The Emerging Atrial Fibrillation Epidemic: Treat It, Leave It or Burn It?

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Case #2

- 26 year-old man with a three-year history of sporadic/unpredictable palpitations
- Primarily at rest, rarely with exertion
  - Big game hunting, hiking in mountains, soccer
- Physical examination including blood pressure are normal
- Atrial fibrillation confirmed on electrocardiography
- Baseline electrocardiogram, cardiovascular testing normal
- Treatment has included as-needed atenolol and propafenone

Case #2

Non-membrane active

- L-type calcium channel blockade
  - Diltiazem
  - Verapamil
- Beta-adrenergic blockade
  - Metoprolol
  - Atenolol
  - Carvedilol
  - Propranolol
- Digoxin

Membrane active

- Sodium channel blockade
  - Flecainide
  - Propafenone
- Potassium channel blockade
  - Sotalol
  - Dofetilide
  - Amiodarone
  - Dronedarone

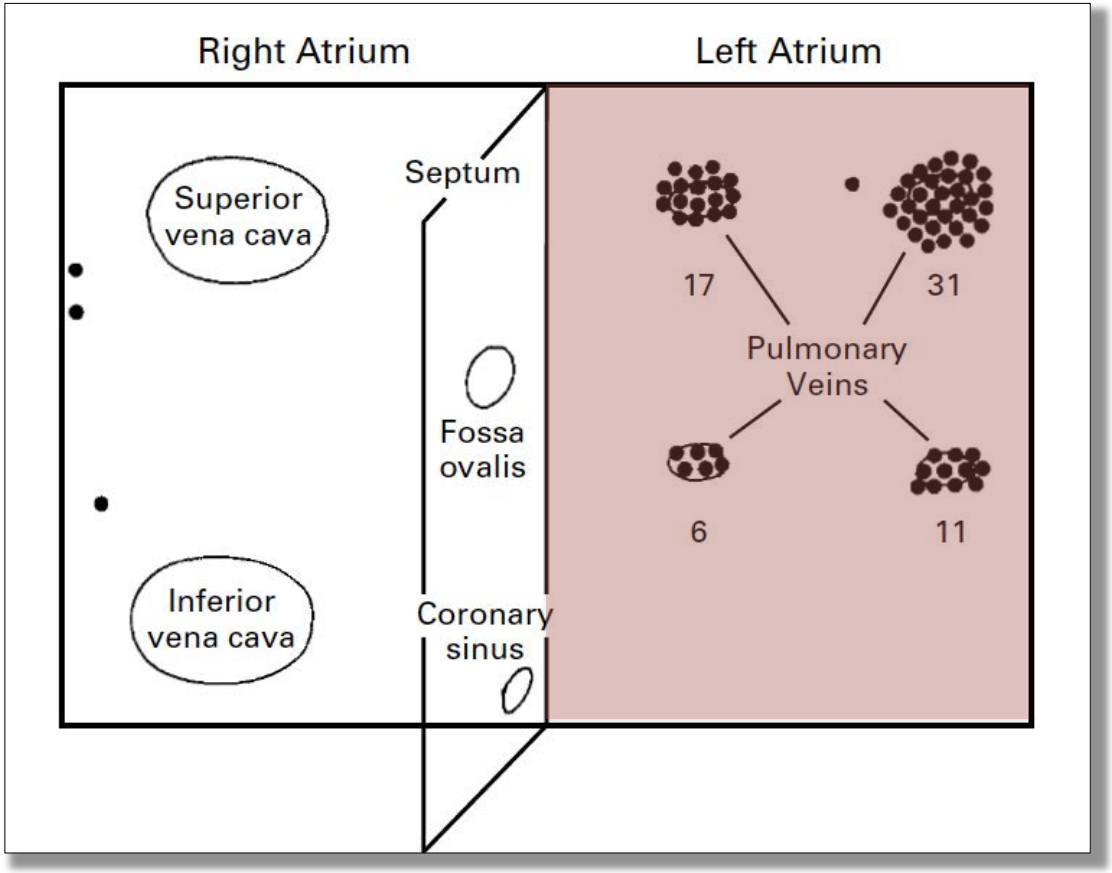
Case #2

- Increasing frequency of symptoms is reported despite escalating doses of medical therapy
- Following discussion, catheter ablation (pulmonary vein isolation) is planned

SPONTANEOUS INITIATION OF ATRIAL FIBRILLATION BY ECTOPIC BEATS ORIGINATING IN THE PULMONARY VEINS

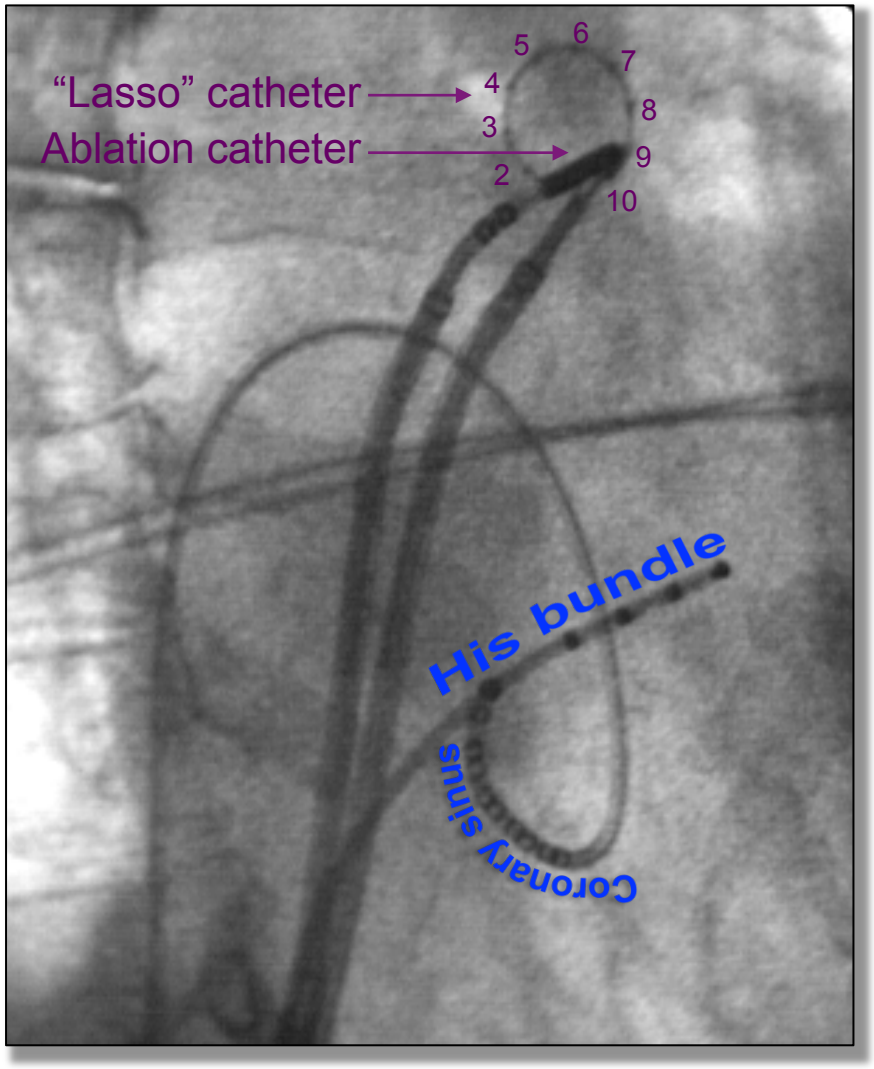
MICHEL HAÏSSAGUERRE, M.D., PIERRE JAÏS, M.D., DIPEN C. SHAH, M.D., ATSUSHI TAKAHASHI, M.D., MÉLÈZE HOCINI, M.D., GILLES QUINIOU, M.D., STÉPHANE GARRIGUE, M.D., ALAIN LE MOUROUX, M.D., PHILIPPE LE MÉTAYER, M.D., AND JACQUES CLÉMENTY, M.D.

