COMPARISON OF INITIAL LA PATTERNS AS THE ROAD TO SUCCESSFUL ENDOCARDIAL «BOX LESION» ABLATION

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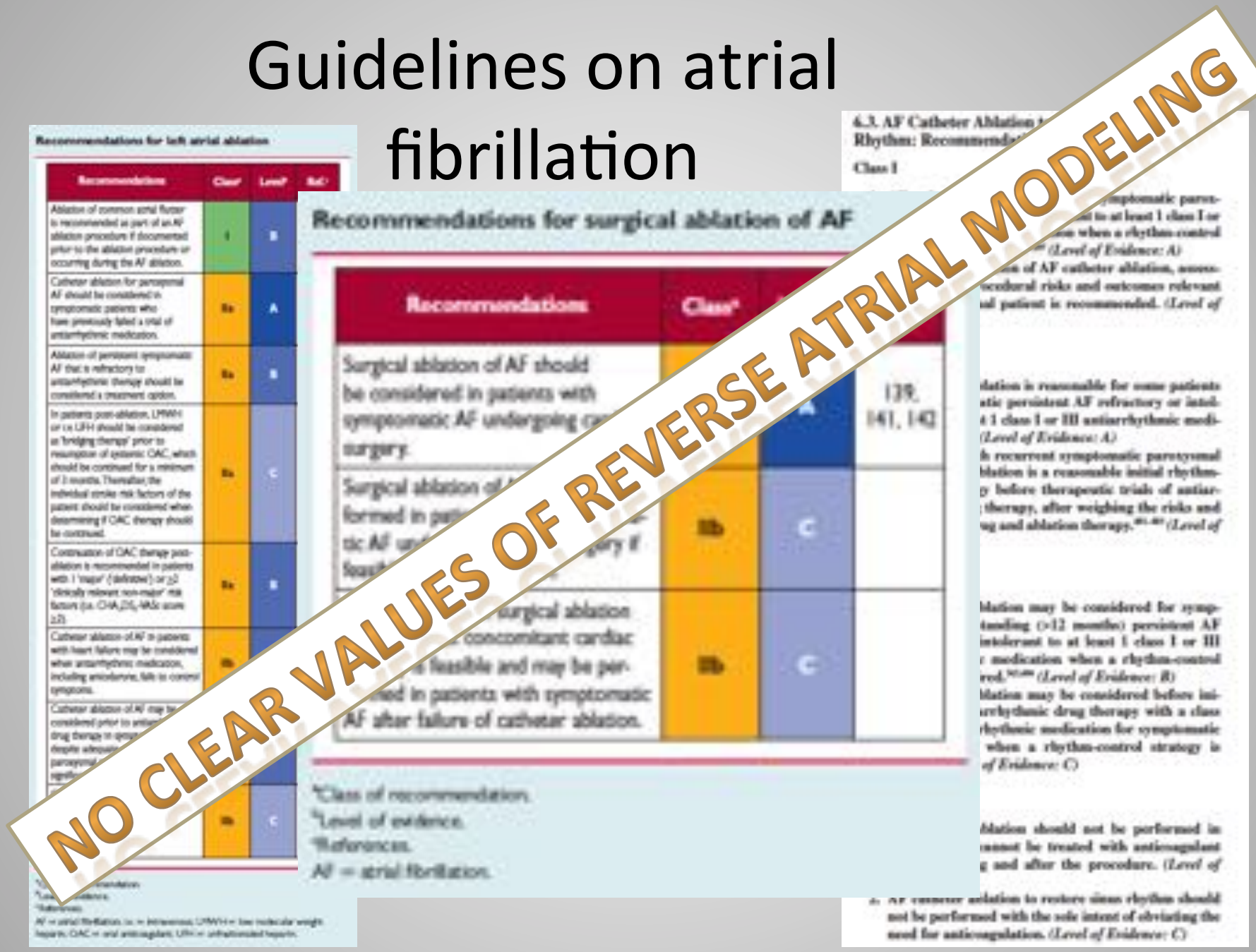
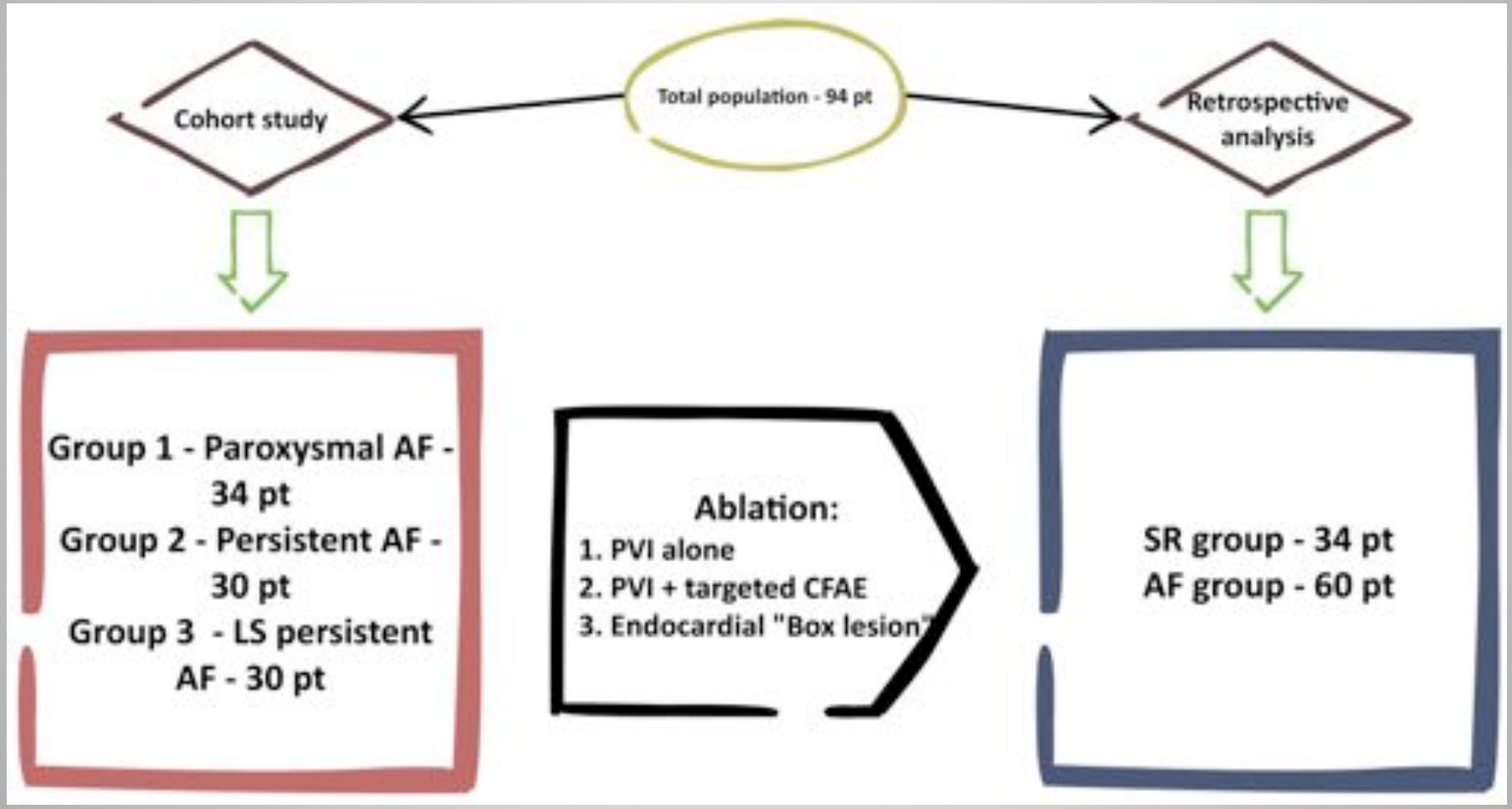
Guidelines on atrial fibrillation



