



MiniMaze: New Surgical Operation for Lone Atrial Fibrillation

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INTRODUCTION: Sinus Rythm: definition

1. Sino-atrial (SA) node:

- Group of cells at the border right atrium-superior caval vein
- Electrical depolarization in a spontaneous regular way
- Electrical wave travels through both atria
- Contraction of both atria

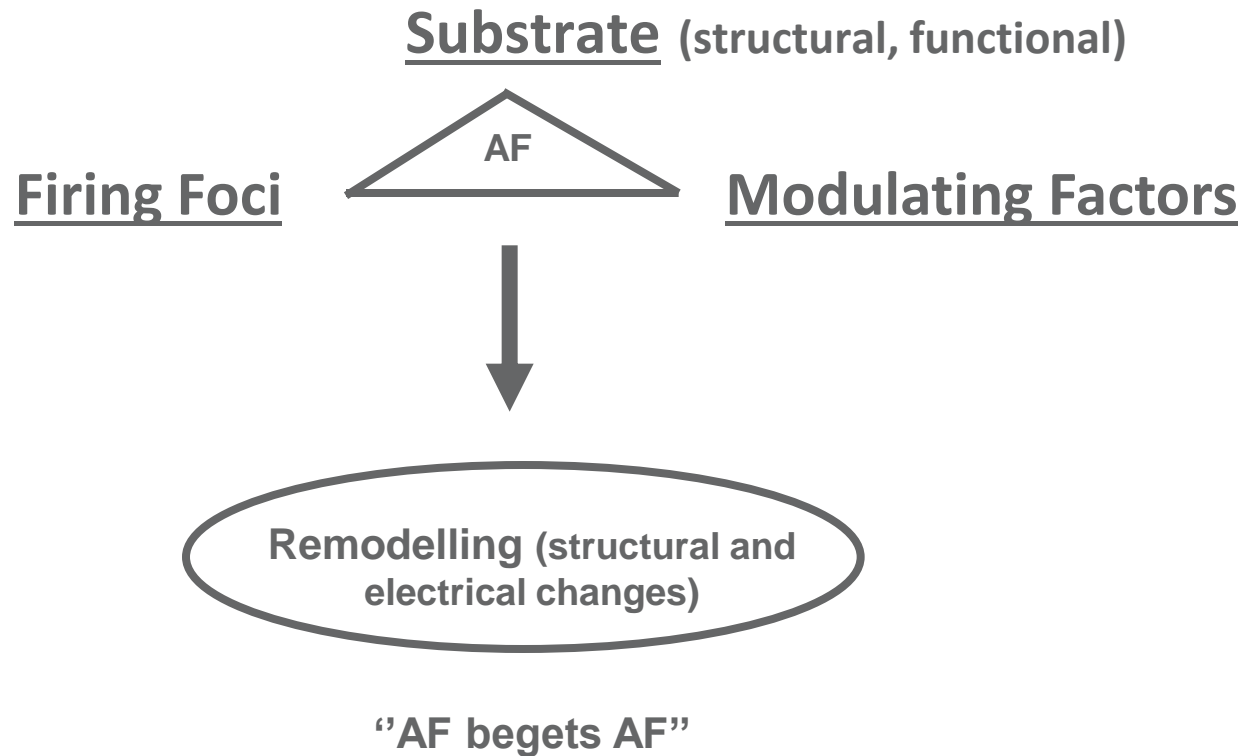
2. Atrioventricular (AV) node:

- Group of cells located at the membranous septum
- Activated by the electrical wave from the atrial
- Electrical wave travels through His' Bundel
- Contraction of both ventricals

Introduction: Atrial Fibrillation (AF): definition

1. **Electrical activity does not start in the SA node**
2. **Initiating groups of cells (≥ 2 foci) near the left/right antrum**
3. **Rapid and dysorganised conduction through both atria**
4. **Both atria are fibrillating**
5. **Irregular and fast depolarization of the AV node**
6. **Irregular and fast response contraction rate of both ventricles**

Atrial Fibrillation (AF): Mechanisms



Atrial Fibrillation: types

1. Paroxysmal
2. Persistent
3. Long-standing persistent

Atrial Fibrillation (AF): etiology

1. Lone AF:

Hypertension

Obesitas

Lung disease, diabetes

Stress, alcohol

Inflammation

2. Concomitant AF:

Coronary artery disease

Valvular disease

Cardiac failure

Atrial Fibrillation (AF): epidemiology and symptoms

- **1.9 x higher life-long mortality**
(Framingham study: *Circulation* 1999;98:946)
- **Life-time risk: 10-20%**
- **Symptomen: hartkloppingen, moe**
- **Gezondheidsrisico: thrombo-embolie**
- **Behandeling: ritmemedicatie, antistolling, ECV**

Intervention for the treatment of AF

- **Cox Maze 3/4: 96% freedom from AF at 5-y**
(J Thorac Cardiovasc Surg. 2003 Dec;126(6):1822-8.)
- **Catheter ablation: 47% freedom from AF at 5-y**
(Circulation. 2010 Dec 7;122(23):2368-77.)

