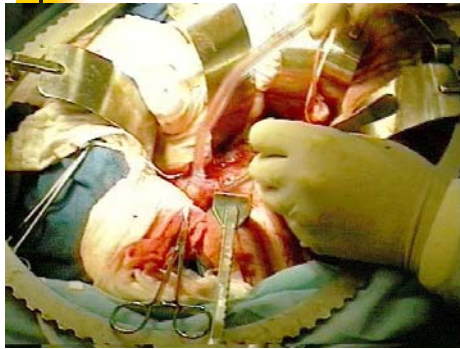


Preop Cardiac Evaluation 2008



John E. Ellis MD





What's the goal of preop eval?

- Is patient in best possible shape?
- Can the patient be made better?
- Risk assessment?
 - Who should not have surgery?



Periop CV Eval 2008

- Who should not undergo elective surgery?
 - Unstable angina
 - Symptomatic dysrhythmias
 - Decompensated CHF



What will kill the patient?

- Triple vessel CAD
- Left main CAD
- Aortic stenosis



Periop CV Eval 2008

- Falling periop event rates make aggressive workup less rewarding
- What's it worth to reduce complications 50%...
 - From 10% to 5%? (NNT = 20)
 - From 2% to 1%? (NNT = 100)



Improvements multifactorial?

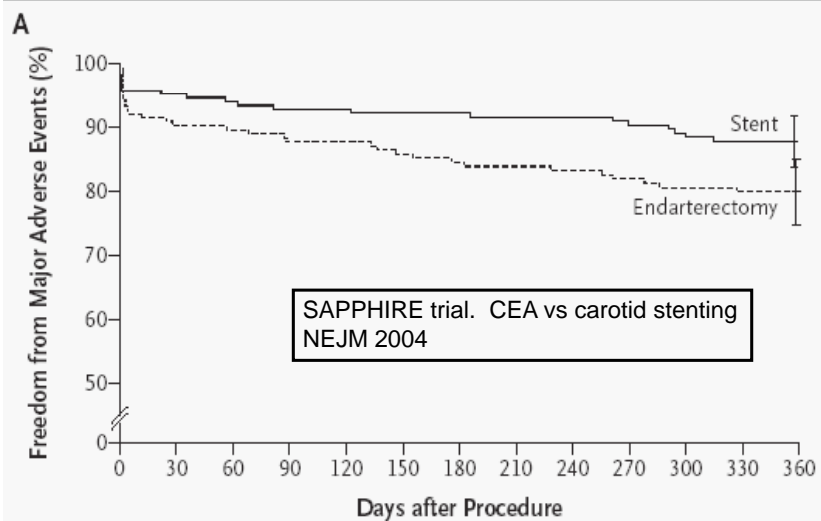
- Better preop selection?
 - Stress tests
- Better preop management?
 - HTN control
 - Statins
 - ACE-inhibitors
 - PTCA, stents / CABG



Improvements multifactorial?

- Better intraop management?
 - Endovascular
 - Robotics
 - Minimally invasive
- Better postop management?
 - Intensivist care

Better surgical management





Periop CV Eval 2008

- Problems with aggressive preop testing
 - \$\$
 - OR inefficiency
 - Fear
 - Complications (eg stroke from cardiac cath)
 - Delay needed surgery
 - Hip fracture
 - Acute limb ischemia
 - Symptomatic AAA



Current practice / recommendations

Some evidence-based
Some personal

What will kill the patient?

- Triple vessel CAD
- Left main CAD
- Aortic stenosis



Goal of preop cardiac testing

- **Rule out 3 vessel CAD**
- Revascularize if found
 - In appropriate patients
- Perioperative cardiac protection in others