- N = 45
- Drug resistant AF
- Frequent AF (q <2 d)
- Frequent PACs (>700/d)
- 28 (62%) free of AF (8 ± 6 mos.)

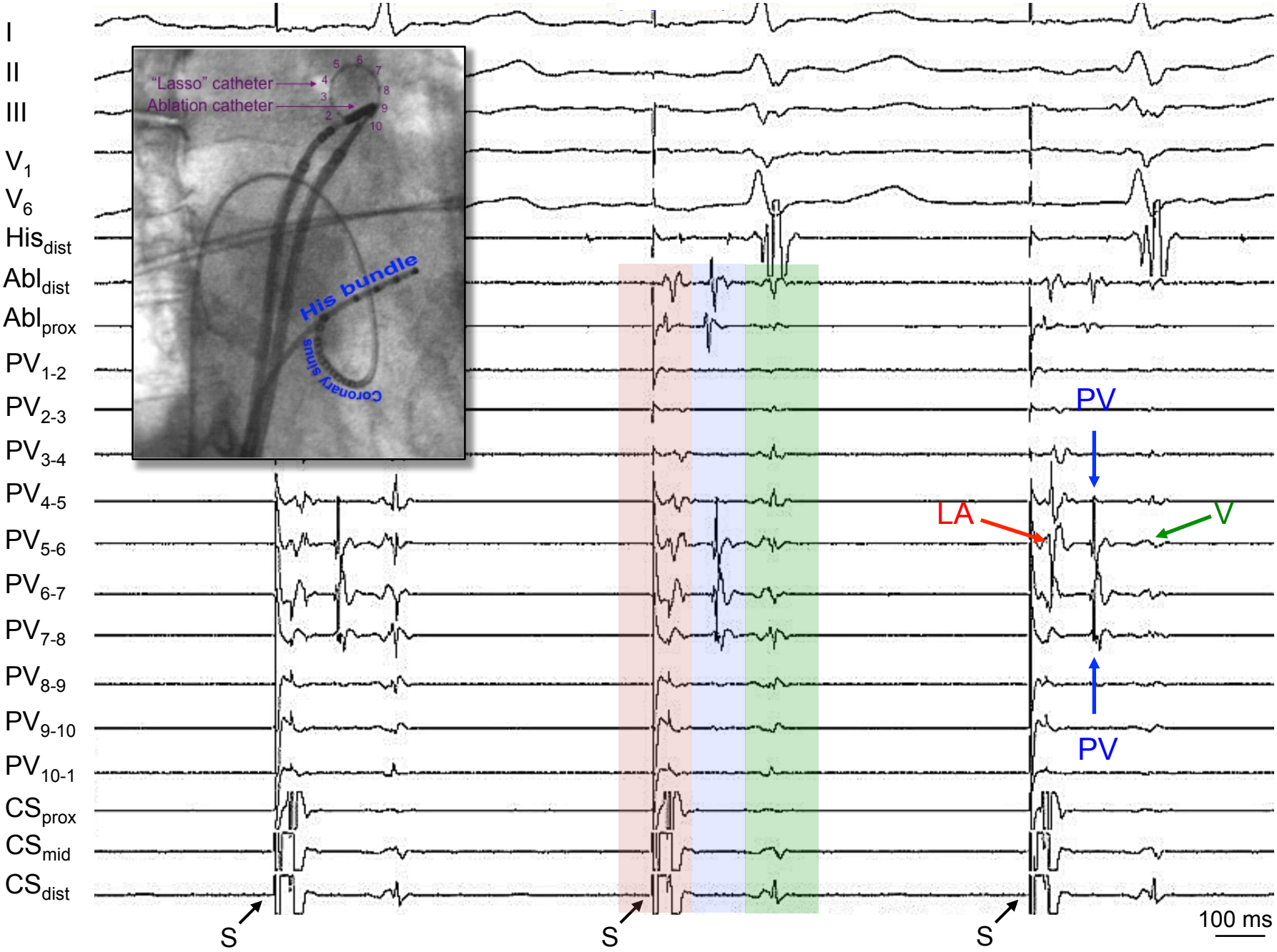


HaÏssaguerre, N Engl J Med 1998;339:659-66

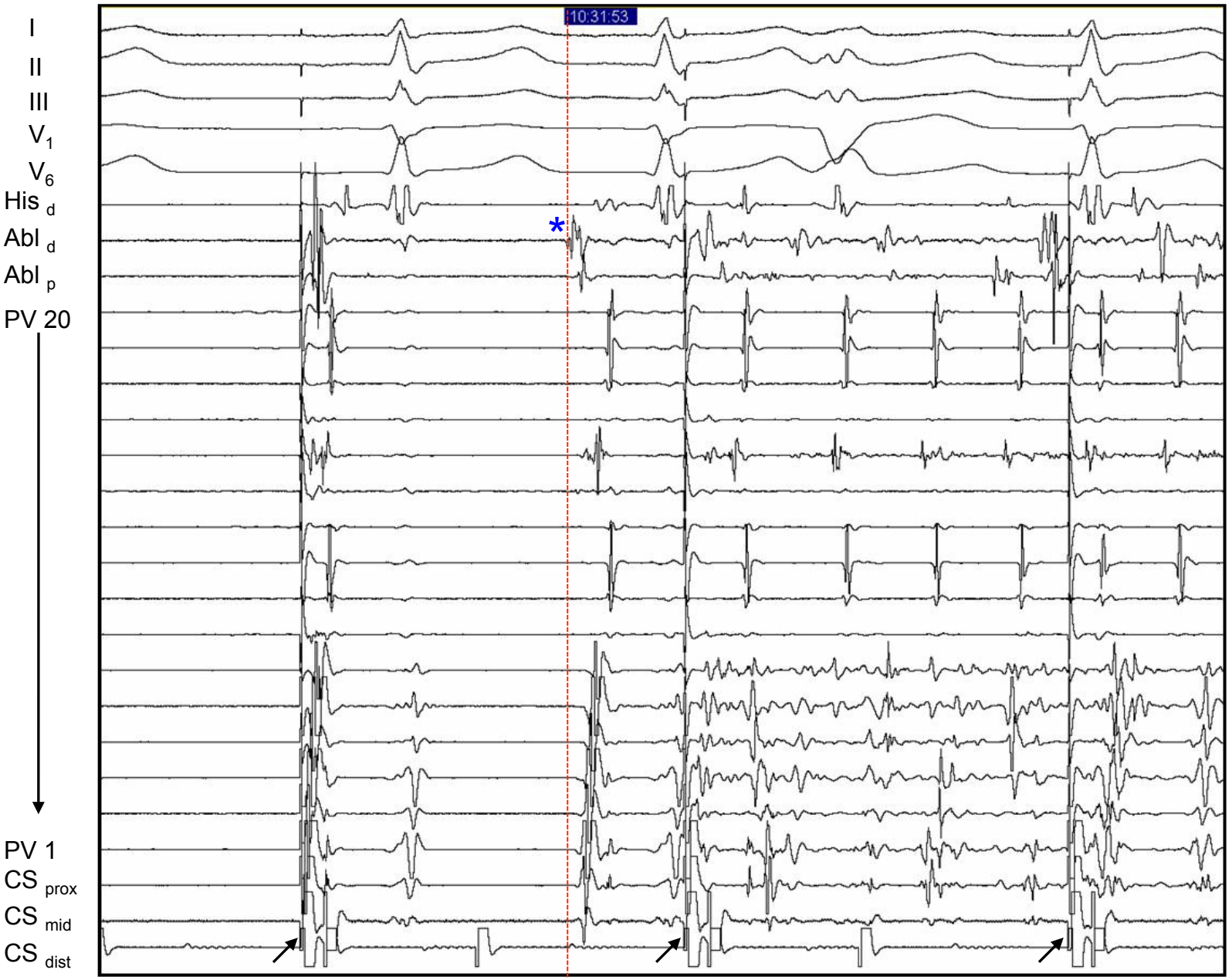
Baseline catheter positions



Baseline left atrial and pulmonary vein recordings



Case #2: Atrial fibrillation onset – left inferior pulmonary vein



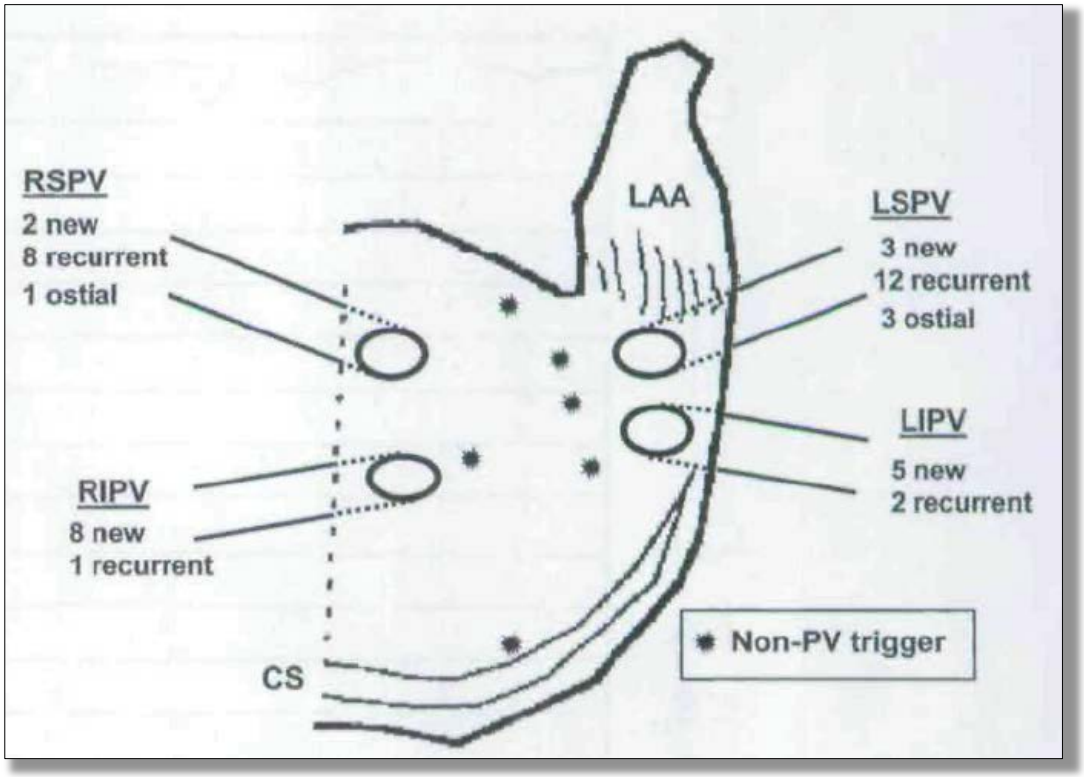
Case #2: Focal atrial fibrillation - Ablation target

- Limited/focal ablation
  - Advantages
    - Shorter procedure time
      - Bleeding
      - Perforation
      - Thromboembolism
      - Anesthesia
    - Limited lesion sets
      - Left atrial flutter
      - Pulmonary vein stenosis
  - Disadvantages
    - Additional triggers/sources
    - Incomplete result

Incidence and Location of Focal Atrial Fibrillation Triggers in Patients Undergoing Repeat Pulmonary Vein Isolation: Implications for Ablation Strategies

EDWARD P. GERSTENFELD, M.D., DAVID J. CALLANS, M.D., SANJAY DIXIT, M.D., ERICA ZADO, P.A.C., and FRANCIS E. MARCHLINSKI, M.D.

