
RITMECHIRURGIE

20/09/2021 – JELLE FLEERAKKERS

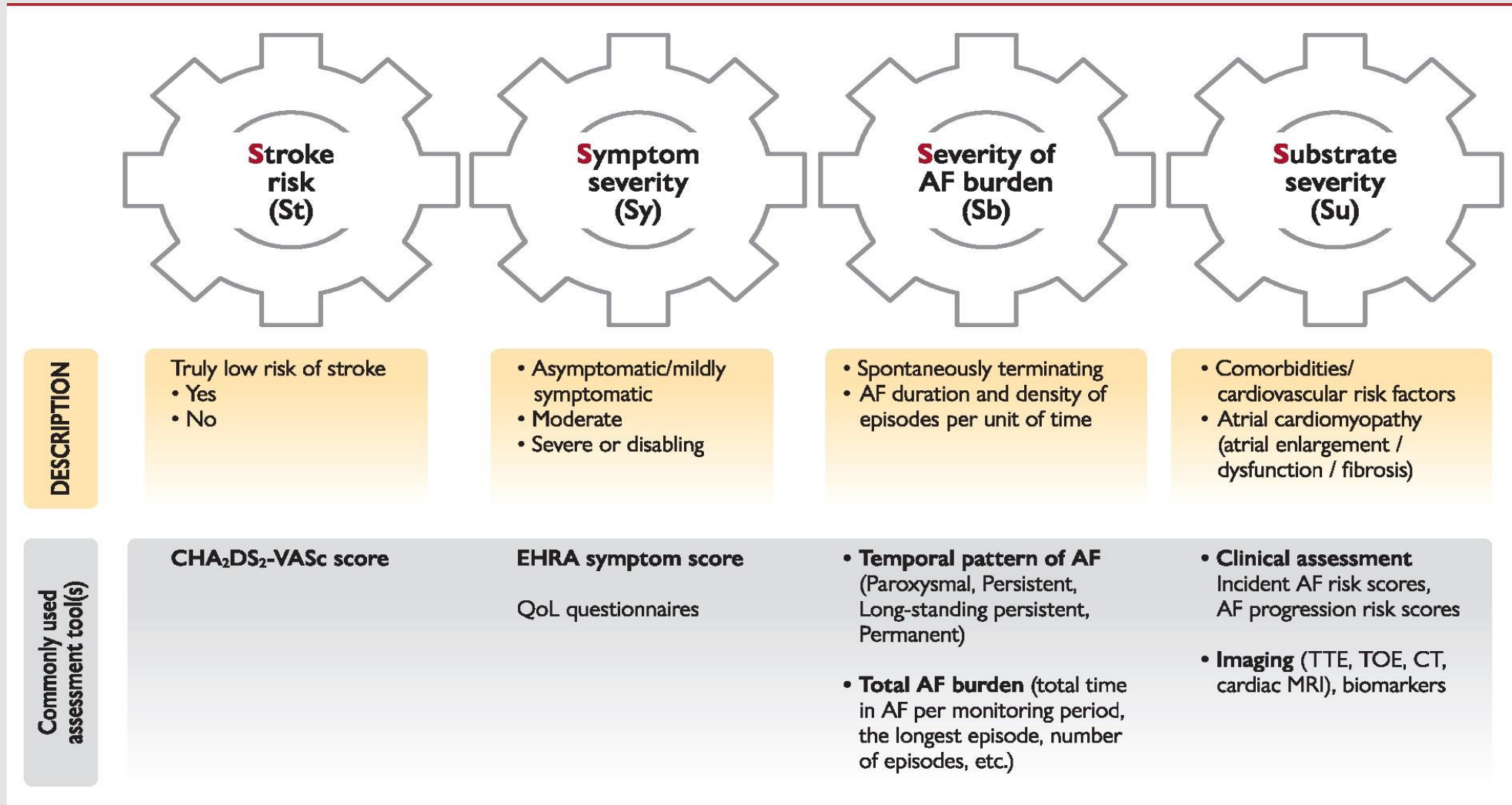
AIOS CARDIOTHORACALE CHIRURGIE

ST ANTONIUS
een santeon ziekenhuis

INHOUD

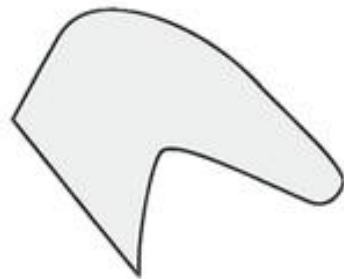
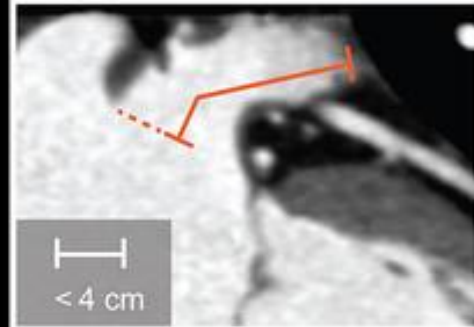
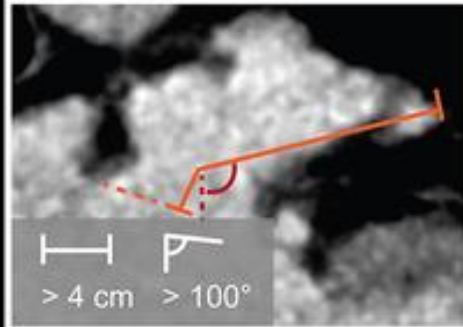
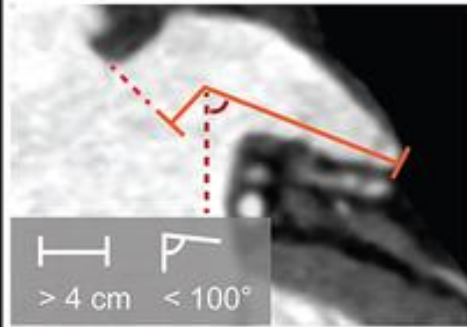
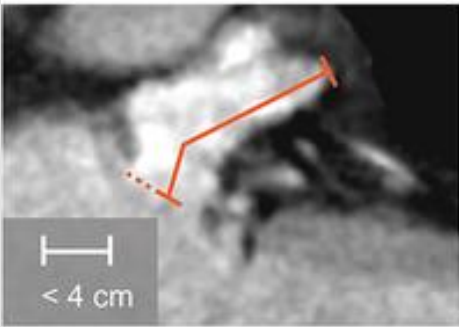
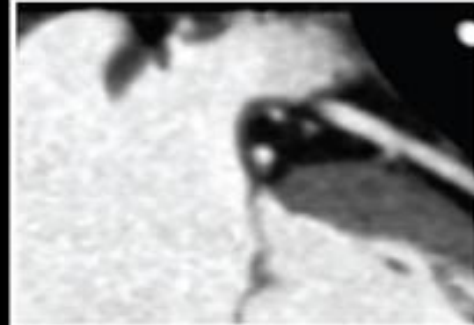
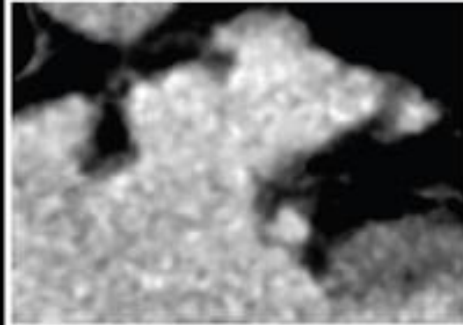
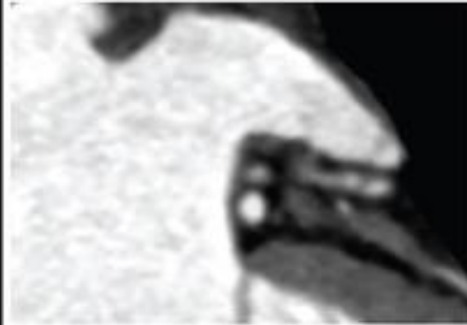
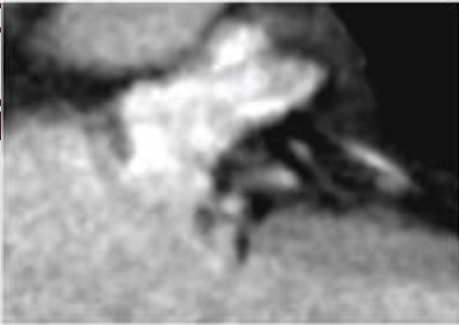
- Behandeling AF
- Stroke preventie - Het linker hartoor
- Ritme controle - Chirurgie
 - (Concomitante) MAZE
 - Mini-MAZE
- Resultaten