AIM

to find the initial clinical electro-mechanical patterns in patients with successful RFA in the late postoperative period

Design


Total population - 94 pt
Cohort study
Retrospective analysis
Group 1 - Paroxysmal AF - 34 pt
Group 2 - Persistent AF - 30 pt
Group 3 - LS persistent AF - 30 pt
Ablation:
1. PVI alone
2. PVI + targeted CFAE
3. Endocardial "Box lesion"
SR group - 34 pt
AF group - 60 pt

Anamnesis

	Group 1	Group 2	Group 3
Age, y	51,91±11,49*	55,83±7,87*	56,1±11,66*
Gender, n	m-15; f-19	m-20; f-10	m-14; f-16
AF anamnesis, month	11,57±4,13**	32,67±10,84**	39,98±12,44**
Concomitant cardiac pathology	Mitral regurgitation – 9, CAD – 8	Mitral regurgitation – 15, CAD - 8	Mitral regurgitation – 17, CAD - 6
Procedure	Lone PVI – 12 PVI+CFAE – 11 Endocardial «Box Lesion» - 11	Lone PVI – 10 PVI+CFAE – 10 Endocardial «Box Lesion» - 10	Lone PVI – 10 PVI+CFAE – 10 Endocardial «Box Lesion» - 10

(- p=0,217; ** - p=0,001)*

Computed Tomography

	Group 1	Group 2	Group 3	p
LA LD, cm	6±0,738	6,994±1,171	7,367±1,006	0,002
LA AP, cm	3,306±0,5379	3,463±0,866	3,393±0,787	0,699
LA vol, ml	82,96±18,803	87±22,265	76,2±16,094	0,189
LA index, abs	64,3±7,756	61,5±9,172	59,97±8,104	0,12
RSPV, cm	3,313±0,4639	3,624±0,465	3,753±0,403	0,004
RIPV, cm	1,559±0,2501	1,606±0,3579	1,871±0,3704	0,018
LSPV, cm	1,788±0,3333	2,025±0,2408	2,124±0,3011	0,006
LIPV, cm	1,635±0,2473	1,781±0,281	1,753±0,2939	0,275

Echocardiography

	Group 1	Group 2	Group 3	p
LVES, cm2	3,829±0,4663	3,866±0,8393	3,935±0,787	0,001
LVED, cm2	5,167±0,5655	5,362±0,591	5,207±0,452	0,341
ESV, ml	46,72±19,682	57,03±22,327	53,92±20,034	0,142
EDV, ml	128,09±30,52	140,9±35,66	135,39±32,2	0,314
LVEF, %	64,3±7,756	61,5±9,172	59,97±8,104	0,12
dLA, cm	4,074±0,6663	4,663±0,810	5,084±0,745	0,001
MV annulus, cm	3,313±0,4639	3,624±0,465	3,753±0,403	0,004

