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# POSTOPERATIVE ATRIAL FIBRILLATION: NOT JUST A NUISANCE RHYTHM

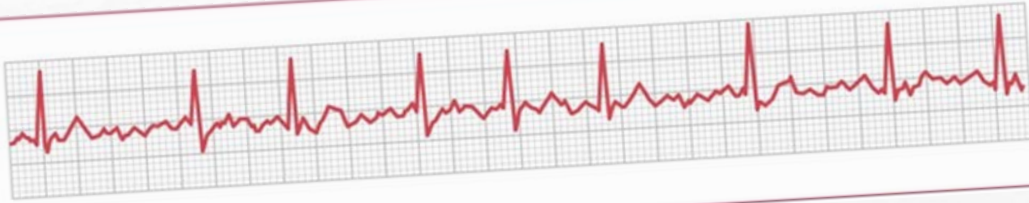
DIEM T.T. TRAN

JUNE 17 2017



uOttawa





## OUTLINE

EPIDEMIOLOGY  
SHORT & LONG TERM OUTCOMES  
TREATMENT  
MANAGEMENT  
PREVENTION



# CARDIAC SURGERY

- INCIDENCE OF NEW ONSET POSTOPERATIVE ATRIAL FIBRILLATION (POAF) VARIES FROM 22.5% IN CABG TO 45% IN COMBINATION BYPASS/VALVE PROCEDURES
- PEAK INCIDENCE POD 2-4
- RARELY OCCURS AFTER A WEEK
- VARYING SYMPTOMATOLOGY





# SHORT-TERM OUTCOMES

## MARISCALCO ET AL 2008

- 1832 PTS
- STROKE 3 VS 1%
- IABP 5 VS 3%
- INFECTIONS 14 VS 10%
- RESPIRATORY FAILURE 12 VS 5%

## KALAVROUZOTIS ET AL 2007

- 7347 PTS
- STROKE 2.8 VS 1.6%
- GI COMPLICATIONS 4.2 VS 2.1%
- DSWI 1.3 VS 0.4%
- SEPSIS 4.0 VS 1.1%
- RENAL FAILURE 7.6 VS 4.3%
- HOSPITAL STAY 8 VS 6 DAYS

# LONG-TERM MORTALITY

- CABG

- N=994: 4 YRS MORTALITY 13% → 26%
- N=1832: 4.3 YRS ODDS RATIO 1.34 → 2.99
- N= 6899: 10 YRS SURVIVAL 52.3% VS 69.4%
- N=615: 15 YRS MORTALITY HAZARD RATIO 1.47
- N=9482: 3 YRS MORTALITY HAZARD RATIO 1.55

- AVR

- N= 157 4 YRS 0.2%/PT-YR VS 2.8%/PT-YR
- N=1039: 10 YRS HAZARD RATIO 1.48

# THORACIC SURGERY

- WEDGE RESECTION 2-4%
- SEGMENT OR LOBE 12.5 – 33%
- LUNG TRANSPLANT 39%
- PEAKS POD 2-3
- GARNER ET AL 2017
  - N= 377, LUNG RESECTION
  - POAF 11% AT POD 3.55
  - OPEN 13.8% VS VATS 9.0%



# OUTCOMES

## SHORT TERM

- LONGER ICU STAY
- LONGER HOSPITAL STAY
- HOSPITAL READMISSION
- MORBIDITY
- MORTALITY

## LONG TERM

- STROKE

## CHIN ET AL 2016

- N=583 ESOPHAGECTOMIES
- MEAN F/U 51 MOS
- MORTALITY 5 YR: HR 1.5



# NON CT SURGERY

POAF INCIDENCE IS 3%

- HIP FRACTURE: 3.7% - MORTALITY HR 6.7
- SHORT TERM:
  - BACTERIAL PNEUMONIA
  - CHF
  - LONGER HOSPITAL STAY
  - MORTALITY
- POISE TRIAL: STROKE OR 3.51 AT 30D





# Perioperative Atrial Fibrillation and the Long-term Risk of Ischemic Stroke

Gino Gialdini, MD; Katherine Nearing, MD; Prashant D. Bhawe, MD; Ubaldo Bonuccelli, MD; Costantino Iadecola, MD; Jeff S. Healey, MD; Hooman Kamel, MD

