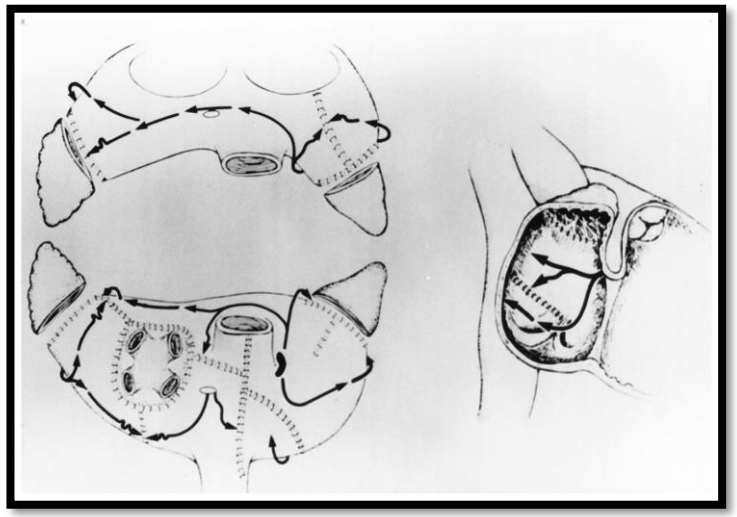
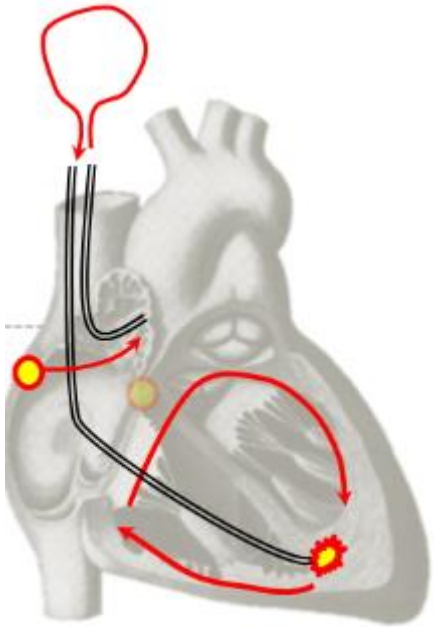
- CASE #3 AF with sinus nodal dysfunction -

AF ablation should be performed irrespective of pacemaker implantation





Ho Young Hwang

Professor

Seoul National University Hospital

Seoul National University College of Medicine

AF & Sick Sinus Syndrome

Treatment Goal of AF

Clinical Scenario

Summary

Sick Sinus Syndrome

- SSS (Sinus nodal dysfunction; SND)

Some Causes of Sinus Node Dysfunction

Underlying Heart Disease	Other Predisposing Factors	Reversible Causes
Coronary artery disease	Friedreich's ataxia	Atrial Fibrillation
Ischemic sino-atrial disease	Muscular Dystrophy	Atrial Flutter
Rheumatic heart disease	Collagen Disease	Acute Ischemia
Dilated cardiomyopathy	Amyloidosis	Pericarditis
Restrictive cardiomyopathy	Hemochromatosis	Myocarditis
Hypertrophic cardiomyopathy	Familial sinoatrial disease Muscular Dystrophy	Pneumonia

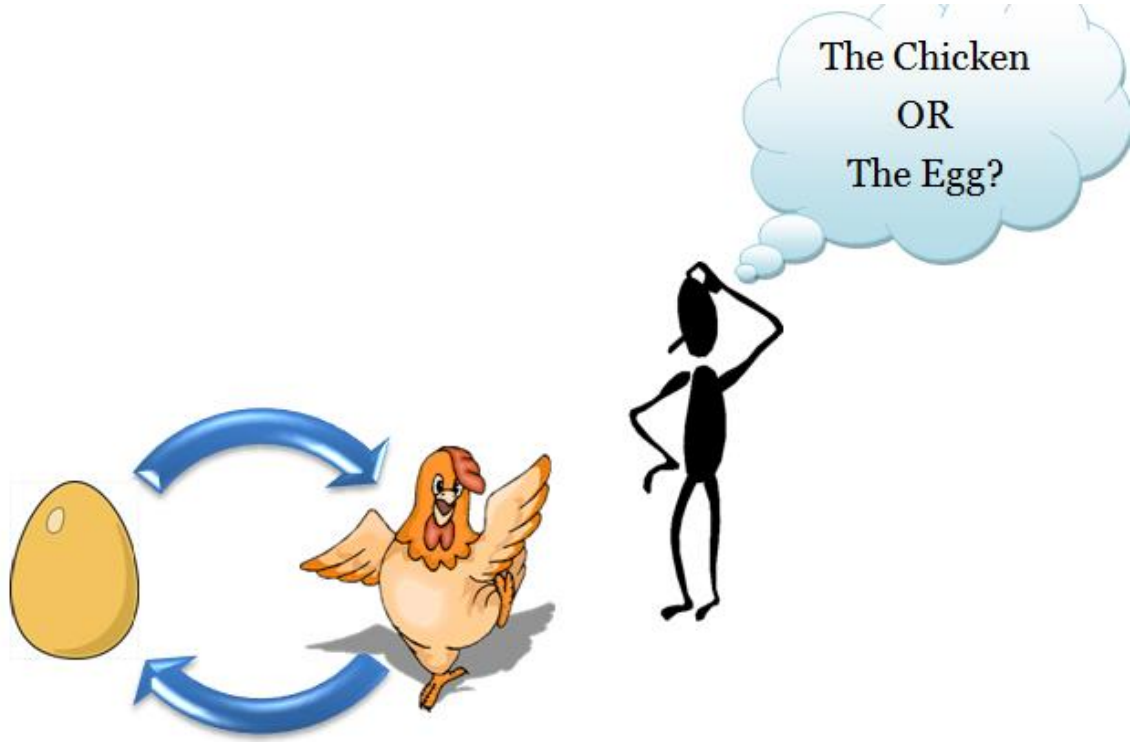
Ferrer MI. JAMA *1968*

Kezerashvili A. *J At Fibrillation 2008*

Tse G et al. Int J Mo Med 2017;39:519–526
Lamas GA, et al. Am Heart J 2000;140:541–551
Monfredi O, et al. J Mol Cell Cardiol 2015;83:88-100

Sick Sinus Syndrome & AF

- Cause or effect? (Chicken or Egg?)