BEHANDELING



PRE

- Si
- St
- Bi



e

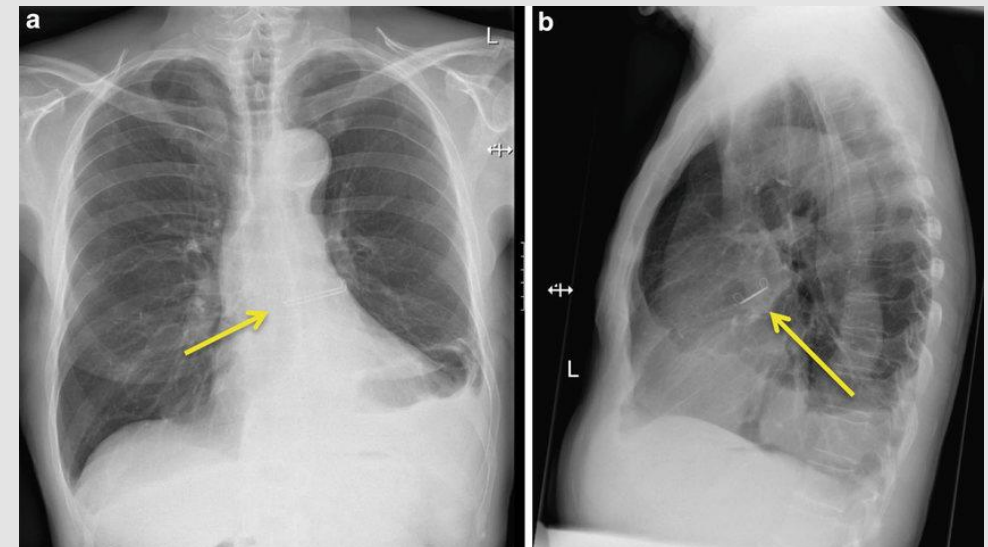
PREVENTIE VAN BEROERTE – LINKER HARTOOR (LAA)

- OAC (*CHA2DS2-VASc* >1 bij mannen of >2 bij vrouwen)
- LAA-clip:
 - Bij contra-indicatie voor OAC
 - Bij patiënten met AF die cardiochirurgie ondergaan
 - Als onderdeel van de ritmebehandeling



Letter	Risk factor	Score
C	Congestive heart failure/LV dysfunction	1
H	Hypertension	1
A ₂	Age ≥75	2
D	Diabetes mellitus	1
S ₂	Stroke/TIA/thrombo-embolism	2
V	Vascular disease*	1
A	Age 65–74	1
S	Sex category (i.e., female sex)	1
Maximum score		9

Congestive heart failure/LV dysfunction means LV ejection fraction ≤40%. Hypertension includes the patients with current antihypertensive medication. *Prior myocardial infarction, peripheral artery disease, aortic plaque. LV: left ventricular, TIA: transient ischemic attack

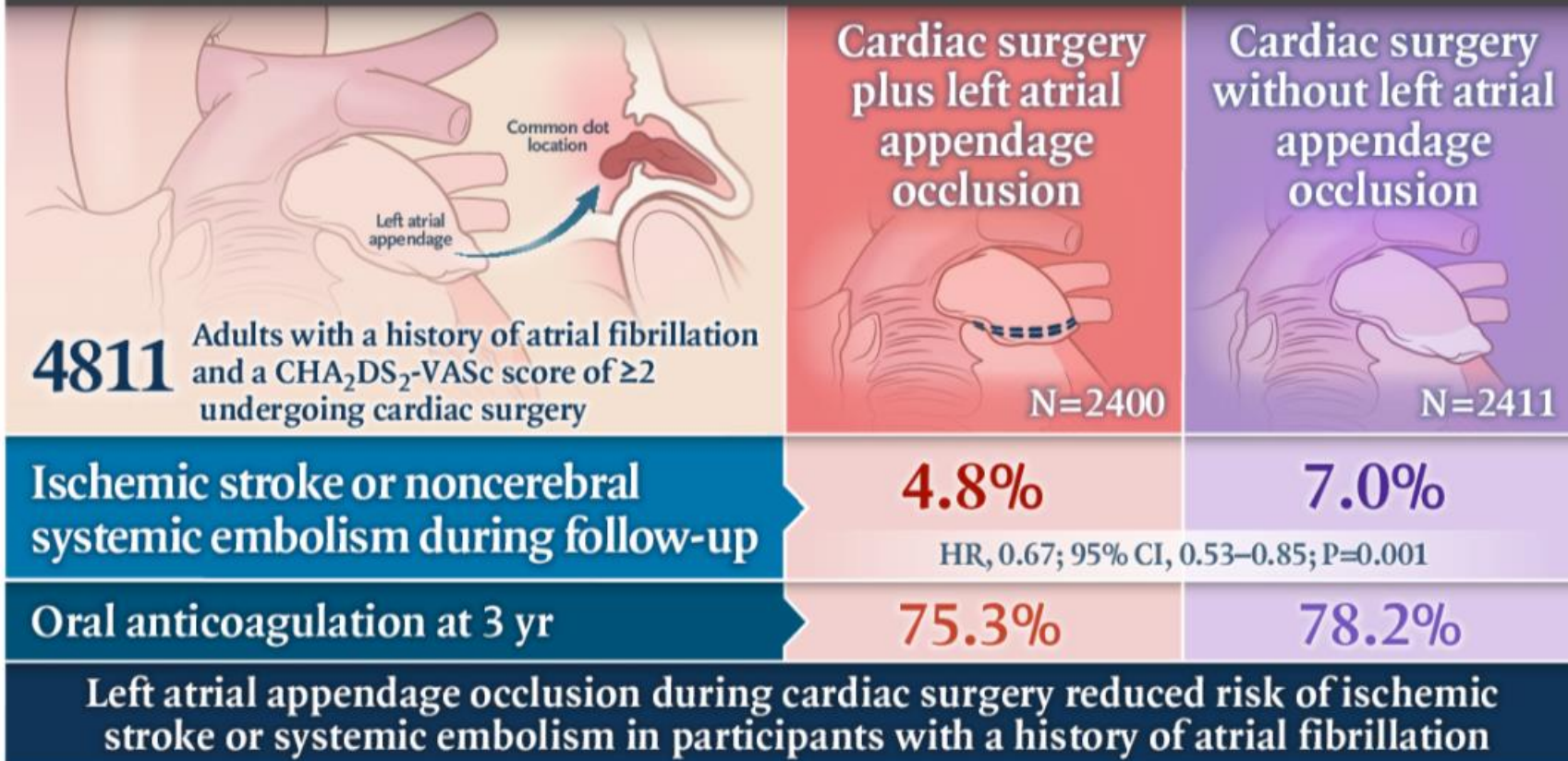


PREVENTIE VAN BEROERTE – LINKER HARTOOR (LAA)