Goal = Identify 3 vessel CAD

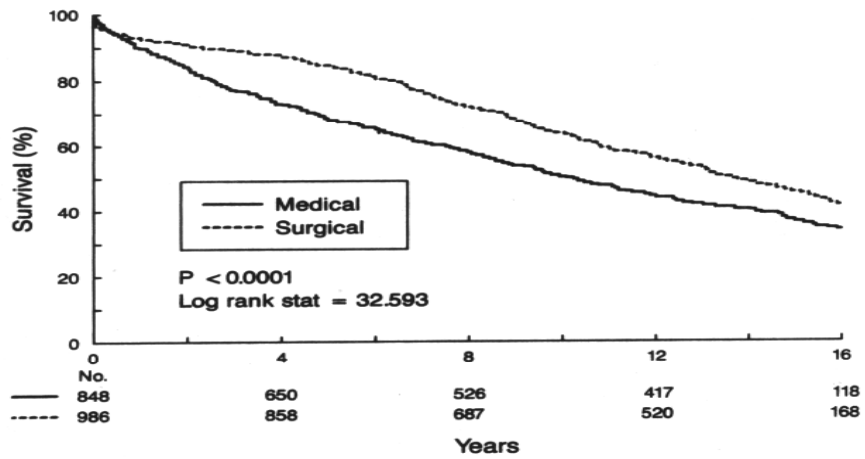
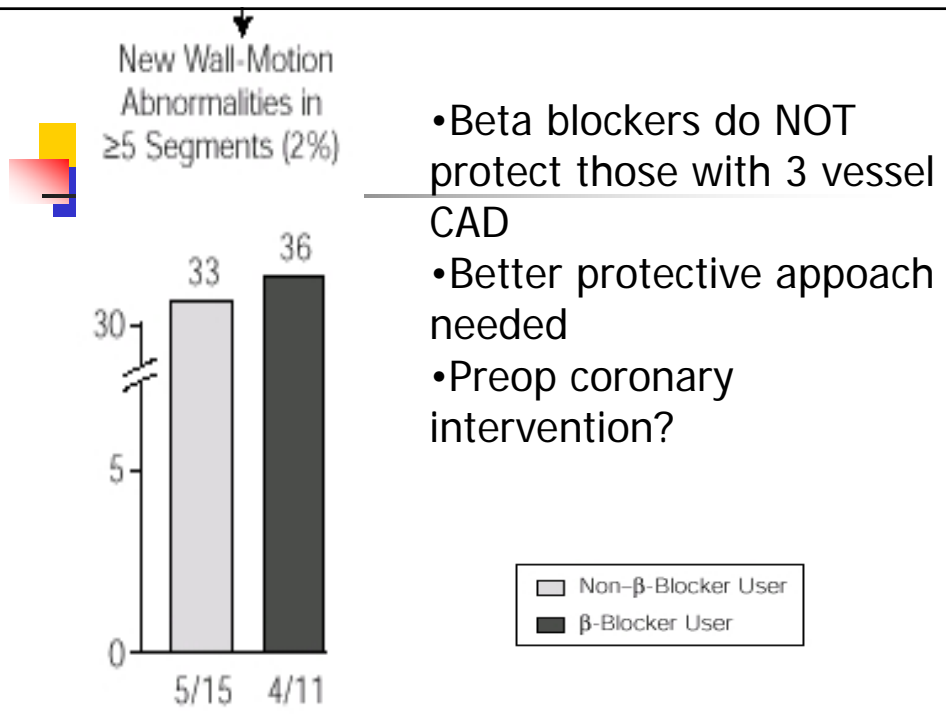


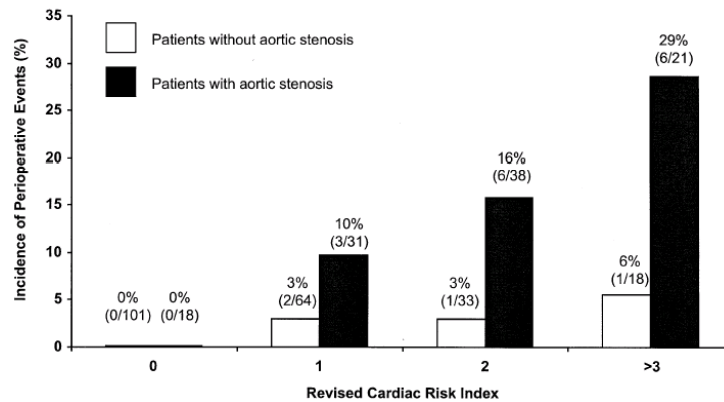
FIG 1. Kaplan-Meier estimated probability of survival among 1834 patients with peripheral vascular disease enrolled in the Coronary Artery Surgery Study registry. Survival curve is adjusted for number of diseased coronary arteries.



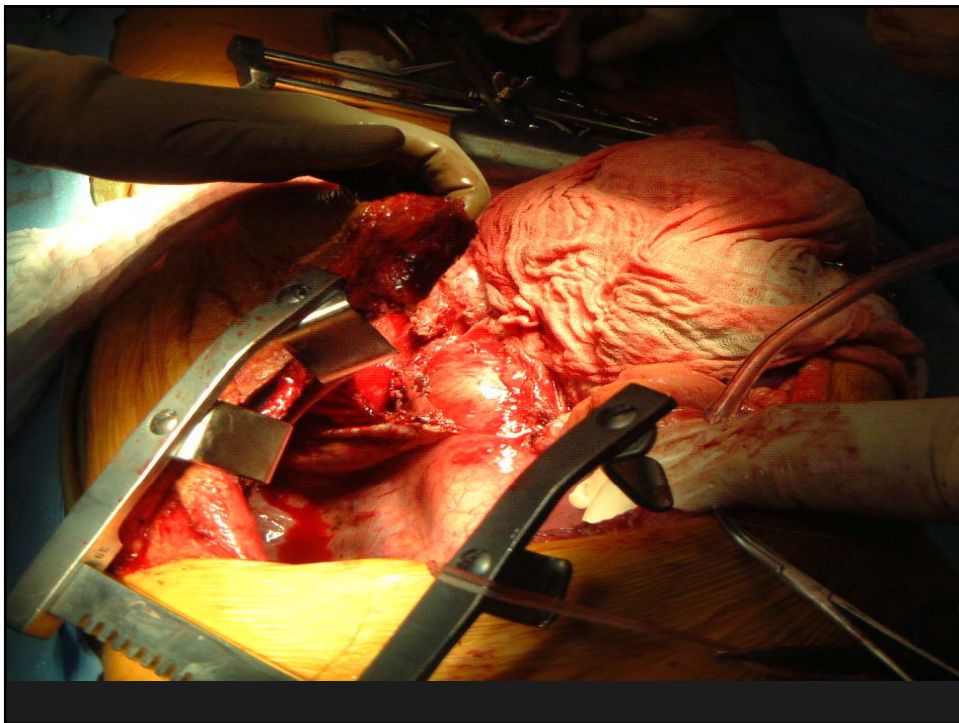
Aortic Stenosis: An Underestimated Risk Factor for Perioperative Complications in Patients Undergoing Noncardiac Surgery