Chang W. Herz 2022

Sick Sinus Syndrome Induces AF

- **AF** is the m/c accompanying arrhythmia in SSS (40-70%)
- SSS is associated w/ 4-fold increase in the risk of AF during 17Y f/u

- **Tachy-brady syndrome**: SSS accompanied by tachyarrhythmia (AF)

- Slow rate or pause – allowing other foci to mature & fire

Tse G et al. Int J Mo Med 2017;39:519–526
Lamas GA, et al. Am Heart J 2000;140:541–551

AF Induces SSS?

- Long-term overdrive **suppression of SN activity** by AF
- Electrical remodeling
- Changes in atrial substrate (structural remodeling)

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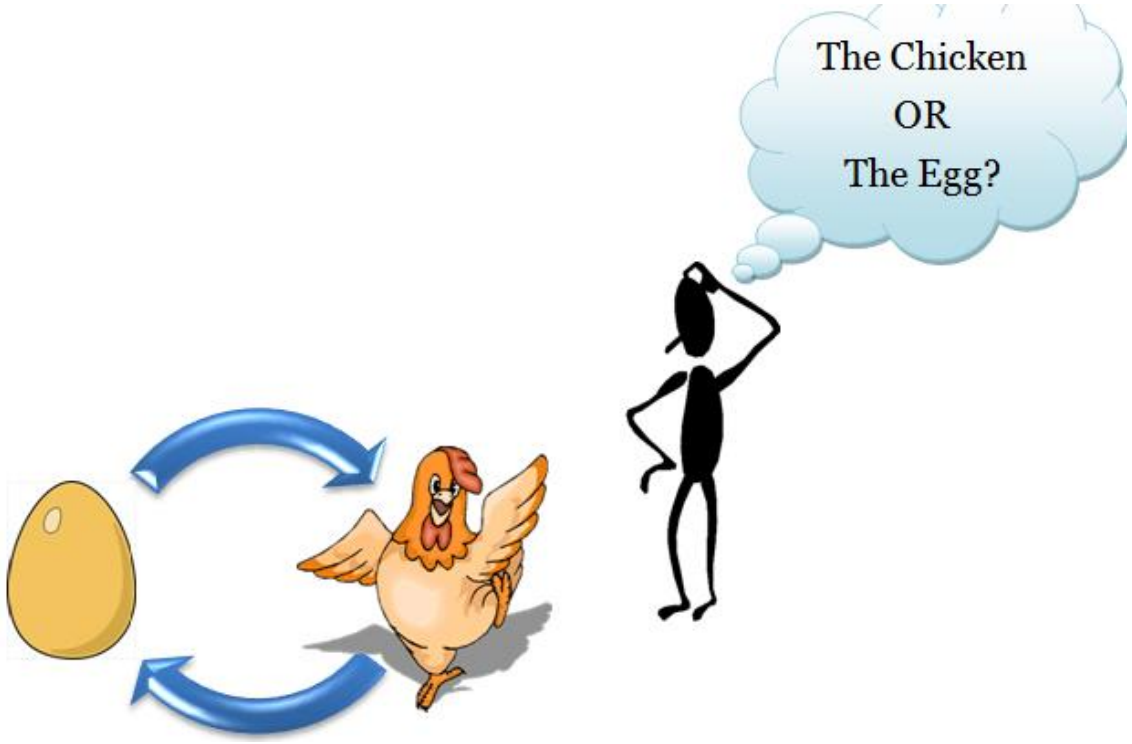
Tse G et al. Int J Mo Med 2017;39:519–526
Lamas GA, et al. Am Heart J 2000;140:541–551

Sick Sinus Syndrome & AF

- Cause or effect? (Chicken or Egg?)



Chang W. Herz 2022

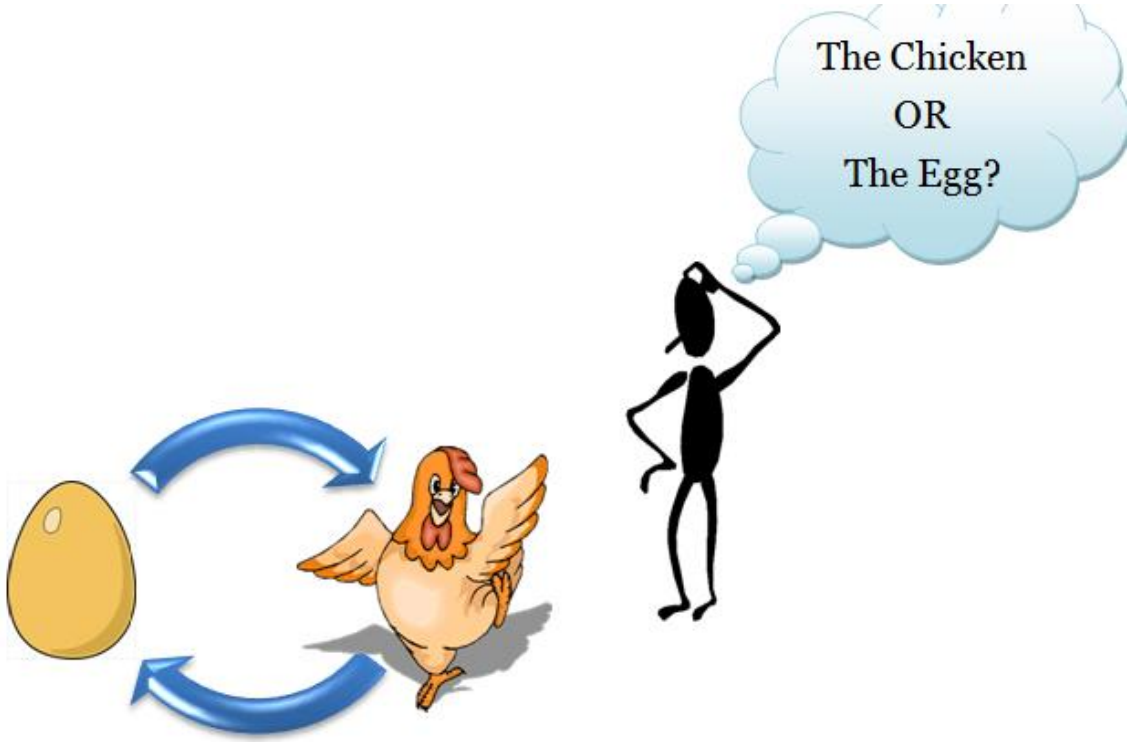
Tse G et al. Int J Mo Med 2017;39:519–526
Lamas GA, et al. Am Heart J 2000;140:541–551