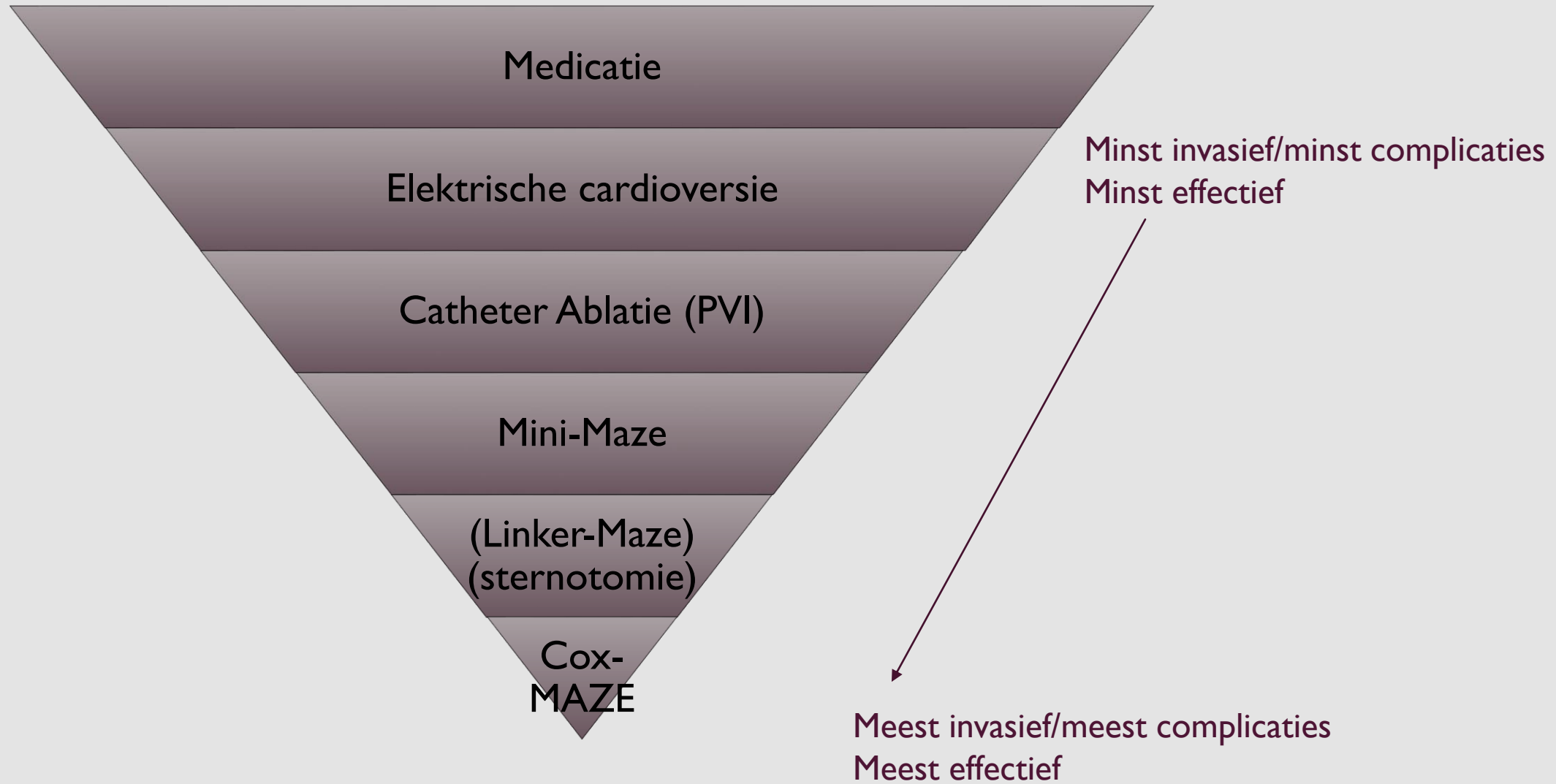
The NEW ENGLAND JOURNAL of MEDICINE

Left Atrial Appendage Occlusion during Cardiac Surgery to Prevent Stroke

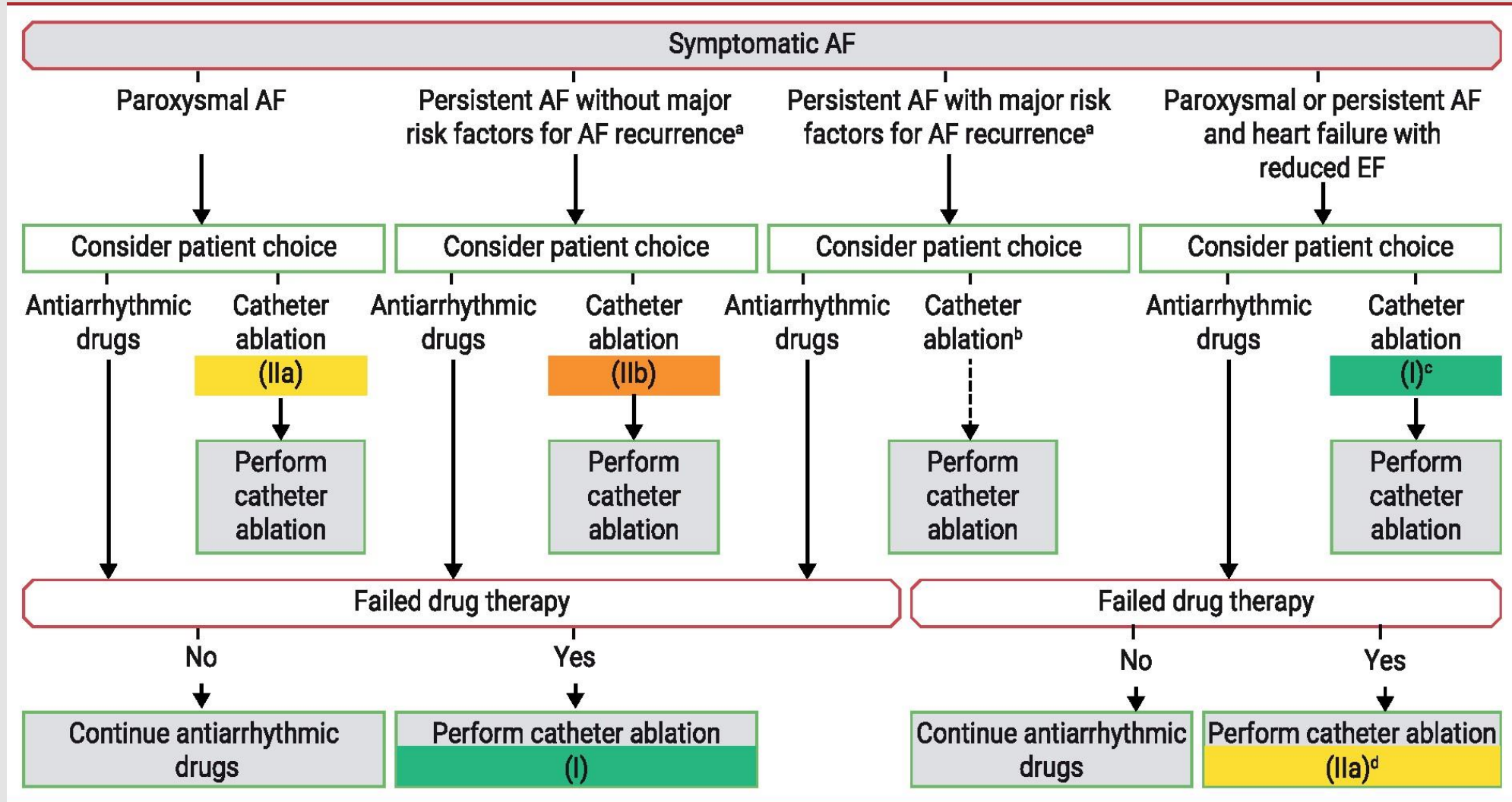
MULTICENTER, RANDOMIZED, CONTROLLED TRIAL



RITME CONTROLE



RITME CONTROLE = VOOR SYMPTOMEN



BEHANDELING – INDICATIES CHIRURGIE

Recommendations	Class ^a	Level ^b
Concomitant AF ablation should be considered in patients undergoing cardiac surgery, balancing the benefits of freedom from atrial arrhythmias and the risk factors for recurrence (left atrial dilatation, years in AF, age, renal dysfunction, and other cardiovascular risk factors). ^{461,843,857–859}	IIa	A
Thoracoscopic—including hybrid surgical ablation—procedures should be considered in patients who have symptomatic paroxysmal or persistent AF refractory to AAD therapy and have failed percutaneous AF ablation, or with evident risk factors for catheter ablation failure, to maintain long-term sinus rhythm. The decision must be supported by an experienced team of electrophysiologists and surgeons. ^{860,861}	IIa	B
Thoracoscopic—including hybrid surgical ablation—procedures may be considered in patients with persistent AF with risk factors for recurrence, who remain symptomatic during AF despite at least one failed AAD and who prefer further rhythm control therapy.	IIb	C

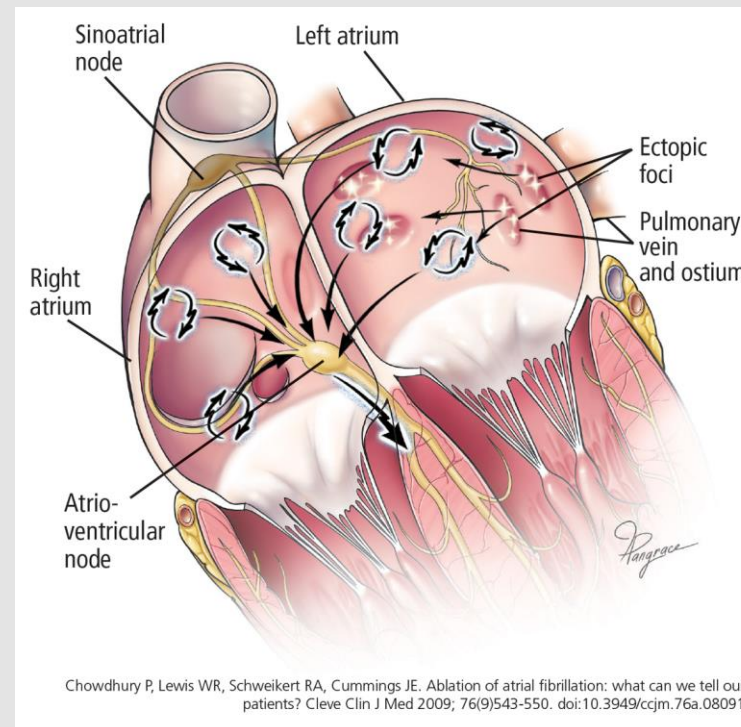
BEHANDELING

Doel= onderbreken van meest voorkomende macro-re-entry circuits

→ Pulmonaal venen

→ Creëren van **transmurale** laesie waardoor geen geleiding meer

→ Chirurgisch/snijden > Bipolair radiofrequentie > Cryoablatie en Unipolaire radiofrequentie



