



# Early complications after cardiac surgery – the cardiologist's perspective

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# Partial list of complications after cardiac surgery

- Perioperative acute myocardial infarction (mostly post CABG)
- Arrhythmias
  - Postoperative atrial fibrillation
  - Bradyarrhythmias and AV block
  - Ventricular tachyarrhythmias, polymorphic VT/VF
- Pericarditis, pericardial effusion and tamponade
- LV dysfunction, left heart failure
- RV dysfunction, right heart failure
- Low cardiac output state, cardiogenic shock
- Dynamic LVOT obstruction (mostly related to MVR/MV repair)
- Mediastinitis, Hemothorax, Pneumothorax – surgical issues
- Endocarditis (mostly related valve repair/replacement)



# Early cardiac complications after coronary artery bypass graft surgery

- Perioperative MI – occurs in 4%-5% of CABG pts
  - Diagnosis is difficult: symptoms relate to hemodynamic instability
    - Cardiac enzymes often elevated post surgery
    - ECG changes may reflect pericardial inflammation
  - 3<sup>rd</sup> universal definition of myocardial infarction (type 5)
    - “MI associated with CABG is arbitrarily defined by elevation of cTn values  $>10 \times$  99<sup>th</sup> percentile URF in pts with normal baseline cTn values ( $<99^{\text{th}}$  percentile)
    - In addition, either (i) new Q-waves or new LBBB, or (ii) angiographic documented new graft or new native coronary artery occlusion, or (iii) imaging evidence of new loss of viable myocardium or new regional WMA”



# Early cardiac complications after coronary artery bypass graft surgery

- Perioperative MI – pathophysiology:
  - Usually attributed to poor distal perfusion after grafting of more proximal arteries has been performed
  - Early graft failure, poor myocardial protection, plaque debris
  - Increased risk in re-CABG, long CPB time, cardiomegaly
- Perioperative MI – related to worst prognosis:
  - CASS in-hospital mortality
    - 9.7% with Q-wave MI vs 1.0% without MI
  - BARI 5 year mortality
    - 8.2% with Q-wave MI vs 3.7% without MI
  - Meta-analysis of 7 studies (19,000 pts)
    - Direct relationship between 30-day mortality and 8-24h increase in CKMB or cTn (i.e related to extent of myocardial necrosis)



# Early cardiac complications after coronary artery bypass graft surgery

- Perioperative MI – early graft occlusion
  - 5%-10% of SVG, usually thrombotic
  - Mostly related to technical problems at the anastomosis
  - Risk is reduced with aspirin (given within 6h after CABG)
- Perioperative MI – clinical manifestations
  - Occur early after CABG (usually within 2 days, median 12h)
  - Ischemic symptoms
  - Significant ischemic ECG changes
  - Hemodynamic instability
  - Ventricular arrhythmias
  - Management: urgent diagnostic cath and prompt revascularization (repeat CABG ~ 20%, PCI ~ 80%)
  - Increased procedural complications (bleeding, renal failure, perforation)
  - Increased early stent thrombosis (no DAPT) and 30-day mortality



# Post-operative arrhythmias

- Mostly tachyarrhythmias
- Relate to preoperative hypokalemia
  - If  $K < 3.5$  mEq/l than OR 2.2 for serious ventricular arrhythmia, need for resuscitation, incidence of AF/Aflut
- Post-operative atrial fibrillation
  - Occurs in 15-40% of CABG pts
  - Up to 60% post combined CABG with valve replacement
  - Beta blockers, sotalol and amiodarone reduce the frequency of post-operative AF by 52-65% (beta-blockers should be given before or ASAP after surgery)
  - In practice, amiodarone is continued for 30 days or until 1<sup>st</sup> postoperative visit



# Randomized Trial of Atorvastatin for Reduction of Postoperative Atrial Fibrillation in Patients Undergoing Cardiac Surgery

## Results of the ARMYDA-3 (Atorvastatin for Reduction of MYocardial Dysrhythmia After cardiac surgery) Study

Giuseppe Patti, MD; Massimo Chello, MD; Dario Candura, MD; Vincenzo Pasceri, MD; Andrea D'Ambrosio, MD; Elvio Covino, MD; Germano Di Sciascio, MD

***(Circulation. 2006;114:1455-1461.)***

- 200 consecutive patients undergoing CPB operation
- Randomized to 40 mg atorvastatin vs. placebo for 1 week before surgery and following surgery to discharge (~1 week)
- Open-label atorvastatin continued for 3 more weeks in all pts
- Primary endpoint: in-hospital atrial fibrillation (> 5 min)



