



LA-Isolation

A novel Ablation Strategy for severely advanced LA disease

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Disclosure

- Nothing to declare

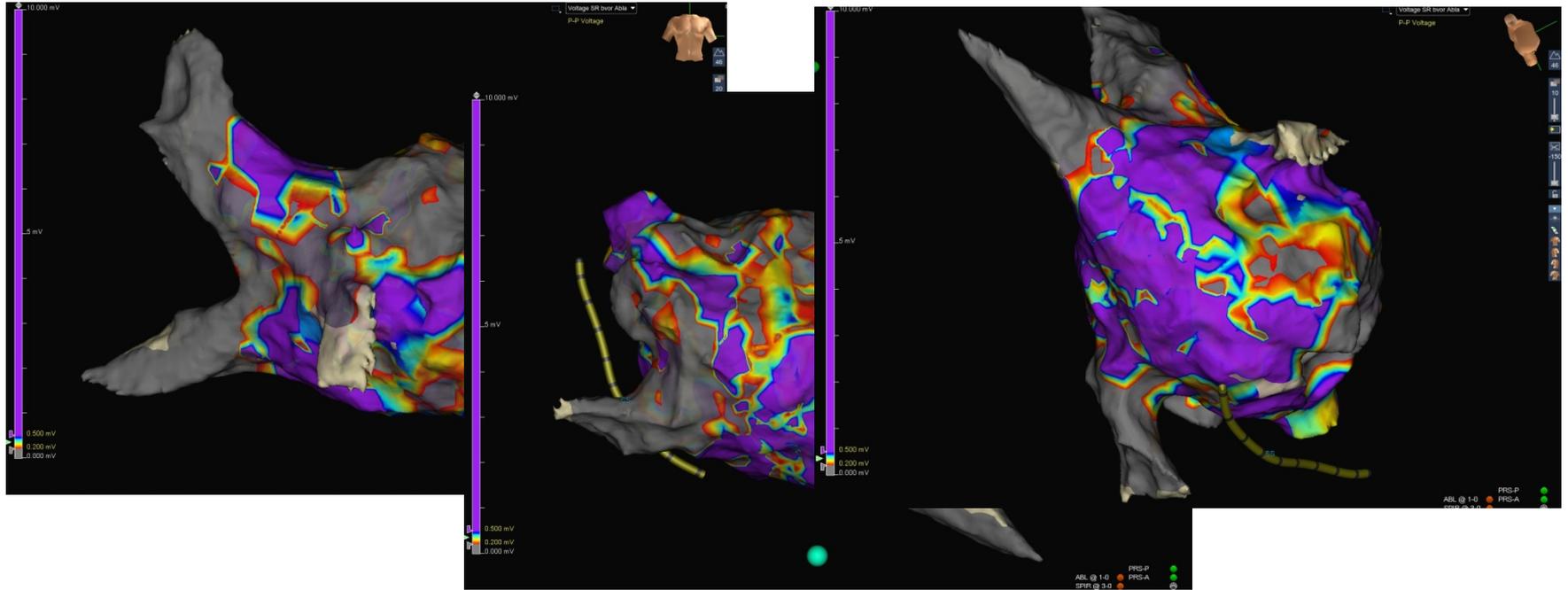
Clinical case

- **W.H. ♂, 79 yrs**
- Persistent AF (FD 2014), CHA²DS²-VASc 4, EHRA III
- PVI + Substrate Ablation (2015)
- AF-Recurrences under Amiodarone
- LVEF 50%, no CHD
- CV-Risk Factors: DM type II, arterial hypertension, chronic renal failure (St. IV)



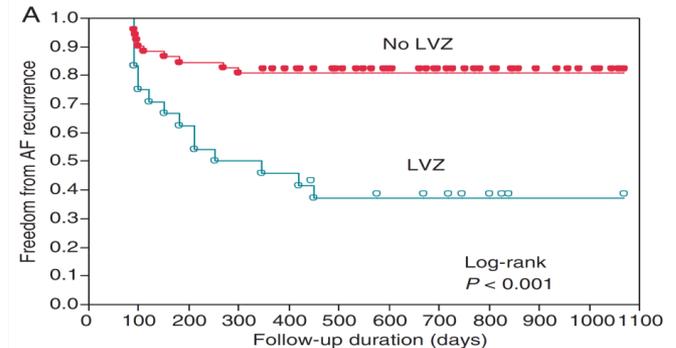
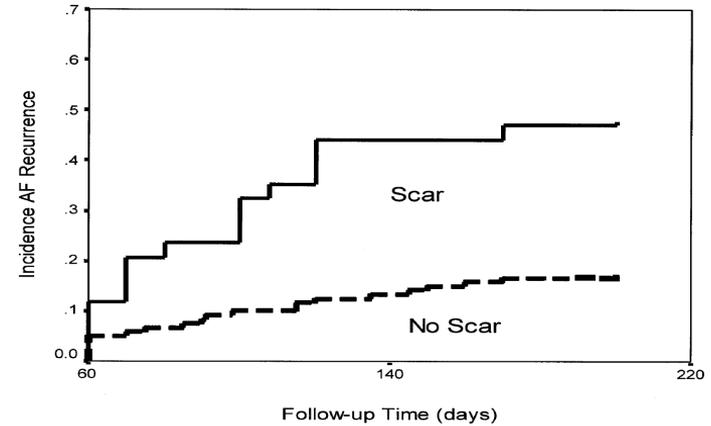
RE-DO
ABLATION

Voltage Map

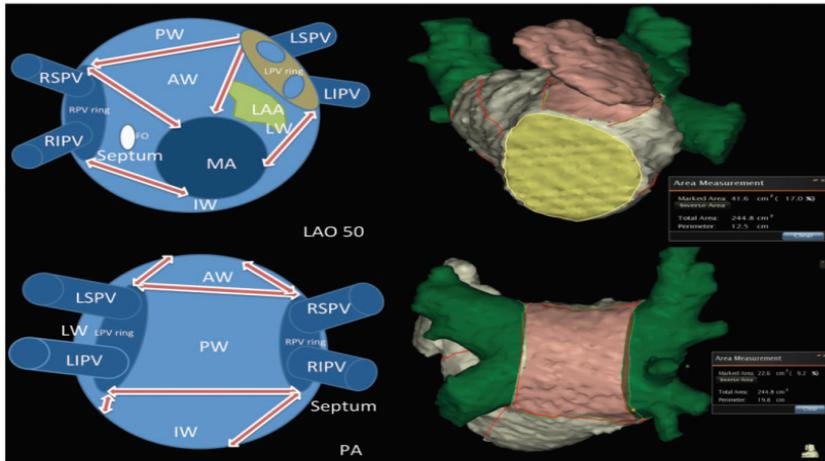


LA Low Voltage Zones in AF

- Scar ≤ 0.05 mV
- Low-voltage “abnormal” areas ≤ 0.5 mV
- Extent of the LVZ as independent risk factor of AF recurrence after PVI alone.