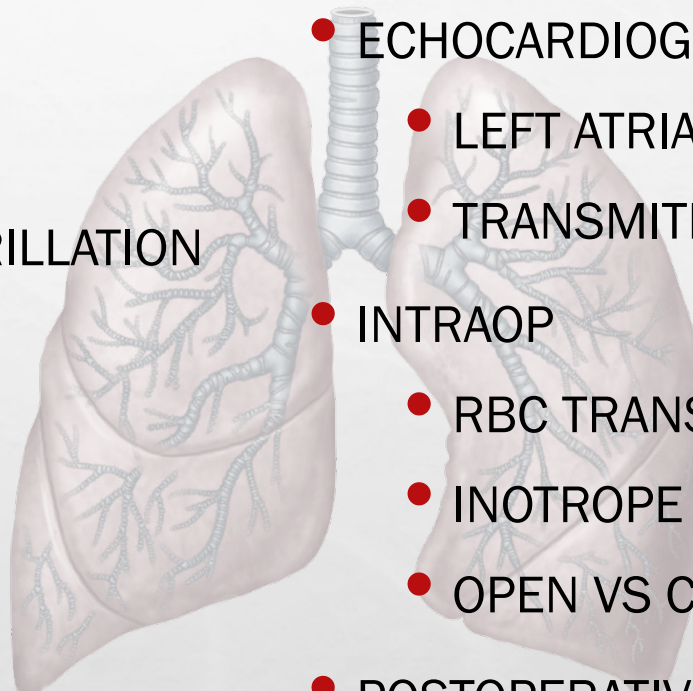
- RETROSPECTIVE COHORT STUDY ( 1 729 360) WITH ADMINISTRATIVE DATA OF PTS HOSPITALIZED FOR SURGERY
- 24 711PTS WITH NEW ONSET POAF
- 13 952 PTS HAD A STROKE AFTER DISCHARGE

| Type of Surgery | Cumulative Rate of Stroke 1 Year After Hospitalization, % (95% CI) |                                      | Hazard Ratio (95% CI) |
|-----------------|--------------------------------------------------------------------|--------------------------------------|-----------------------|
|                 | Perioperative Atrial Fibrillation                                  | No Perioperative Atrial Fibrillation |                       |
| Noncardiac      | 1.47 (1.24-1.75)                                                   | 0.36 (0.35-0.37)                     | 2.0 (1.7-2.3)         |
| Cardiac         | 0.99 (0.81-1.20)                                                   | 0.83 (0.76-0.91)                     | 1.3 (1.1-1.6)         |

# PREDICTORS OF POAF - CS

- PATIENT
  - AGE >60
  - GENDER
  - BMI
- MEDICAL HISTORY
  - SMOKING/COPD
  - DM
  - STROKE
  - HTN
  - RENAL DYSFUNCTION
- CARDIAC HISTORY
  - LV DYSFUNCTION
  - LEFT ATRIAL SIZE
  - HX OF INTERMITTENT AFIB
  - HX OF CHF
- SURGERY
  - VALVE/COMBINATION SURGERY
  - REPEAT CARDIAC SURGERY
  - CPB TIME

# PREDICTORS OF POAF - TS

- 
- AGE
  - MALE
  - WEIGHT LOSS
  - HX OF ATRIAL AFIBRILLATION
  - HTN
  - SMOKER
  - PVD
  - COPD
  - ALCOHOL CONSUMPTION
  - CHF
  - ECHOCARDIOGRAPHIC
    - LEFT ATRIAL DIASTOLIC VOLUME
    - TRANSMITRAL DECELERATION TIME
  - INTRAOP
    - RBC TRANSFUSION
    - INOTROPE USE
    - OPEN VS CLOSED
  - POSTOPERATIVE INFECTIONS



# NON CARDIOTHORAC IC SURGERY

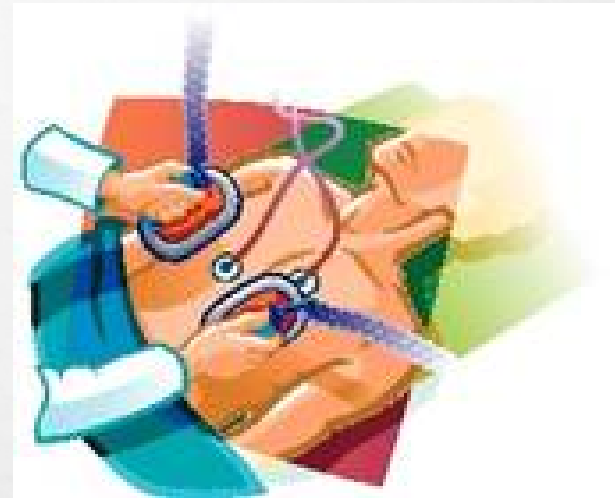
VALLURUPALLI *ET AL*  
CLINICAL CARDIOLOGY  
2017;40:329-332