	Group 1	Group 2	Group 3	p
LA LD, cm	6,114±0,9122	7,294±0,937	7,073±0,968	0,002
LA AP, cm	3,402±0,5703	3,595±0,7215	3,583±0,7	0,001
LA vol, ml	96,93±23,6	135,95±72,0	175,68±66,0	0,001
LA index, abs	54,60±15,89	86,74±49,18	89,47±33,02	0,074
RSPV, cm	1,812±0,2956	2,071±0,358	2,059±0,335	0,045
RIPV, cm	1,559±0,2501	1,606±0,3579	1,871±0,3704	0,018
LSPV, cm	1,788±0,3333	2,025±0,2408	2,124±0,3011	0,006
LIPV, cm	1,635±0,2473	1,781±0,281	1,753±0,2939	0,275

PROSPECTIVE COHORT STUDY RESULTS

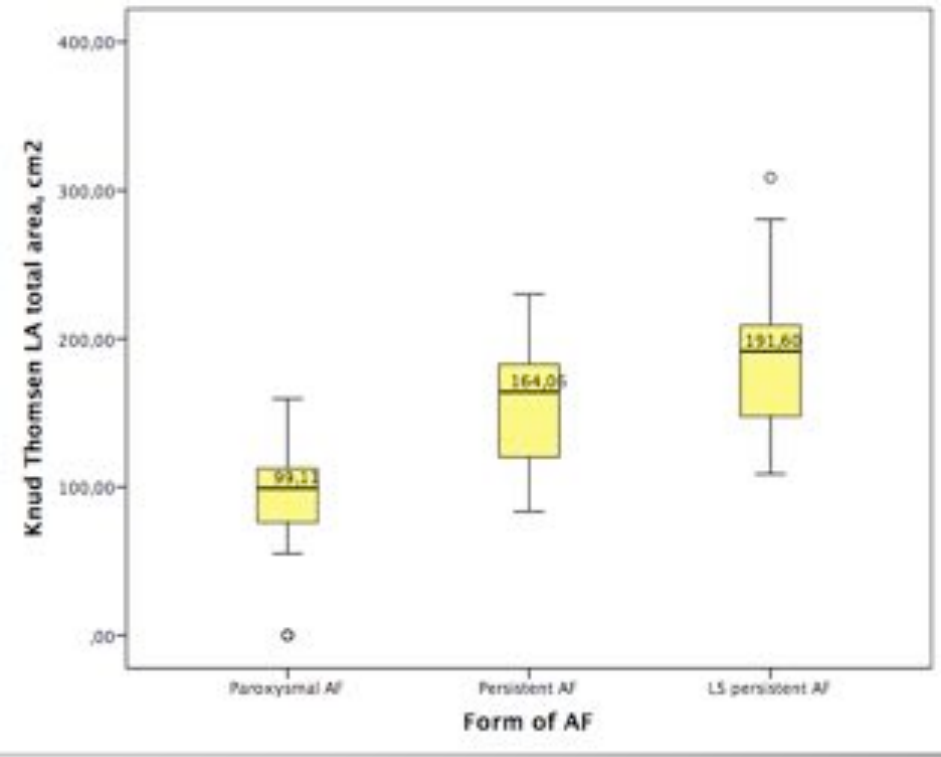
LA surface area

- Knud Thomsen's Formula (Surface Area of an Ellipsoid)

$$S \approx 4\pi[(a^p b^p + a^p c^p + b^p c^p)/3]^{\frac{1}{p}}$$

Method of calculation	Value	p
LA CT vol, ml	136,4±68,77	0,516
Knud Thomsen's Formula, ml	140,97±65,69	