Miklos D. Kertai, MD, Manolis Bountiokos, MD, Eric Boersma, PhD, Jeroen J. Bax, MD,
Ian R. Thomson, MD, Fabiola Sozzi, MD, Jan Klein, MD, Jos R.T.C. Roelandt, MD,
Don Poldermans, MD

Aortic Stenosis/Kertai et al



Who "needs" a stress test?
Cardiology consultation?





Laura C

- 55 yo F
- s/p CVA, MI, CHF, IDDM
- Gangrenous toes
- Fem-distal bypass proposed

Does she need a stress test?



John B

- 75 yo WM for iliac angioplasty
- Cath, stented RCA s/p MI 2 years ago
 - No symptoms since
- Medical Rx
 - ACE-I
 - Beta blocker
 - Statin
 - Aspirin

Does he need a stress test?



I will argue

Laura C *maybe* needs a stress test (or maybe straight to cardiac cath)

John B does not

“Bedside” Risk Factors

Derivation and Prospective Validation of a Simple Index for Prediction of Cardiac Risk of Major Noncardiac Surgery

Thomas H. Lee, MD, SM; Edward R. Marcantonio, MD, SM; Carol M. Mangione, MD, SM; Eric J. Thomas, MD, SM; Carisi A. Polanczyk, MD; E. Francis Cook, ScD; David J. Sugarbaker, MD; Magruder C. Donaldson, MD; Robert Poss, MD; Kalon K.L. Ho, MD, SM; Lynn E. Ludwig, MS, RN; Alex Pedan, PhD; Lee Goldman, MD, MPH

Lee TH et al Circulation 1999

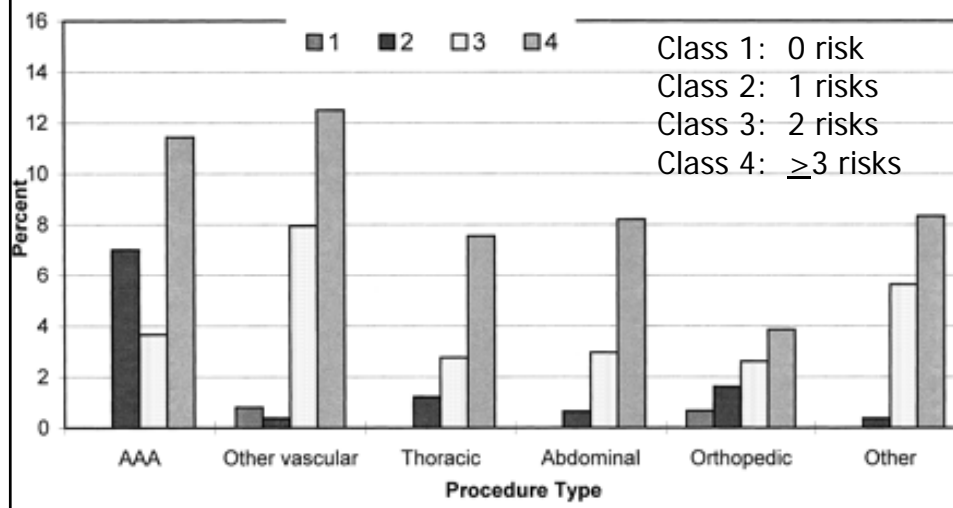
“Bedside” Risk Factors

- High risk surgery
- h/o ischemic heart disease
- h/o CHF
- h/o CVA
- Insulin Rx
- Creatinine > 2.0 mg/dL

Lee TH et al Circulation 1999

By definition, patients undergoing AAA, thoracic, and abdominal procedures were excluded from class I.

Risk class predicts cardiovascular morbidity



Isolated abnormal ECG?