LA Low Voltage Zones in AF

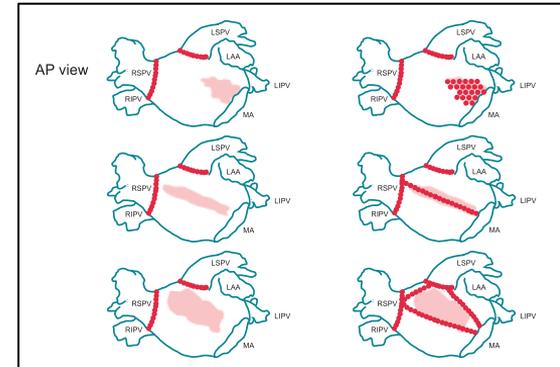
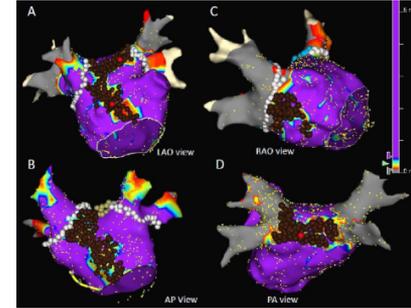
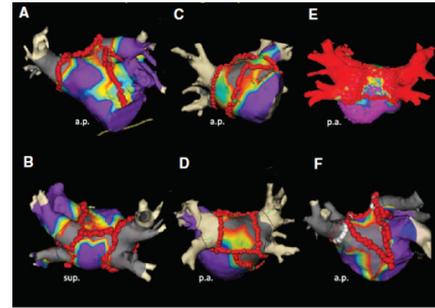


- Larger LVZ in persistent AF as PAF
- Most frequent anterior wall, septum, and posterior wall
- Older age
- Female gender
- Larger LA surface area
- Association with SND

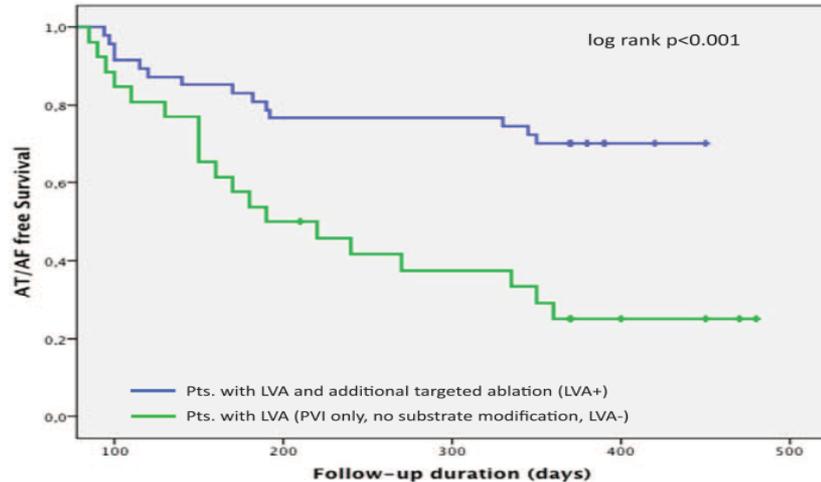
Low Voltage Area in LA... Which strategy?

Low-Voltage based Substrate Ablation

- General treatment principles:
 - no low voltage – no ablation outside PVs
 - regional ablation aiming to homogenize small low voltage areas (LVAs)
 - linear lesions isolating large LVAs from surrounding atrial myocardium (eg. posterior LA wall)
 - linear lesions connecting LVAs to anatomical obstacles (eg. PVs, MA, SVC, IVC)
 - always create complete line of block !!!

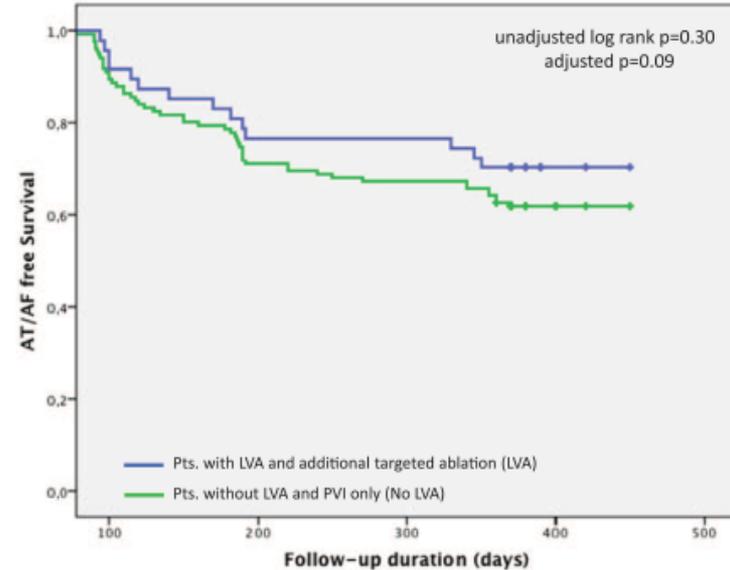


Low-voltage based substrate ablation



Number at risk (pts.)

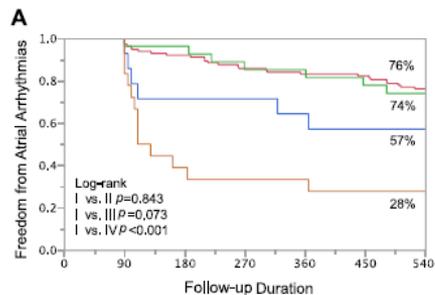
LVA+ (47)	44	36	36	2	0
LVA- (26)	22	13	9	4	0



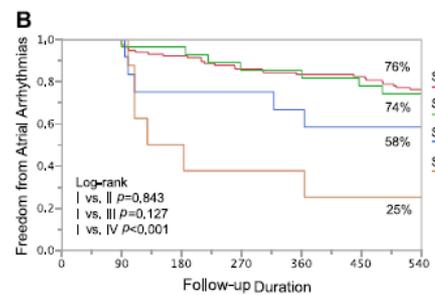
Number at risk (pts.)