Invasive and effective vs Less invasive and effective

Invasive and effective vs Less invasive and effective

Why:

1. Completeness of lines
2. Transmurality: uni- versus bipolar devices
3. Number of lines
4. Ganglion ablation
5. Substrate treatment

PVI through double thoracotomy

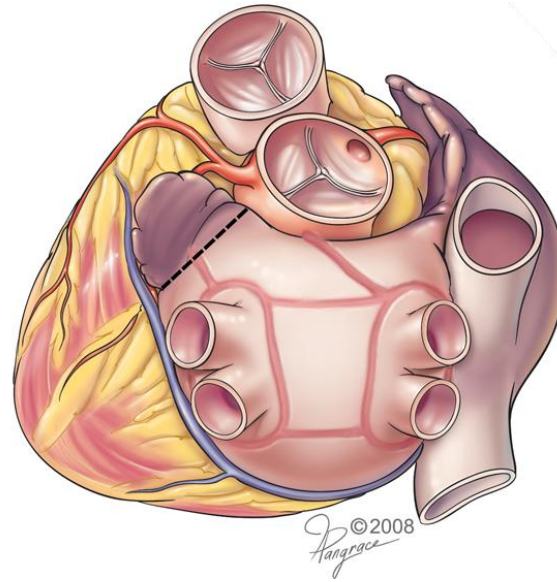
(Wolf RE et al)



MiniMaze

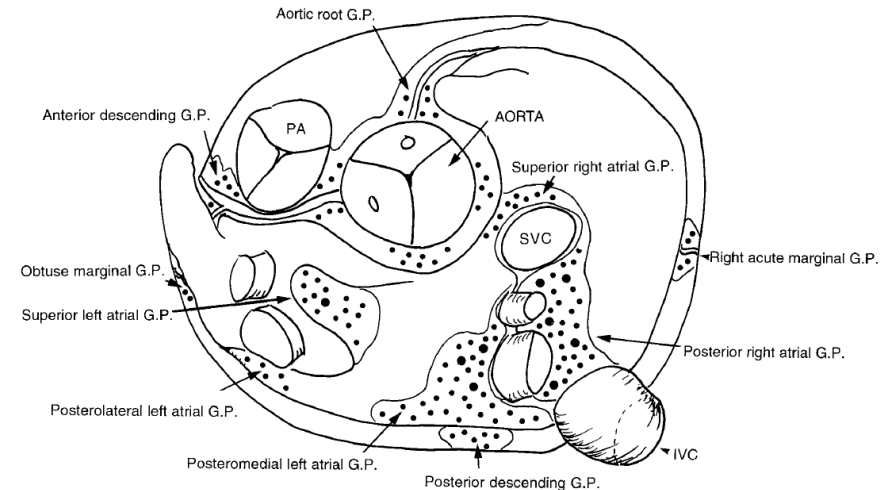
(Yilmaz A, Van Putte BP, Van Boven WJ. J Thorac Cardiovasc Surg. 2008;136(2):521-2).

MiniMaze

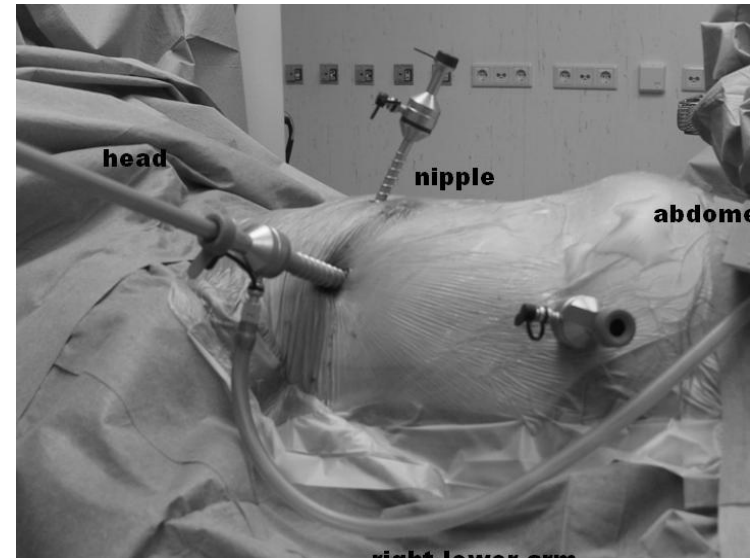


Summary of the MiniMaze:

1. PVI
2. Roof line + bottom line
3. Trigonum line
4. Ganglion ablation
5. Left auricle amputation
6. Bidirectional block of the box/PVI (25 mA!)
7. Bicaval line



Minimize: OR positioning





How the ablation works:

