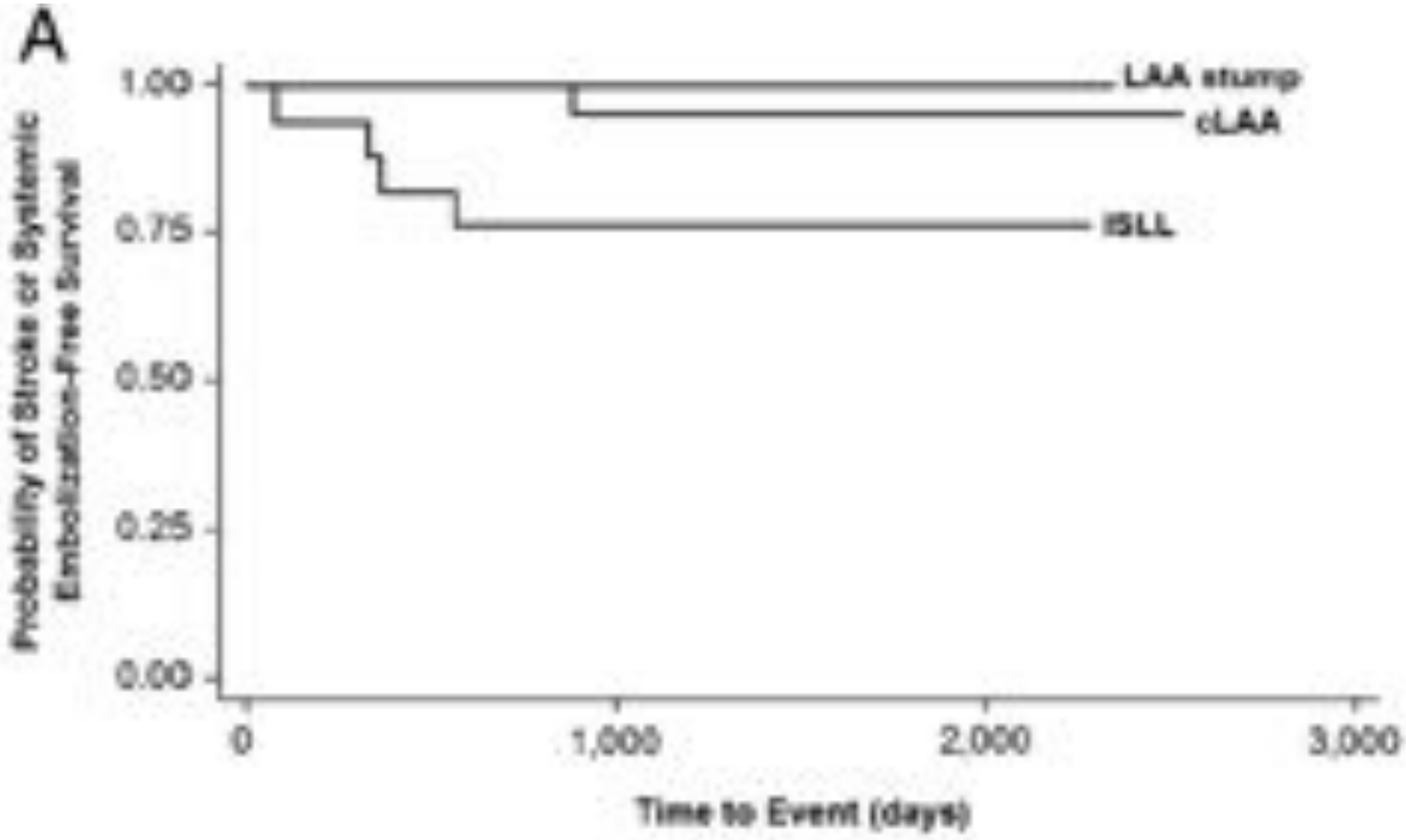
64% complete closure

24% incomplete

12% Stump

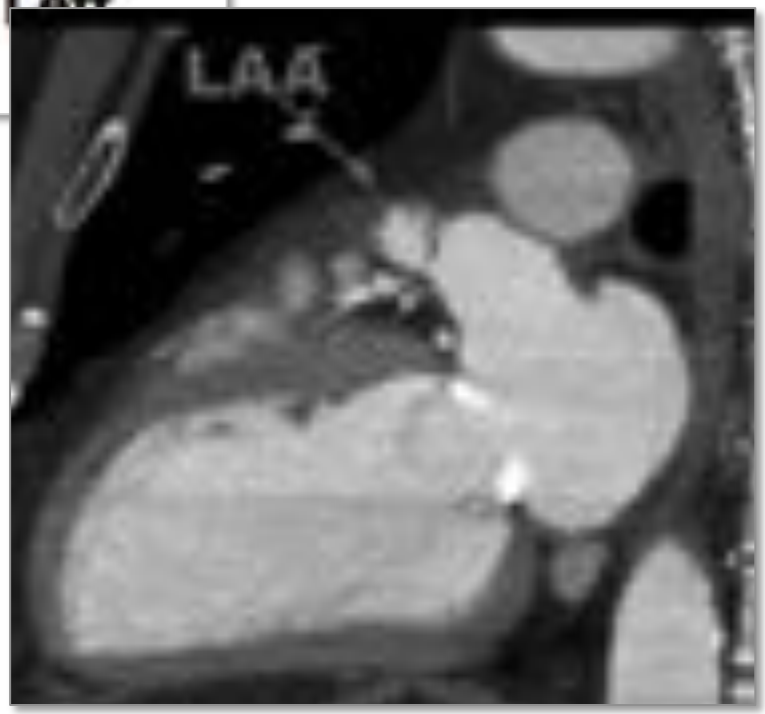
Aryana et al.. Heart Rhythm, Jul 2015

LAA closure is best done with surgery



Aryana et al.. Heart Rhythm, Jul 2015

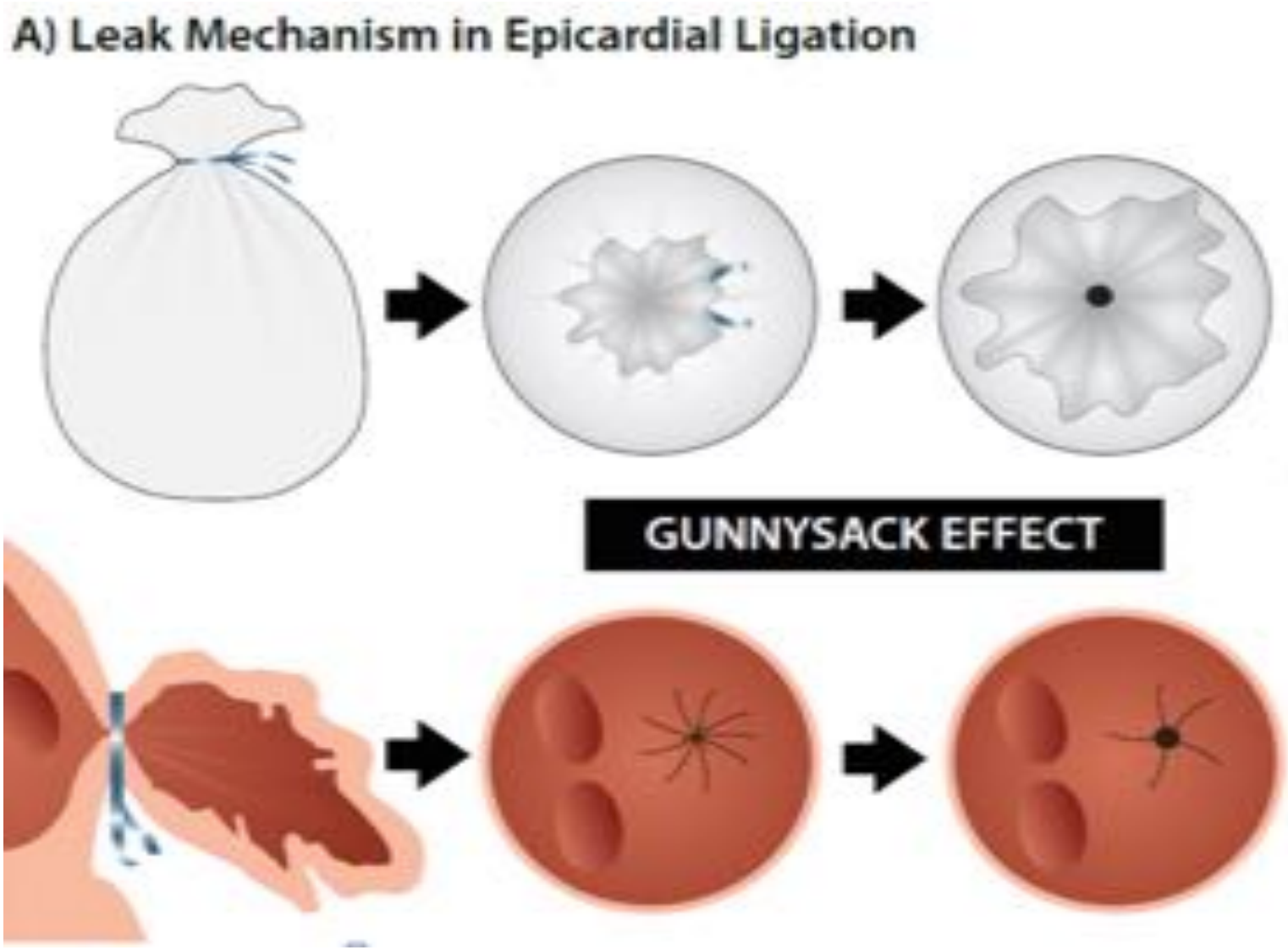
Assessing the Immediate and Sustained Effectiveness of Circular Epicardial Surgical Ligation of the Left Atrial Appendage