- 34/226 patients with recurrent AF after ablation
- 84 PVs isolated in 34 patients
- 51/84 PVs had recurrent potentials
- Isoproterenol infused to identify PAC/AF trigger
  - 27/50 (54%) from previously targeted PV
  - 16/40 (32%) from previously non-targeted PV

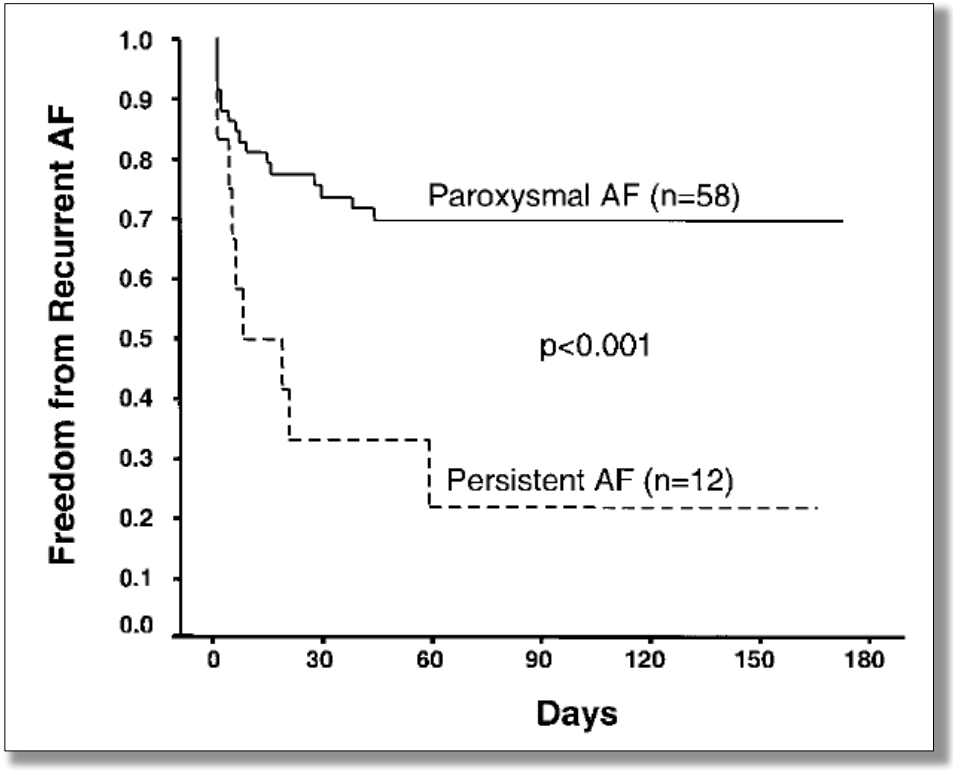


Gerstenfeld, J Cardiovasc Electrophysiol 2003;14:685-90

Pulmonary Vein Isolation for Paroxysmal and Persistent Atrial Fibrillation

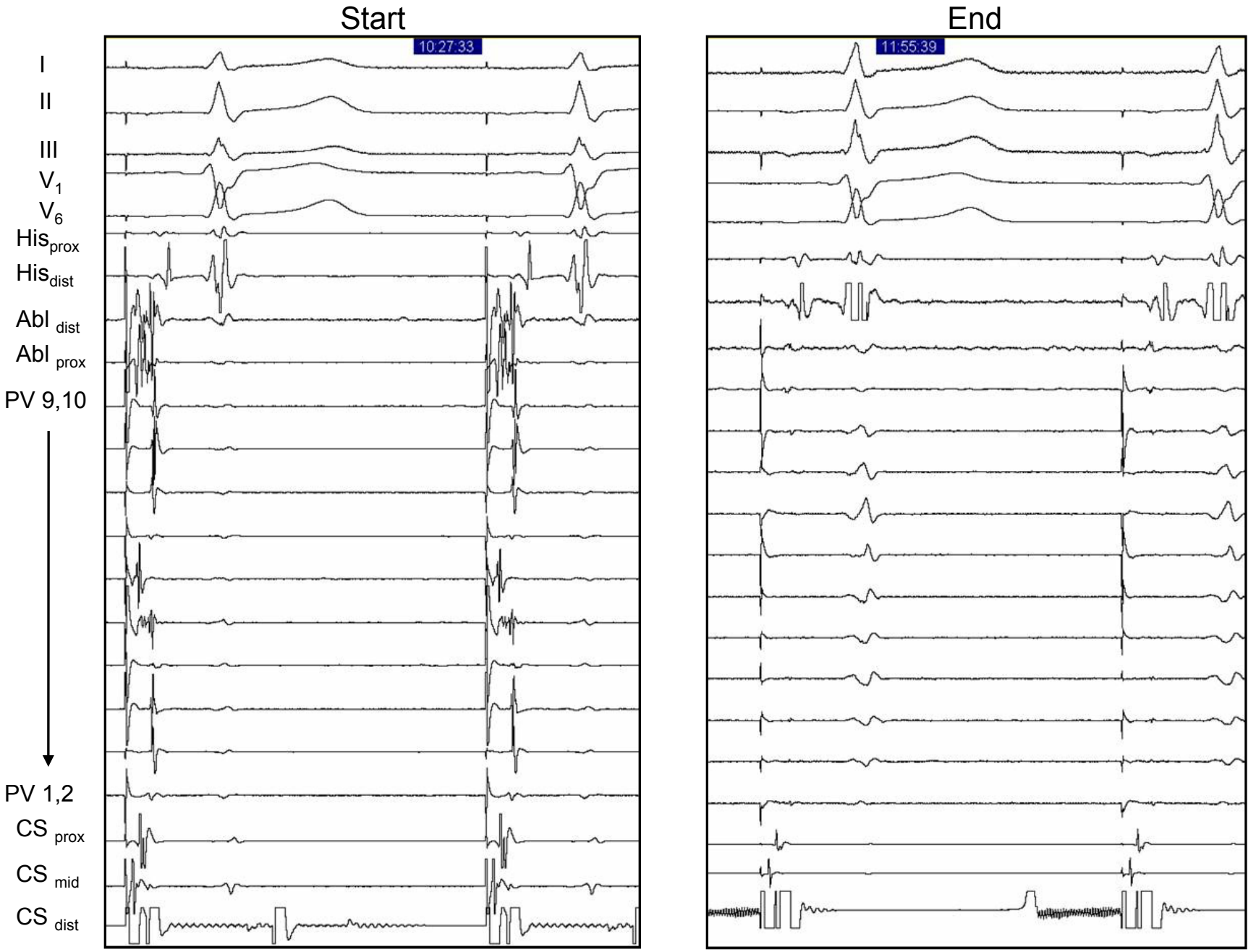
Hakan Oral, Bradley P. Knight, Hiroshi Tada, Mehmet Özaydin, Aman Chugh, Sohail Hassan, Christoph Scharf, Steve W.K. Lai, Radmira Greenstein, Frank Pelosi, Jr, S. Adam Strickberger and Fred Morady

