Cardiac evaluation for the non-cardiac patient

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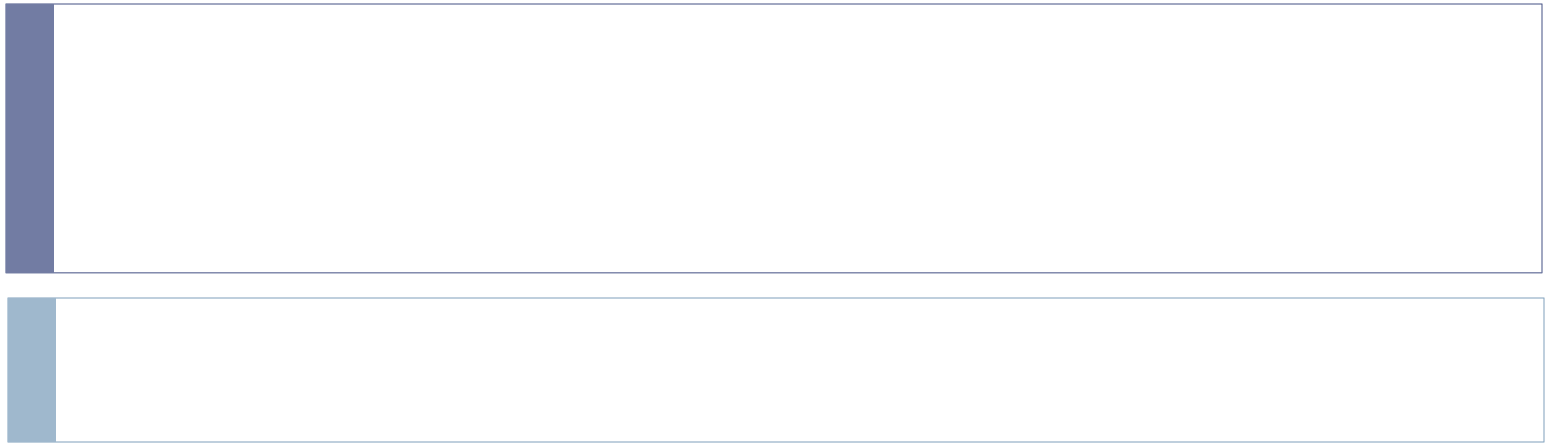

Objectives

- Review ACC / AHA guidelines as updated for 2009
- Discuss new recommendations with β-blockers.
- Discuss issues surrounding revascularization and stents in the perioperative setting

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ACC/AHA GUIDELINE

ACC/AHA 2007 Guidelines on Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery: Executive Summary

A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 2002 Guidelines on Perioperative Cardiovascular Evaluation for Noncardiac Surgery)

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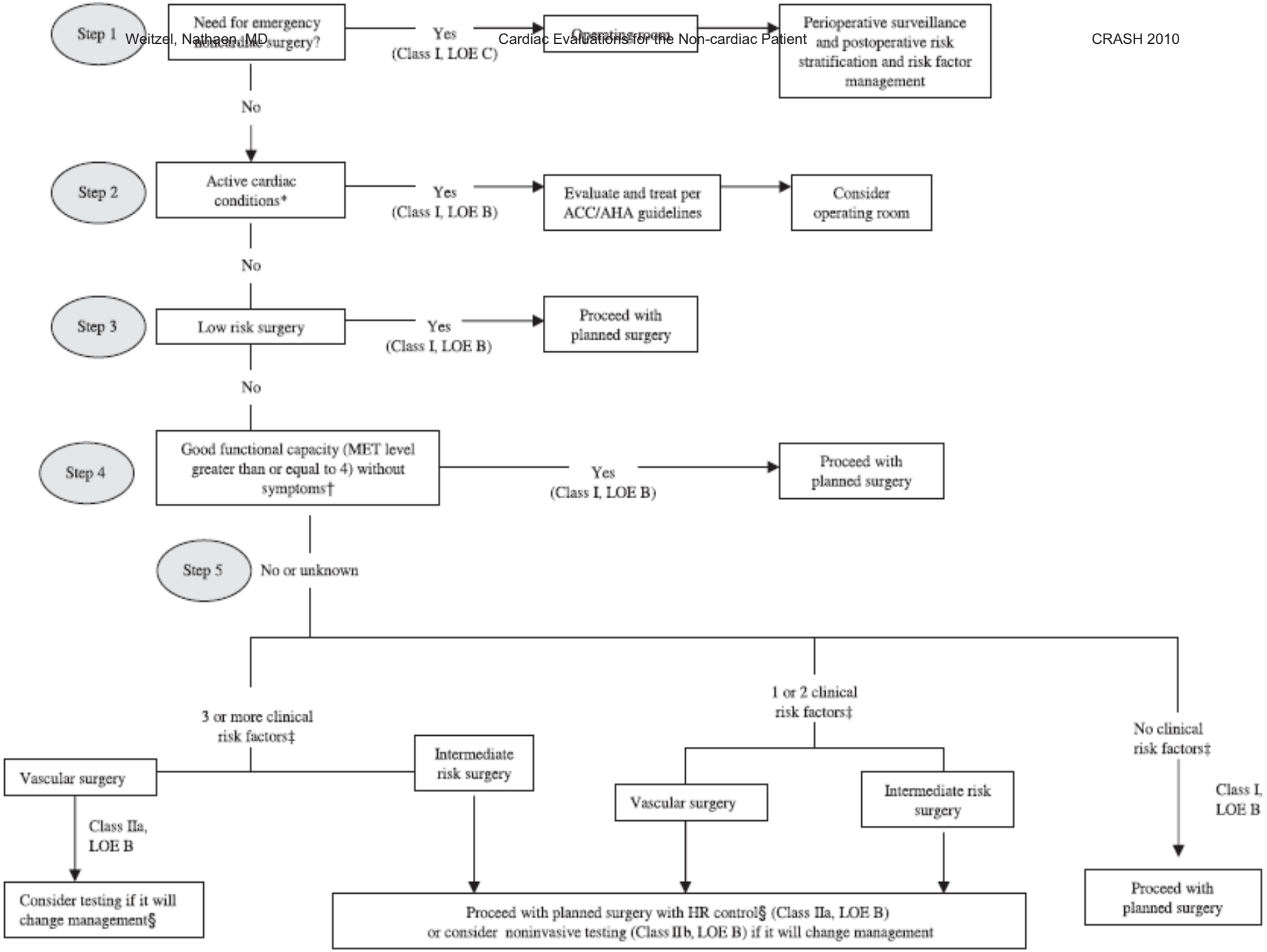
	Class I *Benefit >>> Risk* Procedure/Treatment SHOULD be performed/administered	Class IIa *Benefit >> Risk* *Additional studies with focused objectives needed* IT IS REASONABLE to perform procedure/administer treatment	Class IIb *Benefit ≥ Risk* *Additional studies with broad objectives needed; Additional registry data would be helpful* Procedure/Treatment MAY BE CONSIDERED	Class III *Risk ≥ Benefit* *No additional studies needed* Procedure/Treatment should NOT be performed/administered SINCE IT IS NOT HELPFUL AND MAY BE HARMFUL
Level A *Multiple (3-5) population risk strata evaluated** *General consistency of direction and magnitude of effect*	• Recommendation that procedure or treatment is useful/effective • Sufficient evidence from multiple randomized trials or meta-analyses	• Recommendation in favor of treatment or procedure being useful/effective • Some conflicting evidence from multiple randomized trials or meta-analyses	• Recommendation's usefulness/efficacy less well established • Greater conflicting evidence from multiple randomized trials or meta-analyses	• Recommendation that procedure or treatment not useful/effective and may be harmful • Sufficient evidence from multiple randomized trials or meta-analyses
Level B *Limited (2-3) population risk strata evaluated**	• Recommendation that procedure or treatment is useful/effective • Limited evidence from single randomized trial or non-randomized studies	• Recommendation in favor of treatment or procedure being useful/ effective • Some conflicting evidence from single randomized trial or non-randomized studies	• Recommendation's usefulness/efficacy less well established • Greater conflicting evidence from single randomized trial or non-randomized studies	• Recommendation that procedure or treatment not useful/effective and may be harmful • Limited evidence from single randomized trial or non-randomized studies
Level C *Very limited (1-2) population risk strata evaluated**	• Recommendation that procedure or treatment is useful/effective • Only expert opinion, case studies, or standard-of-care	• Recommendation in favor of treatment or procedure being useful/ effective • Only diverging expert opinion, case studies, or standard-of-care	• Recommendation's usefulness/efficacy less well established • Only diverging expert opinion, case studies, or standard-of-care	• Recommendation that procedure or treatment not useful/effective and may be harmful • Only expert opinion, case studies, or standard-of-care