- n=12 concomitant ligation
- Endoloop®
- TEE and pre-discharge ✓
- At 3 month FU **<u>75% perfused on CT</u>**

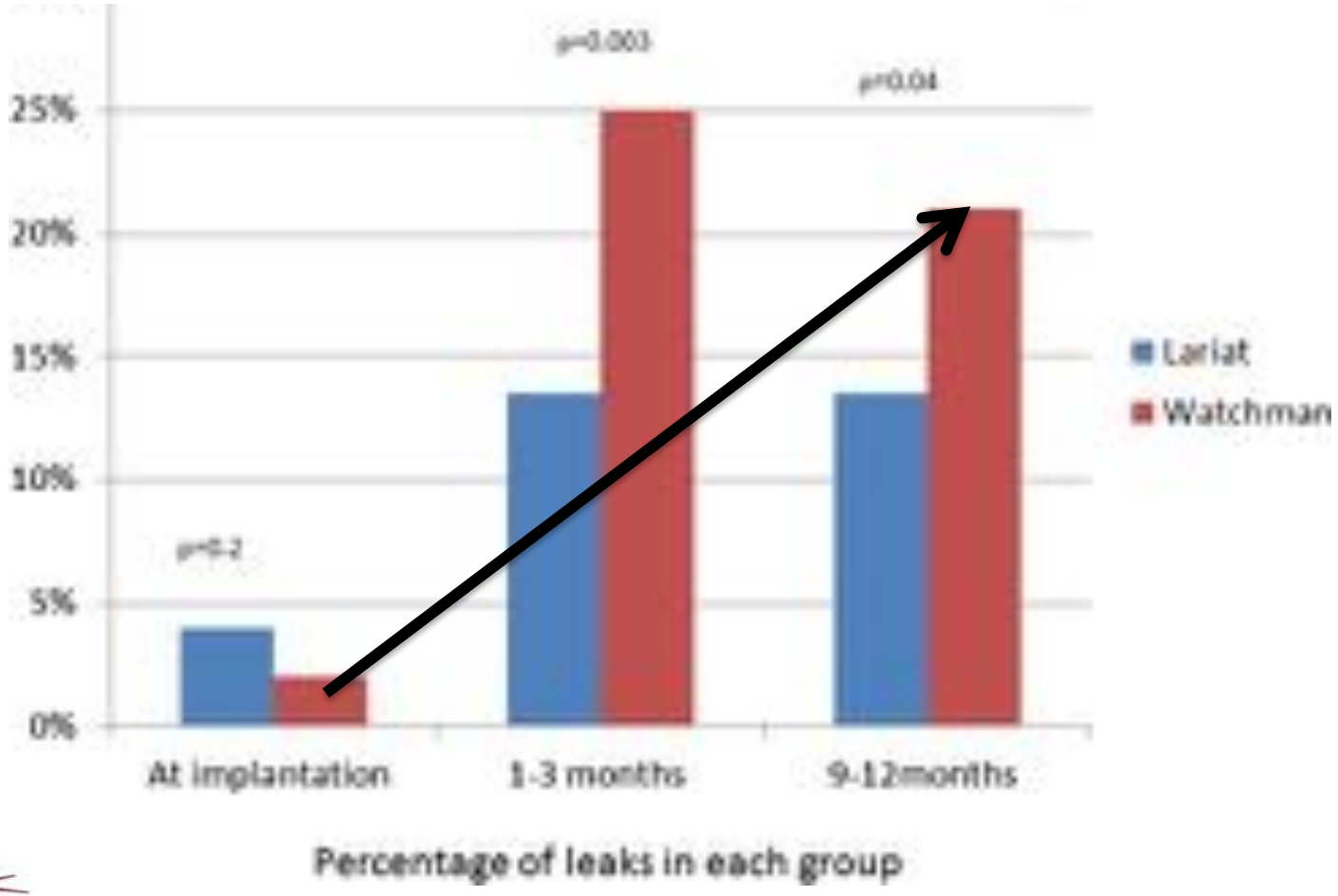
Adams et al. JCE 2012

LAA closure is best done with surgery



Heart Rhythm, Volume 12, Issue 7, 2015, 1501–1507

Understanding the differences of leaks and their clinical implications



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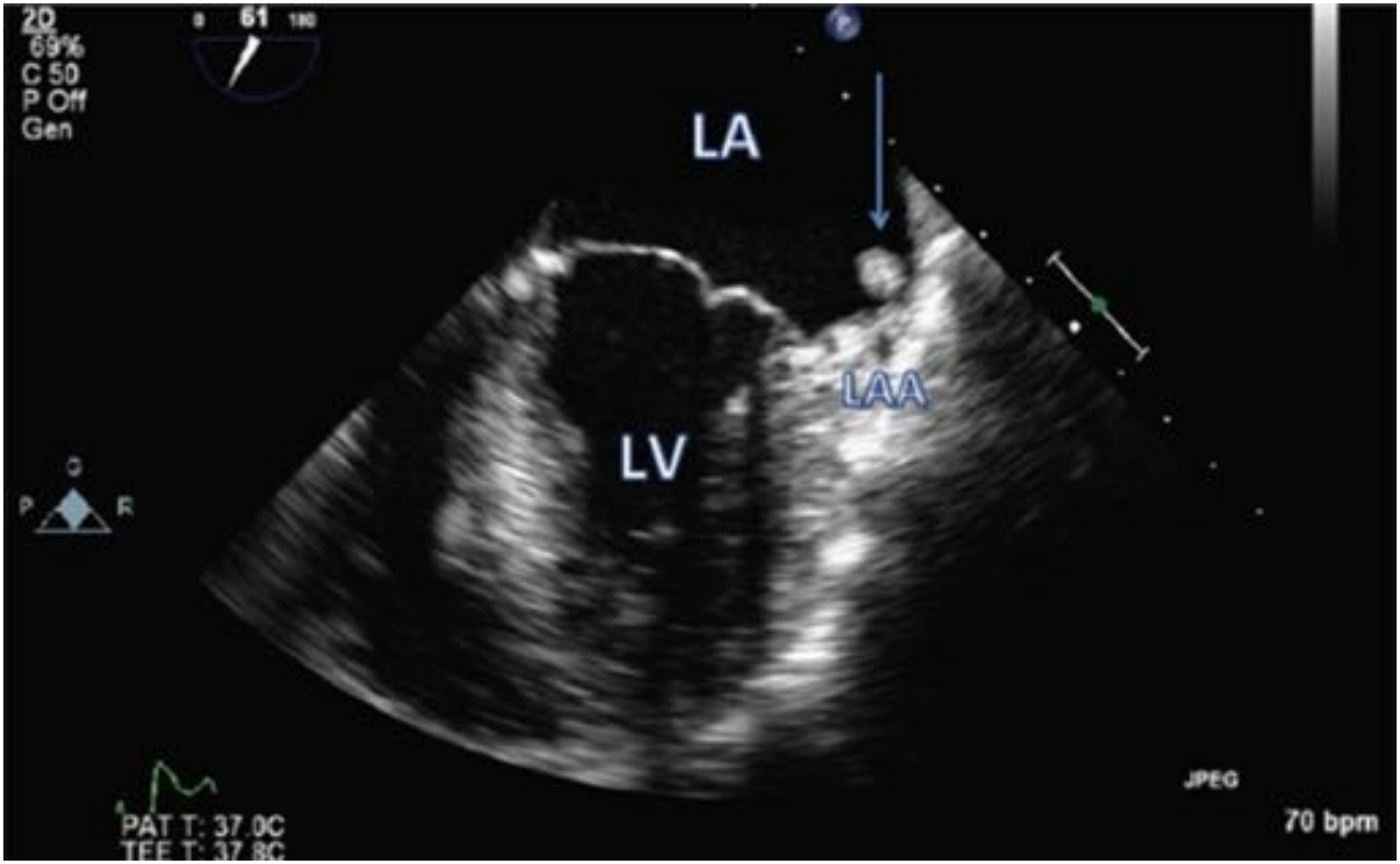
Heart Rhythm, Volume 12, Issue 7, 2015, 1501–1507