Sick Sinus Syndrome & AF

- Cause or effect? (Chicken or Egg?)

→ **Coexistent**; similar structural abnormalities & etiologies

: **atrial myopathy (fibrosis)**



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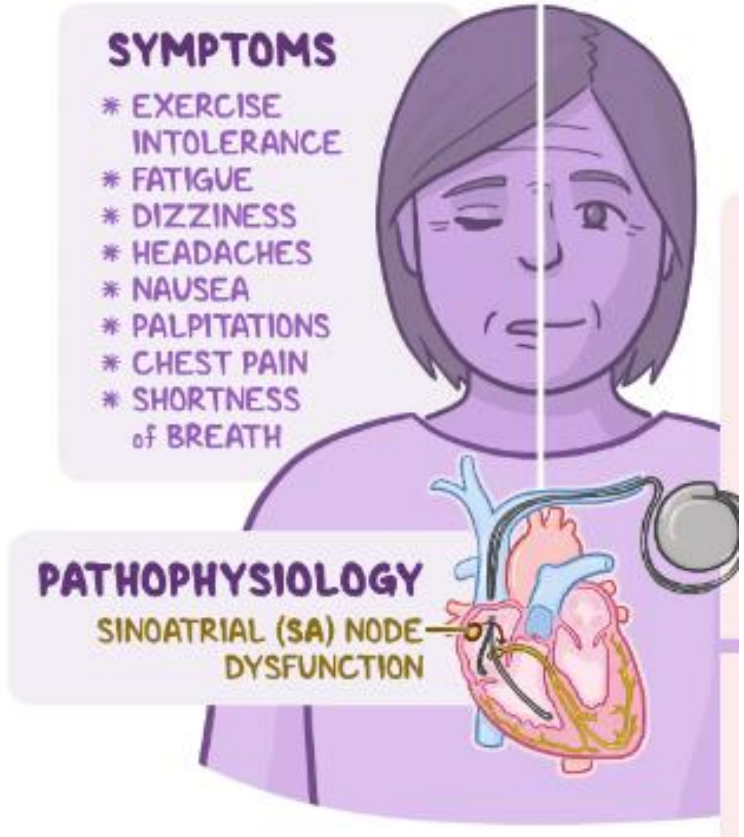
Lamas GA, et al. Am Heart J 2000;140:541–551

Sick Sinus Syndrome & AF

- Hemodynamic abnormality: End organ hypoperfusion
- Cerebral hypoperfusion m/c (50% of SSS pts): syncope / pre-syncope
- ***Chronotropic impotence***