LVA (47)	44	36	36	2	0
No LVA (131)	118	93	88	2	0

Low-voltage based substrate ablation



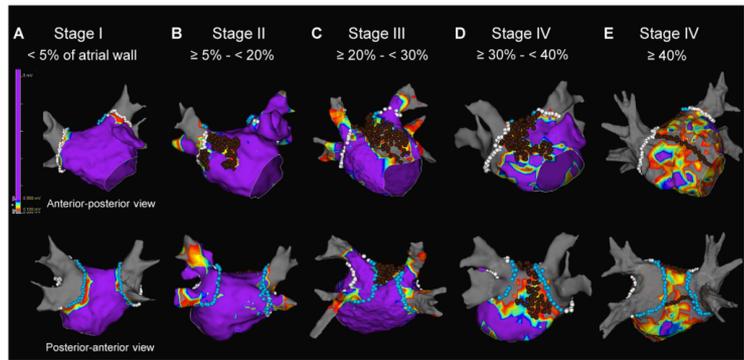
No. at risk	I	110	104	97	94	93	86
I	113	110	104	97	94	93	86
II	27	26	26	24	22	21	20
III	14	13	10	10	9	8	8
IV	18	15	7	6	6	5	5



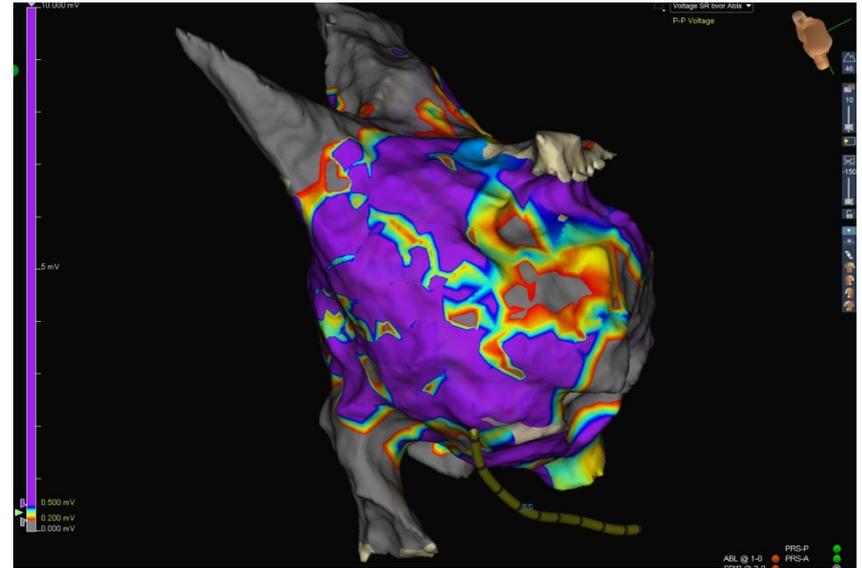
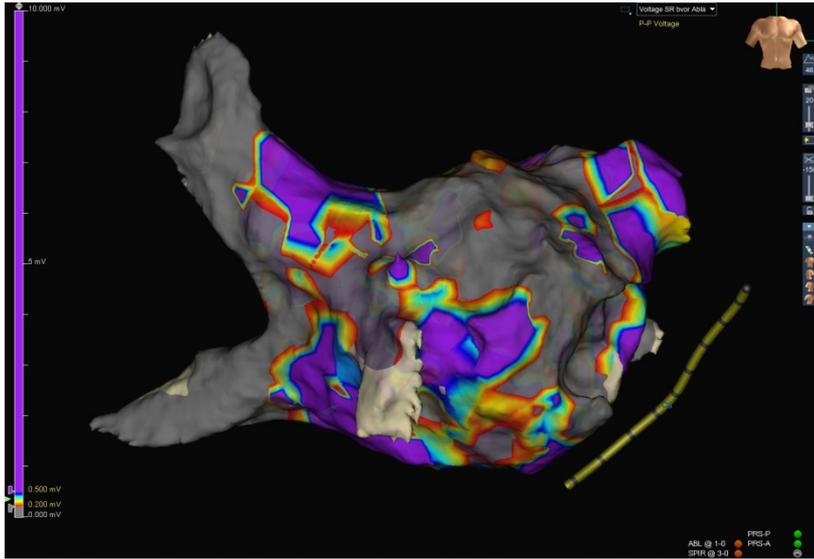
No. at risk	I	113	104	97	94	93	86
I	113	110	104	97	94	93	86
II	27	26	26	24	22	21	20
III	12	12	9	9	8	7	7
IV	8	8	4	3	3	2	2

The extent of LVZ is an independent predictor for recurrence even after LVZ homogenization

Yamaguchi T. J. Cardiol (2018)



...But what do we do in this case?



LAI: History of the concept

1997

Long-Term Follow-Up of Corridor Operation for Lone Atrial Fibrillation: Evidence for Progression of Disease?

NORBERT M. VAN HEMEL, M.D., JO J.A.M. DEFAUW, M.D.,
GÉRARD M. GUIRAUDON, M.D.,* JOHANNES C. KELDER, M.D.,
EMILE R. JESSURUN, M.D., and JEF M.P.G. ERNST, M.D.