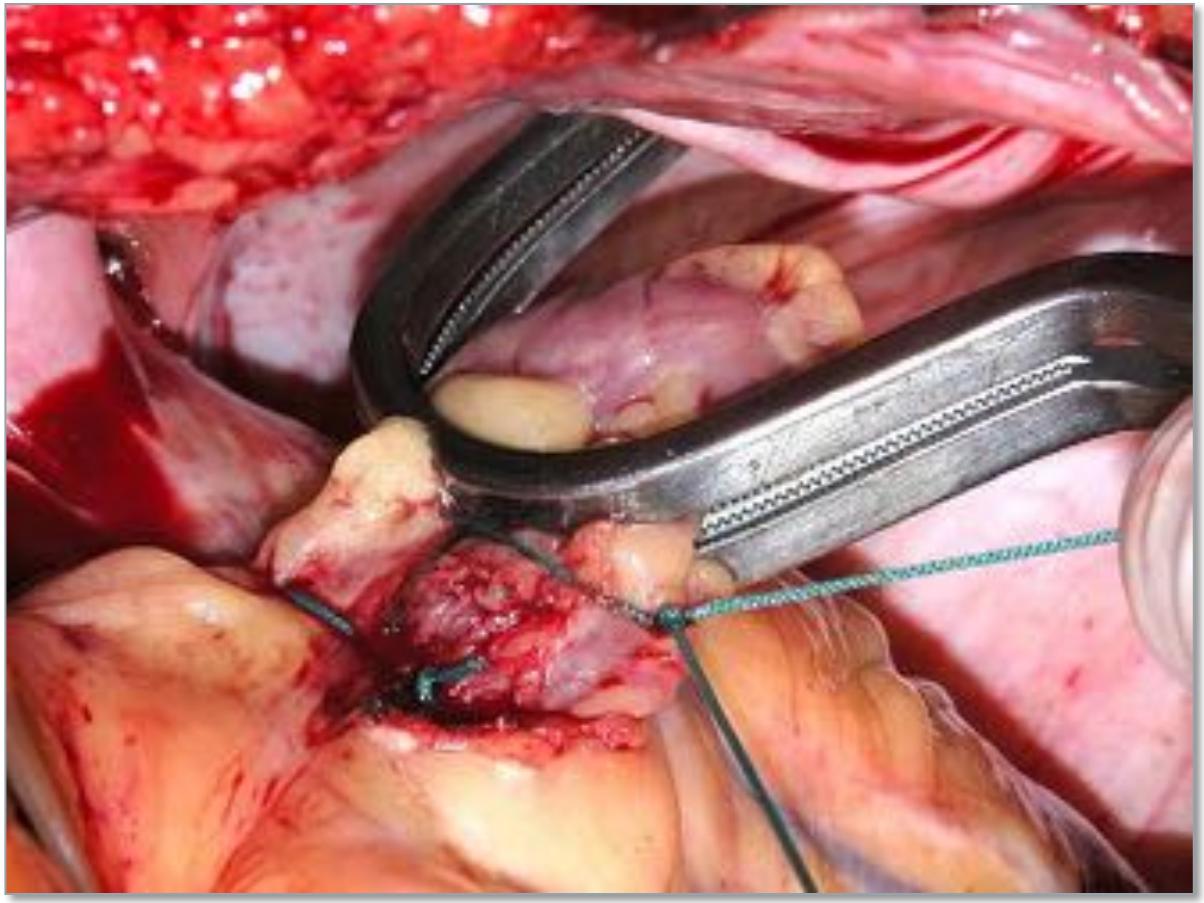
A transesophageal image of an endocardial left atrial pedunculated thrombus (arrow) seen 3 months after left atrial appendage closure.



Evaldas Giedrimas et al. Circ Arrhythm Electrophysiol. 2013;6:e52-e53

American Heart Association.

These days are over…



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LAA closure is best done with surgery

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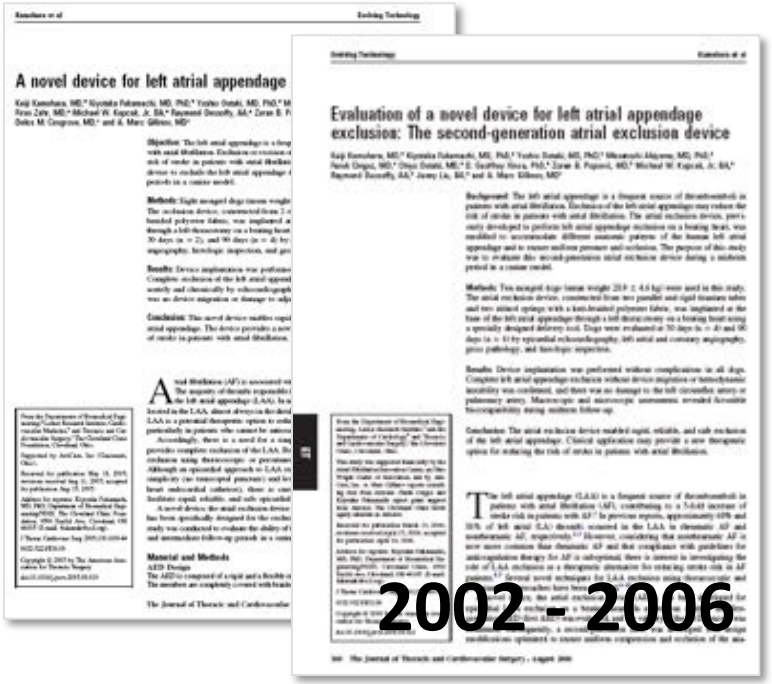
Pre-Clinical - Device Optimisation
Generation I > II > III



Preclinical Development

Transition into Clinic

Understanding epicardial in-growth

Clinical Development

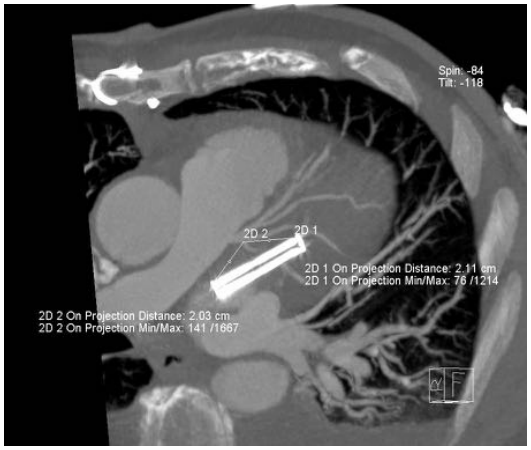
"First in Man", CE mark in 2009, FDA approval 2010