Preoperative Electrocardiogram Abnormalities Do Not Predict Postoperative Cardiac Complications in Geriatric Surgical Patients

Linda L. Liu, MD, Samir Dzankic, MD, and Jacqueline M. Leung, MD, MPH

- *“Abnormalities on preoperative ECGs are common but are of limited value in predicting postoperative cardiac complications in older patients undergoing noncardiac surgery.”*

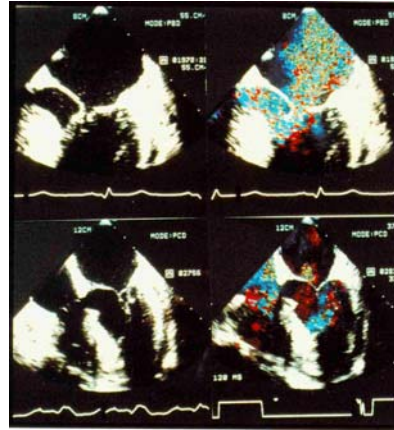
Does stress testing add more information?





Preop stress testing

- Dobutamine echo becoming standard test
- Function, valves, ischemic potential



1327

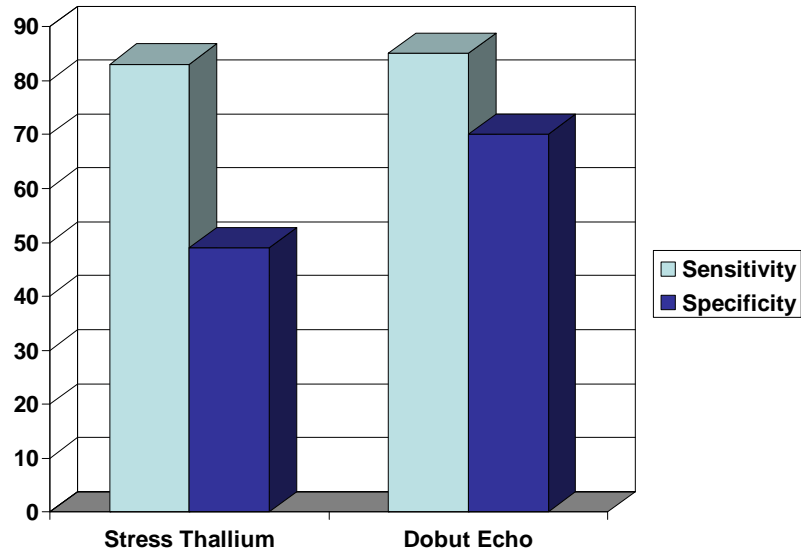
INTERVENTIONAL CARDIOLOGY AND SURGERY

A meta-analysis comparing the prognostic accuracy of six diagnostic tests for predicting perioperative cardiac risk in patients undergoing major vascular surgery

M D Kertai, E Boersma, J J Bax, M H Heijnenbroek-Kal, M G M Hunink, G J L'italien, J R T C Roelandt, H van Urk, D Poldermans

.....
Heart 2003;89:1327-1334

Meta-analysis of stress tests



Why not stress test everyone?

- False positives:
 - \$\$
 - Delay needed surgery
 - Frighten patients
 - Cath complications
 - Stroke
 - Peripheral vascular



What does stress test add?

- L'Italien et al
 - ROC curve areas (Prognostic accuracy)
 - 74% by clinical criteria
 - 81% by clinical criteria + stress tests



2003 Survey

- Hypothetical vascular surgery
- 439 US anesthesiologists
- More likely to get stress test:
 - Women anesthesiologists
 - New England anesthesiologists
 - More recent graduate
 - Expect more EBL
 - Expect higher PMI rate

Ellis JE et al (submitted)

It's the history!

Once again, history and physical more important than "specialized" testing

If Laura C's DSE was normal?

- Doesn't eliminate risk
- CAD likelihood falls
 - ? 80% to 40%?
- Tests are only 80% sensitive, specific



Laura C

- 55 yo F
- s/p CVA, MI, CHF, IDDM
- Gangrenous toes
- DSE floridly positive
 - Lateral, apical, anterior reversibility
- Cath shows 3 vessel disease
- Off pump CABG recommended



Preoperative Medical Interventions 2008

- Modern cardiovascular prevention emphasize chronic stress reduction
- May decrease need for “stress-reducing” anesthetics
- May improve long-term survival



Novel preoperative predictors

- Abnormal endothelial function
- Coronary calcium deposits
- Decreased coronary supply

Risk Stratification for Postoperative Cardiovascular Events via Noninvasive Assessment of Endothelial Function

A Prospective Study

Noyan Gokce, MD; John F. Keaney, Jr, MD; Liza M. Hunter, ANP; Michael T. Watkins, MD;
James O. Menzoian, MD; Joseph A. Vita, MD

(*Circulation*. 2002;105:1567-1572.)