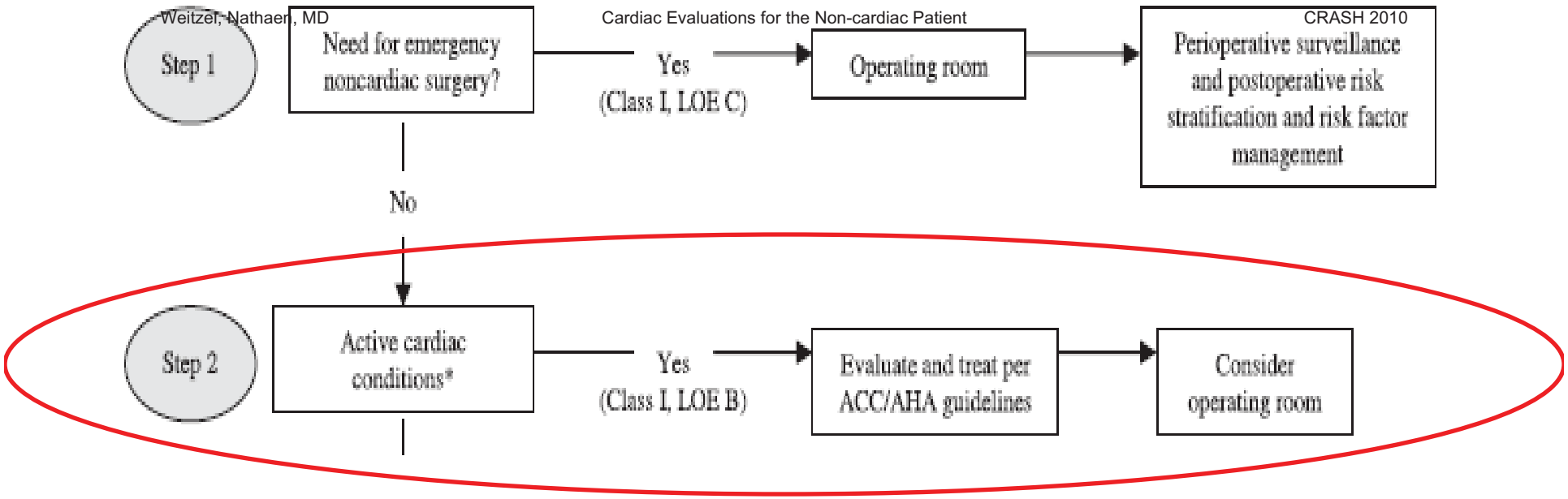
General approach:

- Goal is not "medical clearance" for surgery.
- Rather it is a discussion about cardiac risk for a given procedure and patient.
- Ideally this allows for medical planning to minimize risk, and utilize maximal therapy prior to surgery.

Who should you worry about?

- Patients with known CAD.
- Patients with new symptoms indicating CAD
- Asymptomatic patients over age 50:
  - This group is the reference in the Revised Cardiac Risk Index
  - More extensive evaluation may be warranted – starting with focused cardiac history


Step 1
Need for emergency noncardiac surgery?
Yes
(Class I, LOE C)
Operating room
Perioperative surveillance and postoperative risk stratification and risk factor management
No
Step 2
Active cardiac conditions*
Yes
(Class I, LOE B)
Evaluate and treat per ACC/AHA guidelines
Consider operating room
No
Step 3
Low risk surgery
Yes
(Class I, LOE B)
Proceed with planned surgery
No
Step 4
Good functional capacity (MET level greater than or equal to 4) without symptoms†
Yes
(Class I, LOE B)
Proceed with planned surgery
Step 5
No or unknown
3 or more clinical risk factors‡
1 or 2 clinical risk factors‡
No clinical risk factors‡
Vascular surgery
Intermediate risk surgery
Vascular surgery
Intermediate risk surgery
Class IIa, LOE B
Class I, LOE B
Consider testing if it will change management§
Proceed with planned surgery with HR control§ (Class IIa, LOE B)
or consider noninvasive testing (Class IIb, LOE B) if it will change management
Proceed with planned surgery



What are the active cardiac conditions?

Active Cardiac Conditions: The Big Five

1. Unstable coronary syndromes
   - Unstable angina / recent MI (within 30 days)
2. Decompensated Heart Failure
   - Class IV or new onset
3. Significant Arrhythmias
   - High grade AV block, 3rd degree block, symptomatic ventricular arrhythmias, SVT's without rate control, severe bradycardia, new VT