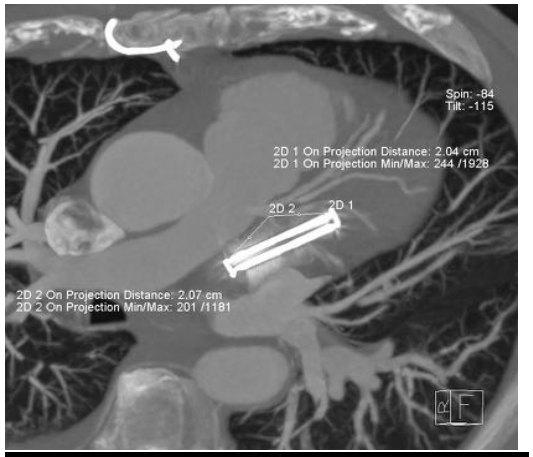
3 year Follow-up

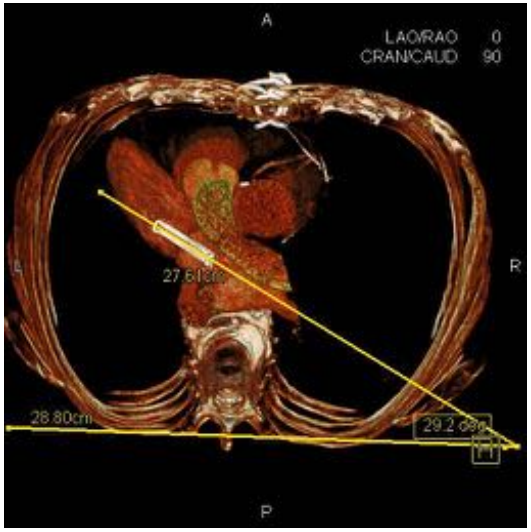
Assessment of Stability

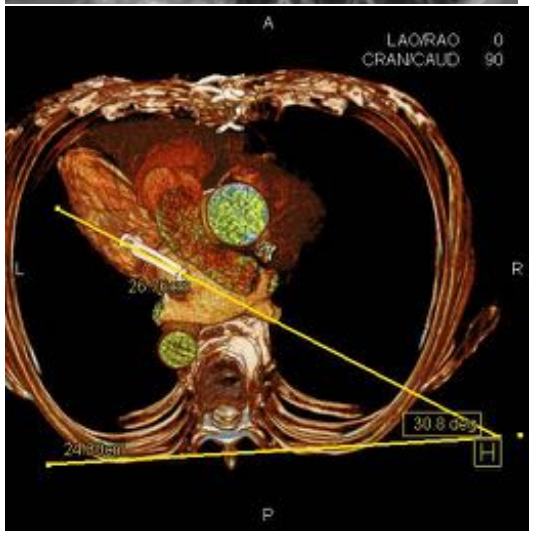
Distance to Cx Artery

Angle of Clip to Spine









Discharge

36 mo. FU

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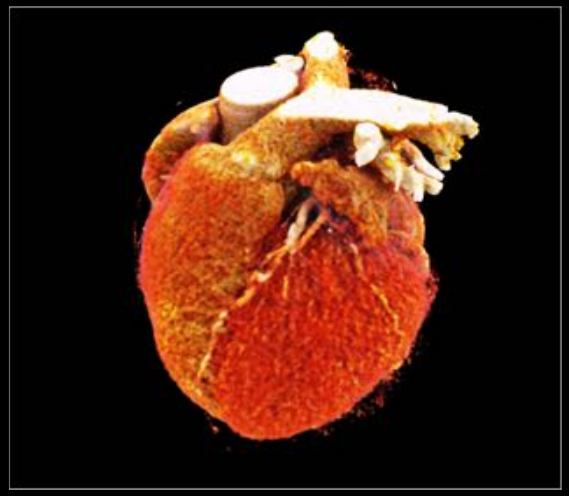
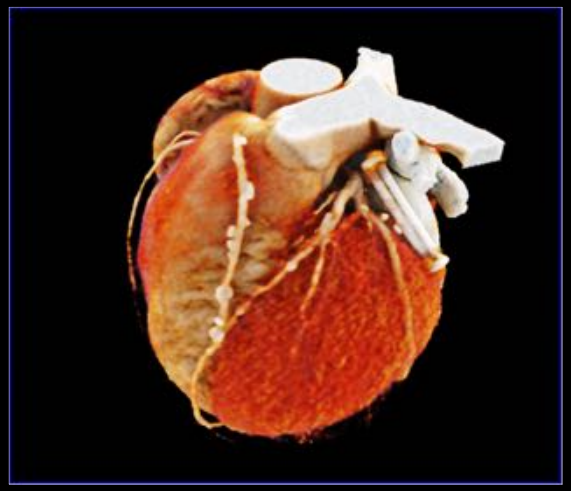
LAA Clip Occlusion Durability

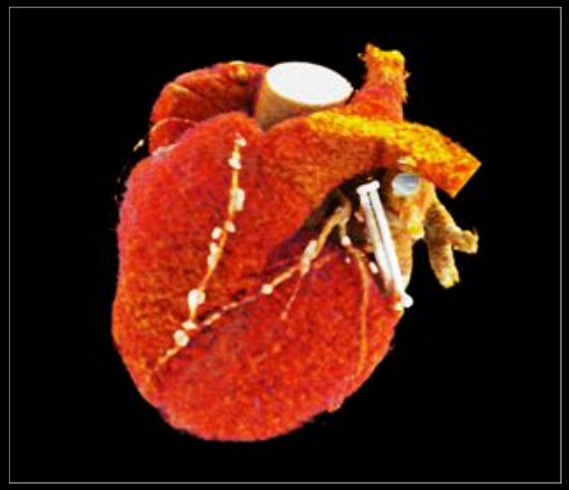


preop

postop



1year



2years

3years

7.5years

Zurich LAA Clip experience

- n=291 2008-2015
- patients undergoing cardiac surgery

Perioperative

Stroke	3	(surgery-related)
TIA	1	

Expected:

Mean	CHADSVASC	3.07 ± 1.5 (0.0,8.0)	3.2%

Follow Up		**Patient years**	**Rate/100pt.yrs**
Stroke	2	826.8pt/yrs	0.24
TIA	4	826.8pt/yrs	0.48

Courtesy Dr. Emmert

Surgical Devices for stand alone minimally invasive LAA occlusion

Stapler (Covidien)

Atriclip (Atricure)

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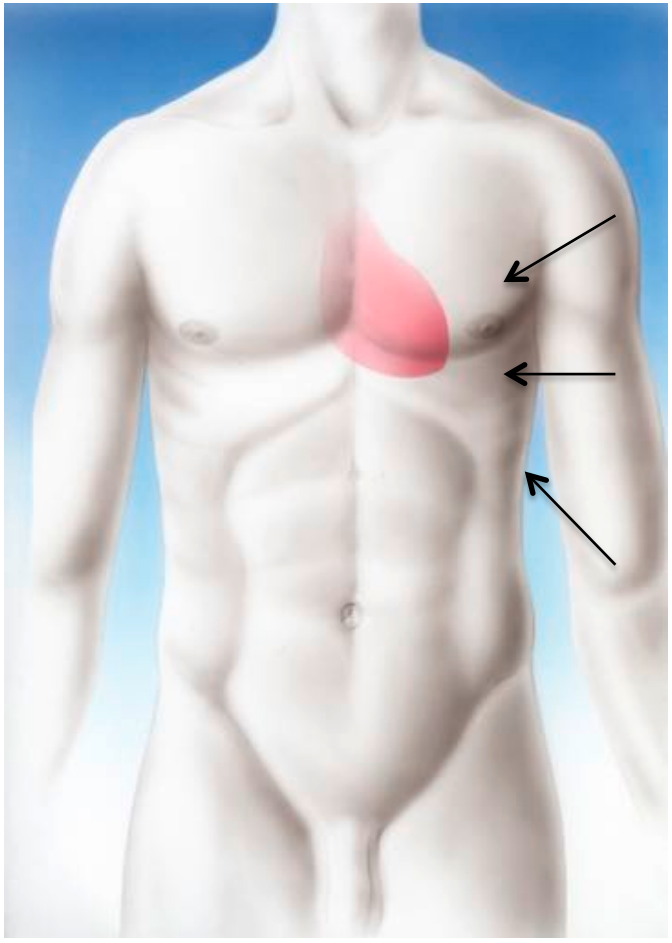
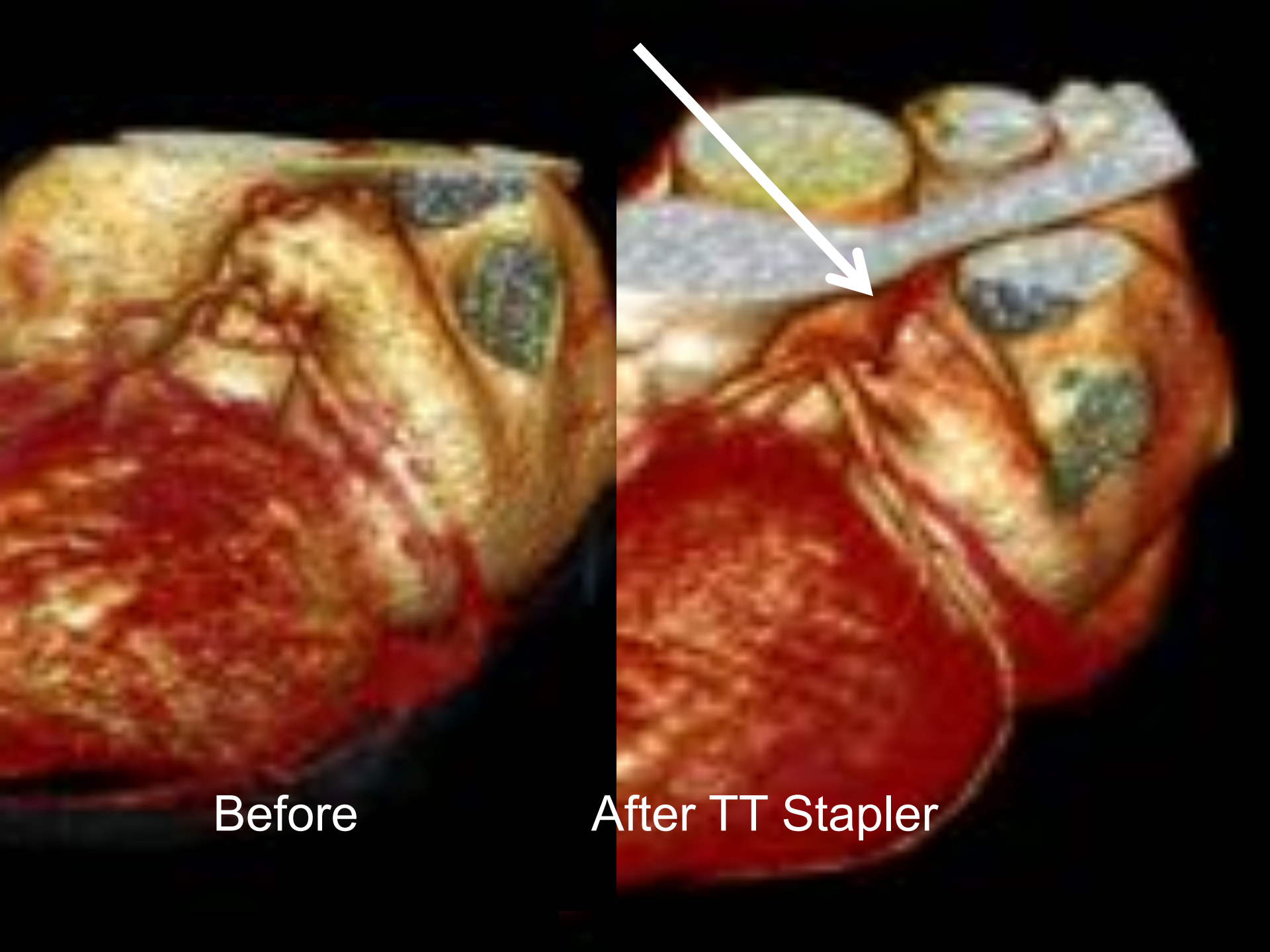
Minimally Invasive Stand Alone Options