AF & Sick Sinus Syndrome

Treatment Goal of AF

Clinical Scenario

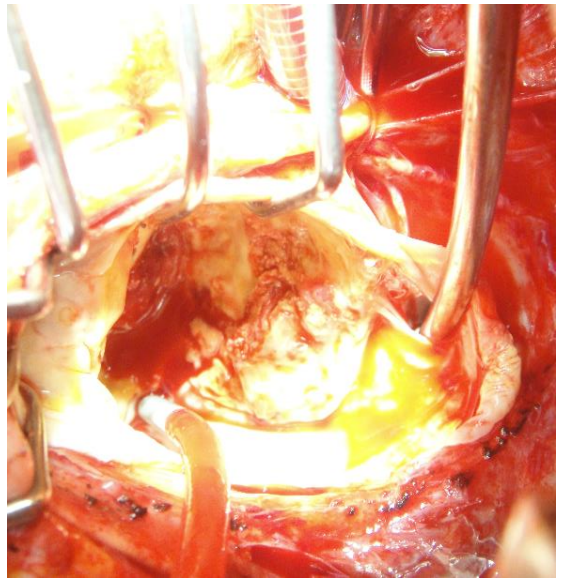
Summary

Sequelae of AF

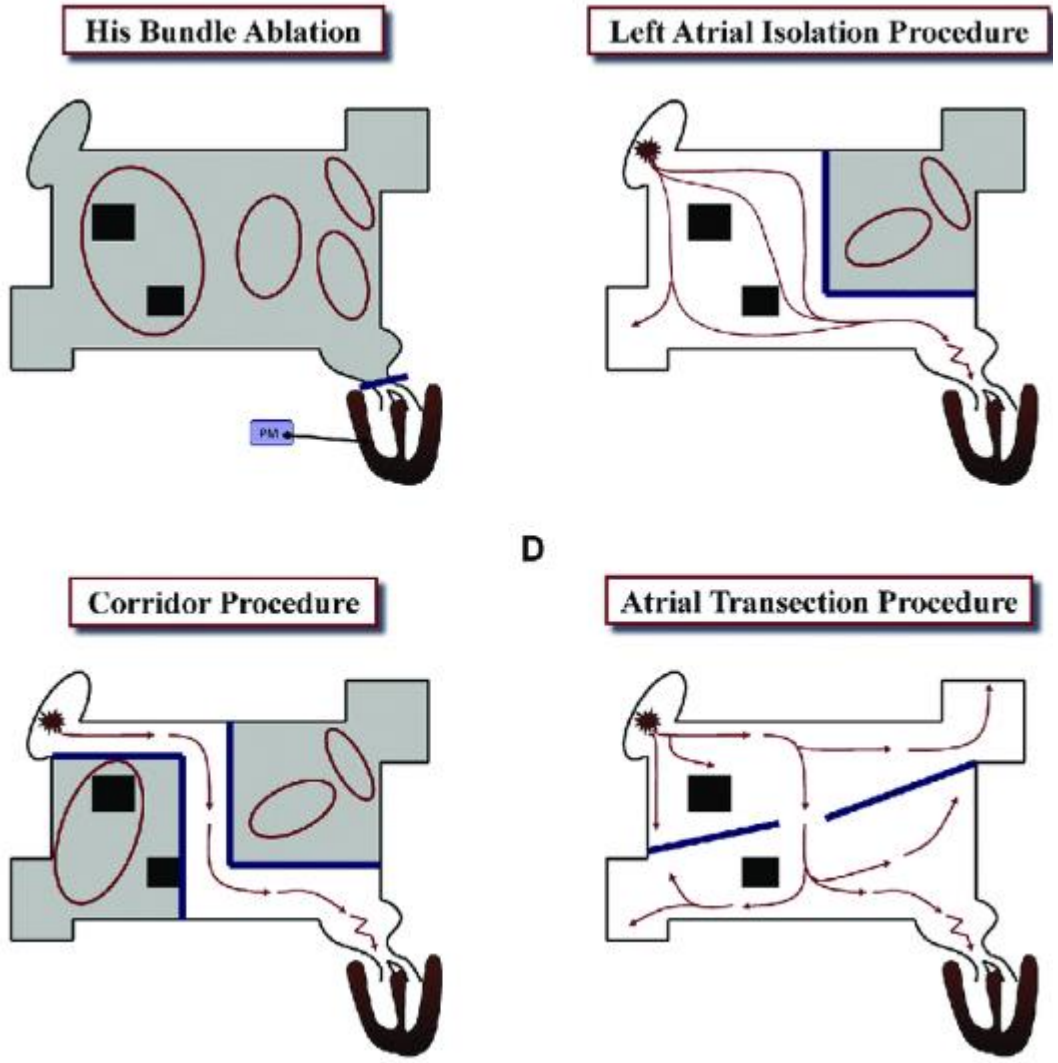
- **Pts' discomfort**: palpitation & anxiety
- **Blood stasis**: thromboembolic risk
- **Loss of AV synchrony**: compromise cardiac hemodynamics
  → ventricular dysfunction, CHF

Goal of AF Treatment

- **Symptom relief**
  : Regular beat
- **Prevention of TE**
  : Atrial kick
- **Restoration of AV synchrony**
- **: Atrial kick**