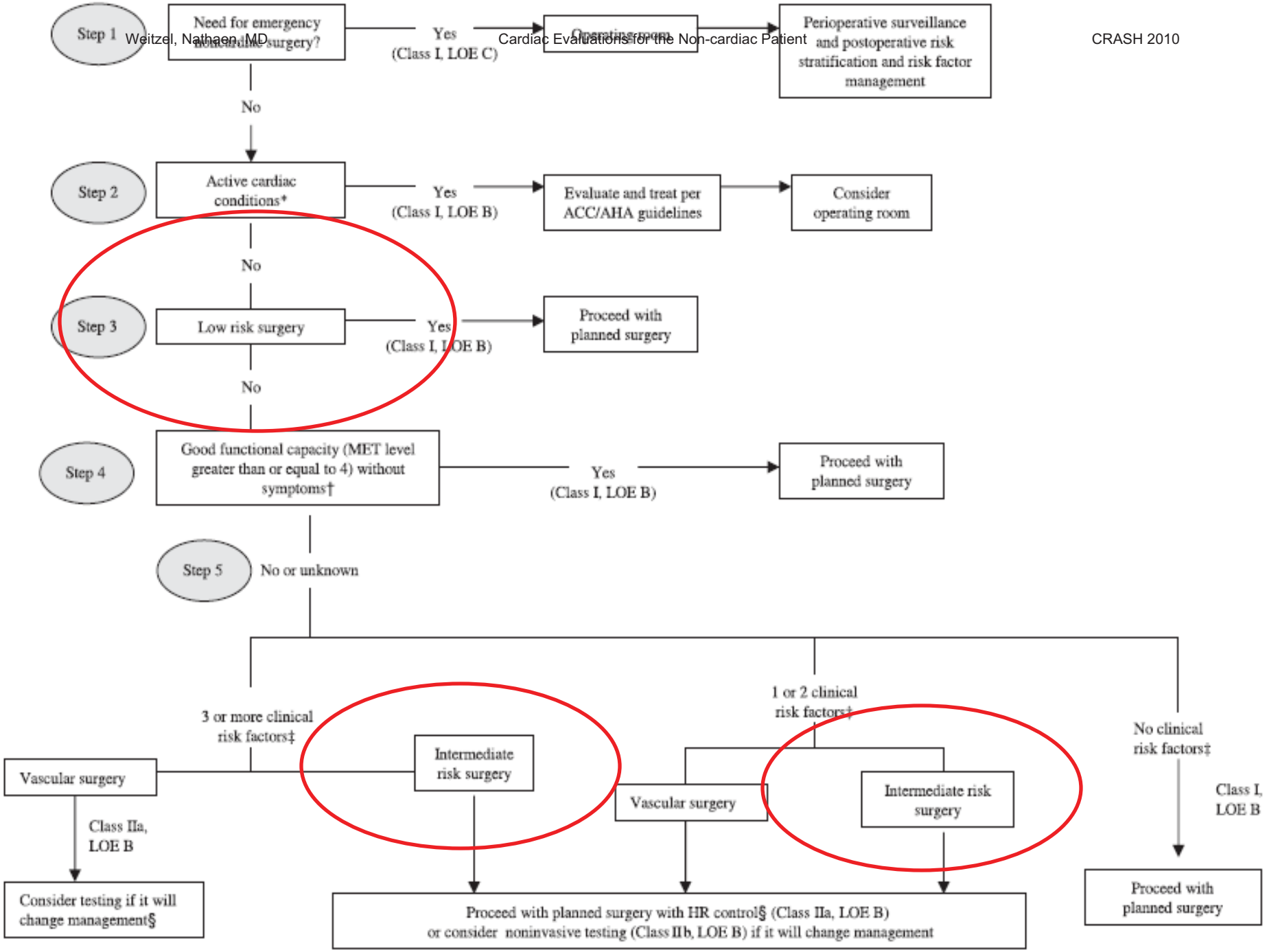
Active Cardiac Conditions:

4. Severe AS*
5. Severe MS*

- Presence of Active Cardiac Conditions warrants further evaluation unless case is emergent. (Class I)
  - Non-invasive testing vs catheterization based on patient scenario and previous workup.

What's next-

- Absence of the **big five** leads to the OR most of the time
- Based on functional capacity and surgical risk.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Proceed with planned surgery

Low Surgical Risk:

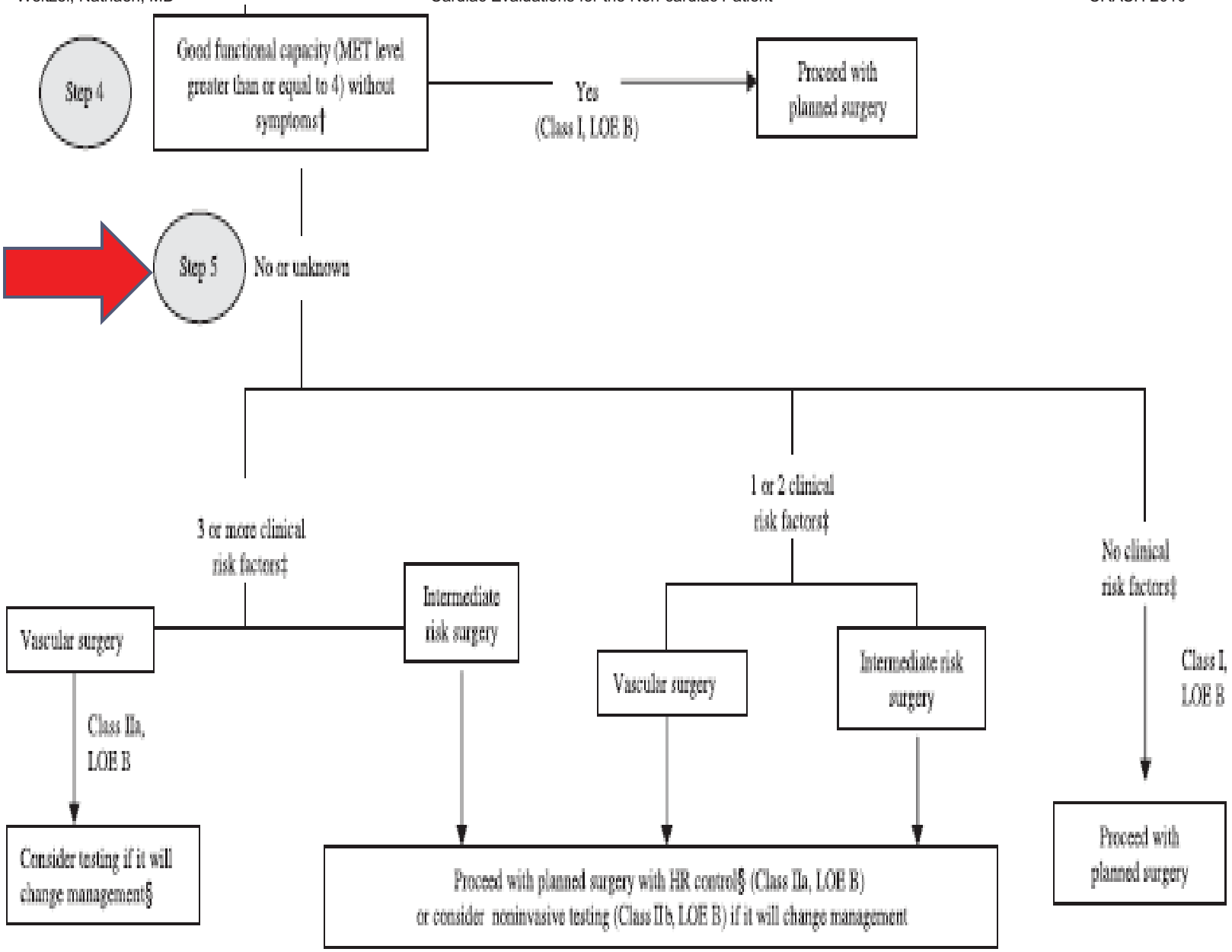
- Combined incidence of cardiac death or nonfatal MI < 1%
- Ambulatory surgery, Cataracts, Breast surgery, endoscopic procedures, superficial procedures
- Noninvasive testing not useful in low risk surgery (Class III)

Intermediate Risk Surgery:

- Cardiac Risk 1-5%
- Orthopedic surgery, head and neck, carotid endarterectomy, prostate surgery, intraperitoneal surgery, & intrathoracic surgery.

High Risk Surgery

- Cardiac risk reported > 5%.
- Aortic and major vascular surgery along with peripheral vascular procedures.
- Key point: For intermediate or high risk surgery, further testing should be based on clinical risk factors & undertaken only if it will change management. (Class IIa / IIb)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Step 5 is often the key

- These patients fall into the unknown category.
- Not clearly healthy, but not clearly unhealthy
- Assesment based on physical ability, and clinical risk factors.

Table 3. Estimated Energy Requirements for Various Activities

	Can you...		Can you...
1 MET	Take care of yourself?	4 METs	Climb a flight of stairs or walk up a hill?
	Eat, dress, or use the toilet?		Walk on level ground at 4 mph (6.4 kph)?
	Walk indoors around the house?		Run a short distance?
	Walk a block or 2 on level ground at 2 to 3 mph (3.2 to 4.8 kph)?		Do heavy work around the house like scrubbing floors or lifting or moving heavy furniture?
4 METs	Do light work around the house like dusting or washing dishes?		Participate in moderate recreational activities like golf, bowling, dancing, doubles tennis, or throwing a baseball or football?
		Greater than 10 METs	Participate in strenuous sports like swimming, singles tennis, football, basketball, or skiing?