- 70 patients (58 paroxysmal, 12 persistent AF)
- 217/230 (94%) targeted PVs isolated
- with recurrent AF after ablation
- 6/70 (9%) required second ablation
- Ablation targeting ≥3 PVs in patients with paroxysmal AF felt to have high (83%, 5 months) success rate

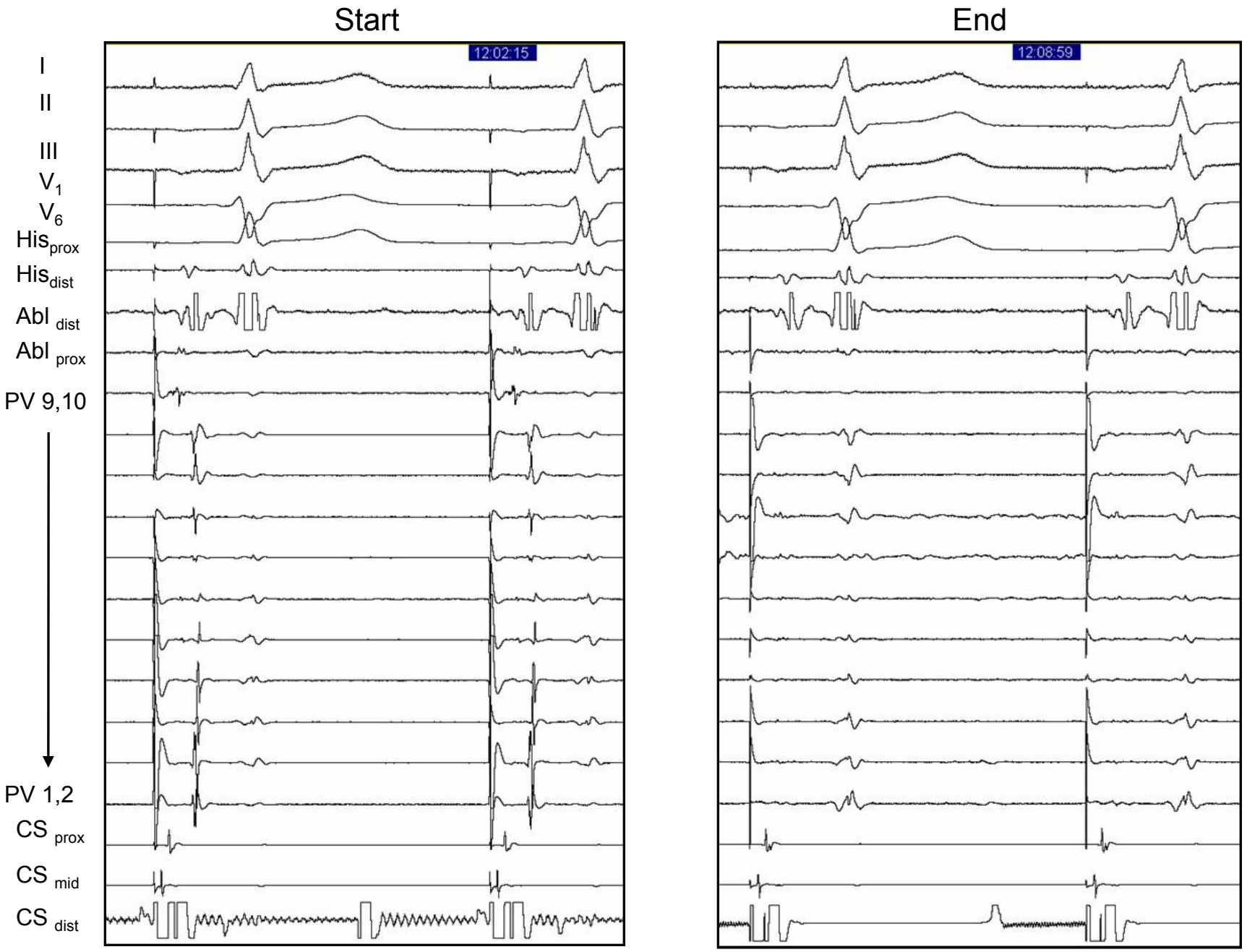


Oral, Circulation 2002;105:1077-81

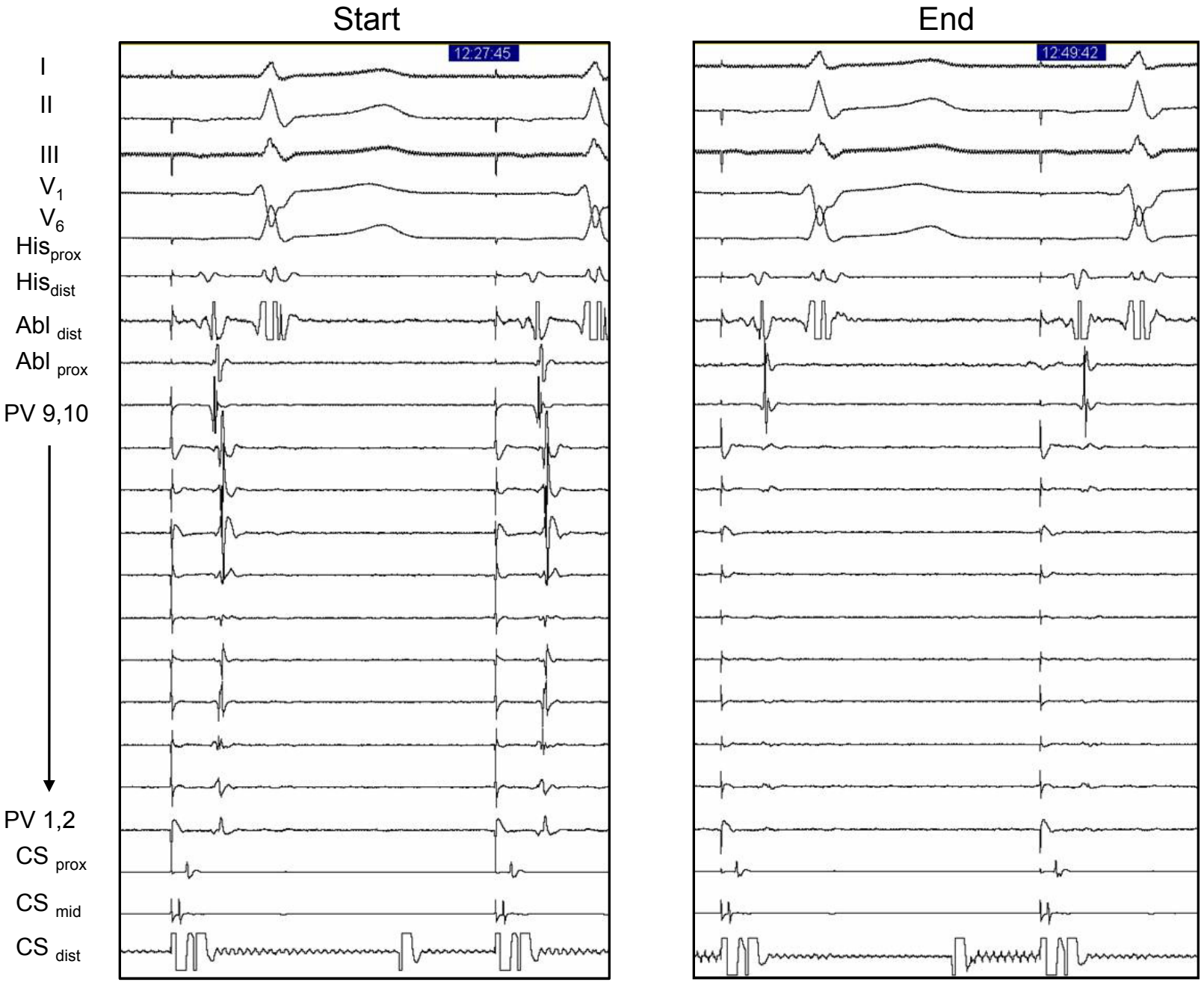
Left inferior pulmonary vein



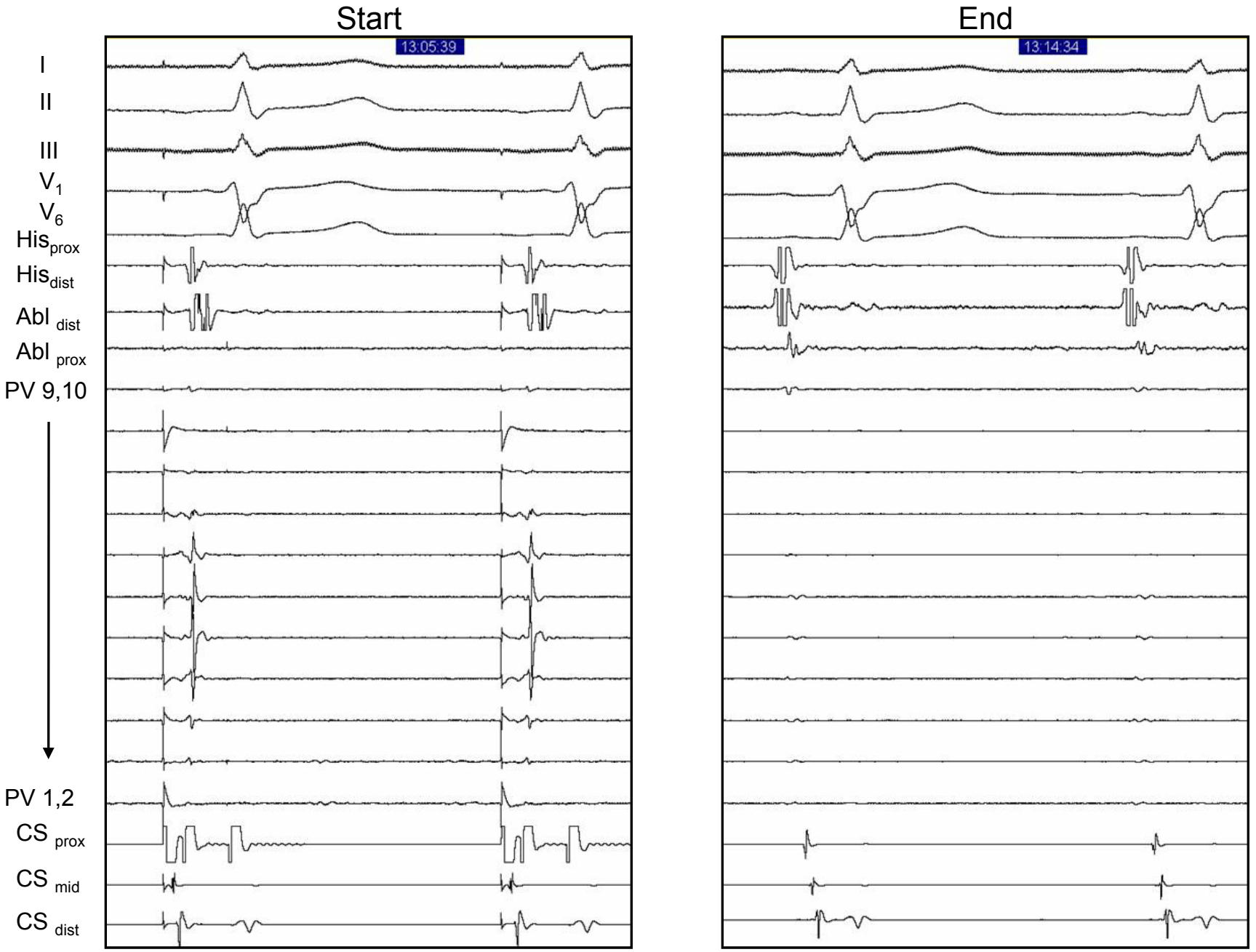
Left superior pulmonary vein



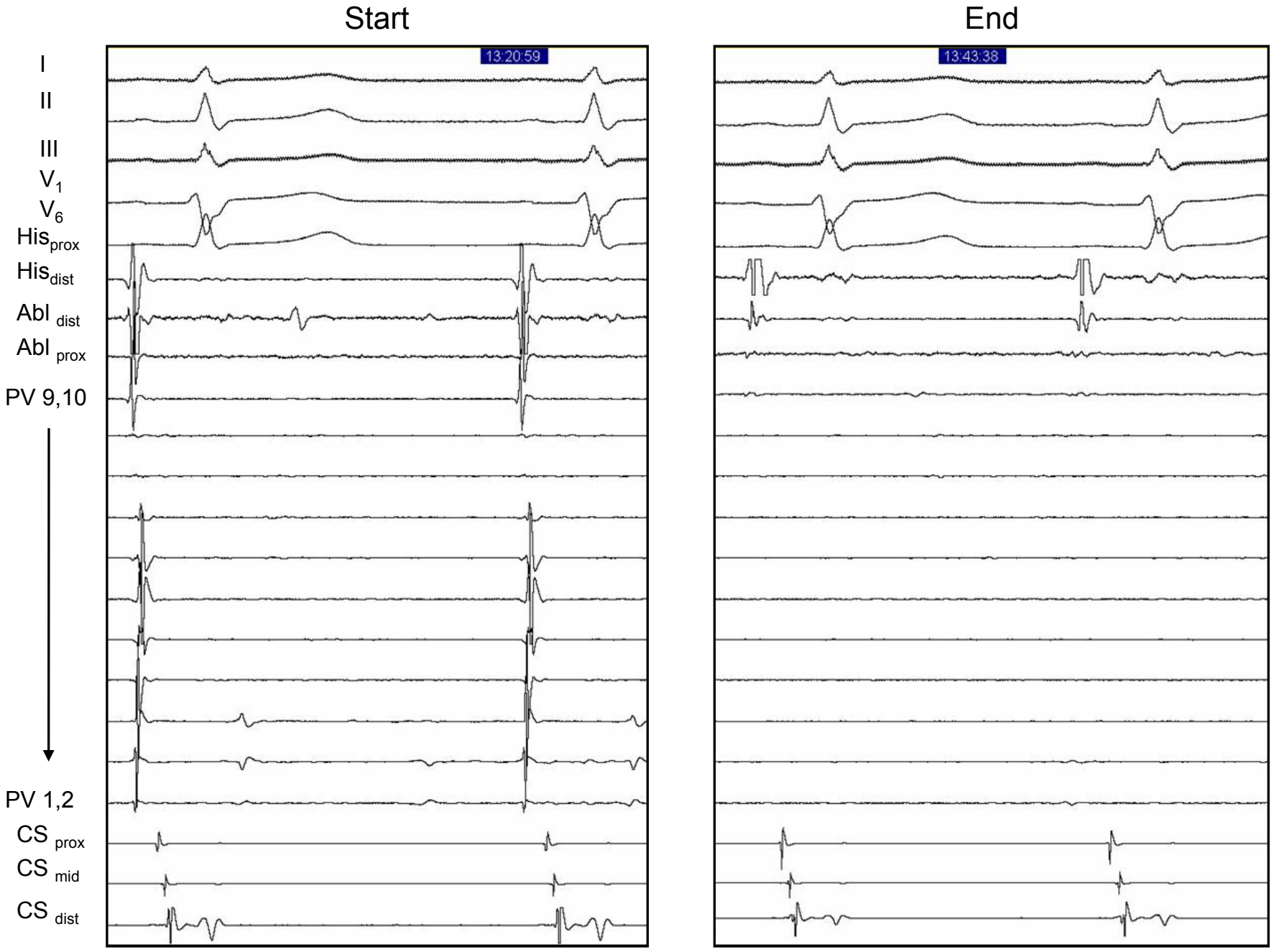
Right superior pulmonary vein



Right inferior pulmonary vein



Superior vena cava



Case #2: Focal atrial fibrillation

- Follow-up
  - Uncomplicated procedure
  - Anti-arrhythmic drug therapy discontinued
  - One five-minute episode at six-month follow-up visit
  - Free of arrhythmic symptoms (four years)

Case #2: Conclusions

- Catheter ablation remains a highly effective means for treatment of paroxysmal atrial fibrillation