Failure of Previous Surgery for AF

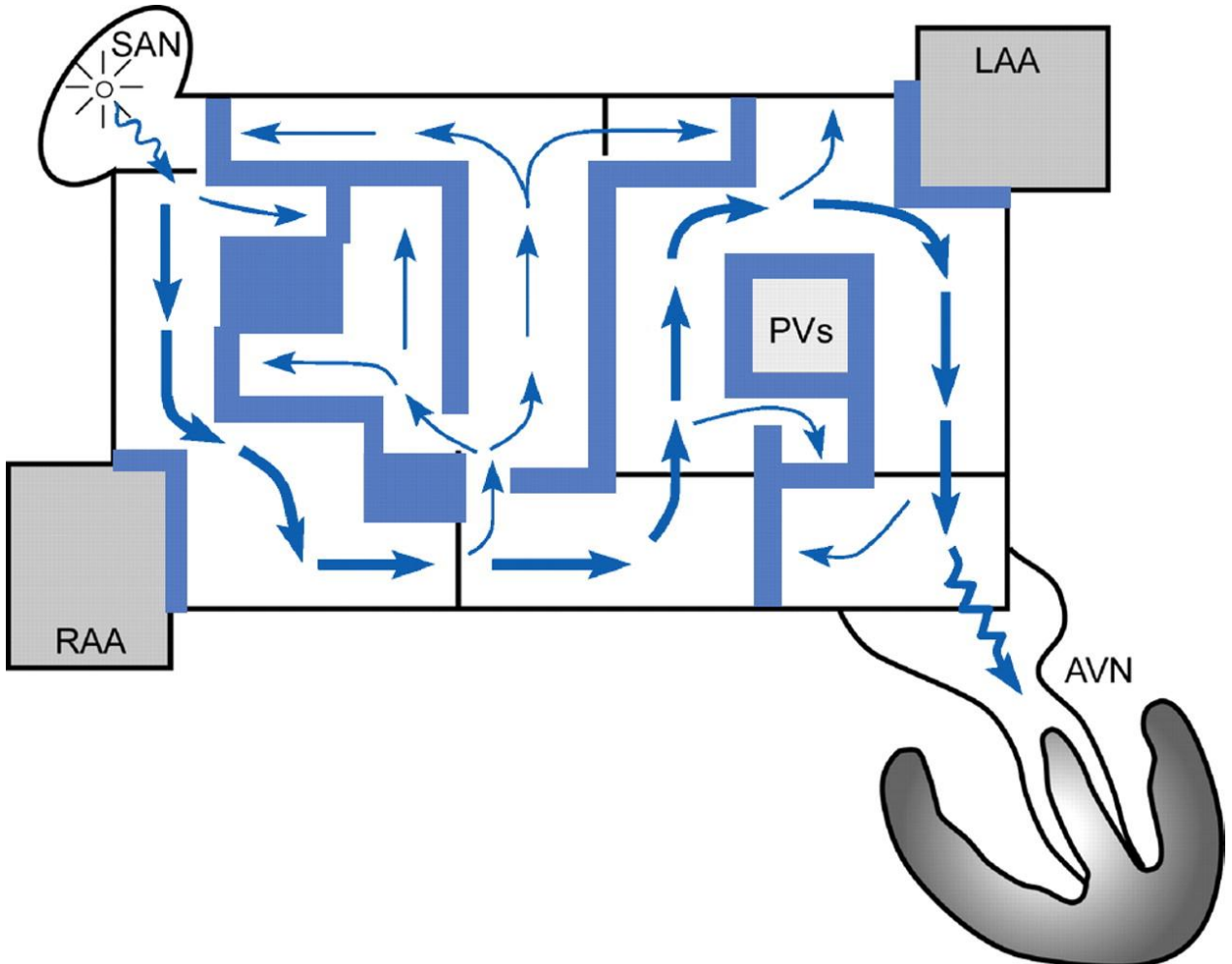


- **Symptom relief**
- **Prevention of TE**
- **Restoration of AV synchrony**

Maze Procedure

The only surgical treatment that can achieve 3 Treatment Goals

James L Cox



Importance of Atrial Contraction

JCI The Journal of Clinical Investigation

Pressure-flow studies in man: effect of atrial systole on left ventricular function

Jerome Ruskin, … , Alexander Harley, Joseph C. Greenfield Jr.

J Clin Invest. 1970;49(3):472-478. https://doi.org/10.1172/JCI106256.

Atrial Contraction Is an Important Determinant of Pulmonary Venous Flow

GAD KEREN, MD,* ALAN BIER, MD,† JACK SHEREZ, MSC,* DENNIS MIURA, MD,† DEBORAH KEEFE, MD, FACC,† THIERRY LEJEMTEL, MD†

Bronx, New York and Tel Aviv, Israel

(J Am Coll Cardiol 1986;7:693–5)

Importance of Atrial Contraction

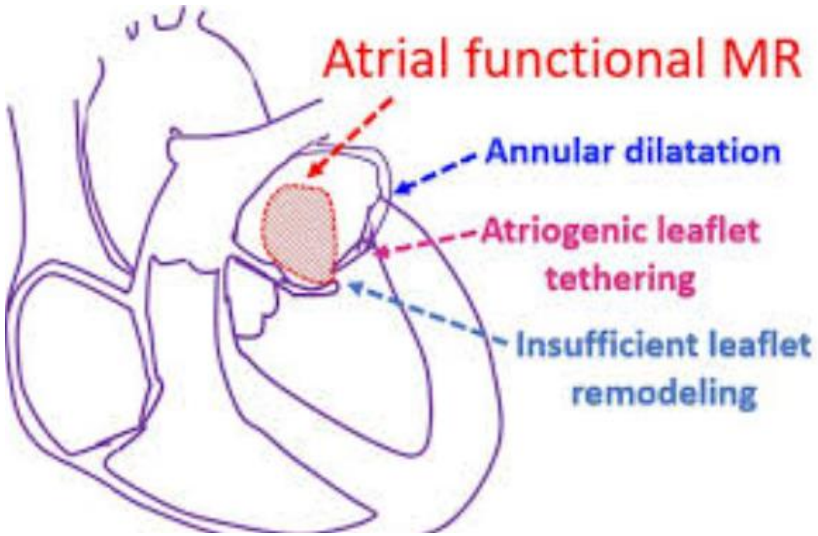
- **Loss of atrial transport**: **20-30% decline in SV & CO** in normal individuals
  even greater decrease in pts w/ heart disease

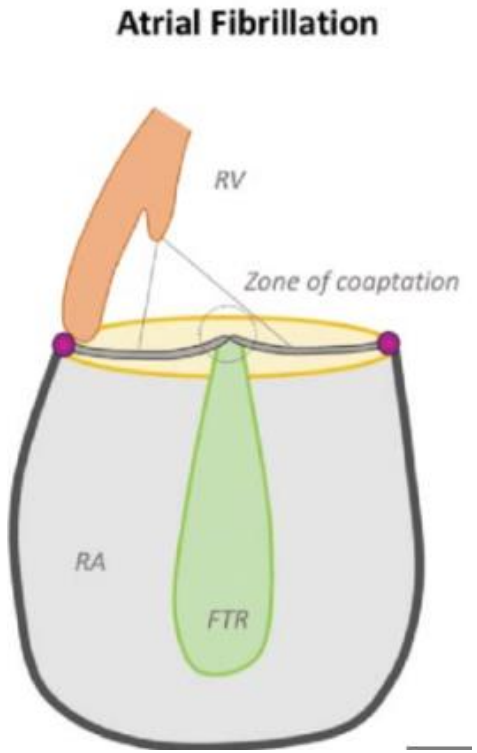
- Pts w/ decreased **ventricular compliance** (increased diastolic stiffness)
  : sensitive to the loss of the "atrial kick": HCMP, AS & MI

Liderer T, et al. Circulation 1983;67:1045-53
Keren G, et al. JACC 1986;7:693-95
Love JC, et al. Am Heart J. 1984;108: 5-13
DeMaria AN, et al. Circulation 1975;51: 273-82