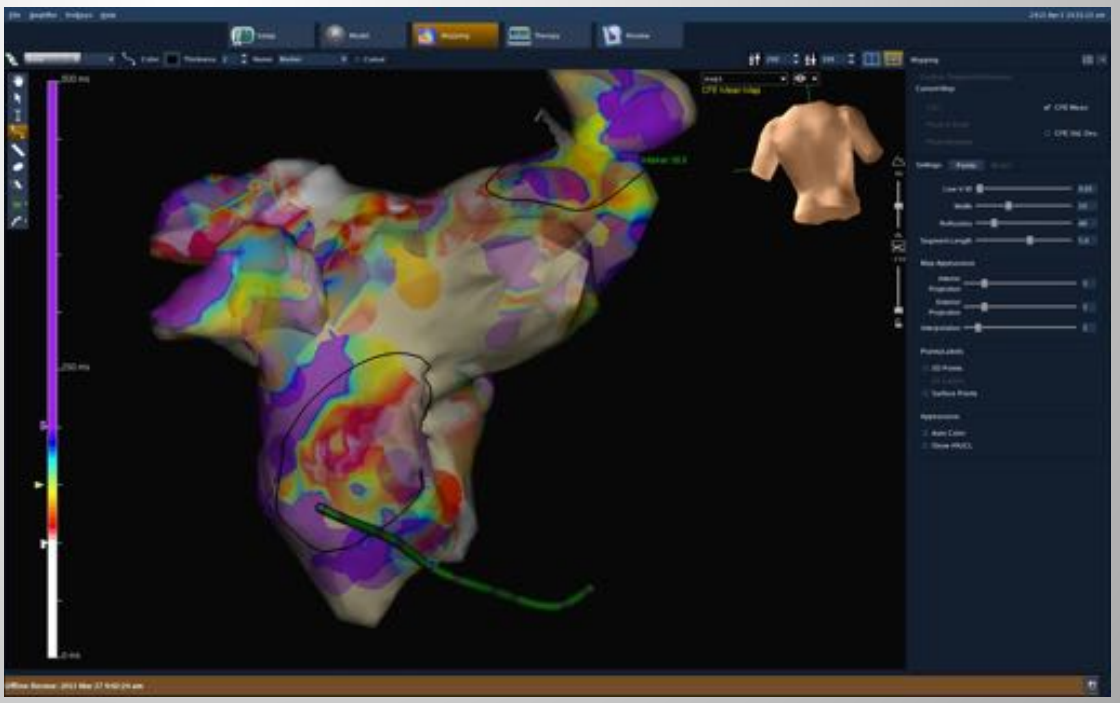
- Calculated LA surface area



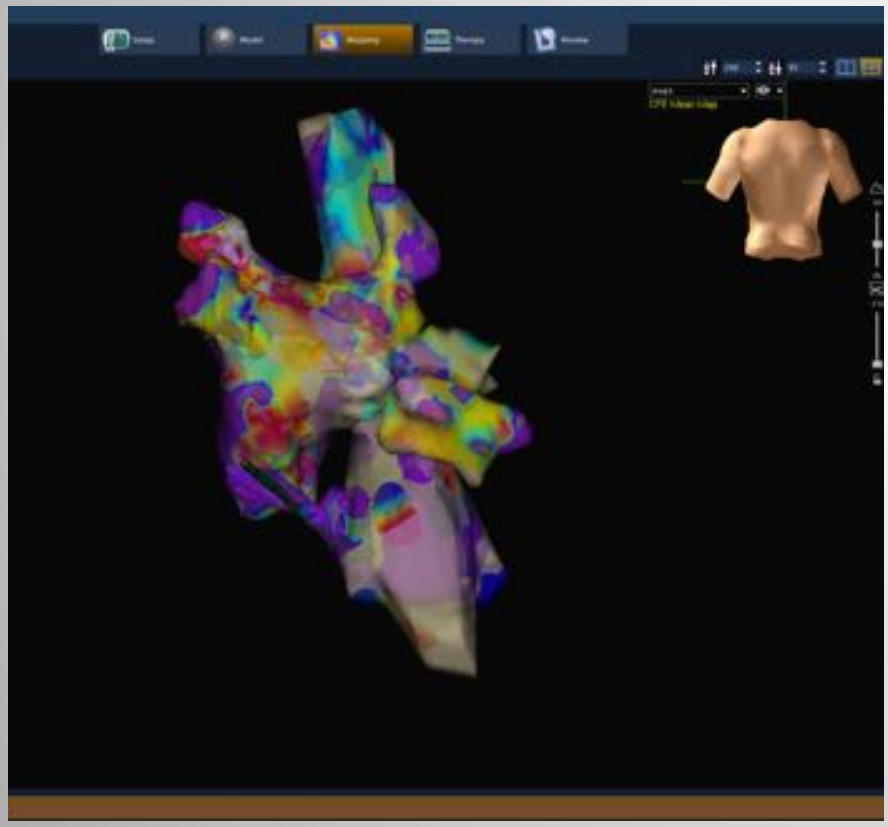
Electroanatomical mapping

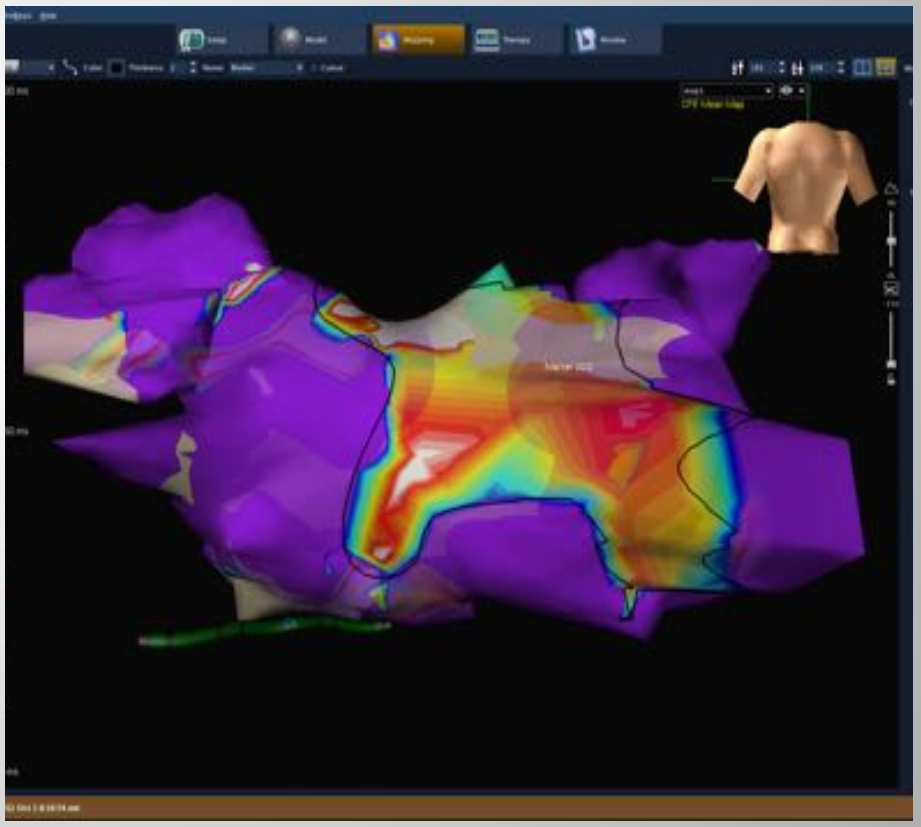
Parameters	Values
P-P sensivity	0,04-0,05 mV
EGM refractory	40 ms
EGM width	20 ms
EGM segment length	8 s
Interpolation	5 mm
Internal/external projection	5 mm