CHIRURGISCHE BEHANDELING: MAZE-OPERATIE

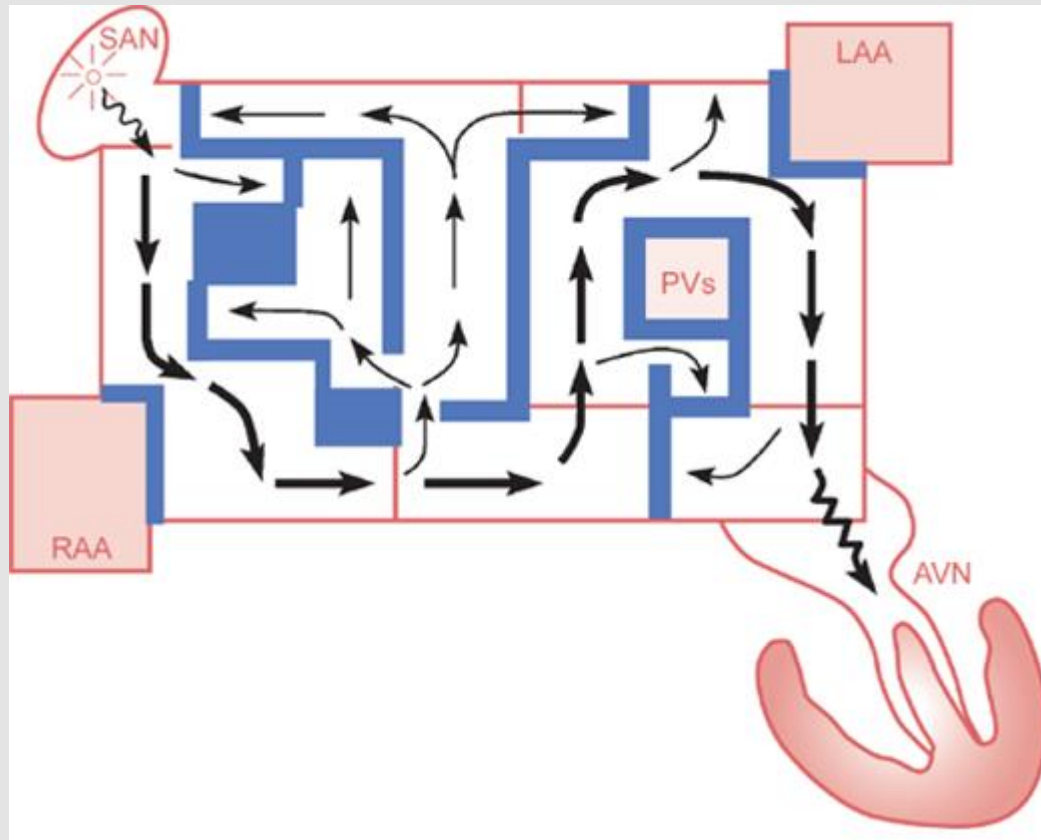
1987
original 'cut-
and-sew'
MAZE



1995
Modified
Cox-MAZE
III



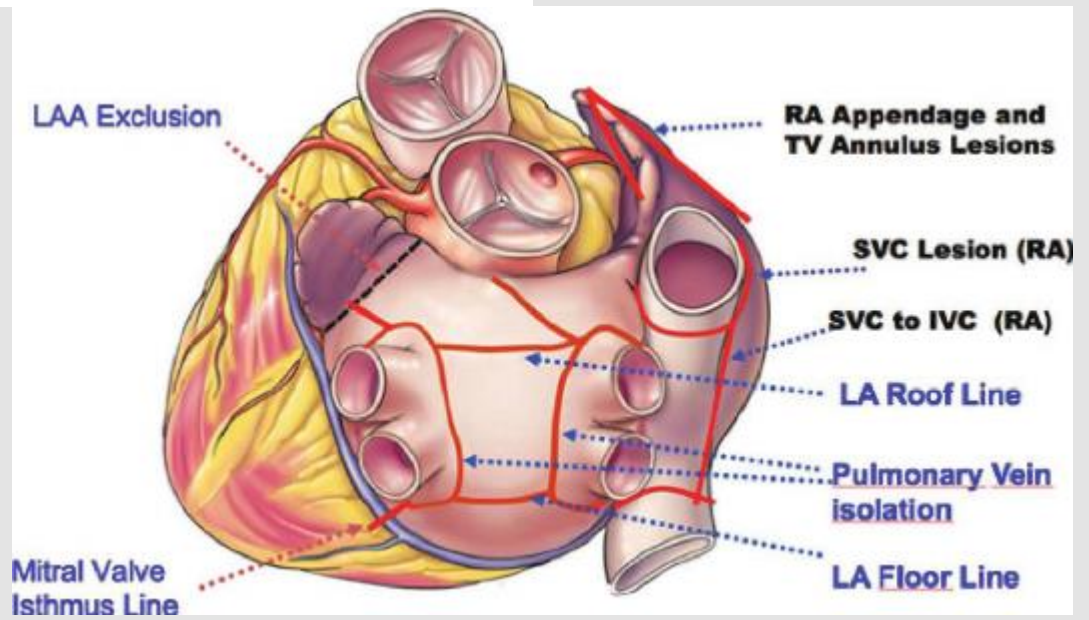
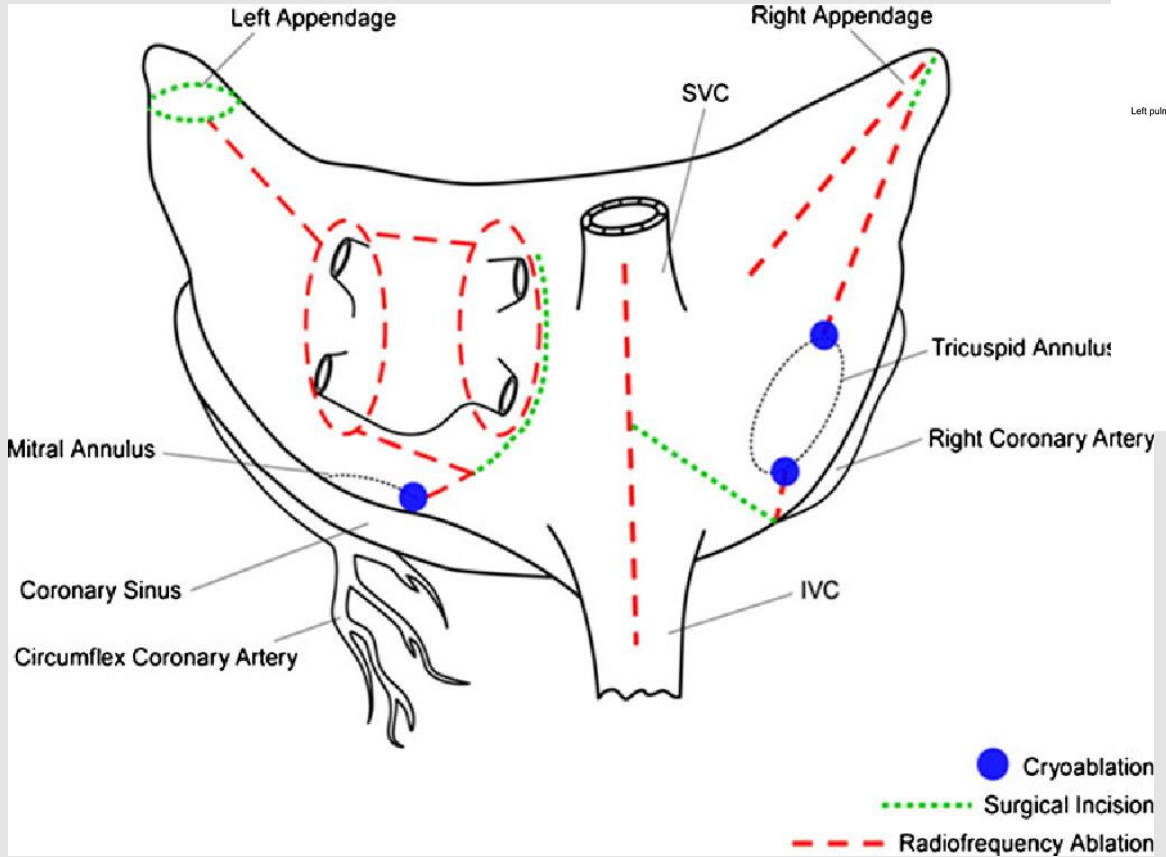
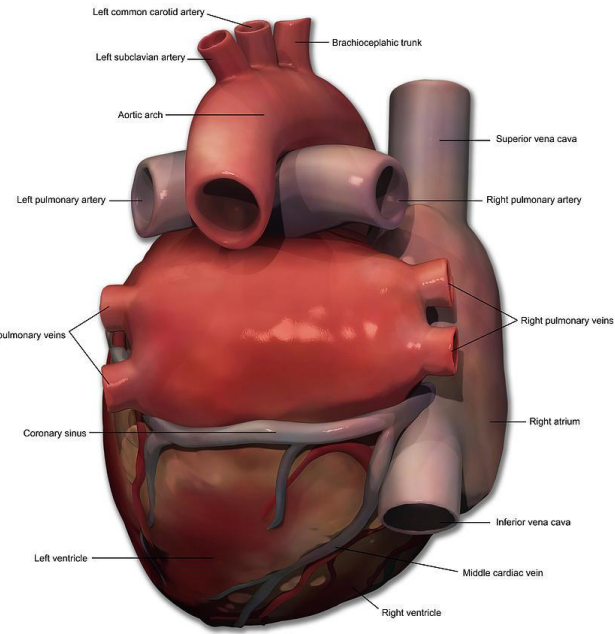
2002
Cox-MAZE
IV