From the Departments of Cardiology and Cardiothoracic Surgery, St. Antonius Hospital, Nieuwegein, The Netherlands; and the *Department of Thoracic & Cardiovascular Surgery, Millard Fillmore Health System, Buffalo, New York

1992

Left Atrial Isolation Associated With Mitral Valve Operations

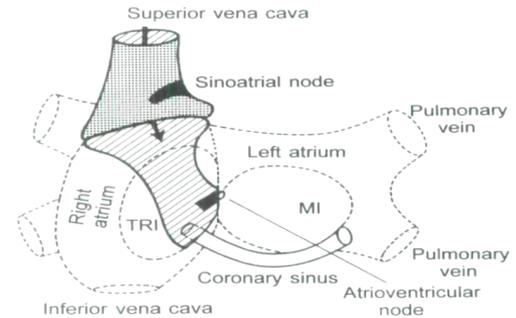
Angelo Graffigna, MD, Francesco Pagani, MD, Gaetano Minzioni, MD,
Jorge Salerno, MD, and Mario Viganò, MD

Cattedra di Cardiocirurgia and Cattedra di Cardiologia, Università degli Studi di Pavia and IRCCS Policlinico S. Matteo, Pavia, Italy

VAN HEMEL N. *J Cardiovasc Electrophysiol*, Vol. 8, pp. 967-975, September 1997

GRAFFIGNA A. *Ann Thorac Surg* 1992;54:1093-8

GUIRAUDON GM. *PACE*, Vol. 9, November-December, Part U, 198



1986

Surgical Treatment of Supraventricular Tachycardia: A Five-Year Experience

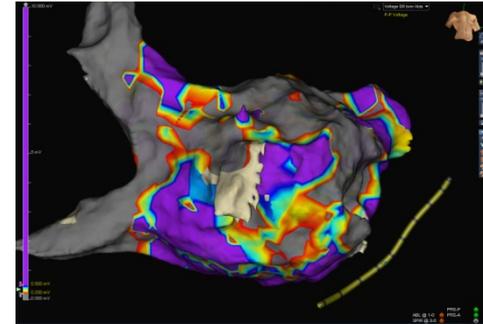
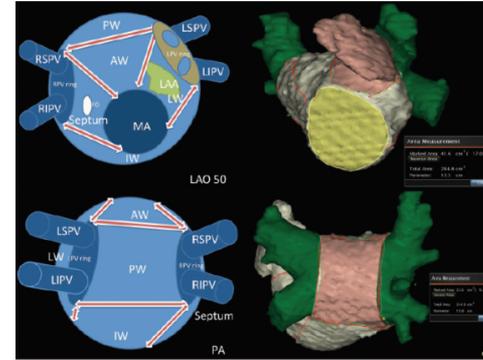
*Traitement chirurgical des tachycardies supraventriculaires:
Une expérience de cinq ans*

GERARD M. GUIRAUDON, GEORGE J. KLEIN, ARJUN D. SHARMA,
RAYMOND YEE, and DOUGLAS G. McLELLAN

From the Department of Surgery and Department of Medicine, University of Western Ontario, London, Ontario, Canada

Our Concept of Catheter-based LA-Isolation

- Extensive LVZ Areas ($\geq 3/5$ LA-regions)
- Especially in AW-PS Region
- Highly symptomatic patients

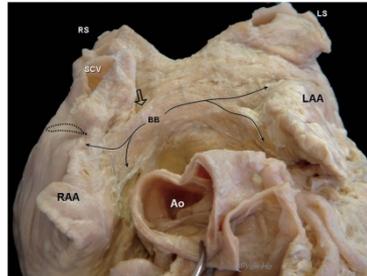
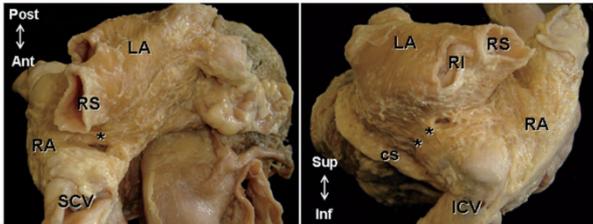
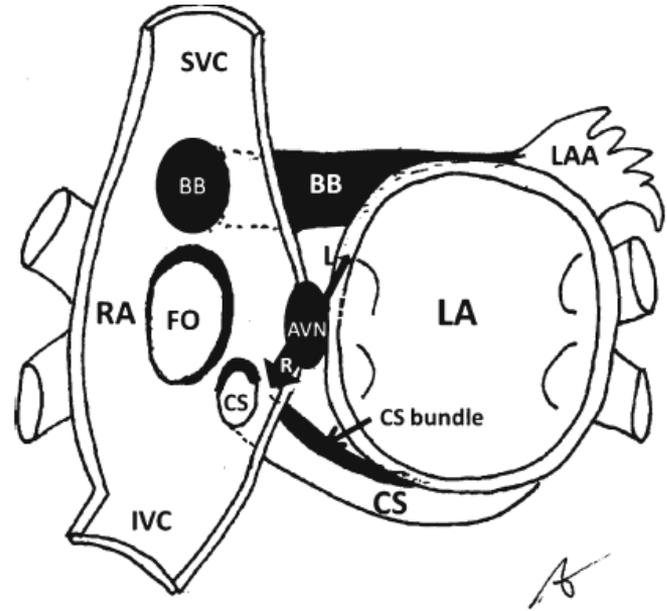


Three relevant topics

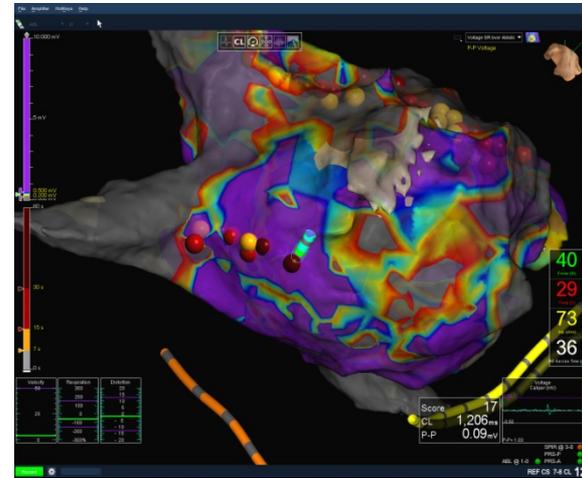
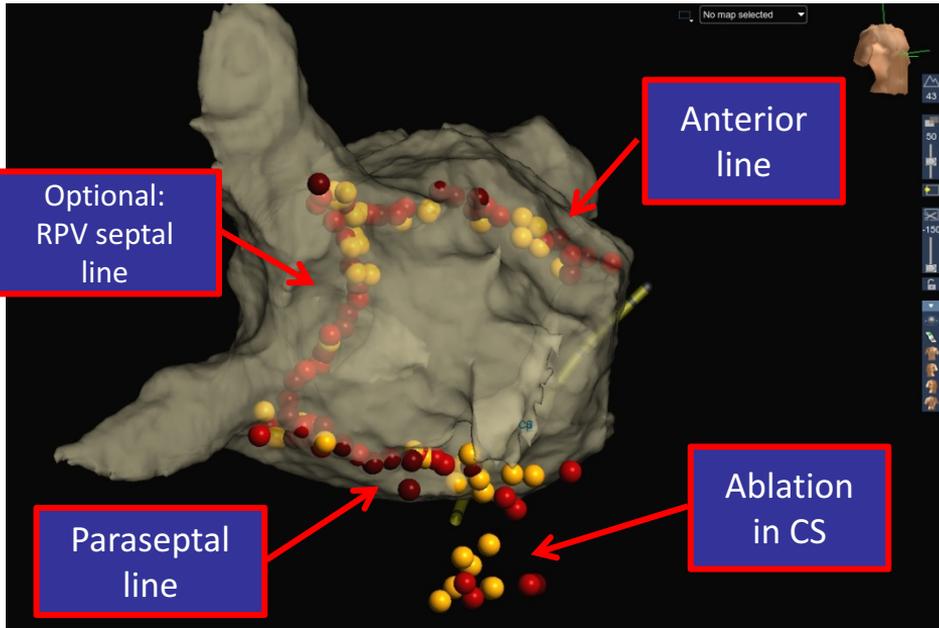
1. How to ablate and rhythm outcome
2. Stroke risk avoidance
3. Hemodynamic changes