- Images of the brachial artery and pulsed-Doppler flow
 - Baseline
 - Reactive hyperemia after 5-minute cuff occlusion of the upper arm
 - *How well do the arteries dilate?*

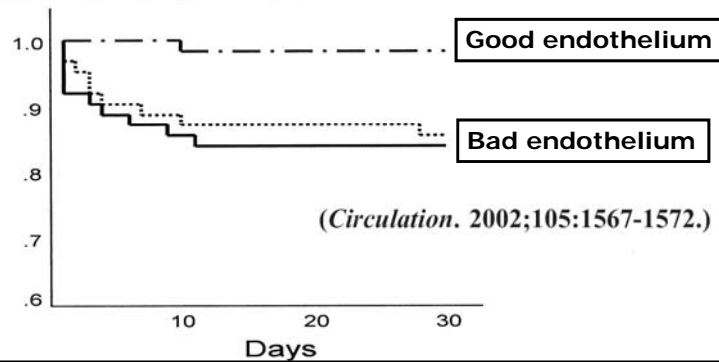


Endothelial dysfunction

TERTILES of FMD

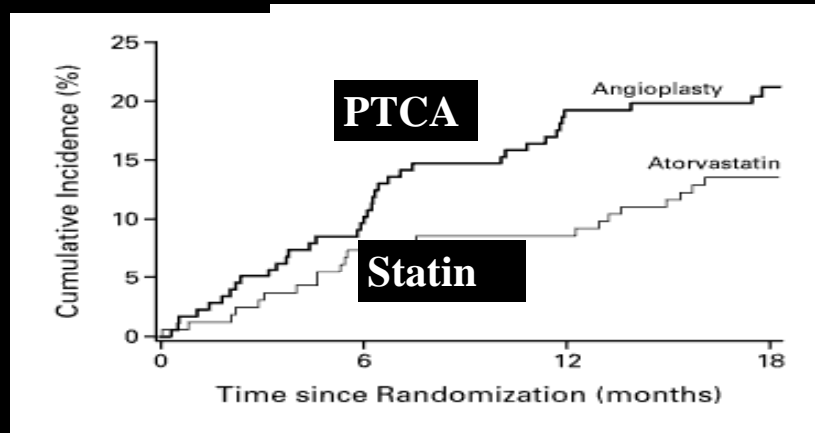
- · — · — High (>8.1%)
- Middle (4.2 – 8.1%)
- Low (<4.2%)

All Events Except Troponin Elevation



Statins vs. PTCA

ischemic events



Pitts B et al. NEJM 1999

Better medical management

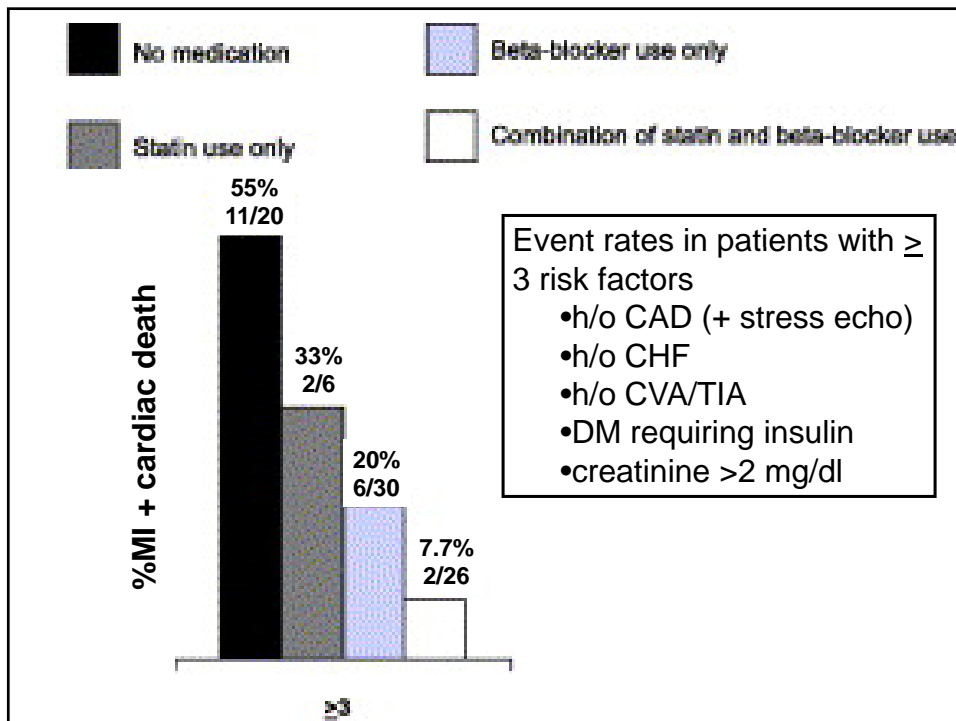
Eur J Vasc Endovasc Surg 28, 343-352 (2004)

doi:10.1016/j.ejvs.2004.07.008, available online at <http://www.sciencedirect.com> on **SCIENCE @ DIRECT**