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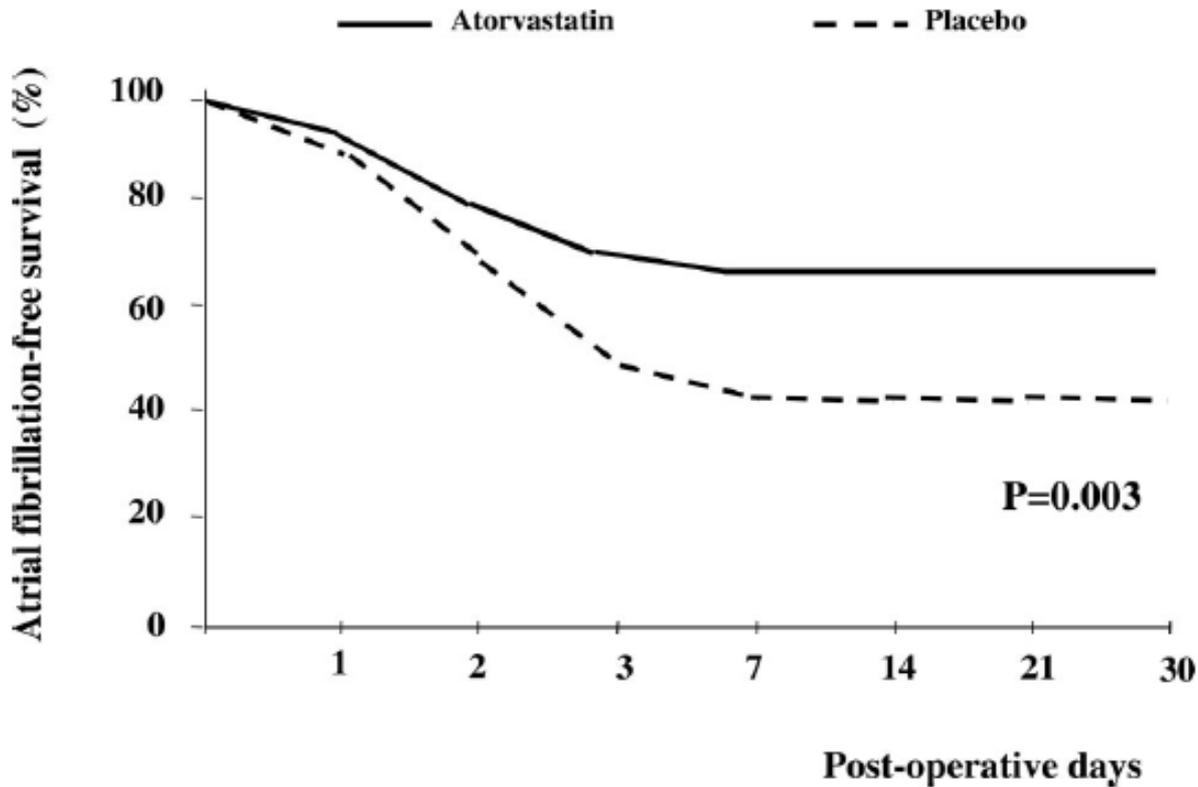


Figure 2. Actuarial curves of 30-day atrial fibrillation-free survival in the 2 arms.

Multivariate analysis:

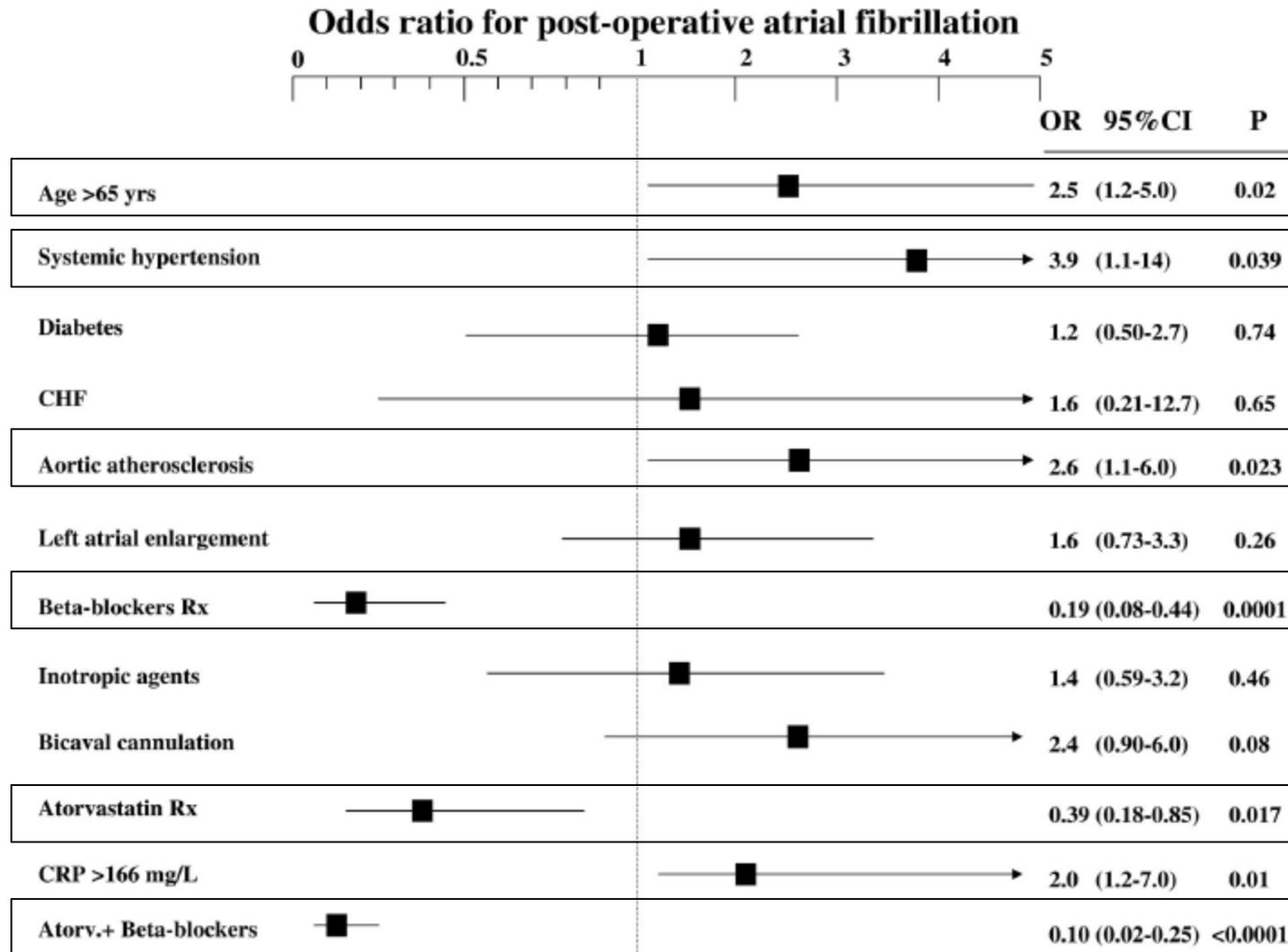
ARR 22% of AF

RRR 61%

P=0.017

Treatment benefit seen in CABG pts; less evident in pts with LA dilation and non-CABG op

# Randomized Trial of Atorvastatin for Reduction of Postoperative Atrial Fibrillation in Patients Undergoing Cardiac Surgery



**Figure 4.** Multivariable analysis indicating predictors of outcome. CHF indicates congestive heart failure; Rx, prescription; and Atorv, atorvastatin.



# Low Cardiac Output

- The cardiologist's perspective – think physiology:
  - Rhythm, heart rate
  - Preload
  - Afterload
  - LV systolic dysfunction
  - LV diastolic dysfunction
- (leave the mechanical problems to the surgeons)



# Low Cardiac Output

- Base assessment on monitoring and imaging:
  - Heart rate, O2 sat., Blood pressure, Blood gases
  - LA line or SG catheter (SVR, PVR)
  - ECG
  - Echocardiography is essential
    - LV function, valves, tamponade (often localized)
    - Don't forget LVOT obstruction (post MVR or AVR)
    - To TEE or not to TEE → to TEE
    - Why is it always in the middle of the night???
    - We need data on performance...



# Post surgical vasodilator response

- In ~ 6% of patients
- More frequent with ACE-I pre-treatment
- Low SVR
- Relates to non-specific inflammatory response to CPB
- Relates to long bypass time
- Relates to reduced systolic function
- Usually responds to low-dose norepinephrine