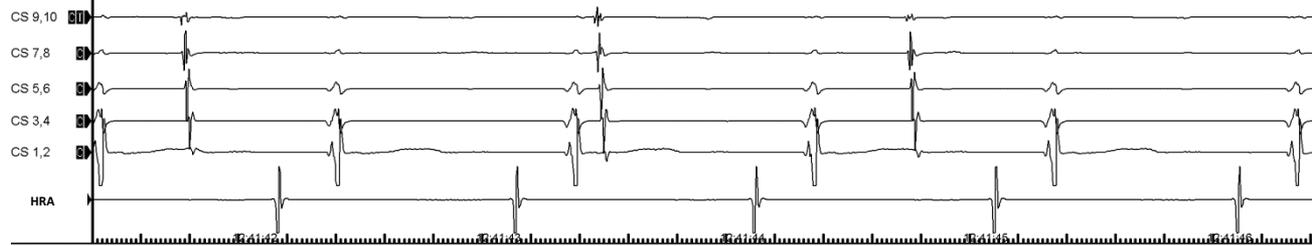
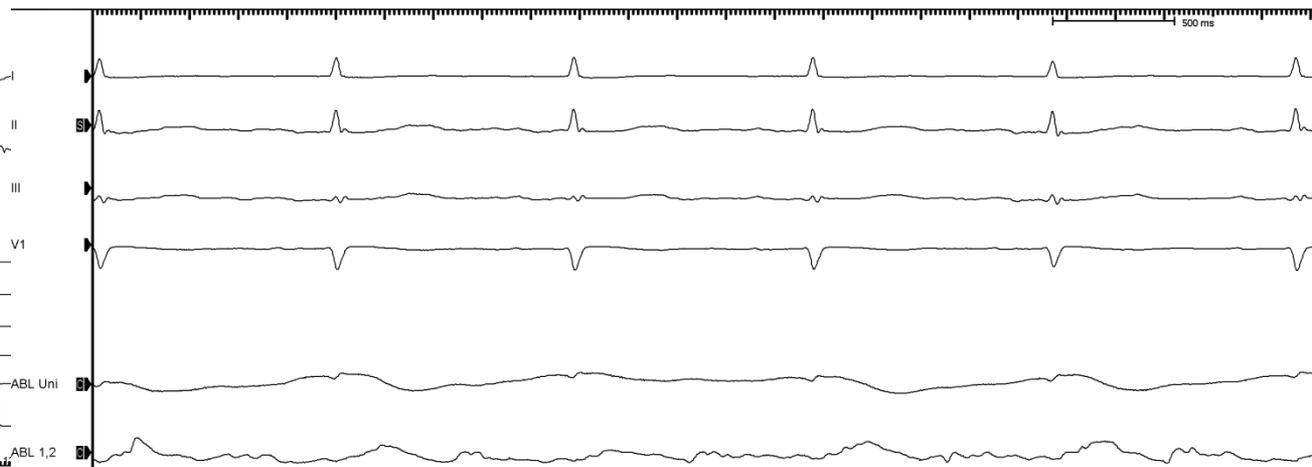
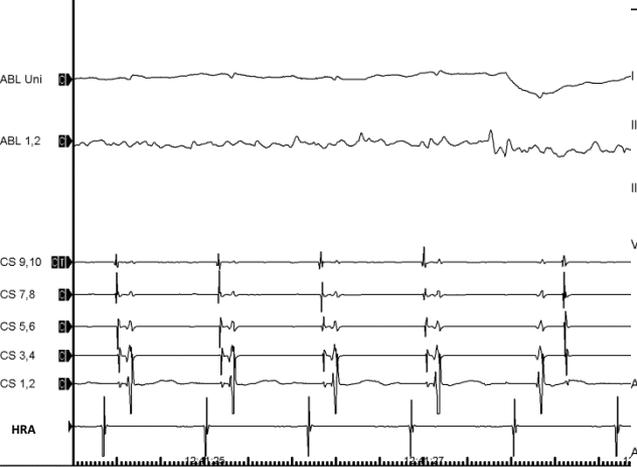
Anatomy