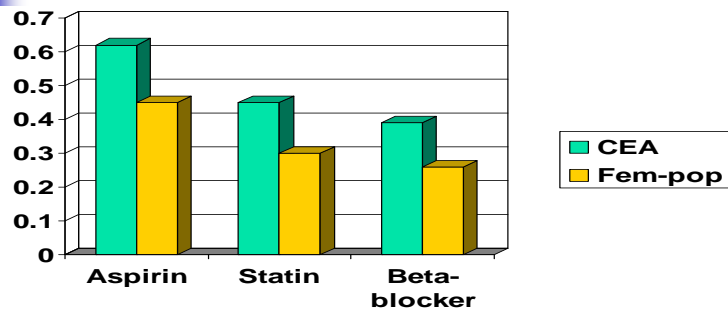
A Combination of Statins and Beta-blockers is Independently Associated with a Reduction in the Incidence of Perioperative Mortality and Nonfatal Myocardial infarction in Patients Undergoing Abdominal Aortic Aneurysm Surgery

M.D. Kertai,¹ E. Boersma,¹ C.M. Westerhout,¹ J. Klein,² H. van Urk,³ J.J. Bax,³ J.R.T.C. Roelandt³ and D. Poldermans^{3*}

Departments of ¹Cardiology, ²Anesthesiology and ³Vascular Surgery, Erasmus MC, Rotterdam, the Netherlands



Yet, many patients undertreated



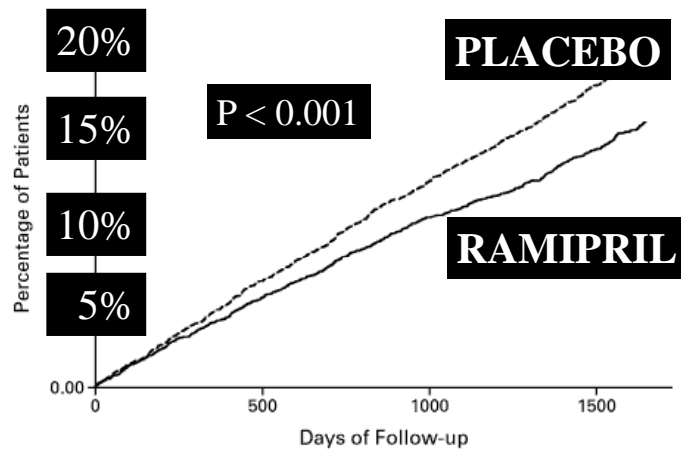
1: Vasc Med 2001;6(1):35-41

Related Articles

Secondary prevention of coronary artery disease in patients undergoing elective surgery for peripheral arterial disease.

Nass CM, Allen JK, Jermyn RM, Fleisher LA.

ACE inhibitor prolongs life





John B

- 75 yo WM for iliac angioplasty
- Cath, stented RCA s/p MI 2 years ago
 - No symptoms since
- Medical Rx
 - ACE-I
 - Beta blocker
 - Statin
 - Aspirin

Does he need a stress test?



He doesn't need stress test

His medical management
is already optimal



Guidelines Goals

- Effective in stratifying cardiac risk
 - clinical predictors
 - estimate functional capacity
- Reduce unnecessary testing
- Select patients likely to benefit from preoperative optimization



Do guidelines offer a better way?

- “I didn’t spend all these years of training to practice “cookbook” medicine!”
- Guidelines don’t even agree with each other
- Do guidelines increase or decrease my liability?

AHA/ACC guidelines for AAA?

| | Baseline 1993-1994 | Using Guidelines 1995-96 | Post Study 1997-98 |
|-----------------------------|-----------------------|--------------------------------|-----------------------|
| Stress tests | 88% | 47% | |
| Cath | 24% | 11% | |
| CABG/PTCA | 25% | 2% | |
| Preop eval costs/patient | \$1087 | \$171 | |
| Death | 4% | 3% | 2% |

Froehlich JB, J Vasc Surg. 2002

Of course, not all studies
agree...

Studies that dispute the value of guidelines

J Clin Anesth. 2002 Mar;14(2):126-8.

[Related Articles.](#)

ELSEVIER
FULL-TEXT ARTICLE

Implementing ACC/AHA guidelines for the preoperative management of patients with coronary artery disease scheduled for noncardiac surgery: effect on perioperative outcome.

Farid I, Litaker D, Tetzlaff JE.

Department of General Anesthesiology, The Cleveland Clinic Foundation, OH 44195, USA.