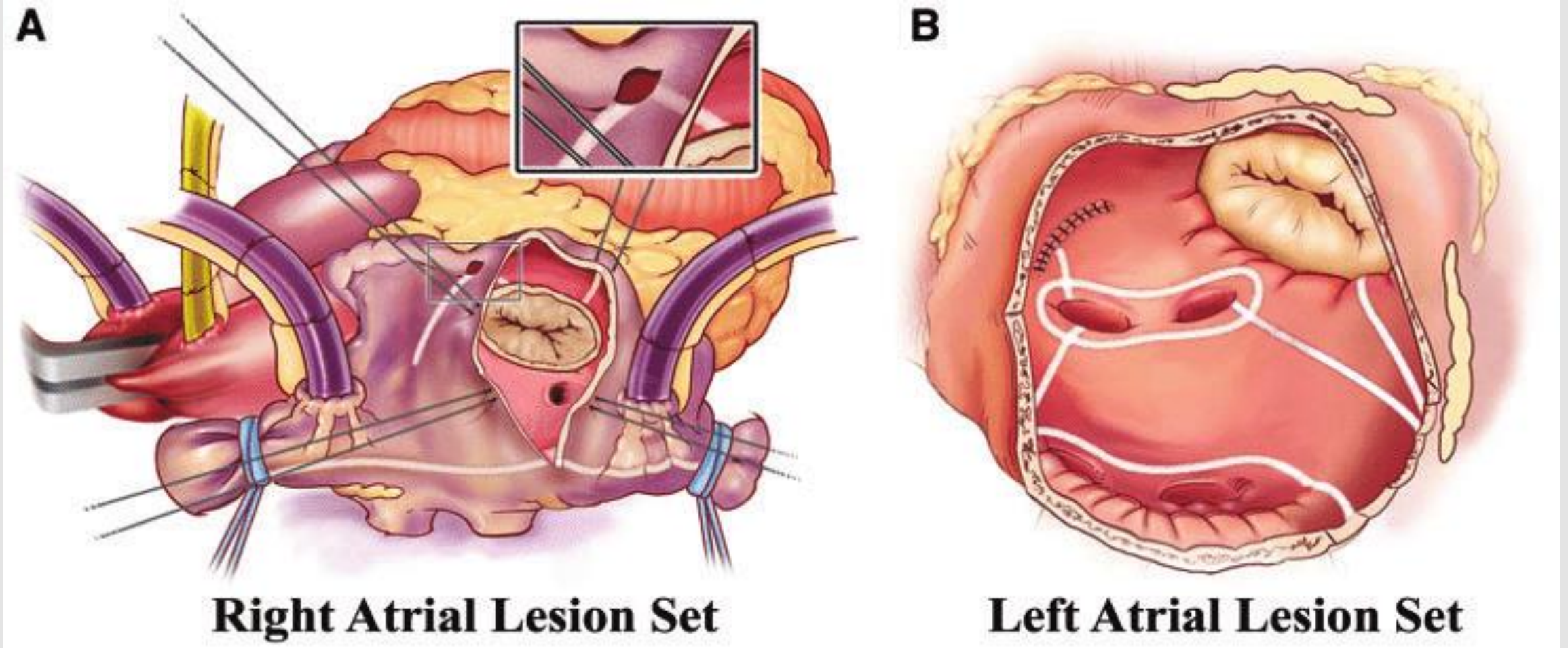
MAZE-IV

- Standaard lesieset
- combinatie 'cut-and-sew' en ablatie (cryo+RF) = kortere klemtijd
- 'Gouden standaard' in ritmechirurgie
- Pacemaker ratio hoog (6-21% bij biatriale-lesies)
- Lange procedure-/klemtijden
- Technisch complex