- Bachmann's bundle
- CS connections
- Septal Connections
- AV-node



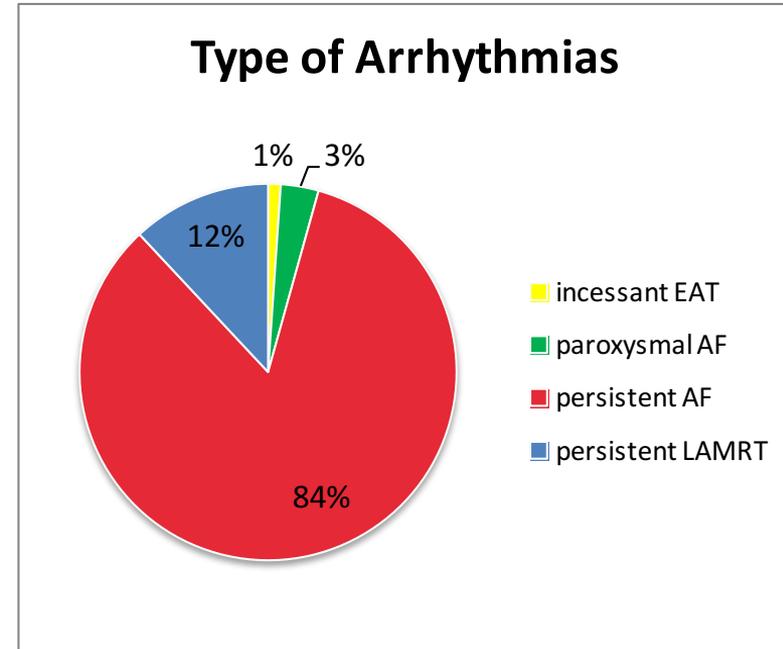
Ablation strategy





Our Experience

Clinical characteristics of study population (n = 92 pts)	
Age (years)	71 ± 8,6
Sex (female , n %)	54 (58,7)
LVEF (%)	52 ± 12,5
Left ventricular dysfunction with LVEF <50% (n, %)	29 (31,5)
LA Diameter (mm)	46,6 ± 7
Structural heart disease (n, %)	29 (31,4)
Ischemic heart disease (n, %)	14 (15,2)
Arterial hypertension (n, %)	77 (83,7)
Renal failure (n, %)	31 (33,7)
Obesity (BMI > 30)	30 (32,6)
History of AF (months)	78 ± 76
CHA2DS2-VASc (mean)	4 ± 1,4
SND (%)	10 (10,9)
PM/CRT/ICD (%)	23 (24,8)



Bipolar Voltage Map Characteristics

	Surface area (cm ²)	Amplitude (mV)	Incidence of LVZ (%)	LVZ area (cm ²)
LA	91,8 (75,3 – 106,6)	0,41 (0,1 - 1,01)	100	37,9 (24,5 - 60,1)
Anterior Wall	11,8 (9,5 – 16,2)	0,145 (0,07 – 0,57)	94,9	7,7 (4,7 – 11,6)
Septum	24,9 (20,1 – 31,1)	0,19 (0,09 – 0,7)	94,9	12,3 (5,6 – 19,8)
Inferior Wall	19,6 (15,6 – 23,3)	0,75 (0,2 – 1,3)	72,9	2,1 (0 – 6,8)
Lateral Wall	12,6 (9,8 – 17,6)	0,94 (0,45 – 1,7)	44,1	0 (0 – 4,2)
Posterior Wall	16,7 (13,6 – 18,9)	0,12 (0,54 – 0,06)	98,3	10,3 (6,8 – 15,3)
LAA	3,5 (1,8 – 5,9)	1,89 (0,97 – 3,24)	6,8	0 (0 – 0)
RA (n. 28)			18 (64,3)	

All data are presented as median and IQR.

Ablation results

Lines in LA (n, %)

Anterior/septal line 92 (100)

Paraseptal line 92 (100)

CS 92 (100)

Extra Lines/Focal Ablation 43 (46,7)

Epicardial access (n, %) 18 (19,6)

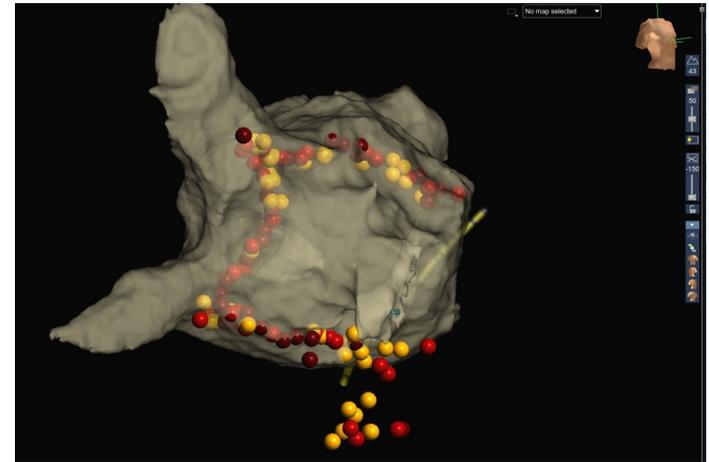
Ablation Lines $2,42 \pm 1,05$

Total procedure Time (min) $150,58 \pm 51,7$

Ablation time (min) $34,5 \pm 15,8$

Total fluoroscopic time (min) $23,5 \pm 15,5$

Fluoroscopic doses (mGyCm²) $7604,4 \pm 10542,26$



Rhythm Outcome

Follow-up (months, median, IQR)	18 (9 – 25)
Continuous Monitoring: ILR, PM, ICD (n, %)	75 (82%)
Pts. with AF burden \leq 1%	84%
Discontinuous Monitoring (4-d-Holter)	17 (18%)
Pts. without AF	82%
Reconnection proved during LAAO	21 (26%)
Re-LAI (n, %)	13 (14,1)

Our Stroke Risk Management

- 4 initial patients with OAC monotherapy bridging till secondary LAAO
- All subsequent patients with OAC triple therapy
 - (N)OAK
 - ASA
 - Clopidogrel
- After 4-6 Weeks, secondary LAA-Occlusion
- After LAAO, NOAK+ASS and FU at 6 Weeks → low dose ASA lifelong

Complications

Severe Complications

Including re-do

PE/Tamponade

3 (3%)