- Lead-up
- Mapping (Step-by-step, OneMap)
- Fusion
- Postprocessing
- CFAE computation



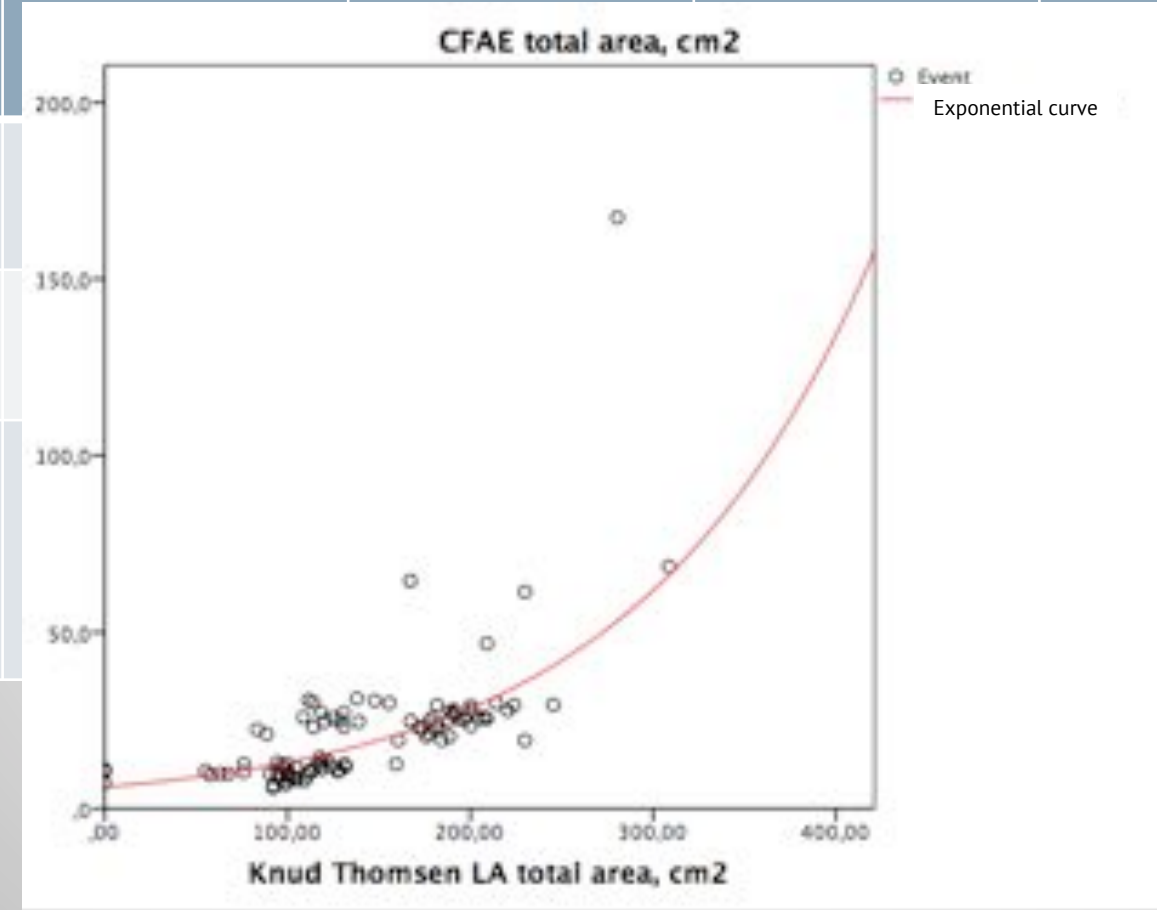
CFAE maps of persistent AF





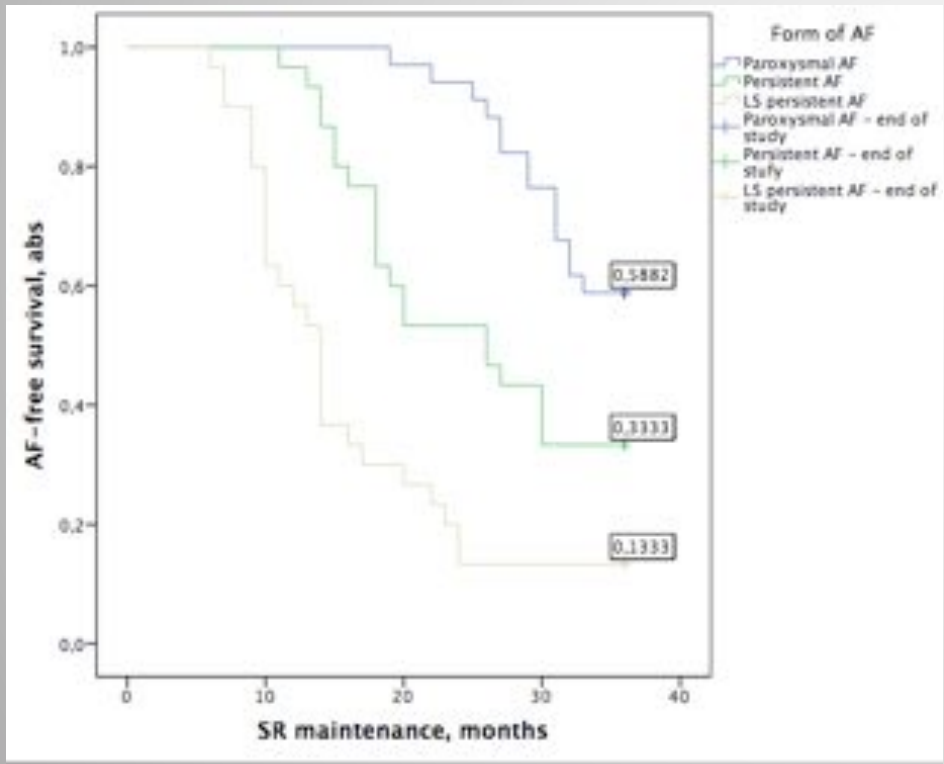