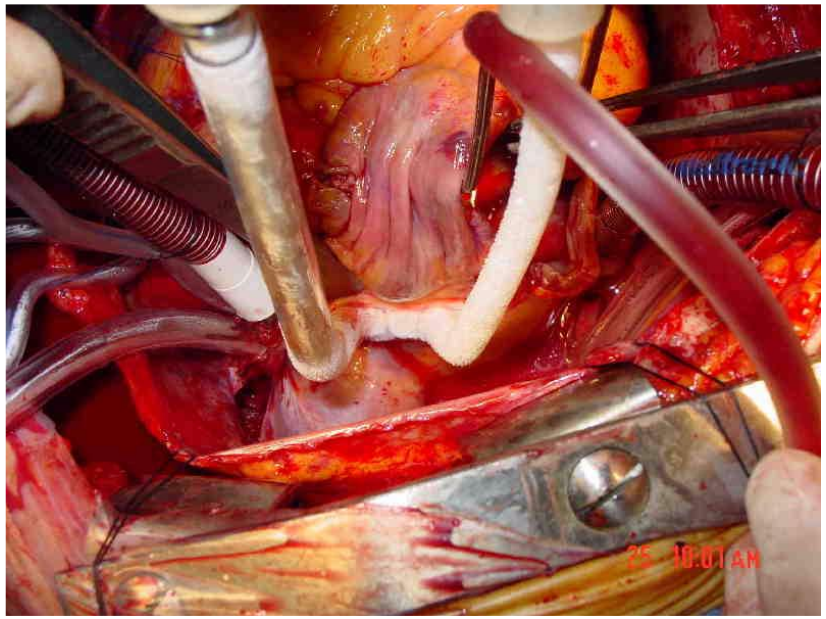
Sequelae of AF – Recent Update

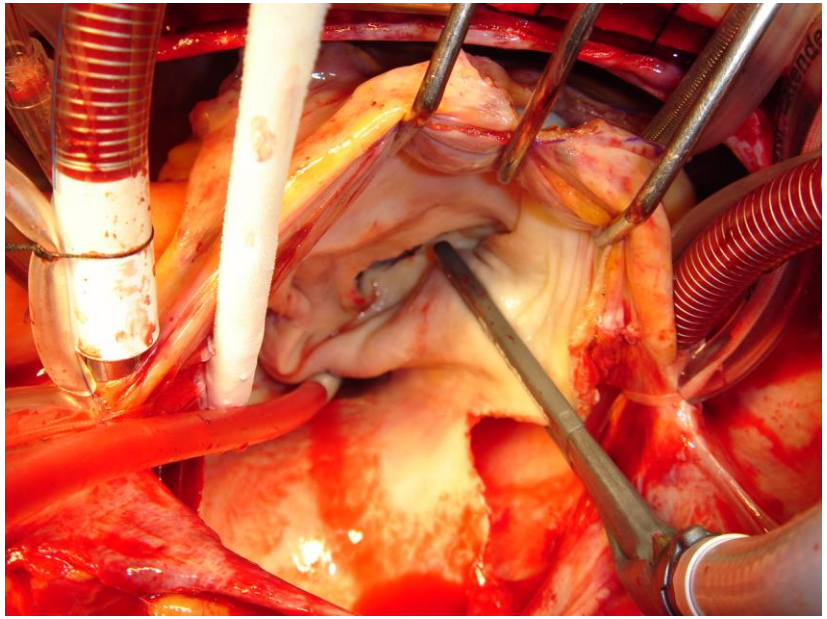
- Atrial functional MR
- Atrial functional TR