COX-MAZE IV - OPERATIE

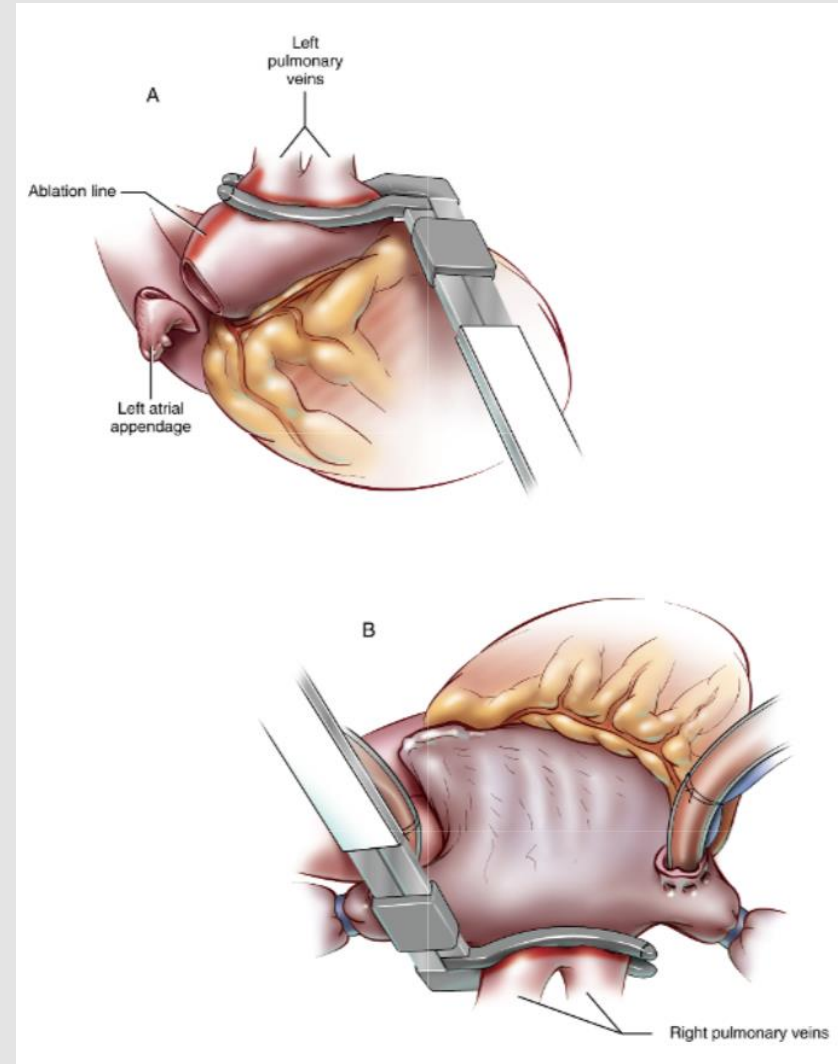


COX-MAZE IV - OPERATIE

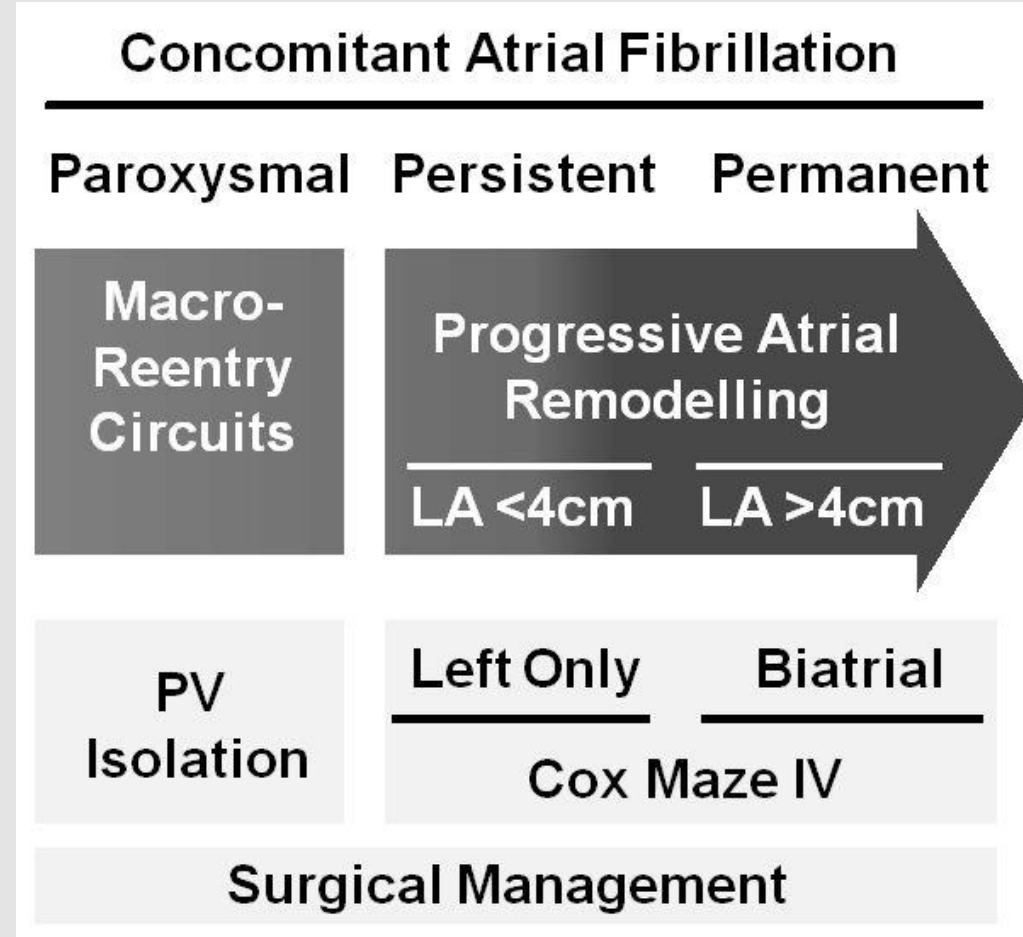
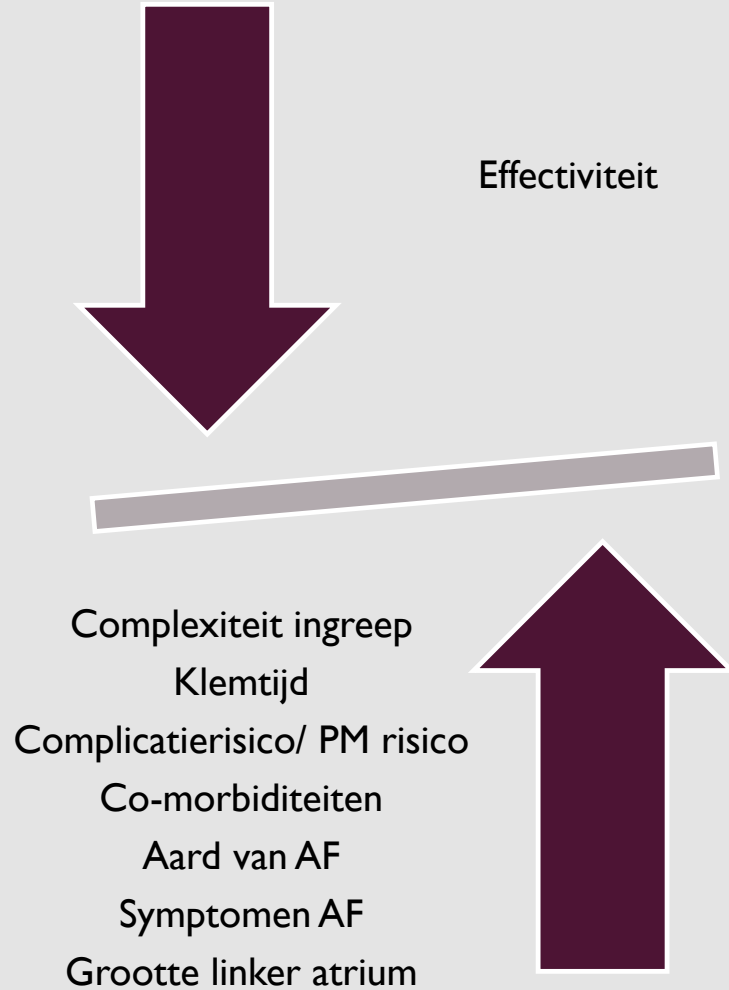


(CONCOMITANTE) LINKER-MAZE

- Linker PVI
- Rechter PVI
- Linker hartoorclip/amputatie
- +/- Roof line en floor line (box)
- +/- Isthmuslijn naar mitraliskleppannulus (openen atrium)



CONCOMITANTE RITMECHIRURGIE



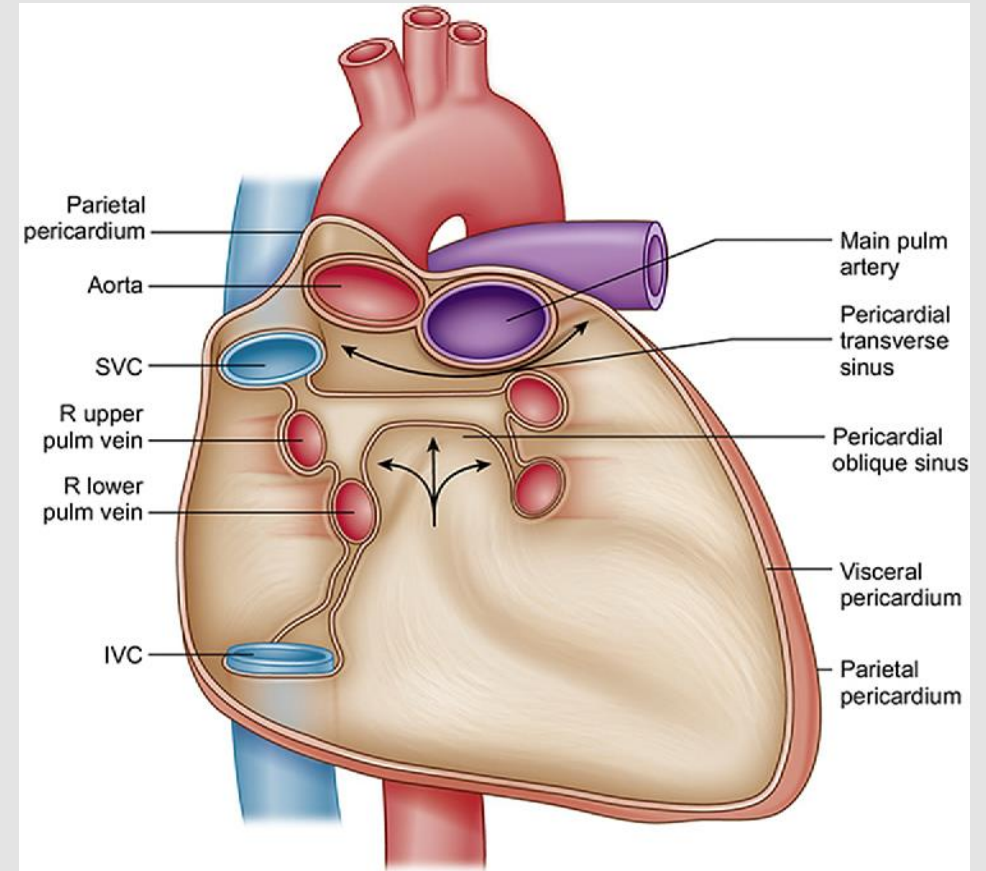
TOTAAL THORACOSCOPISCHE MAZE (MINI-MAZE)

1. Algehele narcose
2. Double lumen tube / bronchus blokker
3. Arteriële lijn
4. Centraal veneuze lijn
5. Urine catheter
6. TEE
7. Beach-chair liggende positie; armen naast lichaam
8. Defibrillatie pads
9. Geen (epicardiale of intraveneuze) pacemaker draad
10. Bair hugger (tot navel)
11. ECC standby in het OK
12. Sternotomie set met zaag aanwezig in het OK