How about low activity or unclear activity patients?

- Must rely on clinical risk factors to determine surgical risk

Clinical Risk Factors:

- ACC / AHA guidelines used Revised Cardiac Risk Index as basis or recommendations.

Circulation

JOURNAL OF THE AMERICAN HEART ASSOCIATION

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

Thomas H. Lee, Edward R. Marcantonio, Carol M. Mangione, Eric J. Thomas, Carisi A. Polanczyk, E. Francis Cook, David J. Sugarbaker, Magruder C. Donaldson, Robert Poss, Kalon K. L. Ho, Lynn E. Ludwig, Alex Pedan and Lee Goldman

Circulation 1999;100;1043-1049

Results:

Revised Cardiac Risk Index

1. High-risk type of surgery
2. Ischemic heart disease
3. History of congestive heart failure
4. History of cerebrovascular disease
5. Insulin therapy for diabetes
6. Preoperative serum creatinine >2.0 mg/dL

Clinical Risk Factors

- Ischemic heart disease:
  - Hx of MI, + treadmill, **NTG use**, current angina, Q waves on ECG**.
- CHF
  - Hx of CHF, Pulm Edema, Bilateral Rales
- Cerebrovascular Disease
  - **TIA** or full stroke

Clinical Risk factors:

- Number of factors correlates to class, ie class I, II, III, IV.
- History of MI or abnormal Q wave on ECG is a clinical risk factor.
- Acute MI < 1 month is active cardiac condition
- Class correlated with risk based on type of surgery

Using clinical factors

- High risk surgery with 3 or more risk factors warrants testing **IF management may be altered! (Class IIa)**
- Intermediate risk→ regardless of clinical factors can proceed with optimal HR control or consider noninvasive testing **IF management may be altered! (Class IIb)**

How different from 2002:

- Elimination of intermediate and minor clinical predictors
  - Use Revised cardiac risk index
  - Minor predictors not proven to independently increase cardiac risk perioperatively
  - Age, Abnl ECG, Rhythm not SR, HTN*
- Goal to identify patients who may benefit from revascularization

Preoperative testing:

- Active Cardiac Conditions warrant invasive testing most of the time
- Resting LV function not a consistent predictor of ischemic events
- ECG warranted within 30 days if:
  - Major surgery and at least 1 risk factor
  - Intermediate surgery and known CAD
  - Age > 50
- Stress test→ gives best information*

Problems with guidelines

- Higher level of Class II evidence used
- Reduced amount of Class I evidence (10%)
- Places high importance on risk of surgery – but increased endovascular therapies (AAA endografts etc) may alter classic risk groups

Case Scenario:

- 58 yo female, SSO for elective hip replacement
- Daughter tells you she had a heart attack 10 months prior – they placed a stent in one of her coronary vessels
- DM – not on insulin
- Patient is not active.
- BP 185/ 95 in pre-op. Baseline 160 / 85

Assessment:

- Intermediate Risk Surgery - Elective
- Pre-op labs
  - Hct 42. Cr 1.1.
- Review Medications
  - On B-Blockade, Statin therapy, ASA. Stopped Plavix 5 days prior.
- Get ECG → Q waves in II / III

Case Scenario

- Should we stress test the patient?
- How about further revascularization?
- What about her β-blockers?
- What about her existing stent?

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PRACTICE GUIDELINES: FULL TEXT

2009 ACCF/AHA Focused Update on Perioperative Beta Blockade Incorporated Into the ACC/AHA 2007 Guidelines on Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery

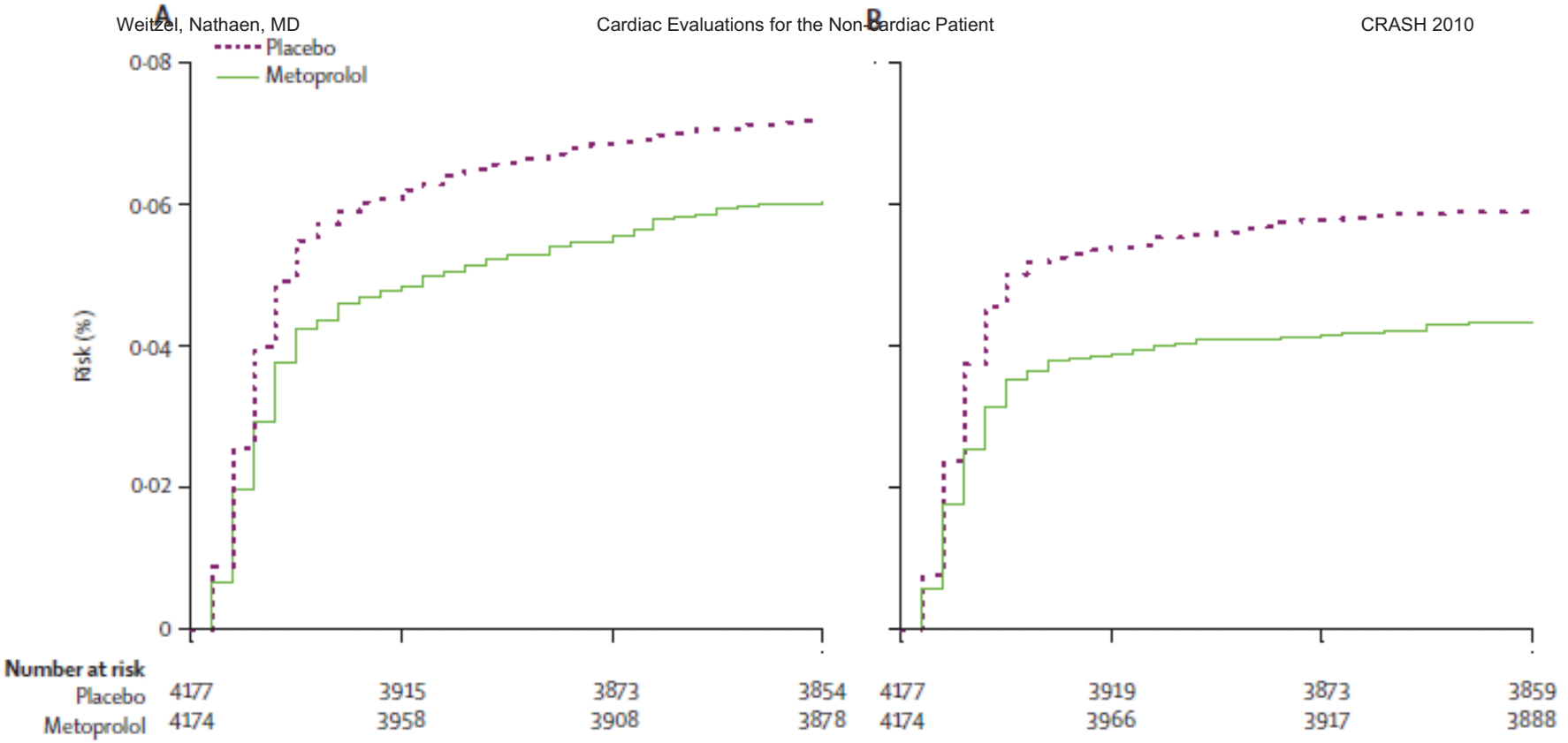
Basic changes are a discussion of the POISE trial and how this has impacted recommendations for β-blocker therapy.