CFAE and LA surface area
Main electrical features correlations

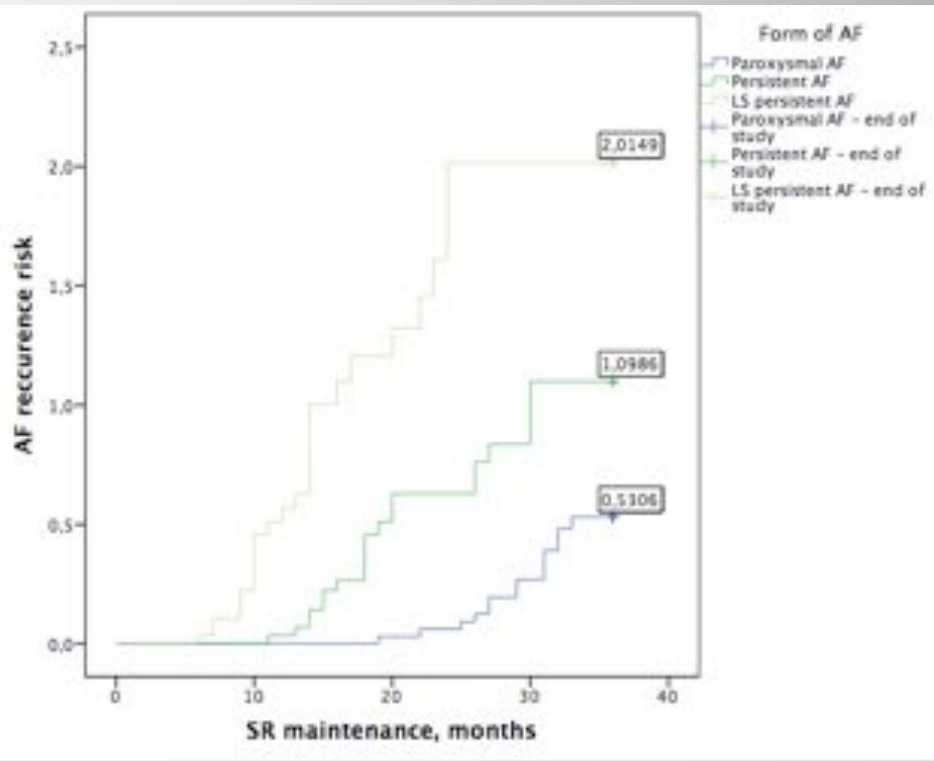
Parameters					p
CFAE duration					0,001
CFAE zones					0,001
CFAE surface area					0,001