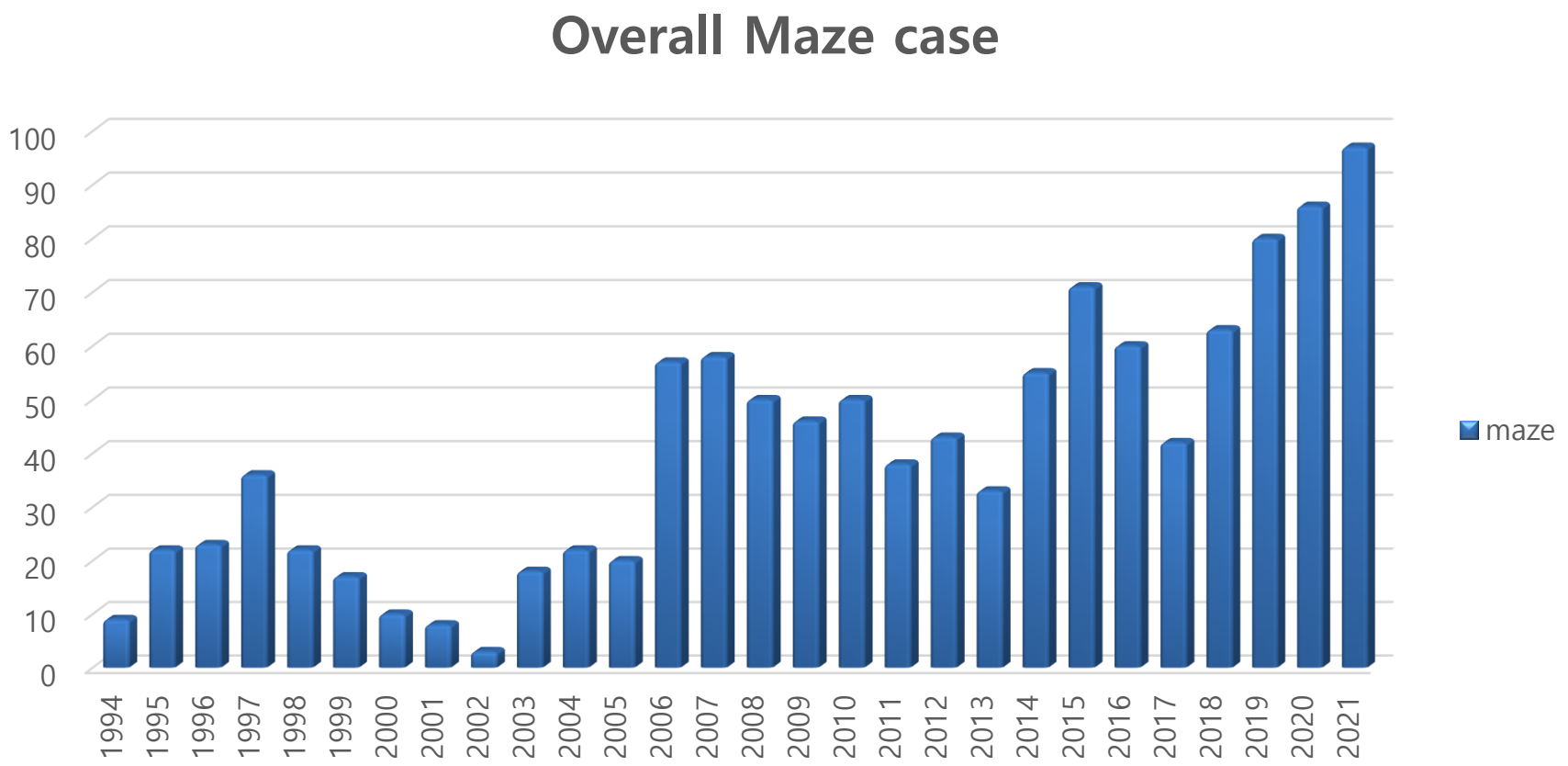


Surgical Risk Is Decreasing





Proportion of Pts Undergoing Maze Is Increasing



AF & Sick Sinus Syndrome

Treatment Goal of AF

Clinical Scenario

Summary

Clinical Scenario

1. AF patients who already had PPM

2. AF patients w/ SSS

Clinical Scenario

1. AF patients who already had PPM

2. AF patients **w/ a high risk of PPM after maze**

Clinical Scenario

1. AF patients who already had PPM

2. AF patients **w/ a high risk of PPM after maze**
: Old age, fine F wave, LA size, Duration of AF

Clinical Scenario 1

Treatment plan for AF Patients who already had PPM

- Almost all patients might have **VVI/R**
- **Maze procedure** w/ concomitant cardiac surgery
- Change to **AV synchronization pacing**

  → Single- (AAI/R) or Dual-chamber (DDD/R)

Clinical Scenario 2

Treatment plan for AF Patients w/ a high risk of PPM

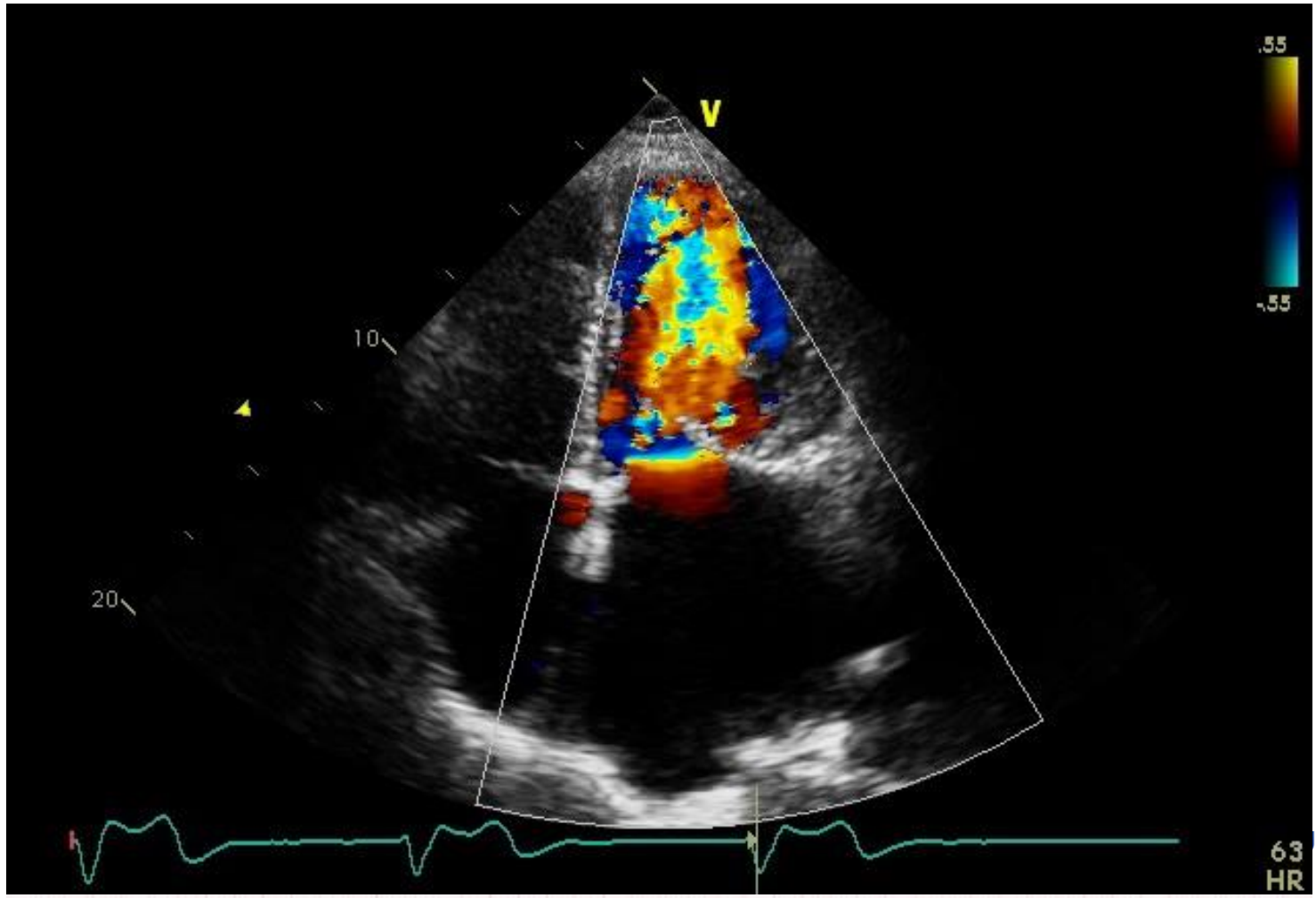
- Risk of PPM = Risk of maze failure
- **Maze procedure** w/ concomitant cardiac surgery
- Implantation of a **PPM that suits for individual pts**