- Pulmonary vein triggers appear to be the predominant source of such AF
- When seen, isolation of triggering PVs/ablation of culprit ectopy is a mandatory ablation target
  - Triggers may be unmasked with isoproterenol infusion
- Empiric isolation of all pulmonary (thoracic) veins may offer enhanced procedural success

Case #4

- 73-year-old woman with persistent atrial fibrillation over the past two years associated with tachycardia, effort intolerance, fatigue, and presyncope requiring several hospital admissions
- Past medical history: atrial flutter with catheter ablation in remote past, sinoatrial node dysfunction with dual chamber pacemaker implantation, and hyperlipidemia
- Current medications include aspirin, metoprolol, and rosuvastatin
- In office evaluation demonstrates blood pressure 118/80, pulse 127/min, no heart failure findings, normal pacemaker function with ongoing atrial fibrillation episode
- Echocardiogram shows left ventricular ejection fraction 0.56 with normal wall thickness, normal right ventricular function, and no valvular abnormalities
- Therapy has included amiodarone and warfarin, discontinued by patient (aversion to medications)

Case #4

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Case #4: Therapeutic options

Rate control

- Medical therapy generally less toxic
- Medical therapy may result in breakthrough tachycardia
- Irregular medication administration more well-tolerated
- Interruption of anticoagulation less consequential
- Consequences due to impaired ventricular filling (diastolic ventricular failure) not fully addressed

Rhythm control

- Medical therapy associated with pro-arrhythmic side effects
- Medical therapy associated with recurrent AF
- Sporadic medication dosing may result in serious events
- Interruption of anticoagulation may be hazardous immediately following cardioversion
- Atrioventricular synchrony/filling restored