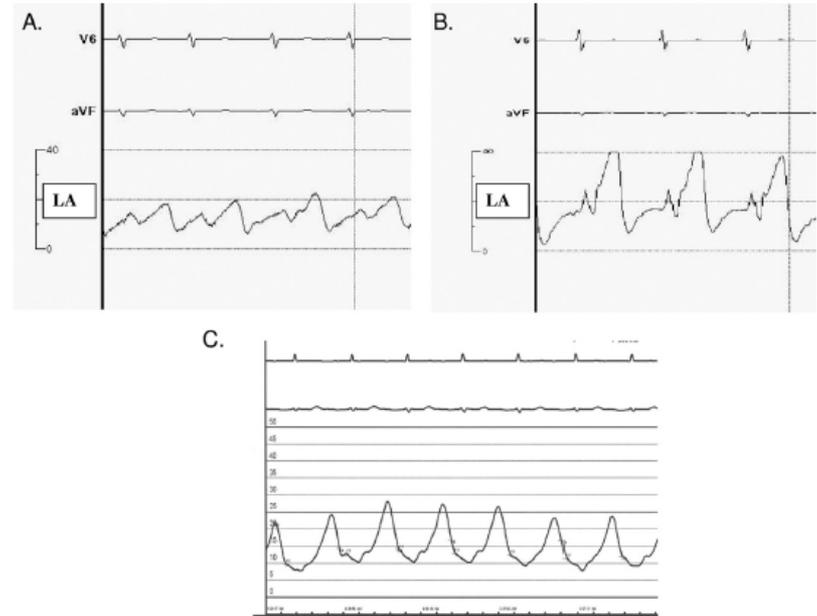
Stroke/TIA

1 (1%) – *before introduction of triple OAC*

No stroke or bleeding since introduction of triple OAC bridging to LAO

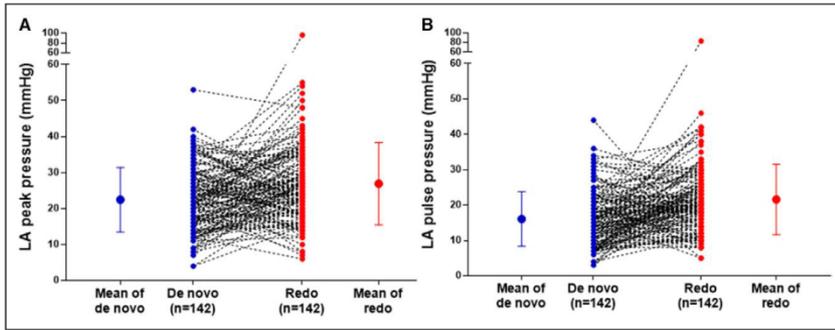
Hemodynamic changes after Ablation

After radiofrequency catheter ablation of atrial fibrillation (RFA), PH with LA diastolic dysfunction or the so-called stiff LA syndrome is a rare but potentially significant complication of AF ablation.

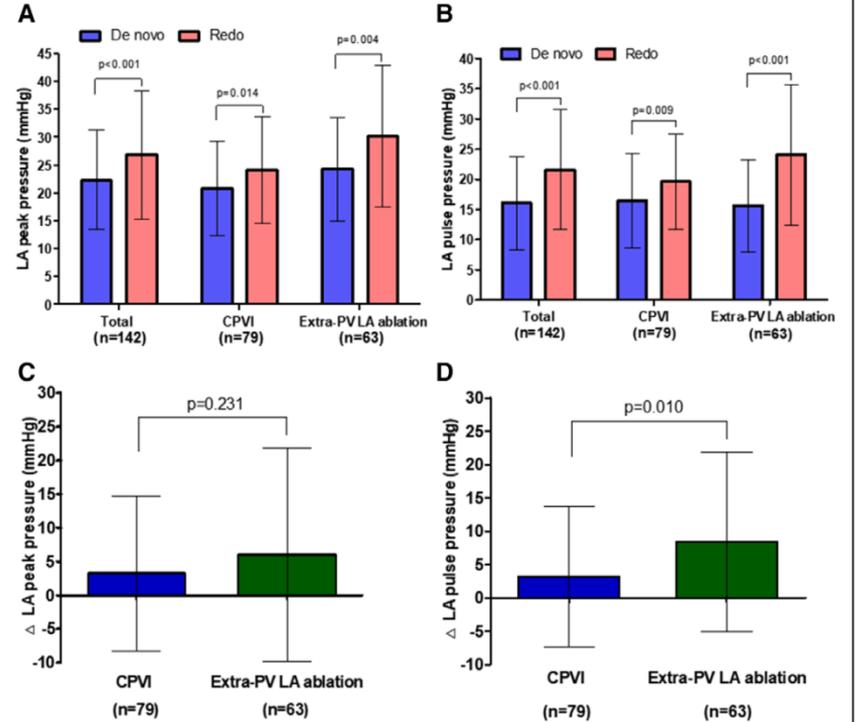


Gibson et al. Heart Rhythm 2011;8:1364–1371

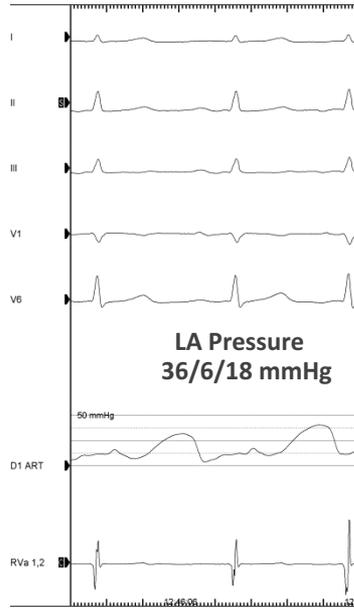
Known Hemodynamic risks after extensive AF-Ablation



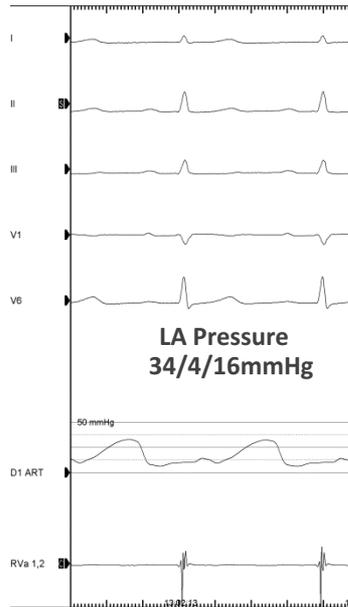
- *Park et al. Circ Arrhythm Electrophysiol. 2019;12:e007073.*