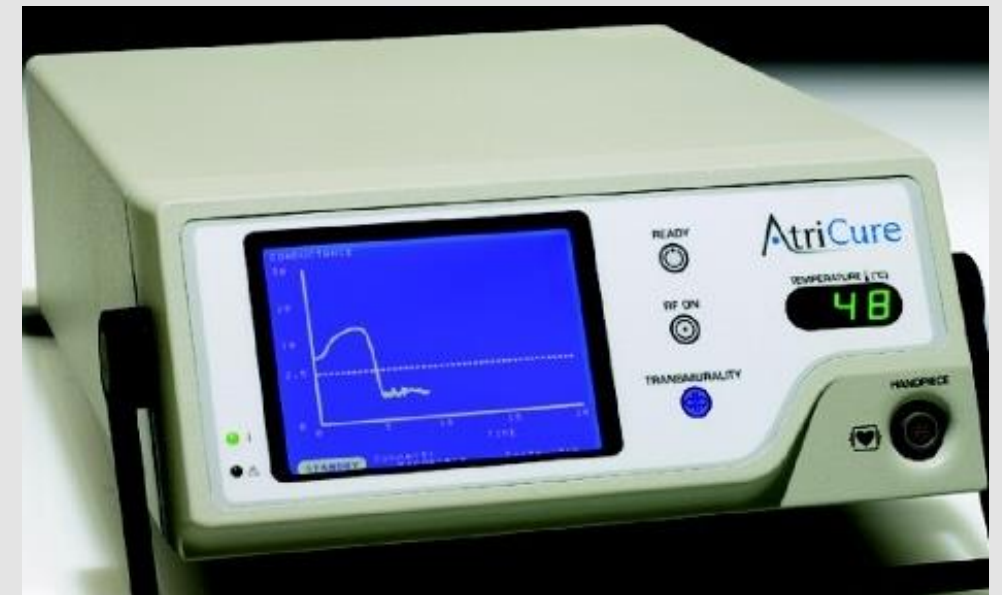
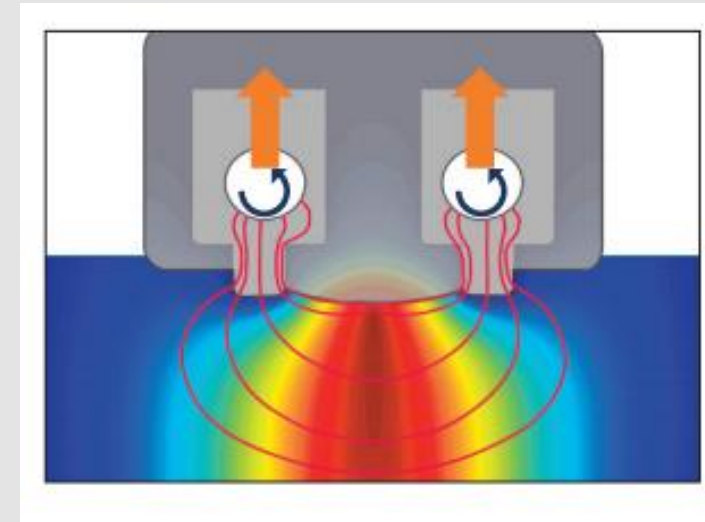
TOTAAL THORACOSCOPISCHE MAZE (MINI-MAZE) – DEEL I

1. Deflatie rechter long
2. Plaatsen trocars + CO₂-insufflatie
3. Openen pericardium + plaatsen weghechtingen
4. Openen ruimte achter vena cava inferior
5. Openen sinus obliquus + transversus
6. Ontwikkelen van interatriale groeve (Waterston)



TOTAAL THORACOSCOPISCHE MAZE (MINI-MAZE) – DEEL 2

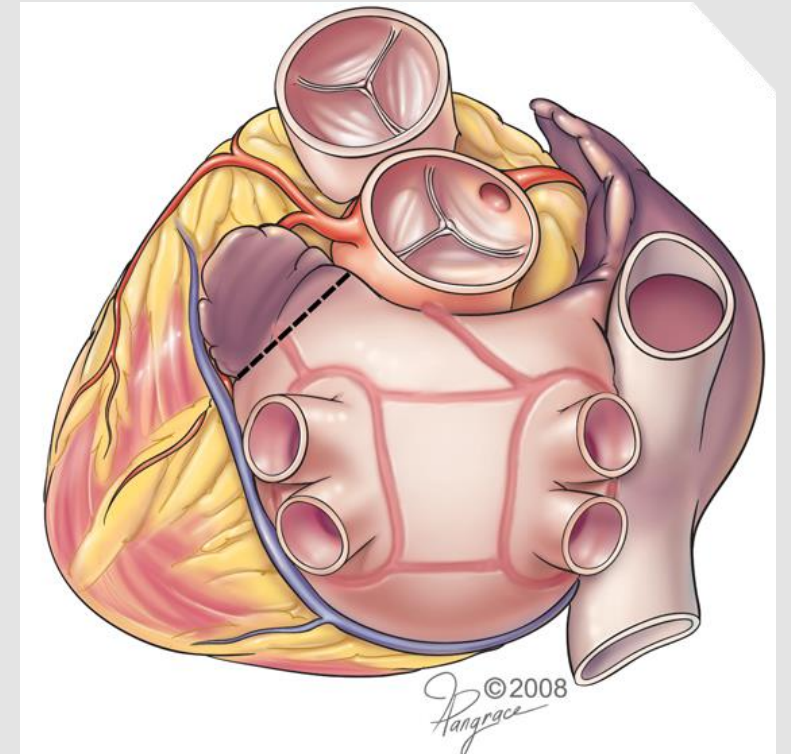
- Lumitip light dissector en omteugelen
- PVI rechts: 5-10x klemmen, conductantie <math>< 5s</math>
(= $1/\text{impedantie}$)
- Unipolaire lijnen met Coolrail (power <math>< 5s</math>), tot 20x (transmuraliteit!)
 1. Roof line
 2. Floor line (cave oesophagus, TTE terugtrekken)



TOTAAL THORACOSCOPISCHE MAZE (MINI-MAZE) – DEEL 3

- Eventueel Linker thoracoscopie (sinds 2019 via rechts)

1. Doornemen ligament van Marshall
(= ook mogelijk AF-substraat)
1. PVI links
2. LAA-clip
3. Controle van entry-/exit-block (25mA)



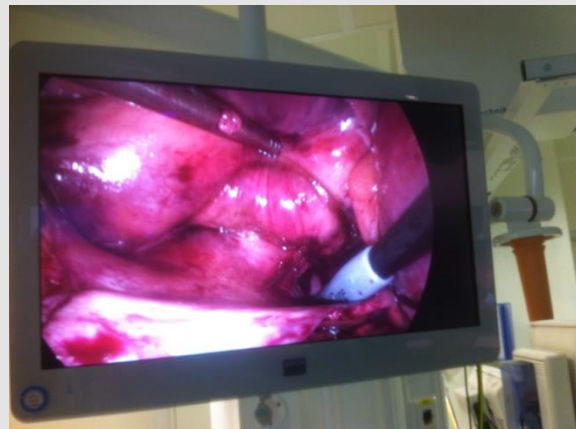
Eindpunt = Sinusritme + bidirectioneel block in box/longvenen

COMPLETE ELEKTRISCHE ISOLATIE = BIDIRECTIONONEEL BLOCK



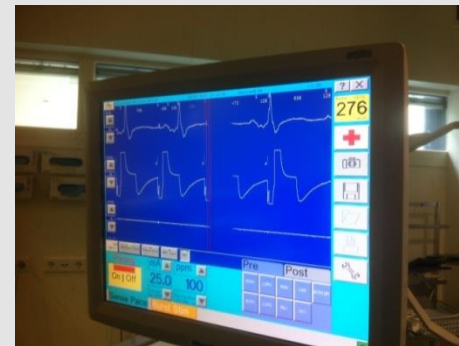
Before ablation

Clear atrial activity,
no entry block



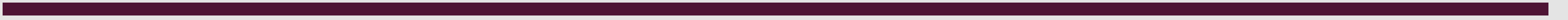
After ablation

No capture,
exit block



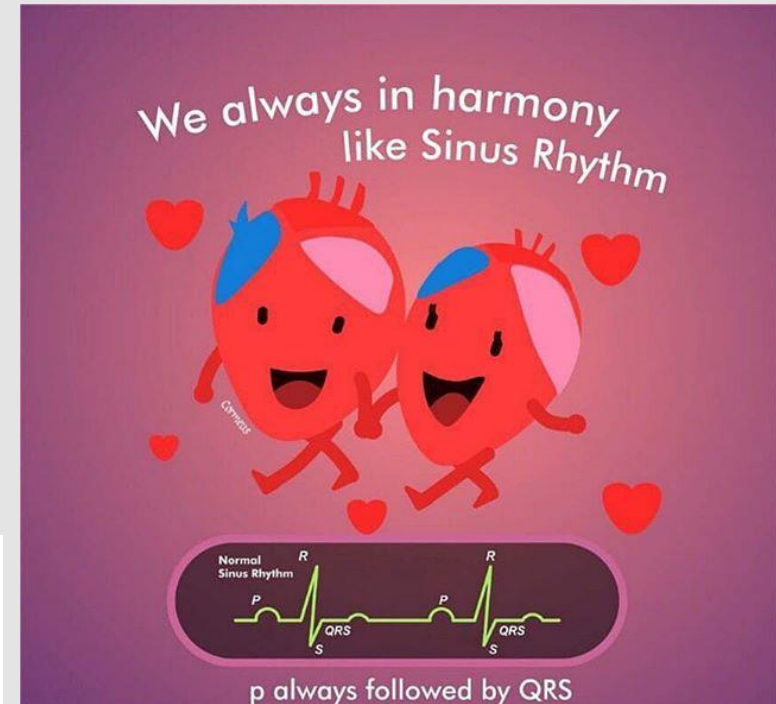
No atrial activity,
entry block





MINI-MAZE NABEHANDELING

- Extubatie op OK
- PACU: als xthorax ok, drains uit en naar afdeling
- Herstart OAC + thuismedicatie op dag +1
- Ontslag vanaf dag 3
- Follow-up
 - 4 weken cardioloog + chirurg
 - 3 maanden: CT linker hartoor
 - 6m + Jaarlijks: Holter (of continue monitoring Reveal)



RESULTATEN

- **Cox Maze IV:** 96% freedom from AF at 5-y (n=198) (*J Thorac Cardiovasc Surg.* 2003 Dec;126(6):1822-8.)
85% freedom from symptomatic AF at 10-y (*Circulation:Arrhythmia and Electrophysiology.* 2012;5:8–14.)