p=0,001

AF-free survival and risk of recurrence





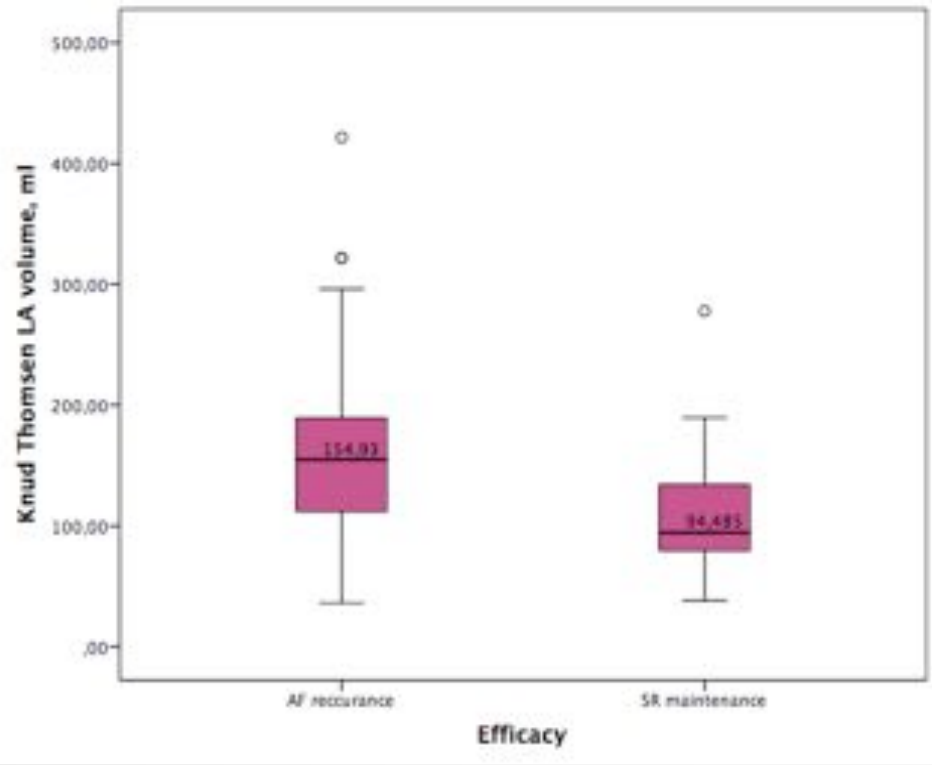
p=0,001

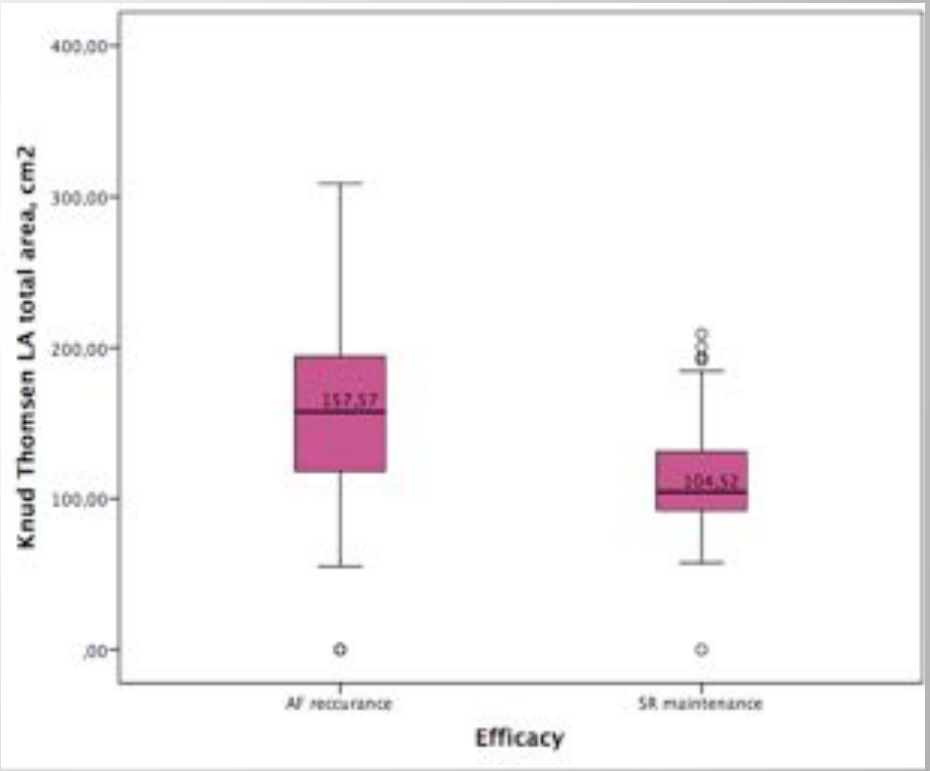
RETROSPECTIVE ANALYSIS

EchoCG and CT values of the heart

Parameters	Groups	p	Median	Quartile		
				25	50	75
LVES, cm	AF reccurance	0,738	3,4	3,1	3,4	3,8
	SR maintenance		3,4	3,1	3,4	3,85
LVED, cm	AF reccurance	0,893	5,3	4,9	5,3	5,5
	SR maintenance		5,3	4,8	5,3	5,7
ESV, ml	AF reccurance	0,405	47,5	37,25	47,5	62,75
	SR maintenance		51	40	51	66
EDV, ml	AF reccurance	0,499	133,5	111,5	133,5	148,25
	SR maintenance		134	114	134	162
SV, ml	AF reccurance	0,457	79	68	79	91
	SR maintenance		82	70,5	82	102,75
LVEF, %	AF reccurance	0,912	62	56	62	66
	SR maintenance		61	56	61	67,5
dLA, cm	AF reccurance	0,001	4,875	4,2	4,875	5,5
	SR maintenance		4,2	3,7	4,2	4,6
MV annulus, cm	AF reccurance	0,061	3,55	3,3	3,55	3,9
	SR maintenance		3,4	3,1	3,4	3,75
LA LD, cm	AF reccurance	0,01	7	6,25	7	7,925
	SR maintenance		6,3	5,7	6,3	6,6
LA AP, cm	AF reccurance	0,007	4,8	4,075	4,8	5,6
	SR maintenance		4,1	3,6	4,1	4,6
LA TD, cm	AF reccurance	0,012	7,2	6,5	7,2	7,75
	SR maintenance		6,5	5,6	6,5	6,9
LA vol, ml	AF reccurance	0,0001	140	114	140	183,5