- Only 15% (27/180) of the patients with indications for a stress test had a positive result.
- Even fewer patients had any alteration of the perioperative period.
- “The guidelines for stress test may be over-sensitive”

PERSPECTIVE

Cardiac Events in Patients Undergoing Noncardiac Surgery: Shifting the Paradigm from Noninvasive Risk Stratification to Therapy

Paul A. Grayburn, MD, and L. David Hillis, MD

In short, the paradigm is shifting from predicting which patient is at high risk for having a perioperative cardiac event to minimizing the likelihood of such an event with specific perioperative pharmacologic therapy.



Better prophylactic Rx...

Requires less
aggressive
preoperative workup

The **NEW ENGLAND**
JOURNAL *of* **MEDICINE**

ESTABLISHED IN 1812 DECEMBER 30, 2004 VOL. 351 NO. 27

**Coronary-Artery Revascularization
before Elective Major Vascular Surgery**

Edward O. McFalls, M.D., Ph.D., Herbert B. Ward, M.D., Ph.D., Thomas E. Moritz, M.S., Steven Goldman, M.D.,
William C. Krupski, M.D.,* Fred Littooy, M.D., Gordon Pierpont, M.D., Steve Santilli, M.D., Joseph Rapp, M.D.,
Brack Hattler, M.D., Kendrick Shunk, M.D., Ph.D., Connie Jaenicke, R.N., B.S.N., Lizy Thottapurathu, M.S.,
Nancy Ellis, M.S., Domenic J. Reda, Ph.D., and William G. Henderson, Ph.D.

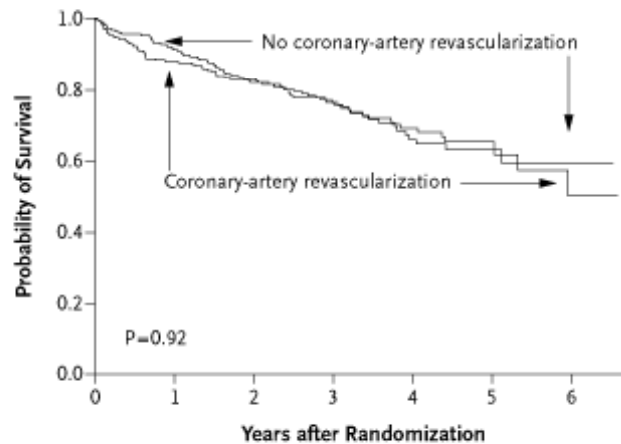
CARP Trial

- 18 VA hospitals
- ~6000 patients screened
- 510 had positive cardiac cath
- 33% AAA
- 67% fem distal
- Randomized to:
 - CABG/PCI vs
 - Medical Rx alone
- Good compliance
- Few crossovers

Excellent medical therapy!

| | Medical Rx | CABG/PCI | P value |
|---------------|------------|----------|---------|
| Beta blockers | 86% | 84% | 0.45 |
| Aspirin | 70% | 77% | 0.12 |
| Statins | 54% | 54% | 0.93 |

No difference in outcomes!



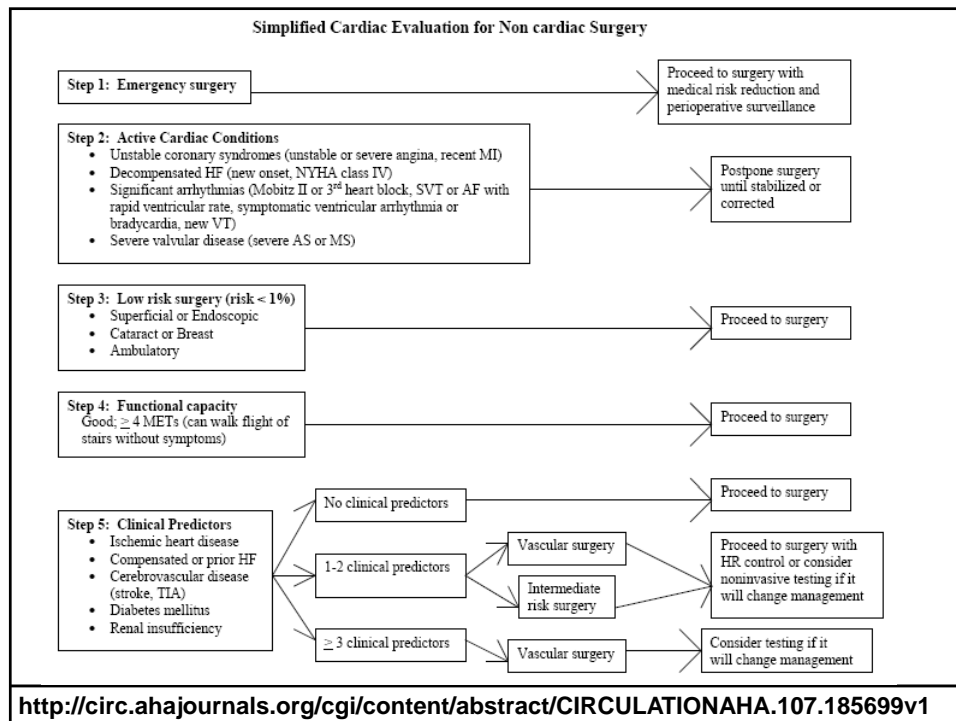
| No. at Risk | | | | | | |
|----------------------|-----|-----|-----|----|----|----|
| Revascularization | 226 | 175 | 113 | 65 | 18 | 7 |
| No revascularization | 229 | 172 | 108 | 55 | 17 | 12 |