- AGE
- CAUCASIAN RACE
- MALE SEX
- HTN, CARDIAC CONDITIONS
- ELEVATED BNP OR NT-PROBNP
- EMERGENCY SURGERY
- GENERAL ANESTHESIA
- ABDOMINAL/INTRACRANIAL
- INTRAOPERATIVE HYPOTENSION
- HYPOXIA
- POSITIVE FLUID BALANCE
- PAIN & NAUSEA

# TREATMENT OF POAF

RHYTHM VS RATE CONTROL

- HEMODYNAMIC STABILITY
- MEDICAL VERSUS ELECTRICAL
- INTRAVENOUS VS PER OS



- CLINICAL SETTING
- RESOURCES

# *The* NEW ENGLAND JOURNAL *of* MEDICINE

ESTABLISHED IN 1812

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VOL. 374 NO. 20

## Rate Control versus Rhythm Control for Atrial Fibrillation after Cardiac Surgery

A.M. Gillinov, E. Bagiella, A.J. Moskowitz, J.M. Raiten, M.A. Groh, M.E. Bowdish, G. Ailawadi, K.A. Kirkwood,

CARDIOTHORACIC SURGICAL TRIALS NETWORK – 23 CENTERS, N= 2109

- 523 (25%) PTS WITH NEW ONSET POAF >60 MINS OR RECURRENT
- RATE CONTROL: TARGET HR <100 BPM WITH MEDS
- RHYTHM CONTROL: AMIODARONE 3 G +/- RATE DRUG FOR 60 DAYS.  
CARDIOVERSION AFTER 24-48 HRS
- POAF >48 HRS: WARFARIN TARGET INR 2-3, 60 DAYS
- +/- BRIDGING LMWH
- 1° OUTCOME: # OF HOSPITAL DAYS WITHIN 60D OF RANDOMIZATION



# RESULTS

## TREATMENT CROSS-OVER

- 23.8% OF RHYTHM CONTROL GROUP DID NOT COMPLETE FULL AMIODARONE COURSE
- 26.7% OF RATE CONTROL GROUP RECEIVED AMIODARONE OR CV

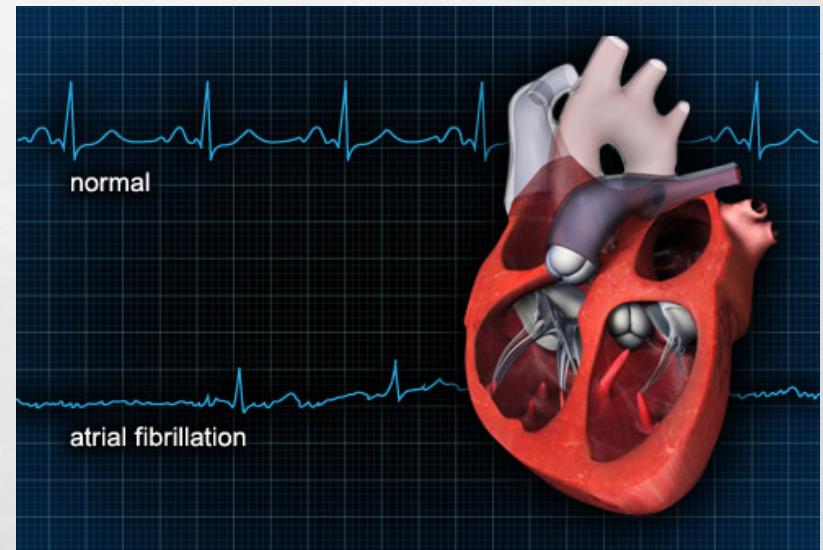
## OUTCOMES

- HOSPITAL DAYS
  - MEAN 5.0 (RATE) VS 5.2 (RHYTHM)
- NO DIFFERENCE IN
  - READMISSION RATES
  - DEATH
  - ADVERSE EVENTS

# MANAGEMENT

## ANTICOAGULATION

- WARFARIN
- NOAC
- HOW LONG ?
  - >30D
  - LONGER IF  $\text{CHA}_2\text{DS}_2\text{-VASC} > 2$



# PREDICTION OF POAF

CAN WE IDENTIFY AT RISK PATIENTS?