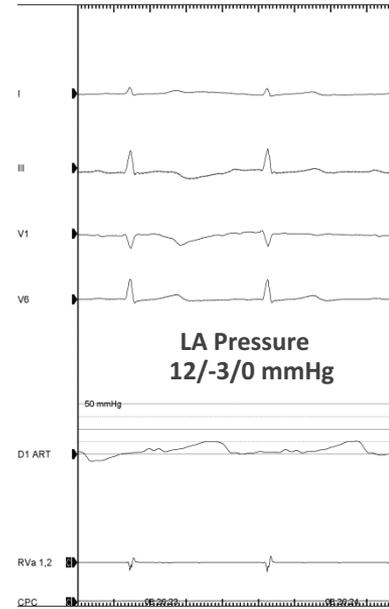
Our typical Hemodynamic Profile



**LA pressure
before LAI**

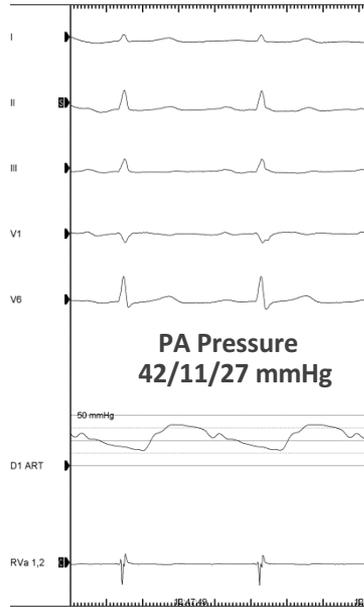


**Acute LA pressure
after LAI**

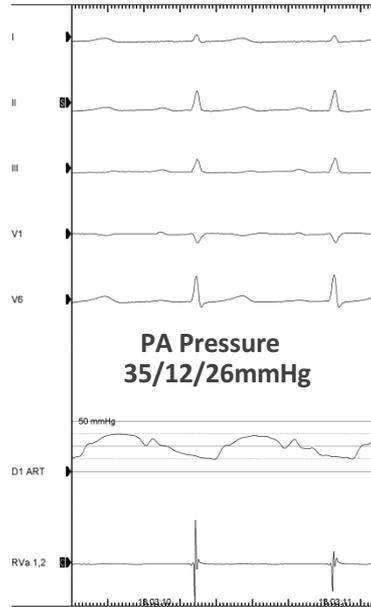


**LA pressure
1 Month after LA I
(during LAO)**

Our typical Hemodynamic Profile



**PA pressure
before LAI**

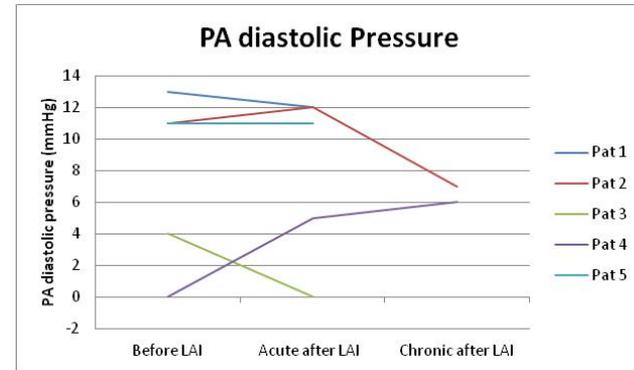
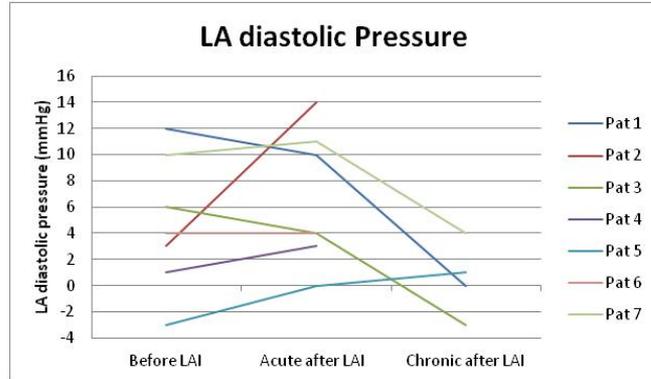
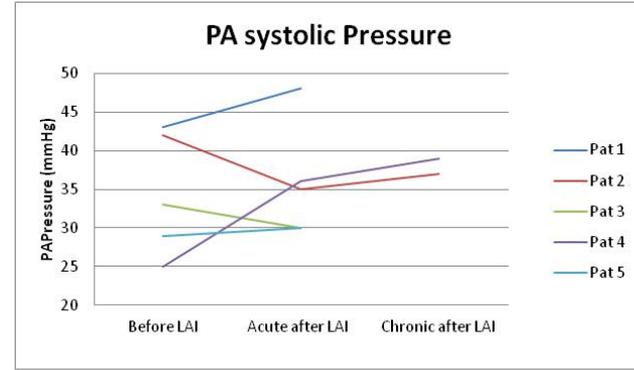
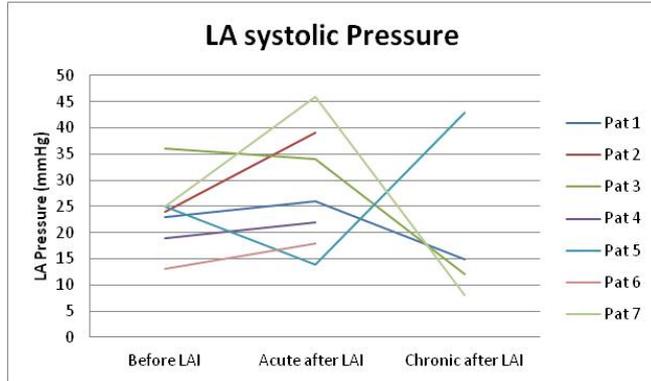


**Acute PA pressure
after LAI**

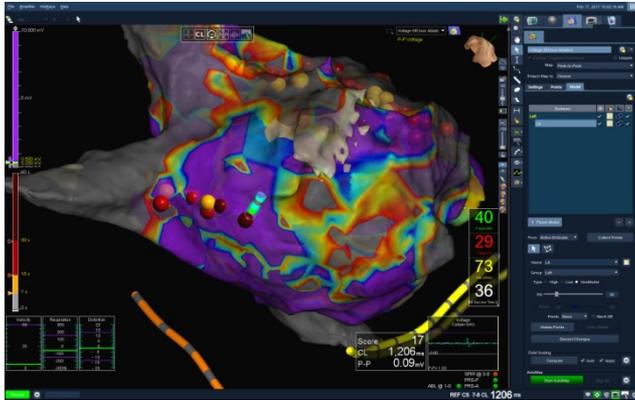


**PA pressure
1 Month after LAI
(during LAAO)**

Our typical Hemodynamic Profile



What happened to our patient?



LAI



LAAO

After 15 months FU
No recurrences
detected on ILR

Conclusions

- The isolation of LA is feasible
- Has been done by surgeons, can be done by us
- It offers an effective treatment option for rhythm control in pts. with severely diseased LA
- However, stroke risk needs consideration,
 - LAAO is mandatory
 - In case of second procedure LAAO, we recommend temporary triple OAC bridging

Thank you for your attention