Effects of extended-release metoprolol succinate in patients undergoing non-cardiac surgery (POISE trial): a randomised controlled trial

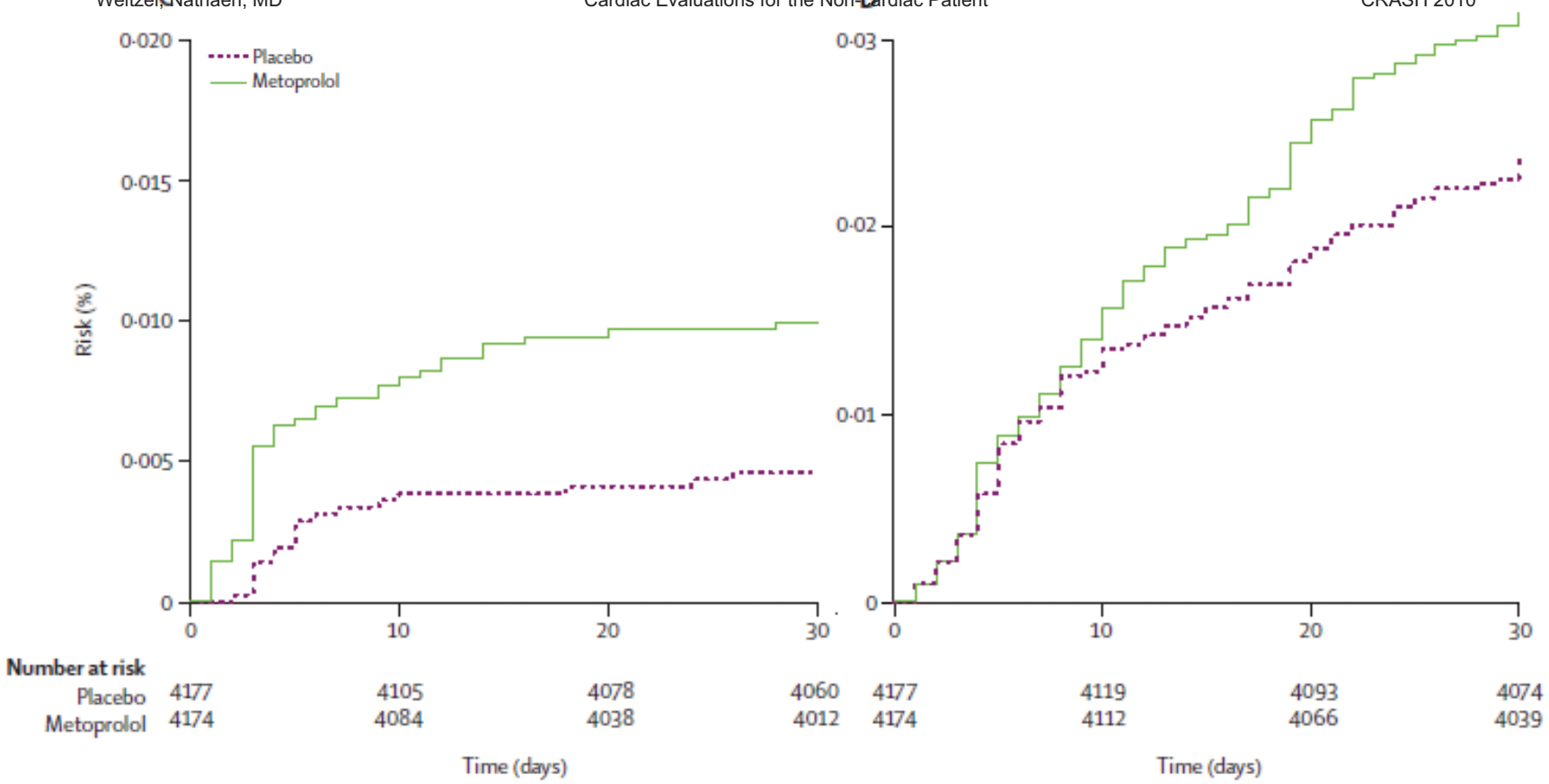
POISE Study Group*

Lancet 2008; 371: 1839–47

- 8351 pts for non-cardiac surgery
- Randomized to metoprolol extended release vs placebo
- 190 hospitals, 23 countries.
- Tx initiated 2-4 hours before surgery – continued for 30 days.



- A – primary outcome was composite of cardiac death, non-fatal MI, non-fatal cardiac arrest within 30 days.
- B- Myocardial Infarction



C – Stroke

D - Death

Conclusions: Reduction in cardiac related events, but increased risk of stroke and overall increase in mortality using extended release Metoprolol.

Table 11. Perioperative Prophylactic Beta Blockers and Anti-Ischemic Medications

					Myocardial Ischemia		MI		Death	
Study	Procedure	n	Control	Drug and Dosage	Control	Drug	Control	Drug	Control	Drug
Studies of Beta Blockers										
Pasternack et al., 1987 (374)	Abdominal aortic aneurysmorrhaphy	83	Case-control	Metoprolol 50 mg PO preoperatively			17.6% (9/51)	3.1% (1/32)*		
Pasternack et al., 1989 (78)	Vascular	200	Unblinded	Metoprolol 50 mg PO preoperatively	1.8±3.2 episodes	0.8±1.6 episodes*				
Stone et al., 1988 (75)	Noncardiac	128	Placebo	Labetalol Atenolol Alprenolol PO preoperatively	28.2% (11/39)	2.2% (2/89)*	0% (0/39)	0% (0/89)		
Poldermans et al., 1999 (88)	Vascular	112	Unblinded	Bisoprolol 5 to 10 mg PO			17% (9/53)	0% (0/59)*	17% (9/53)	3.4% (2/59)*
Raby et al., 1999 (376)	Vascular	26	Placebo	IV esmolol	72.7% (8/11)	33.3% (5/15)*				
Wallace et al., 1998 (381) and Mangano et al., 1996 (87)	Noncardiac	200	Placebo	Atenolol 10 to 20 mg IV or 50 to 100 mg PO	39/101 (38.6%)	24/99 (24.2%)*			(At 6 months) 10/101 (9.9%)	1/99 (1.0%)*
Urban et al., 2000 (382)	Noncardiac	107	Placebo	IV esmolol on the day of surgery, followed by metoprolol starting at 25 mg PO BID and increased to maintain an HR less than 80 bpm, and continued for the next 48 h	14.5% (8/55)	5.8% (3/52)	5.4% (3/55)	1.9% (1/52)		
Brady et al., 2005 (379)	Vascular	103	Placebo	Metoprolol 50 mg PO BID preoperatively until 7 d after surgery	9% (4/44)	9.4% (5/53)	11.3% (5/44)	5.6% (3/53)	2.2% (1/44)	5.6% (3/53)
Perioperative Prophylactic Anti-Ischemic Medications and Cardiac Morbidity										
Juul et al., 2006 (372)	Noncardiac	921	Placebo	Metoprolol 100 mg sustained release 1 d preoperatively, until up to 8 d postoperatively					16% (72/459)	16% (74/462)
Yang et al., 2006 (373)	Vascular	496	Placebo	Weight-adjusted metoprolol, 50, 75, or 100 mg			21/250 (8.4%)	19/246 (7.7%)	4/250 (1.6%)	0/246 (0%)

*$p<0.05$ for drug versus control.
BID indicates twice per day; bpm, beats per minute; HR, heart rate; IV, intravenous; MI, myocardial infarction; n, number of patients; NTG, nitroglycerin; and PO, by mouth.

What to do.