- **Concomitant Ablation:** 70% freedom from AF at 1-y (*Europace* 2018;20. 1442-50.)

Meta-analyse 20 studies: No difference in postoperative complications, stroke or mortality

RESULTATEN

Interactive CardioVascular and Thoracic Surgery 24 (2017) 102–111
doi:10.1093/icvts/ivw311 Advance Access publication 23 September 2016

STATE-OF-THE-ART – ADULT CARDIAC

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The totally thoracoscopic maze procedure for the treatment of atrial fibrillation

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- **TT-MAZE: 78% na 1 jaar en 77% na 2 jaar**, vrij van ATA en anti-aritmica.
 - In-hospital complicaties: <3%
 - 14 studies, n=1171 patiënten, 2011-2016

COMPLICATIES

Table 5: Overall in-hospital complications

Type of in-hospital complication	n (%)
Conversion to sternotomy	10 (0.85)
Pacemaker implantation	9 (0.77)
Cerebrovascular event	4 (0.34)
Rethoracotomy	3 (0.26)
Death	3 (0.26)
Irreversible phrenic nerve paralysis	2 (0.17)
Reintubation due to respiratory insufficiency	1 (0.09)
Pulmonary embolism	2 (0.17)
Pneumonia	1 (0.09)
Overall complication rate	35 (2.9)

Table 3 Endpoints for thoracoscopic and catheter ablation

Outcomes	Thoracoscopic ablation (N = 61)	Catheter ablation (N = 63)
All-cause mortality	4 (7%)	5 (8%)
Cardiovascular death	1 (2%)	4 (6%)
Non-cardiovascular death	2 (3%)	0 (0%)
Unknown cause of death	1 (2%)	1 (2%)
Myocardial infarction	1 (2%)	0 (0%)
Cerebrovascular event ^{a,b}	5 (8%)	6 (10%)
Stroke	4 (7%)	2 (3%)
Transient ischaemic attack	2 (3%)	4 (6%)
Intracranial haemorrhage	0 (0%)	1 (2%)
Bleeding requiring transfusion or surgery	0 (0%)	1 (2%)
Permanent pacemaker implantation	6 (10%)	3 (5%)



ESC

European Society of Cardiology

Europace (2019) 21, 746–753

doi:10.1093/europace/euy325

CLINICAL RESEARCH

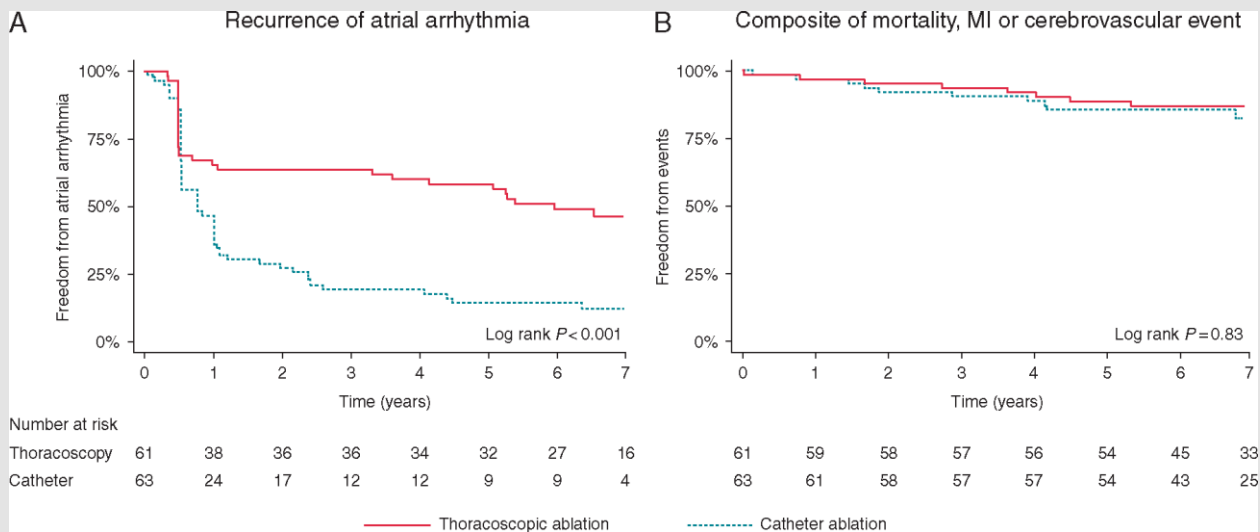
Ablation for atrial fibrillation

Thoracoscopic vs. catheter ablation for atrial fibrillation: long-term follow-up of the FAST randomized trial

Manuel Castellá^{1*}†, Dipak Kotecha^{2†}, Charlotte van Laar³, Lisette Wintgens³, Yakir Castillo¹, Johannes Kelder³, David Aragon¹, María Nuñez¹, Elena Sandoval¹, Aina Casellas⁴, Lluís Mont⁵, Wim Jan van Boven⁶, Lucas V.A. Boersma^{3,6}, and Bart P. van Putte^{6,7}

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Received 3 August 2018; editorial decision 28 December 2018; accepted 2 January 2019; online publish-ahead-of-print 30 January 2019



Arrhythmia recurrence was common at mean follow-up of 7.0 years, but substantially lower with thoracoscopic ablation: 34/61 (56%) compared with catheter ablation 55/63 (87%).

Thoracoscopic surgical ablation or catheter ablation for patients with atrial fibrillation? A systematic review and meta-analysis of randomized controlled trials

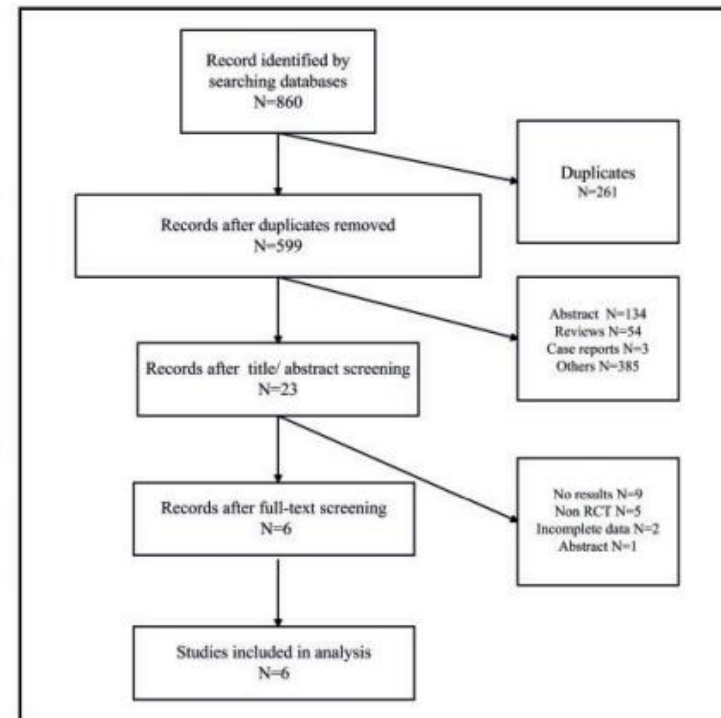
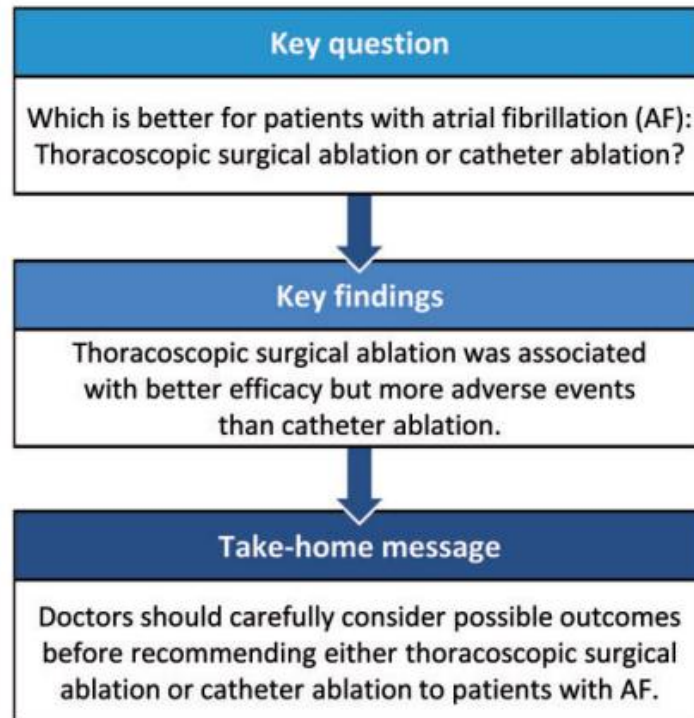
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VRAGEN?