My Recommendations

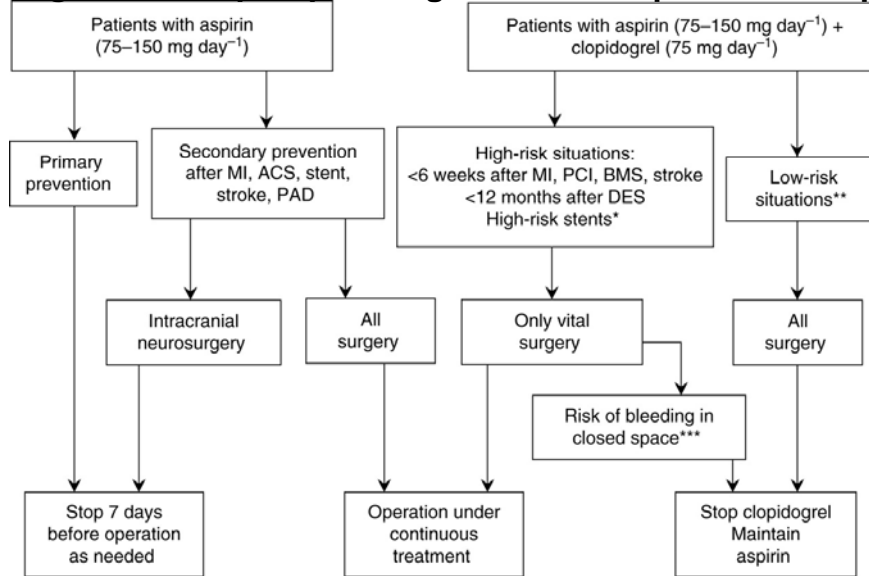
- Cardiology consultations for
 - Major risk factors
 - Multiple intermediate risk factors
 - Lack of state-of-the-art medical therapy
 - Beta blockers
 - Statins
 - Aspirin
 - ACE-inhibitors?
 - Suspected aortic stenosis

My Recommendations

- NO Cardiology consultations for
 - Minor risk factors
 - HTN, smoking, obesity, physical inactivity
 - Isolated ECG changes



Algorithm for preop management of antiplatelet therapy



Chassot, P.-G. et al. Br. J. Anaesth. 2007 99:316-328; doi:10.1093/bja/aem209

British Journal of Anaesthesia

Journal of the American College of Cardiology
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Published by Elsevier Inc.

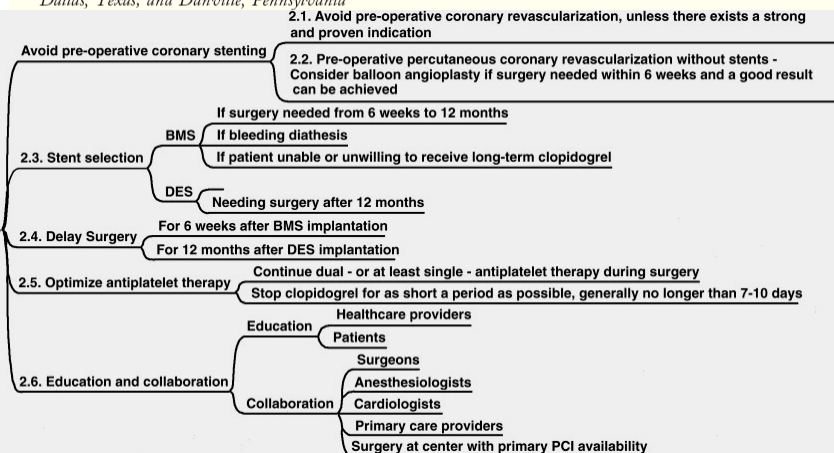
Vol. 49, No. 22, 2007
ISSN 0735-1097/07/\$32.00
doi:10.1016/j.jacc.2007.02.046

STATE-OF-THE-ART PAPER

Perioperative Management of Patients With Coronary Stents

Emmanouil S. Brilakis, MD, PhD, FACC,* Subhash Banerjee, MD, FACC,*
Peter B. Berger, MD, FACC†

Dallas, Texas; and Danville, Pennsylvania



“Breakfast of Champions!”



POISE??

This afternoon and
later in the meeting