- **Class I: Continue β-blockade** for pts on medication
- Class IIa: **Probably good** to titrate β-blockade for high cardiac risk pts in both high and intermediate risk surgery, and for patients with > 1 clinical risk factor.
- Class IIb: Use of β-blockade is **uncertain** in intermediate risk surgery and low / intermediate cardiac risk groups.

What not to do.

- **Class III: Don't give to patients with absolute contraindications to** β-blockade
  - Based on POISE – routine administration of β-blockade on day of surgery cannot be advocated

Revascularization

- Multiple studies, some randomized, some not looking at both CABG and PCI
- Entire lecture series
- Multiple questions: CABG vs PCI, what type of testing best, which group of patients best…..

Does Revascularization Matter??

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.

The NEW ENGLAND JOURNAL of MEDICINE

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

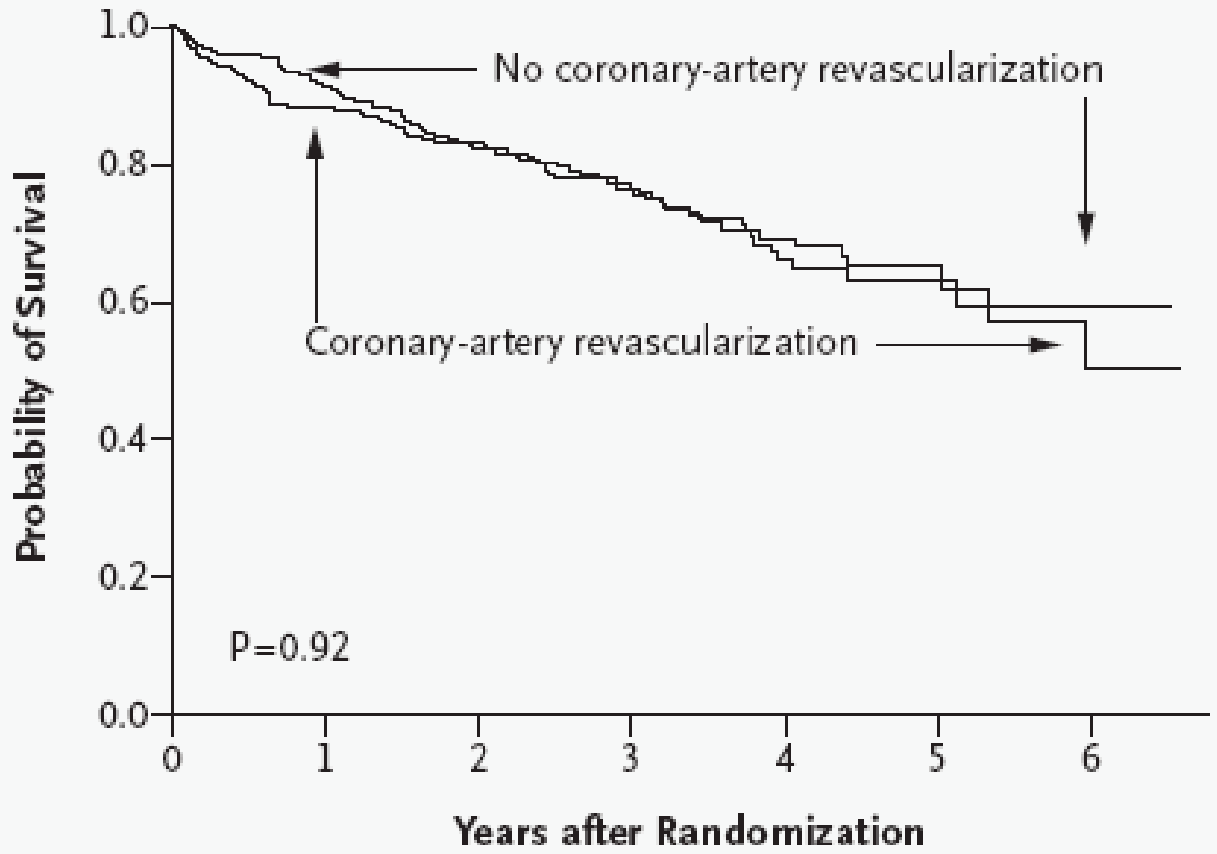
Coronary-Artery Revascularization before Elective Major Vascular Surgery

- 5859 pts for major vascular surgery
- 510 Pts – angiographically stable CAD
  - 1/3 with 3 vessel disease
- 33% aortic, 66% peripheral vascular
- Active Cardiac Conditions excluded
- Randomized to intervention or not before surgery (CABG 41%, PCI 59%)

The NEW ENGLAND JOURNAL of MEDICINE

Coronary-Artery Revascularization before Elective Major Vascular Surgery

- Of 510 pts studied:
- 49% had 2 Clinical Risk Factors
- 13% had 3 Clinical Risk Factors
- 62% had nuclear perfusion scanning
  - Perfusion defect moderate or large in 226 patients
- Mortality was final end point
- One year follow-up minimum



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

Figure 1. Long-Term Survival among Patients Assigned to Undergo Coronary-Artery Revascularization or No Coronary-Artery Revascularization before Elective Major Vascular Surgery.

Table 4. Influence of Coronary-Artery Revascularization on Long-Term Survival among High-Risk Subgroups of Patients Scheduled for Vascular Surgery.*

High-Risk Variable	Patients (N=510)	Hazard Ratio (95% CI)	P Value
	no. (%)		
Angina	198 (38.8)	1.45 (0.79–2.64)	0.23
Positive stress imaging test†	226 (44.3)	1.26 (0.77–2.06)	0.35
Fulfillment of criteria of Eagle and colleagues[4]‡	142 (27.8)	0.90 (0.51–1.62)	0.73
With large stress-induced defect	37 (7.3)	3.96 (0.82–19.11)	0.09
Category of revised Cardiac Risk Index[13]§	248 (48.6)	1.20 (0.76–1.89)	0.44
With large stress-induced defect	50 (9.8)	1.65 (0.64–4.25)	0.30
Prior CABG	77 (15.1)	1.81 (0.81–4.05)	0.15
Three-vessel disease and left ventricular dysfunction	74 (14.5)	1.29 (0.62–2.65)	0.50
Pain at rest and tissue breakdown	152 (29.8)	0.76 (0.43–1.34)	0.34