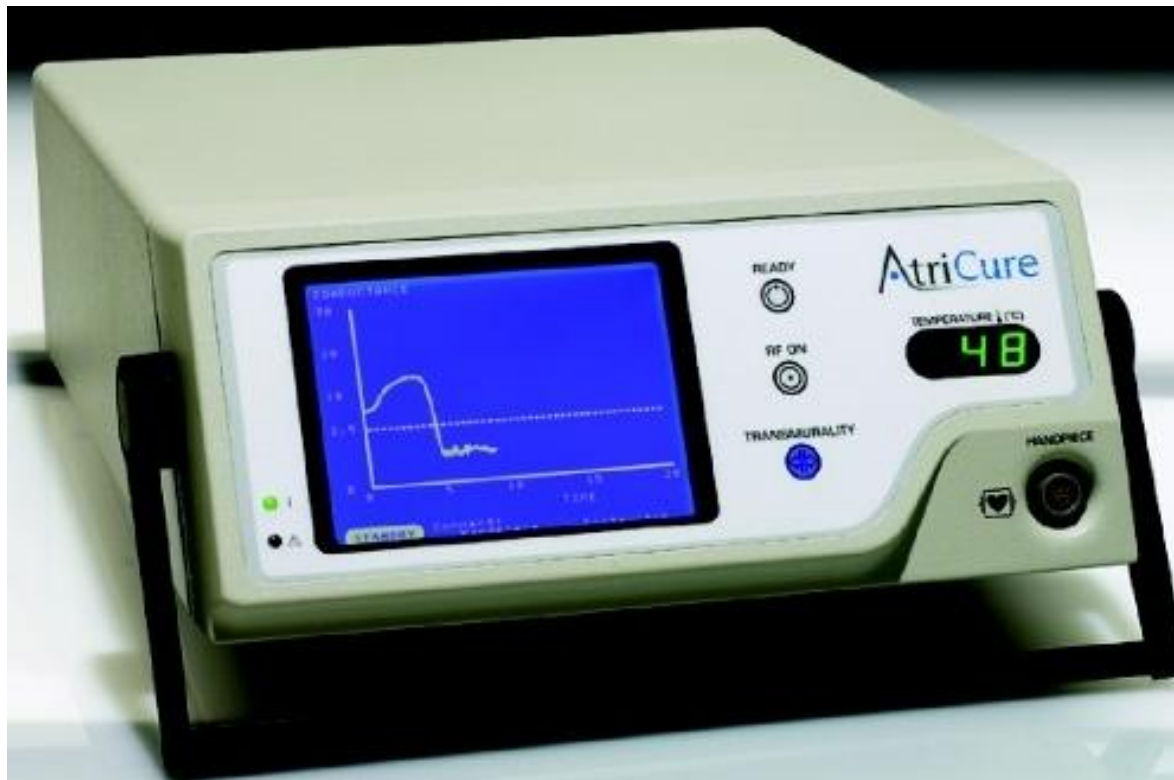
From Radiofrequent Ablation (RF) to Transmural Scar

1. RF results in local heatening of the tissue
2. Water diasappears out of the lines
3. Ablation lines = electrical barrier
4. Entry- and exitblock (25 mA) = “the end of the Minimaze”
5. Necrosis
6. Scar formation: edema!!: no electrical barrier: AF possible!!
7. After 12 months: transmural scar

How to determine Transmurality?

Conductance = $1/\text{resistance}$ in function of time

Bipolar clamp versus unipolar device



Breda Basic Parameters: (June 2011-February 2013, n=99)

Age (median \pm sdev)		61.2 \pm 8.5
Gender (m/f)		76/28
BMI		29.4 \pm 4.6
Duration AF		5.3 \pm 4.3
Type AF	Paroxysmal	46
	Persistent	41
	Long-standing persistent	11
Ablation in history		39
Number of ablations		1.4 \pm 0.5
Left atrial dimension		
LV ejection fraction	< 50%	1
	< 30%	2
CVA/TIA in history		11
Pacemaker in history		3
# anti-arithmetic drugs		2.0 \pm 0.6

Breda Results:

(June 2011-February
2013, n=99)

Operating time (min.)		161 ± 37 (79-269)	
Hospital stay (days)		4.0 ± 2.0 (1-13)	
AF at discharge		11 (first 43 pts)	
Complications	Sternotomy		0
	TIA/CVA		0
	Elevated hemidiaphragm		2
	Drainage hemothorax		1
	Drainage pneumothorax		1
	Pacemaker		1
	AICD		1
	Readmission	Pneumonia	2
		Pleural fluid	2
	Other		4

Literature

FAST trial:

- Minimaze versus Catheter ablation (n=124)
- LA dilatation or failed ablation in the history
- Freedom from AF: 36.5% (cath) vs 65.6% (maze) (P=0.0022)

([Circulation](#). 2012 Jan 3;125(1):23-30. Epub 2011 Nov 14.)

Hybrid approach:

- Minimaze with epicardial EP control (n=31)
- Paroxysmal and non-paroxysmal AF
- Freedom from AF: 86% (after 1 year)

([Circ Arrhythm Electrophysiol](#). 2011 Jun;4(3):262-70. Epub 2011 Apr 14.)

Questions?