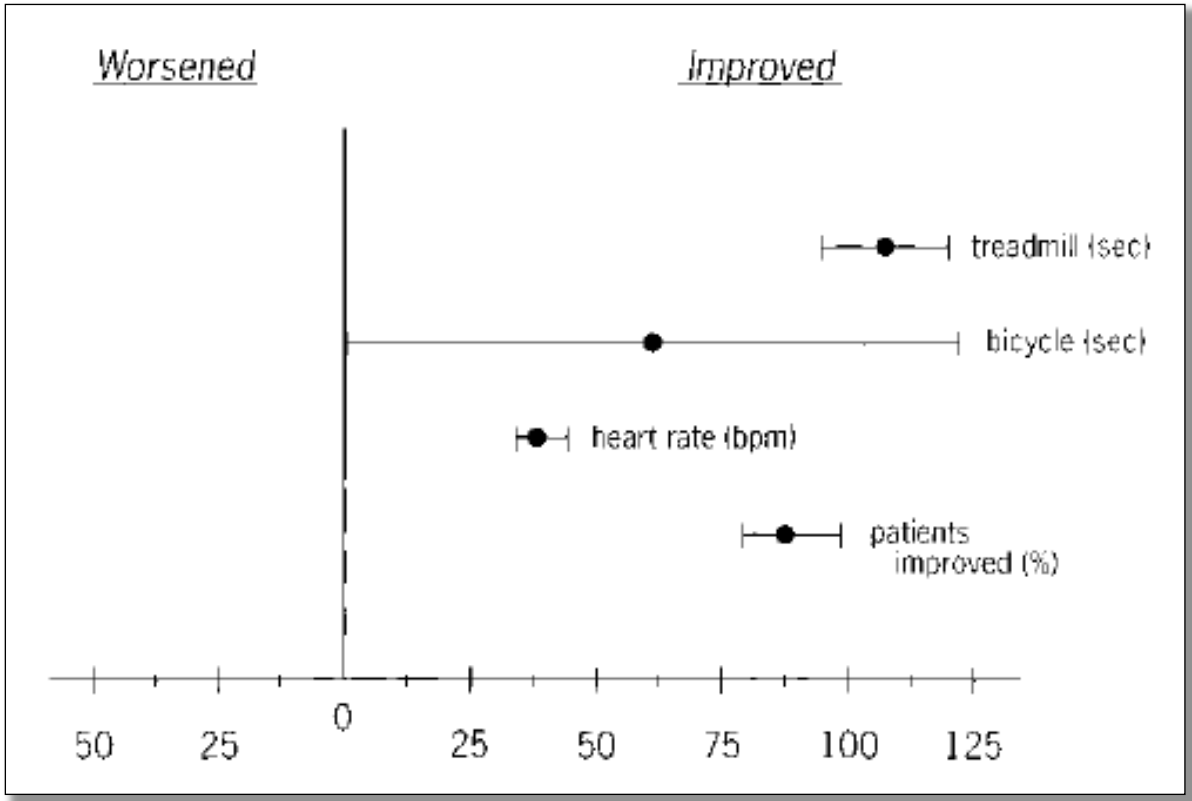
Case #4: Therapeutic options

- Extensive counseling
- Rate control strategy recommended
  - Patient preference regarding medication avoidance
  - Inconsistent medication dosing
  - Aversion to anticoagulation
  - AV junction (node) ablation recommended

Clinical Outcomes After Ablation and Pacing Therapy for Atrial Fibrillation: A Meta-Analysis

Mark A. Wood, Chris Brown-Mahoney, G. Neal Kay and Kenneth A. Ellenbogen

- Meta analysis of 21 studies
- 1181 patients total
- Atrial fibrillation present in 97%
- Overall 1-year mortality: 6.3%
- Overall 1-year sudden death rate:2.0%



Wood, Circulation 2000;101:1138-44

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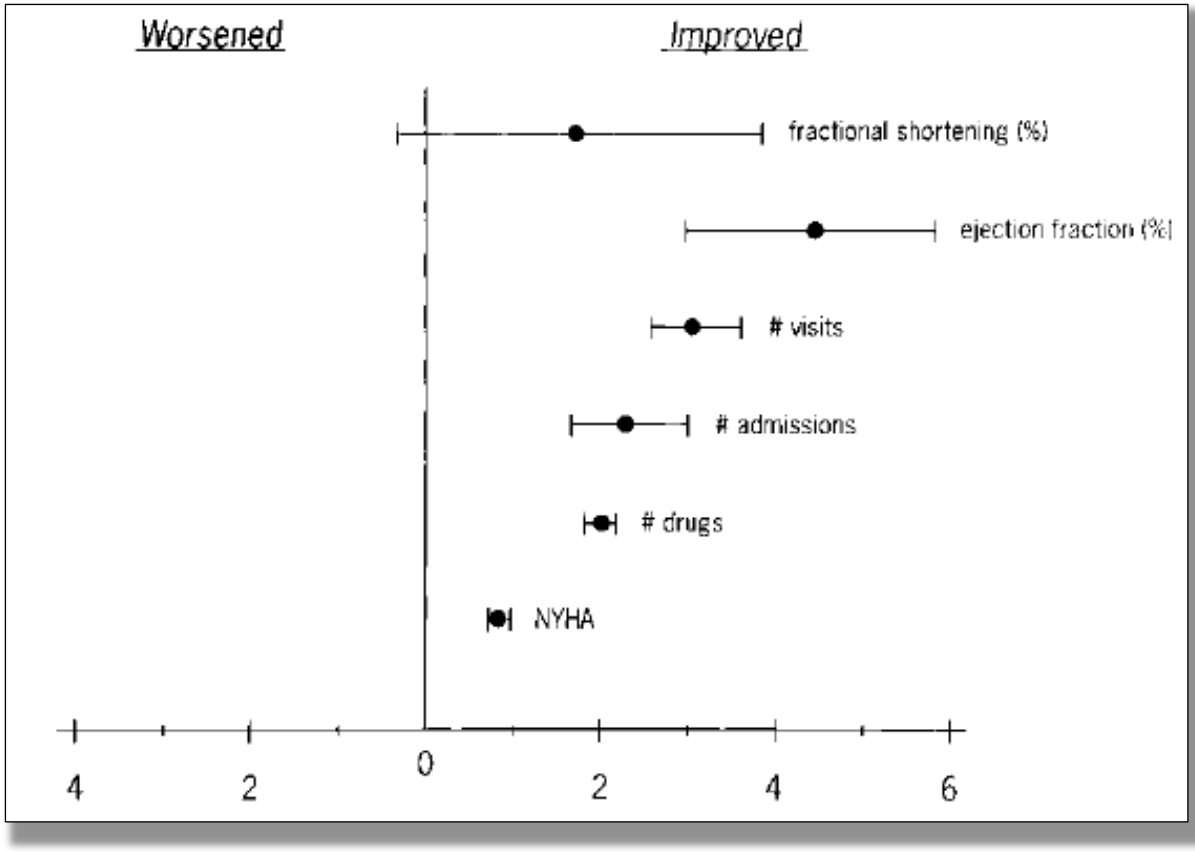

Wood, Circulation 2000;101:1138-44

Case #4: Baseline electrocardiogram (atrial fibrillation, right bundle branch block)

Case #4: AV junction ablation

Case #4: Development of atrioventricular block with ventricular pacing

Case #4: AV junction ablation – Considerations

- Immediate, permanent rate control
- Symptomatic, hemodynamic improvement
- Likely pacemaker-dependence
  - Implications of pacemaker maturation and stability
- Bradycardia-mediated ventricular arrhythmias
  - Variable shortening of action potential duration, dispersion of refractoriness
  - Increased base pacing rate with gradual reduction (months)
- Right ventricular versus biventricular pacing
  - Left ventricular dysfunction
  - Heart failure

Case #4: AV junction ablation

- Follow-up
  - Uncomplicated procedure
  - Programmed base pacing rate 85 ppm
  - Aspirin, metoprolol continued
  - Symptomatic assessment pending

Case #4: Conclusions

- AV junction ablation remains a highly effective means for permanent AF rate control
- Benefits of nearly immediate symptomatic improvement must be weighed against risks/ implications of pacemaker dependence, bradycardia-mediated ventricular arrhythmias/sudden death
- Often associated with evidence of hemodynamic improvement
- Anticoagulation recommendations remain unchanged
- Often used as last resort but may be used sooner in selected individuals