HEART CLINIC ZURICH


Before
After TT Stapler

LAA closure is best done with surgery

- Documented LAA Removal in >90%
- No Stroke/TIA (Mortality 0%)

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Krul et al., Intl J Cardiol, 2012
La Meir et al., Europace 2013

LAA closure is best done with surgery

Thoracoscopic Stand-Alone Left Atrial Appendectomy for Thromboembolism Prevention in Nonvalvular Atrial Fibrillation

Toshiya Otsuka, MD,* Mikio Nanomiya, MD,* Takahiro Nonaka, MD,* Motoyuki Hisagi, MD,*
Takahiro Ota, MD,† Toru Minatani, MD†
Tokyo, Japan

Objectives

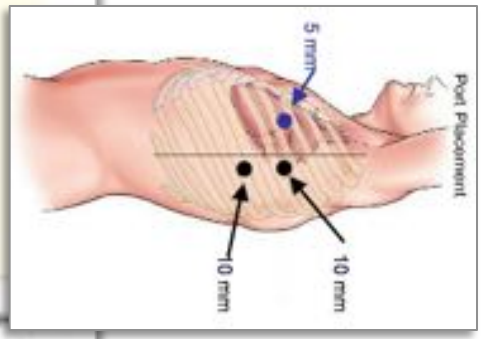
Background