## POAF Score

|                   | SCORE |
|-------------------|-------|
| Age 60-69yrs      | 1     |
| Age 70-79yrs      | 2     |
| Age >79yrs        | 3     |
| COPD              | 1     |
| eGFR < 15mL/min   | 1     |
| Emergency         | 1     |
| Preoperative IABP | 1     |
| LVEF < 30%        | 1     |
| Valve Surgery     | 1     |

- c stat: 0.68 (0.65)

## Atrial Fibrillation Risk Index

|                             | Males        | Females      |
|-----------------------------|--------------|--------------|
| Age (years)                 | > 60 = 1 pt  | > 66 = 1 pt  |
| Weight (kg)                 | > 76 = 1 pt  | > 64 = 1 pt  |
| Height (cm)                 | > 176 = 1 pt | > 168 = 1 pt |
| Peripheral Vascular Disease | 1 point      | 1 point      |

- c stat: 0.65 (0.56)





# THORACIC SURGERY PREDICTION SCORE

- PASSMAN ET AL 2005

- N= 444 (412)

C-STAT 0.66

| Variable                 |       | Odds Ratio | Points |
|--------------------------|-------|------------|--------|
| Male                     |       | 1.95       | 1      |
| Preop Heart Rate >72 bpm |       | 4.88       | 1      |
| Age (yrs)                | 55-74 | 9.31       | 3      |
|                          | >75   | 1.89       | 4      |

# NON CT SURGERY PREDICTION SCORE?

# PREVENTION OF POAF

IS IT BETTER IF IT DOESN'T HAPPEN AT ALL?



# Prophylactic Oral Amiodarone for the Prevention of Arrhythmias That Begin Early After Revascularization, Valve Replacement, or Repair

PAPABEAR: A Randomized Controlled Trial

- N = 601
- INCLUSION: NON-EMERGENT CABG AND/OR VALVE SX.
- INTERVENTION: AMIODARONE 10MG/KG/DAY X 6 DAYS PRIOR TO SURGERY AND 6 DAYS AFTER
- ABSOLUTE REDUCTION 13.4% (16.1 VS 29.5%)
- NNT = 7.5

*JAMA. 2005;294:3093-3100*

# Practical Regimen for Amiodarone Use in Preventing Postoperative Atrial Fibrillation

Lars R. Zebis, MD, Thomas D. Christensen, MD, PhD, Henrik F. Thomsen, MS, PhD, Martin M. Mikkelsen, MD, Lars Folkersen, MD, Henrik T. Sørensen, DMSc, and Vibeke E. Hjortdal, DMSc

- RCT N=250
- INTERVENTION: POSTOP 300MG IV THEN 600MG PO BID AMIODARONE X 5 DAYS
- ABSOLUTE REDUCTION 15% (11 VS 26%)
- NNT 6.9

(Ann Thorac Surg 2007;83:1326–31)

# PREVENTATIVE INTERVENTIONS

## CARDIAC SURGERY

- ARSENAULT ET AL COCHRANE SYSTEMATIC REVIEW (2013)
  - BETA-BLOCKERS (OR 0.33)
  - AMIODARONE (OR 0.43)
  - SOTALOL (OR 0.34)
  - MAGNESIUM (OR 0.55)
  - BI-ATRIAL PACING (OR 0.47)
  - POSTERIOR PERICARDIOTOMY (OR 0.35)
- DECREASE INCIDENCE OF POAF
- DECREASE ECONOMIC BURDEN OF STAY

# Prevention of Atrial Fibrillation in High-risk Patients Undergoing Lung Cancer Surgery

## *The PRESAGE Trial*

*Daniela Cardinale, MD, PhD, FESC,\* Maria T. Sandri, MD,† Alessandro Colombo, MD,‡*

- N = 320 PTS
- NT-proBNP MEASURED DAY BEFORE SURGERY
- METOPROLOL VS LOSARTAN IN PTS WITH HIGH NT-proBNP
- POAF: 6% METOPROLOL, 12% LOSARTAN VS 40% CONTROL
- LOS: 6.8 VS 7.2 VS 8.6 DAYS

*(Ann Surg 2016;264:244–251)*



# Amiodarone Protocol Provides Cost-Effective Reduction in Postoperative Atrial Fibrillation

J. Hunter Mehaffey, MD, MS, Robert B. Hawkins, MD, MS, Matthew Byler, MD, MBA, Judy Smith, RN, John A. Kern, MD, Irving Kron, MD, Gorav Ailawadi, MD, Tanya Wanchek, PhD, and Leora T. Yarboro, MD

- 150 CARDIAC SURGERY PTS
- INTERVENTION – 1.44G IV AMIODARONE X 24HRS IN ICU THEN 200MG PO BID FOR 14 DAYS OR UNTIL DISCHARGE
- POAF REDUCTION: 26% → 17%
- \$458/PT SAVINGS

(Ann Thorac Surg 2018;105:1697–703)

# IN SUMMARY

- POAF VARIES FROM 3 TO 45%
- ASSOCIATED MORBIDITY: INFECTIONS, STROKE, HOSPITAL STAY, CHF, READMISSIONS
- TRANSIENT, 85-90% RESOLVED BY DISCHARGE
- LONG TERM MORTALITY ~50% INCREASE
- TREATMENT: RATE OR RHYTHM CONTROL
- PREVENTION