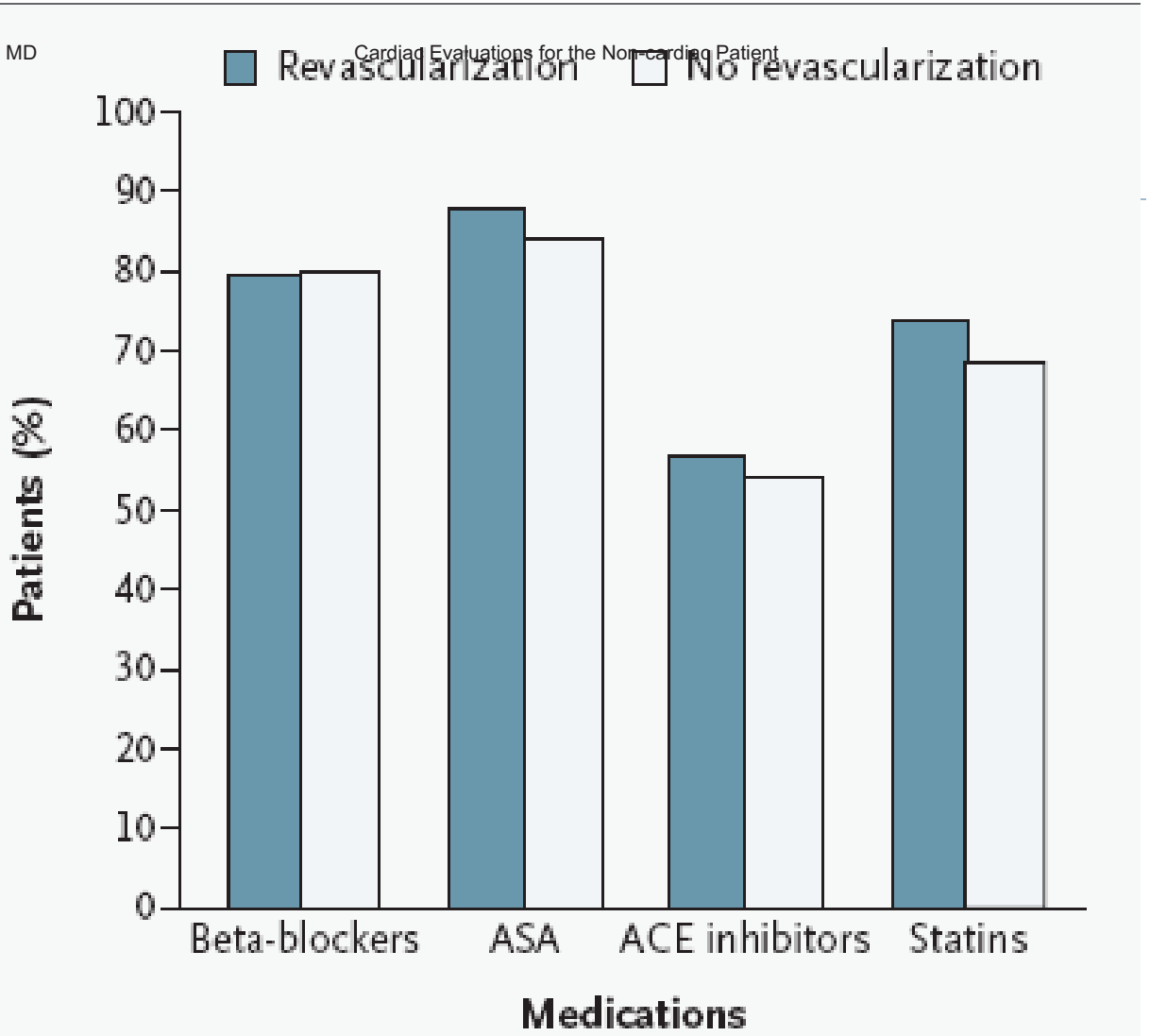


Figure 2. Long-Term Use of Medical Therapy in the Revascularization and No-Revascularization Groups at 24 Months after Randomization.

"Principle finding of this study is that among patients with stable coronary artery disease, revascularization does not improve long term survival."

Revascularization:

Poldermans - J AM Coll Cardiol 2007;49: 1763-9

- Decrease V: Looked at value of preoperative revascularization
- Screened patients with >3 risk factors
- 1880 patients screened, 430 high risk patients found
- 101 patients randomized with extensive ischemia after testing
- End points were death or MI at 30 days and one year.

Results:

- 43% vs 33% incidence, but not statistically significant between groups
- Overall study was a pilot study, and underpowered.
- Key point: High risk study group with relatively high complication rates
- Aggressive medical management with ASA, and B-Blockade

"CONCLUSIONS: In this randomized pilot study, designed to obtain efficacy and safety estimates, preoperative coronary revascularization in high-risk patients was not associated with an improved outcome."

Table 1. Summary of Studies About the Role of Coronary Artery Bypass Grafting or Percutaneous Coronary Intervention Before Noncardiac Surgery

Author; year of publication	No. of patients studied; Design	Inclusion/Exclusion criteria	Type of surgery	Type of revascularization	Outcome
Studies of coronary artery bypass grafting/percutaneous coronary intervention					
Hertzer et al.; 1984[2]	1000; prospective	i: consecutive e: refusal, malignancy	Major vascular	CABG	Low rate of perioperative cardiac complications
Hertzer et al.; 1987[3]	246; retrospective	i: consecutive e: refusal, malignancy	Aortic aneurysm	CABG	Late cardiac mortality reduced
Hertzer et al.; 1987[4]	386; retrospective	i: consecutive e: refusal, malignancy	Peripheral vascular	CABG	Late cardiac mortality reduced
Eagle et al.; 1997[5]	3368; retrospective	i: CAG and noncardiac surgery	Abdominal, vascular, thoracic, head and neck	CABG	Perioperative mortality and myocardial infarction rates reduced
Fleisher et al.; 1999[6]	6895; retrospective	i: random sample of Medicare patients	Major vascular	CABG or PCI	Lower rate of cardiac events for aortic patients; reduction in 1 yr mortality
Hassan et al.; 2001[7]	501; retrospective	i: 2-or 3-vessel disease, severe angina, ischemia e: prior CABG/ PCI, advanced age, left main disease	Noncardiac	CABG or PCI	Late cardiac death and myocardial infarction rates reduced
Back et al.; 2002[8]	425; prospective	i: consecutive, elective vascular patients	Major vascular	CABG or PCI	Prior CABG ≤5 yr, PCI ≤2 yr reduced perioperative cardiac events
Landesberg et al.; 2003[9]	502; retrospective	i: elective, consecutive e: previous CABG/ PCI, thallium scan	Major vascular	CABG or PCI	Better late survival
Landesberg et al.; 2006[10]	624; retrospective	The same as above	Major vascular	CABG or PCI	Better late survival for patients at intermediate risk
Poldermans et al.; 2007[25]	101; prospective	i: severe myocardial ischemia	Major vascular	CABG or PCI	No difference in survival compared to medical therapy

CABG = coronary artery bypass grafting; PCI = percutaneous coronary intervention; CAG = coronary angiography; i = inclusion; e = exclusion.

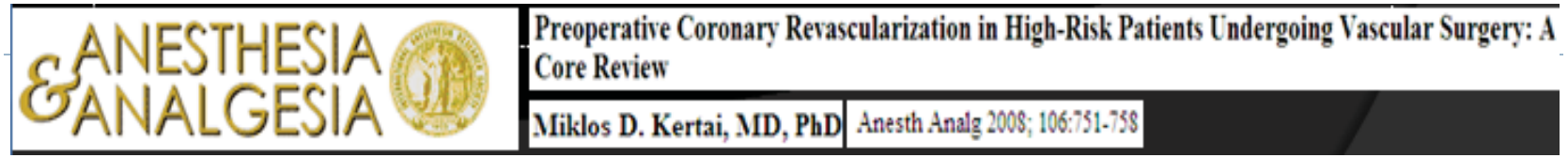
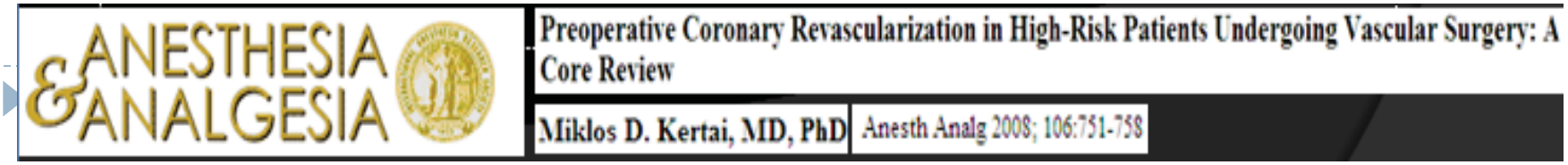


Table 2. Summary of Studies About the Role of Percutaneous Coronary Intervention Before Noncardiac Surgery