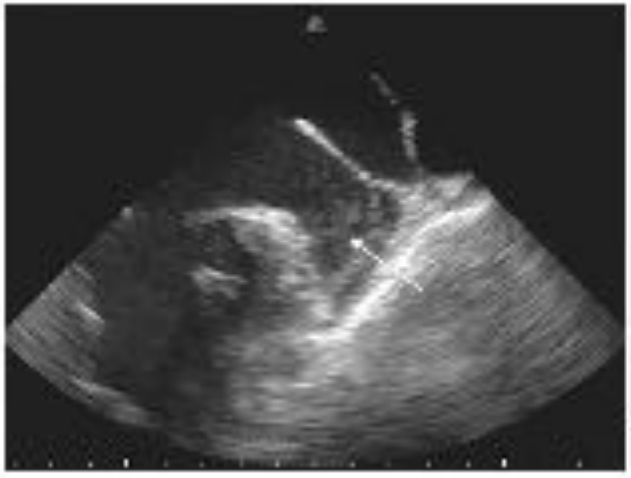
Methods

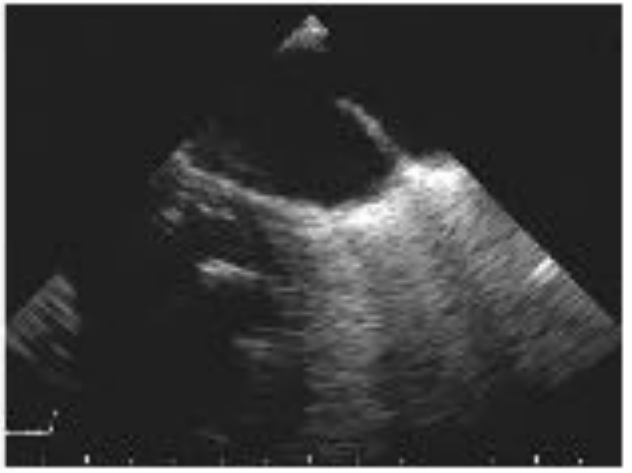
Results

Conclusions

N=30 with 3 month FU

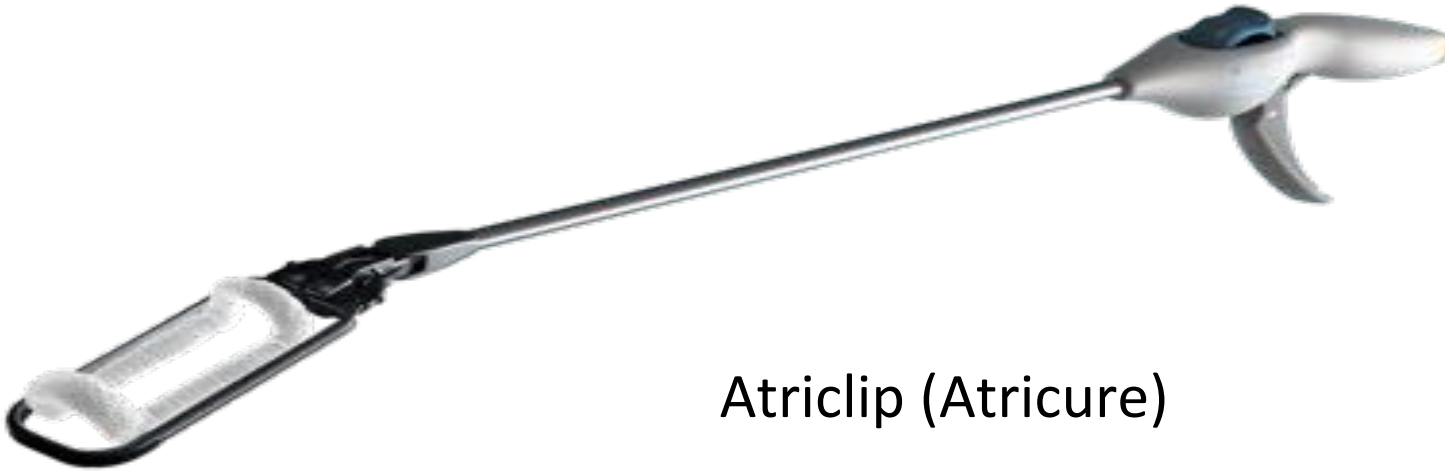




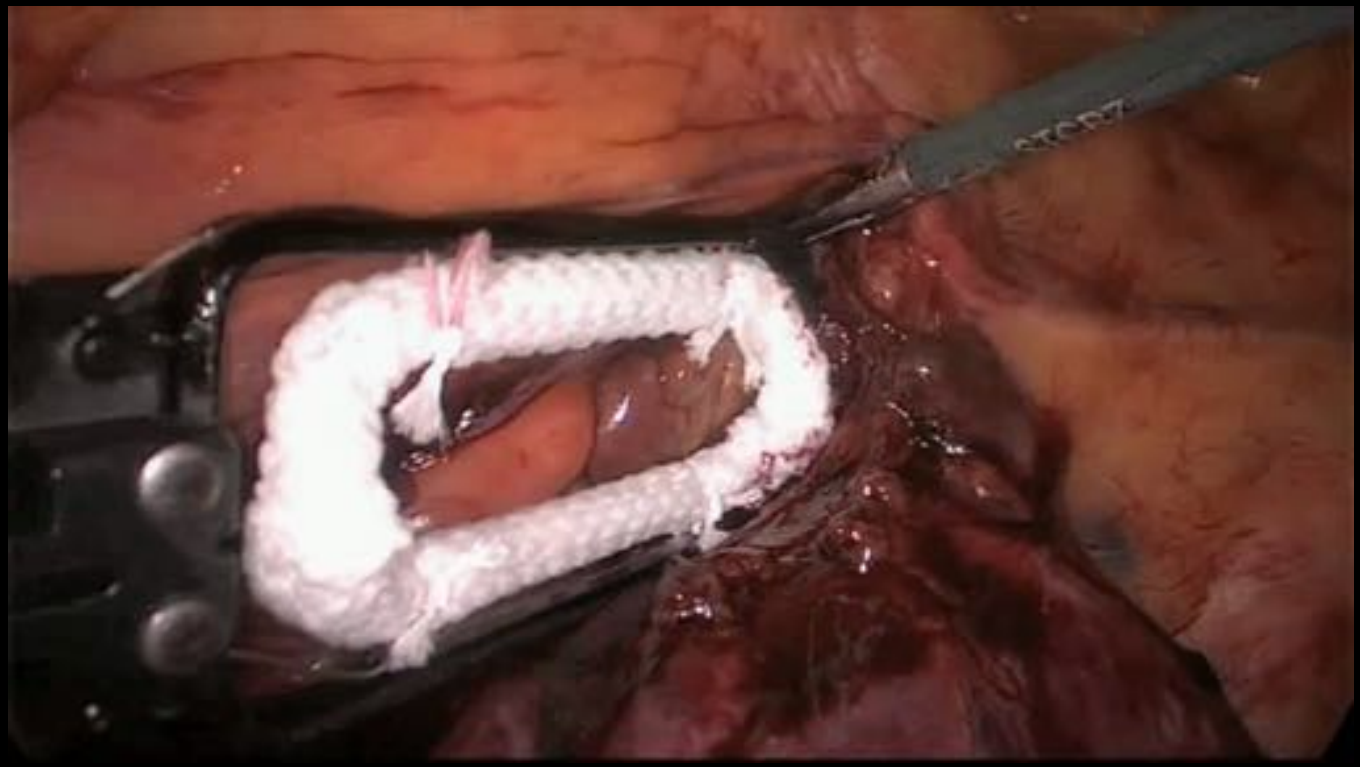


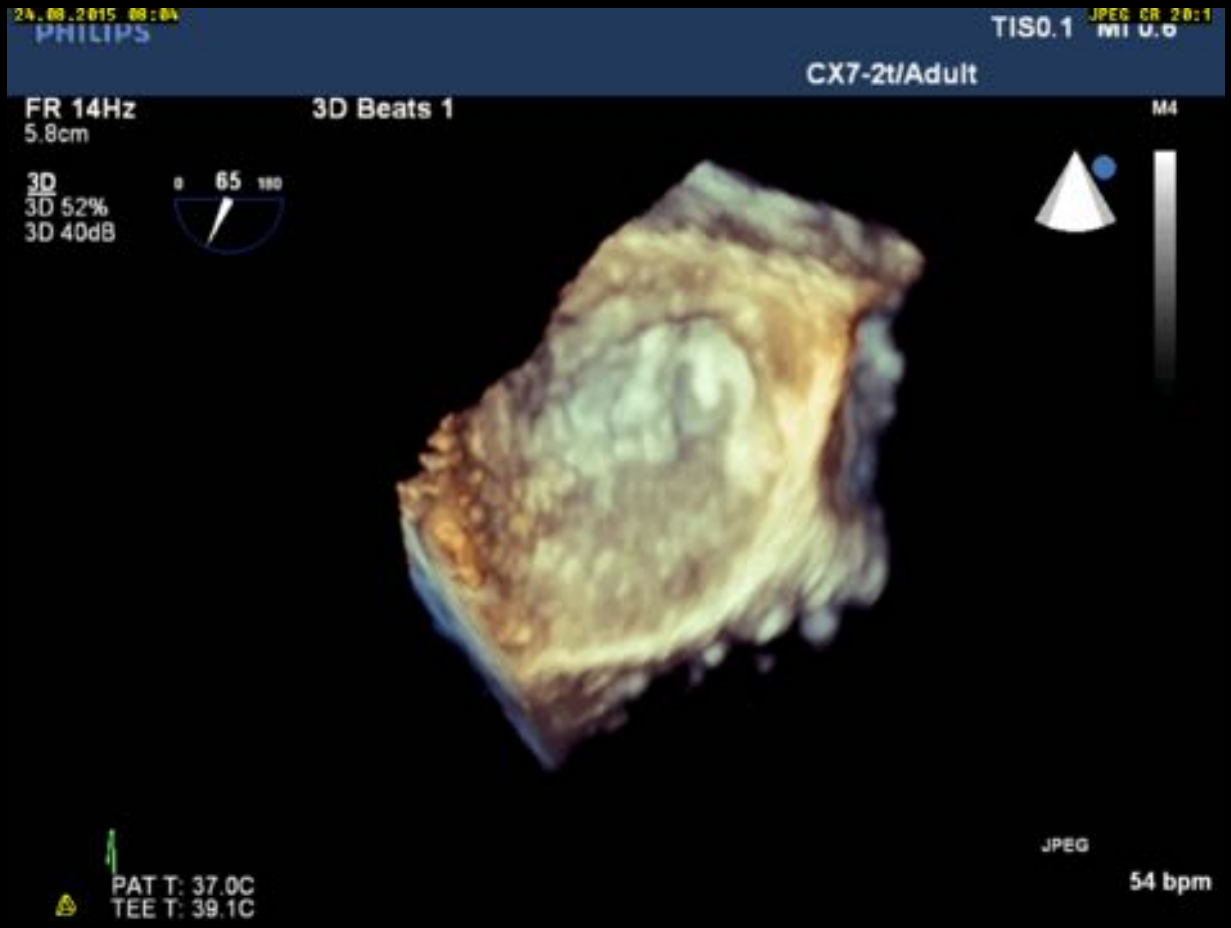
HEART CLINIC ZURICH

Surgical Devices for LAA occlusion



Atriclip (Atricure)




24.08.2015 08:04
PHILIPS
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3D Beats 1
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3D 40dB
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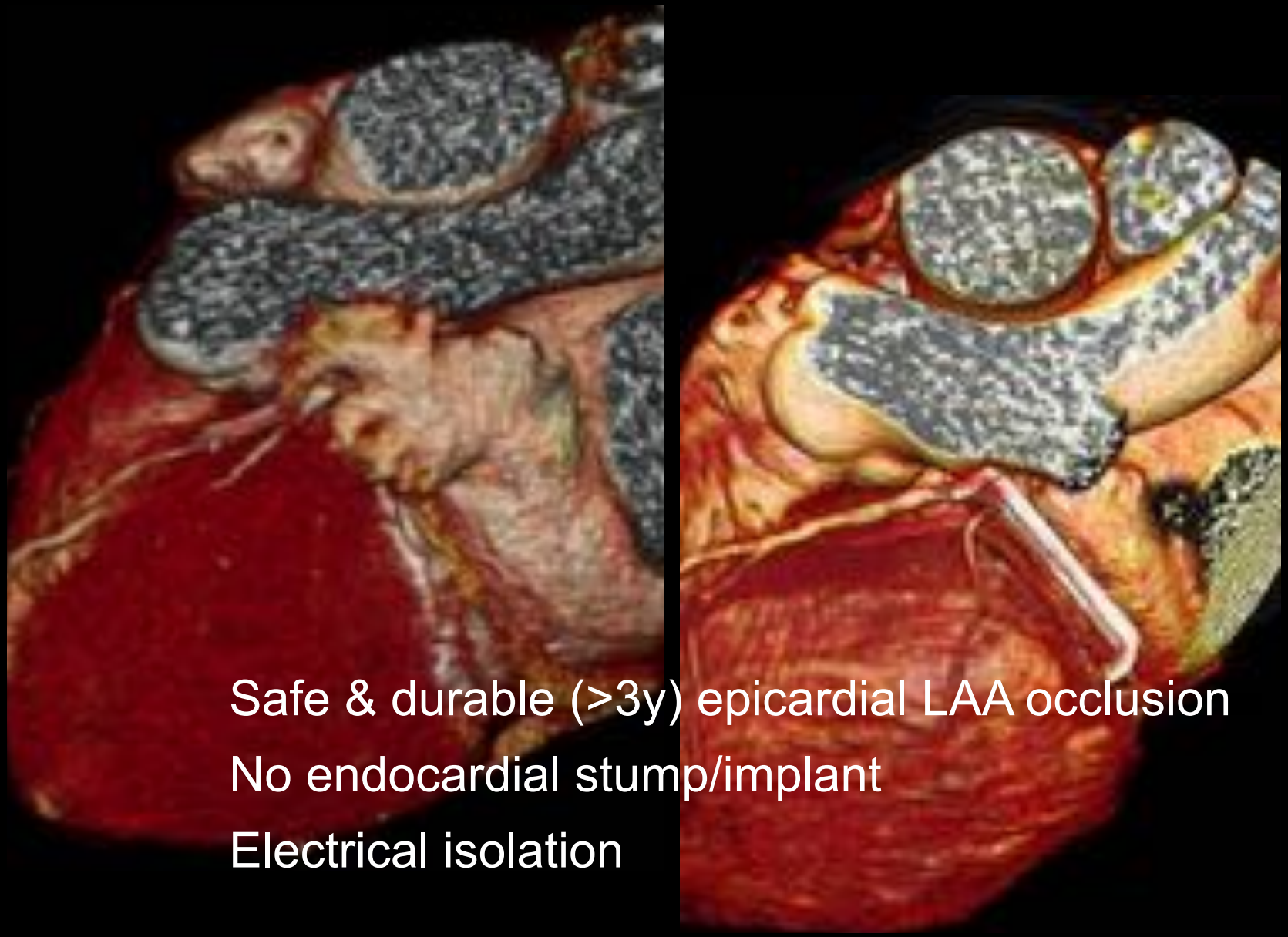
PAT T: 37.0C
TEE T: 39.1C