  → Single- (AAI/R, VVI/R) or Dual-chamber (DDD/R)

Clinical Scenario 2 - Case

F/70 Severe MS (rheu), mild to mod TR, Af, 1VD

- At least 27Y Hx of AF
- **Echo** ESD/EDD/EF 41/62/56%
  LA 65mm PASP 52mmHg



Case

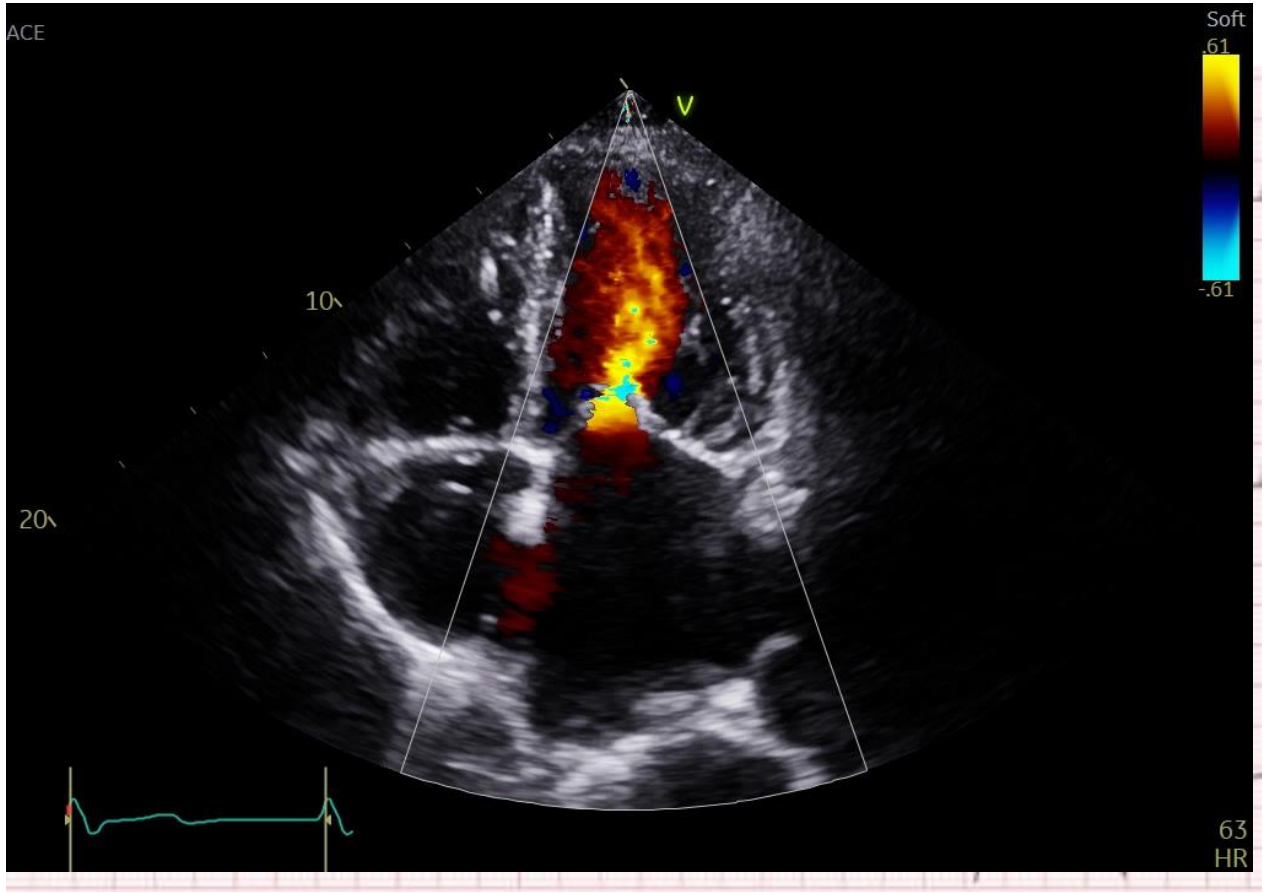
MVr (AL commissurotomy, peeling off thickened leaflets),
TAP with MC3 ring 26mm Cox-Maze III procedure
LAA excision using endoGIA purple 60mm (x1), ONCAB (LITA/LAD)

- At least 27Y Hx of Af
- **Echo** ESD/EDD/EF 41/62/56%
  LA 65mm PASP 52mmHg

Junctional bradycardia at 1Y

→ DDD PPI (Atrial pacing)

- 3Y Echo 30/47/59% mild MS
  LA 66mm PASP 46mmHg



AF & Sick Sinus Syndrome

Treatment Goal of AF

Clinical Scenario

Summary

Summary

1. There is still uncertainty regarding causal relation of AF & SSS. The relationship between AF & SSS might be two manifestations sharing the same pathological process (fibrosis).

2. In pts w/ AF & SND, the management strategy involves both AF ablation & consideration of PPI to prevent detrimental effects owing to loss of atrial contraction.

3. The decision to perform AF ablation irrespective of PPI depends on the individual patient's clinical profile.