	SR maintenance		102,5	84,63	102,5	126,5
LA index, abs	AF reccurance	0,13	71,4	57,205	71,4	101,61
	SR maintenance		52,5	43,64	52,5	83
RSPV, cm	AF reccurance	0,013	2	1,8	2	2,3
	SR maintenance		1,75	1,575	1,75	2,05
RIPV, cm	AF reccurance	0,67	1,7	1,5	1,7	1,9
	SR maintenance		1,65	1,375	1,65	1,9
LSPV, cm	AF reccurance	0,04	2	1,825	2	2,275
	SR maintenance		1,85	1,575	1,85	2,05
LIPV,cm	AF reccurance	0,03	1,8	1,6	1,8	1,9
	SR maintenance		1,55	1,5	1,55	1,8

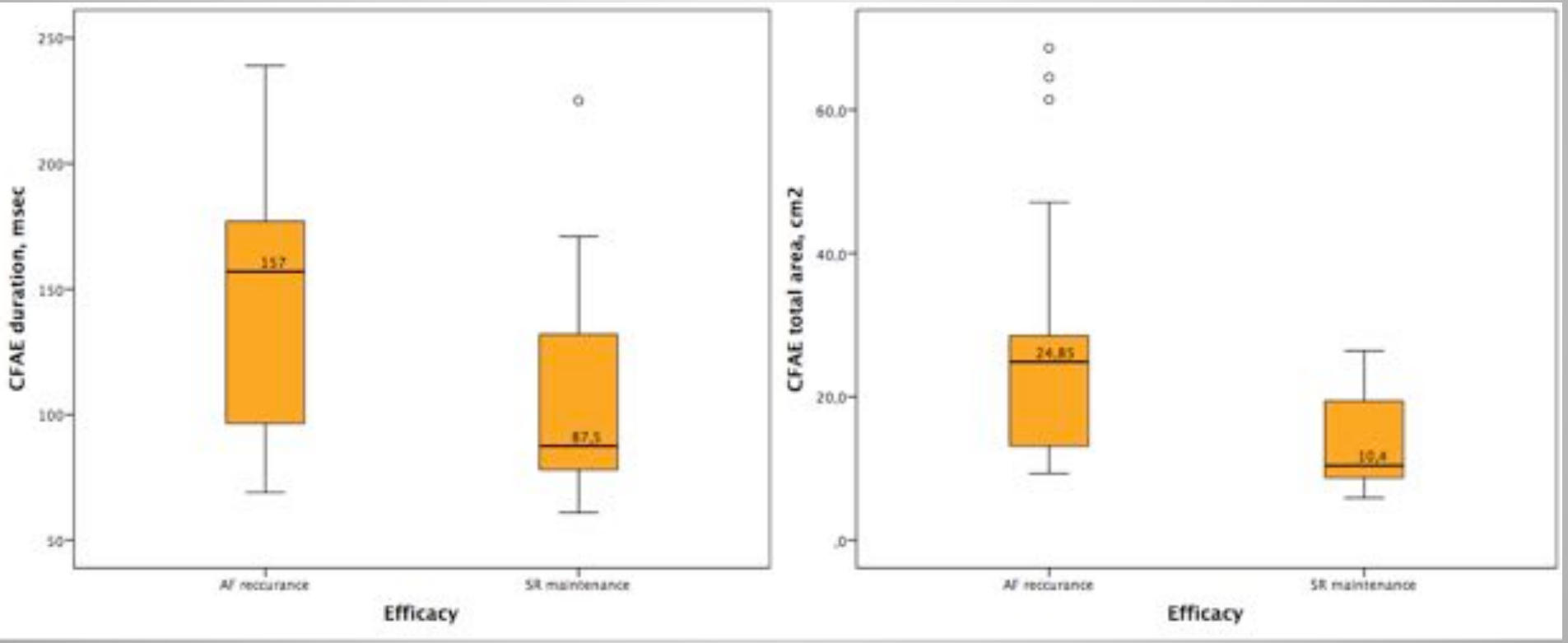
Initial LA mechanical patterns





p=0,001

Initial LA electrical patterns



p=0,001

Conclusion

PV ablation

- Paroxysmal AF
- Lone AF
- LA volume < 100 ml
- No CFAE/< 5 cm^2

Substrate ablation

- Paroxysmal and early persistent AF
- Lone AF
- Expected LA reverse modeling (LA vol < 130 мл)
- Moderate EP findings (CFAE surface area < 10-12 cm^2)

Mini-MAZE

- Persistent/LS persistent AF
- Lone AF
- Possible LA reverse modeling (LA vol < 170 мл)
- Severe EP findings (CFAE surface area < 20 cm^2)

Open MAZE

- LS persistent AF
- Concomitant structural heart pathology
- Irreversible electromechanical remodeling

Thank You! Grazie!