Safe & durable (>3y) epicardial LAA occlusion

No endocardial stump/implant

Electrical isolation

Salzberg et. al., Eur J Cardiothorac Surg. 2014 Jan;45(1):126-31.
Starck et al., Interact Cardiovasc Thorac Surg. 2012 Sep;15(3):416-8.
Salzberg et al., J Thorac Cardiovasc Surg. 2010 May;139(5):1269-74

Patient, Procedure and Device Selection

HEART CLINIC ZURICH

LAA closure is best done with surgery

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Percutaneous Left Atrial Appendage Suture Ligation Using the LARIAT Device in Patients With Atrial Fibrillation

Initial Clinical Experience

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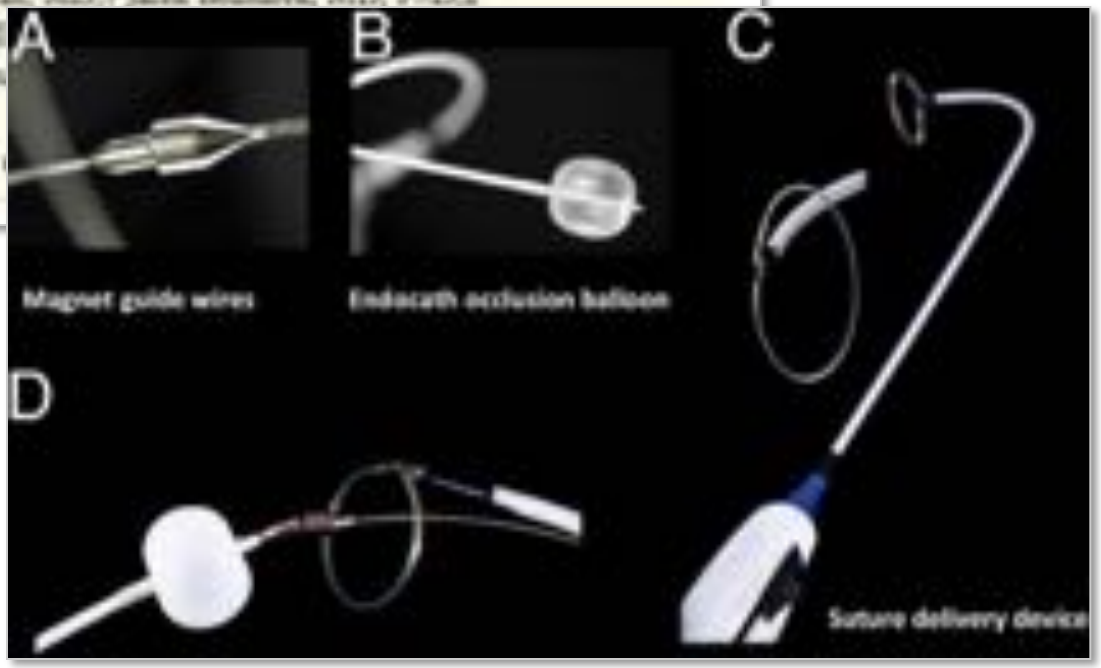
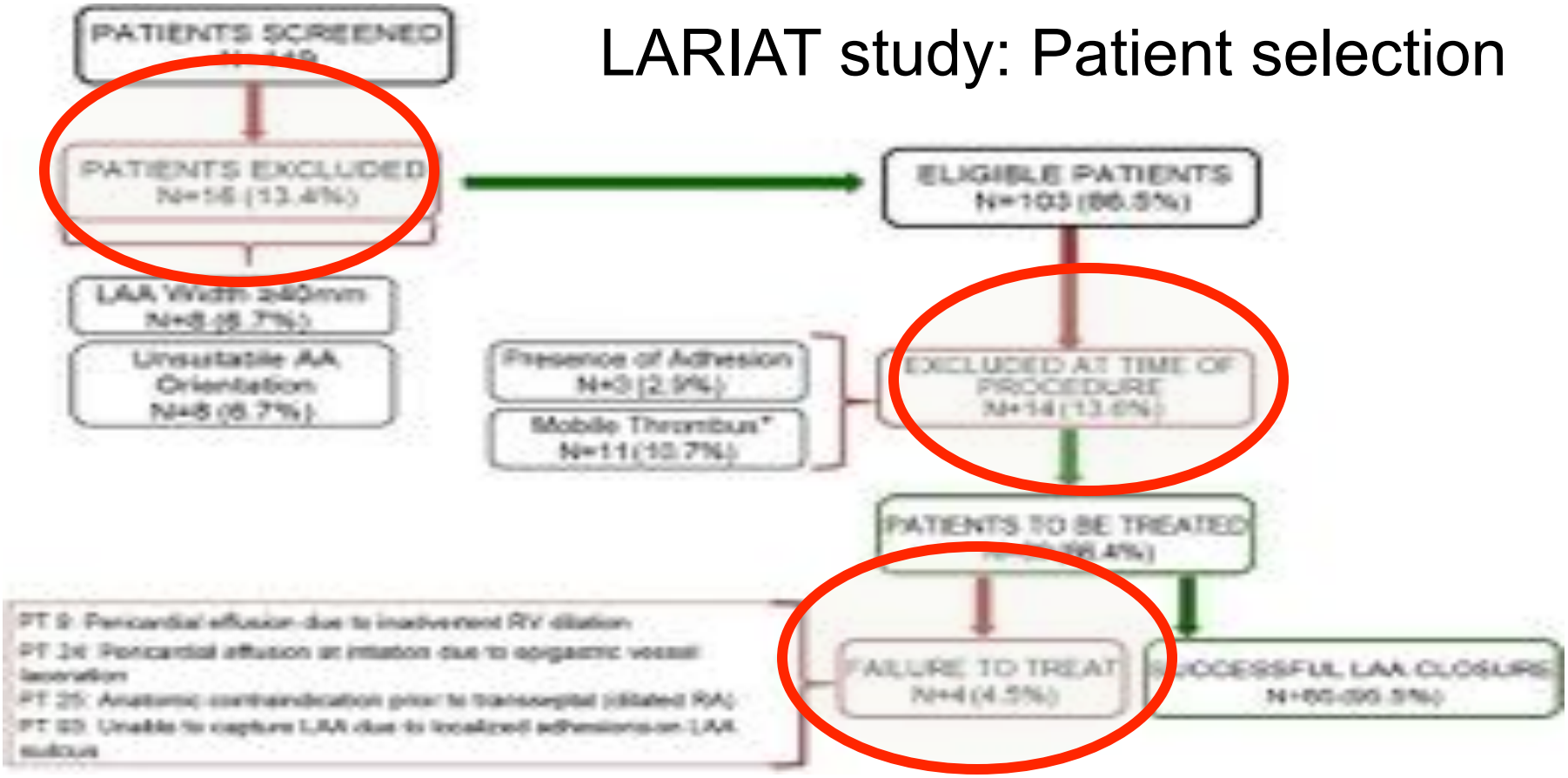
Krakow, Poland; San Francisco, California, and



LARIAT study: Patient selection



= 30 % not treated!!!!

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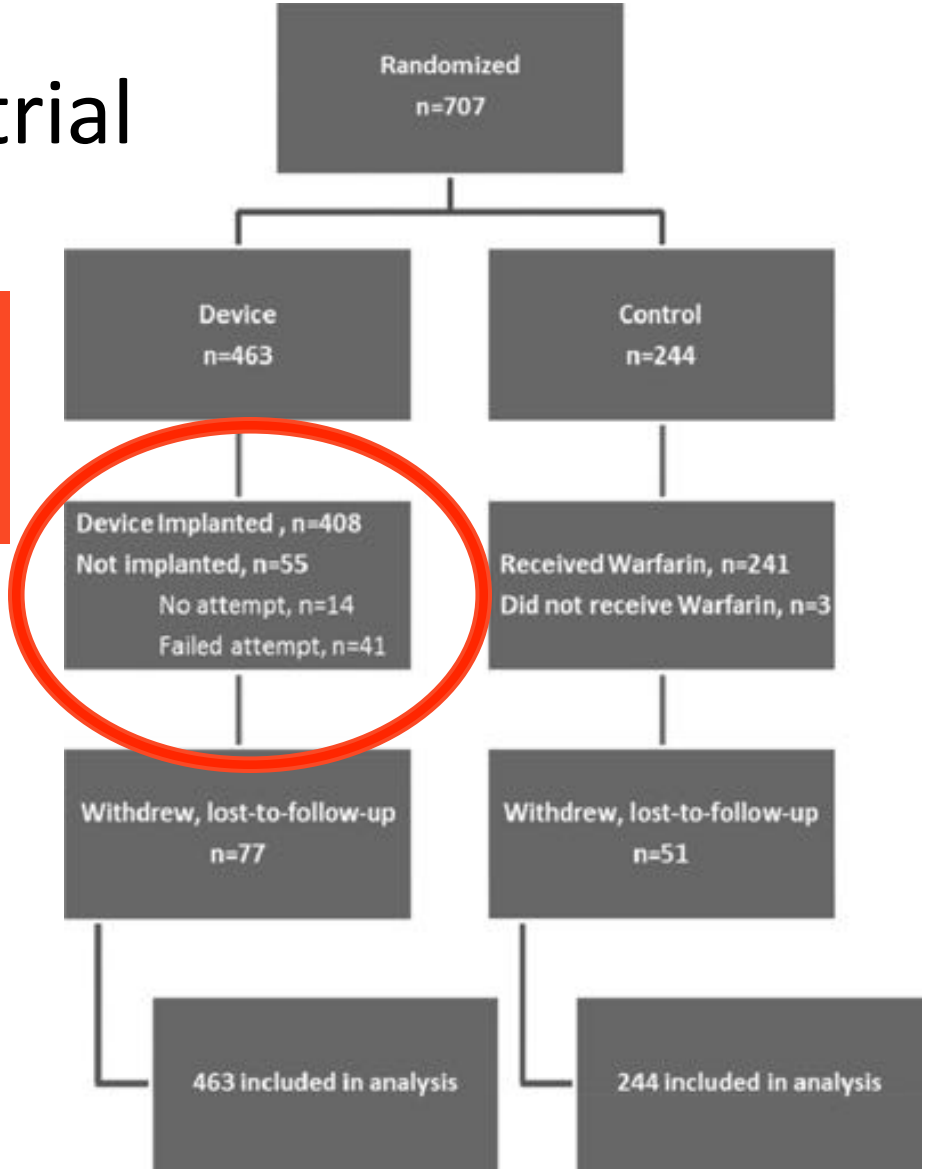
Bartus et al., JACC 2012

Protect AF trial

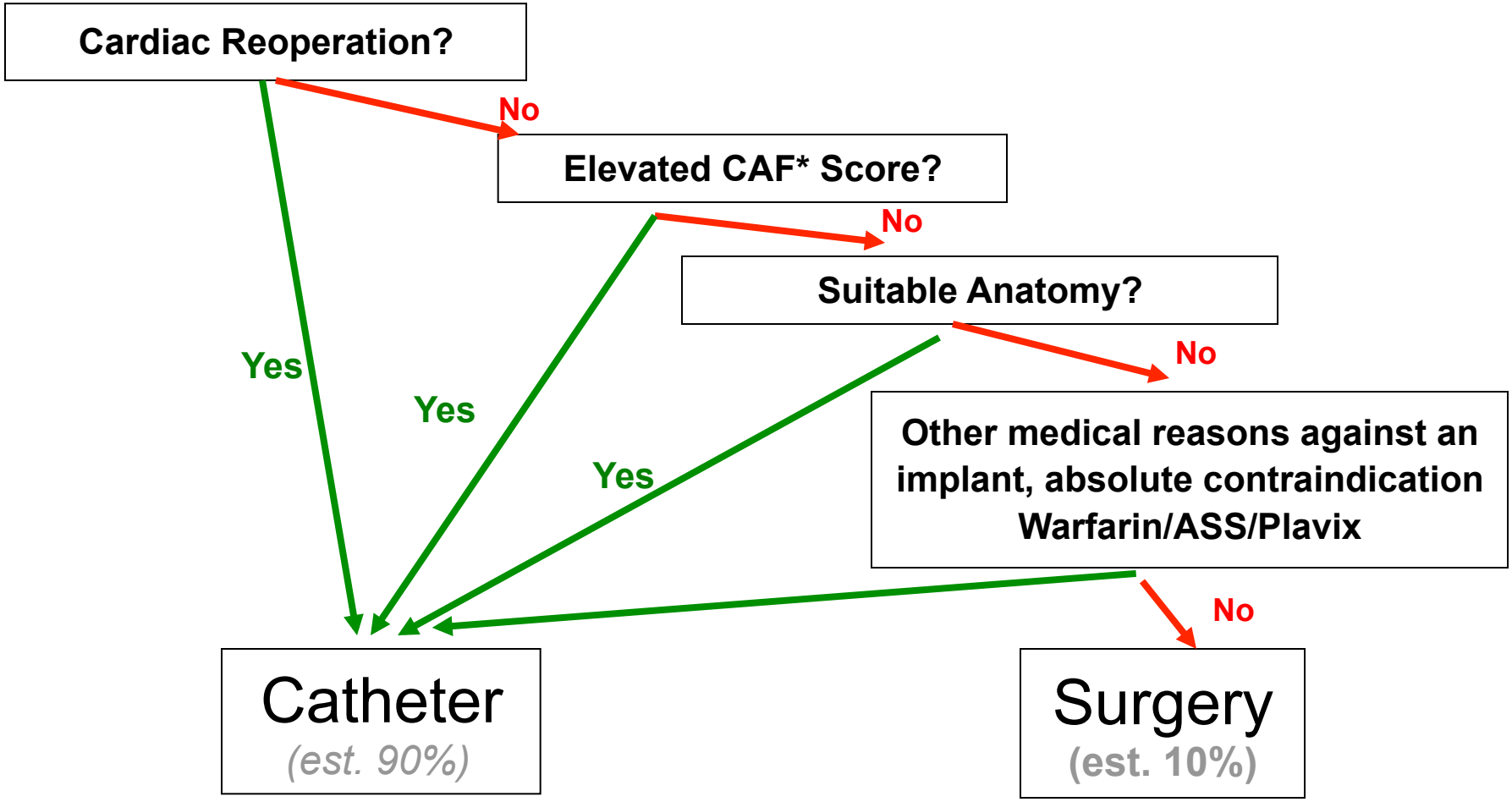
=12% not treated!



HERZKLINIK HIRSLANDEN

Reddy V Y et al. *PROTECT AF - Circulation*. 2013;127:720-729

"Heart Team" Approach for stand alone LAA therapies



* Sündermann et al.. Eur J Cardiothorac Surg. 2011

Conclusions:
LAA Management

- ✓ 100% LAA closure/removal/exclusion is mandatory
- ✓ No touch vs. half touch!
- ✓ Endocardial (Percutaneous) closure appealing and non invasive – hence attractive!
- ✓ Epicardial closure is safe, effective and durable however invasive – hence not popular!
- ✓ Heart Team recommended

HEART CLINIC ZURICH

hirslanden