Author; year of publication	No. of patients studied; Design	Inclusion/Exclusion criteria	Type of surgery	Type of revascularization	Outcome
Studies of percutaneous coronary intervention					
Allen et al.; 1991[17]	148; retrospective	i: PCI before vascular surgery	Major vascular	PCI	Lower perioperative cardiac mortality
Elmore et al.; 1993[18]	2452; retrospective	i: PCI before vascular surgery	Major vascular	PCI or CABG	Perioperative rate of myocardial infarction for patients with PCI is lower, higher rate of late events
Gottlieb et al.; 1998[19]	194; retrospective	i: PCI before vascular surgery e: history of CABG/ PCI, missing data	Major vascular	PCI	Low rate of perioperative cardiac events
Posner et al.; 1999[20]	2841; retrospective	i: PCI before surgery e: patients without an index admission ≥30 days	Noncardiac	PCI or no revascularization or normal	Reduced risk of cardiac events compared to no revascularization
Godet et al.; 2005[21]	1152; retrospective	i: consecutive, elective e: emergency, thoracoabdominal, patients with CABG	Abdominal aortic surgery	PCI or no revascularization	No significant reduction in cardiac risk or death
Coronary artery revascularization prophylaxis trial and substudies					
McFalls et al.; 2004[26]	510; prospective	See Table 4	Major vascular	CABG or PCI or medical therapy	No reduction in perioperative and long-term cardiac events
Ward et al.; 2006[27]	222; retrospective	Same as for the original study (see Table 4)	Major vascular	CABG or PCI or medical therapy	CABG associated with reduction in myocardial infarction and hospital stay than PCI
Raghunathan et al.; 2006[28]	307; retrospective	Same as for the original study (see Table 4)	Surgery for critical limb ischemia and intermittent claudication	CABG or PCI or medical therapy	Low perioperative and long-term mortality, no reduction by coronary revascularization



Revascularization

- Bottom Line:
- CABG probably better than PCI overall
- Only recommended if significant myocardium at risk.

But wait…….

CLINICAL RESEARCH Clinical Trial

Systematic Strategy of Prophylactic Coronary Angiography Improves Long-Term Outcome After Major Vascular Surgery in Medium- to High-Risk Patients

A Prospective, Randomized Study

Mario Monaco, MD,* Paolo Stassano, MD,‡ Luigi Di Tommaso, MD,‡ Paolo Pepino, MD,* Arturo Giordano, MD,† Giovanni B. Pinna, MD,‡ Gabriele Iannelli, MD,‡ Giuseppe Ambrosio, MD, PHD§

Castelvolturno, Naples, and Perugia, Italy

(J Am Coll Cardiol 2009;54:989–96)

Systematic Strategy of Prophylactic Coronary Angiography Improves Long-Term Outcome After Major Vascular Surgery in Medium- to High-Risk Patients

A Prospective, Randomized Study

- Study designed to determine impact of systematic coronary angiography on intermediate and long term outcomes in medium risk patients for vascular procedures.
- Basically – in between CARP and Decrease V.

Systematic Strategy of Prophylactic Coronary Angiography Improves Long-Term Outcome After Major Vascular Surgery in Medium- to High-Risk Patients

A Prospective, Randomized Study

- 208 pts for elective Vascular surgery
- Randomized – Control group had invasive testing based on positive stress test (ACC guidelines strategy)
- Study group had initial coronary angiography from start

Systematic Strategy of Prophylactic Coronary Angiography Improves Long-Term Outcome After Major Vascular Surgery in Medium- to High-Risk Patients

A Prospective, Randomized Study

- Anti-platelet agents stopped and pts bridged with LMWH
- If stents placed, BMS used. Surgery done in 30-60 days. Plavix stopped for surgery, ASA maintained.
- Surgical intervention by OPCAB if indicated

Systematic Strategy of Prophylactic Coronary Angiography Improves Long-Term Outcome After Major Vascular Surgery in Medium- to High-Risk Patients

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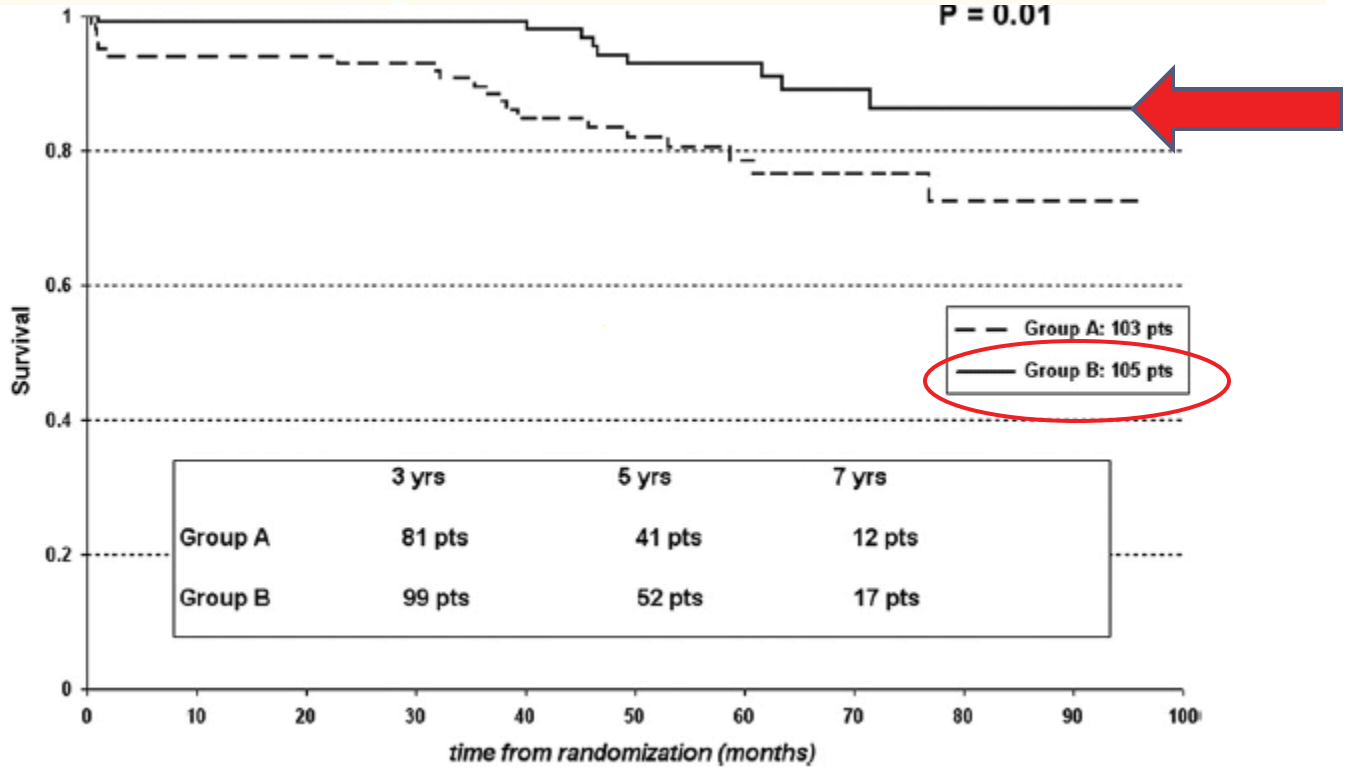


Figure 1 Cumulative Survival

Systematic Strategy of Prophylactic Coronary Angiography Improves Long-Term Outcome After Major Vascular Surgery in Medium- to High-Risk Patients

A Prospective, Randomized Study

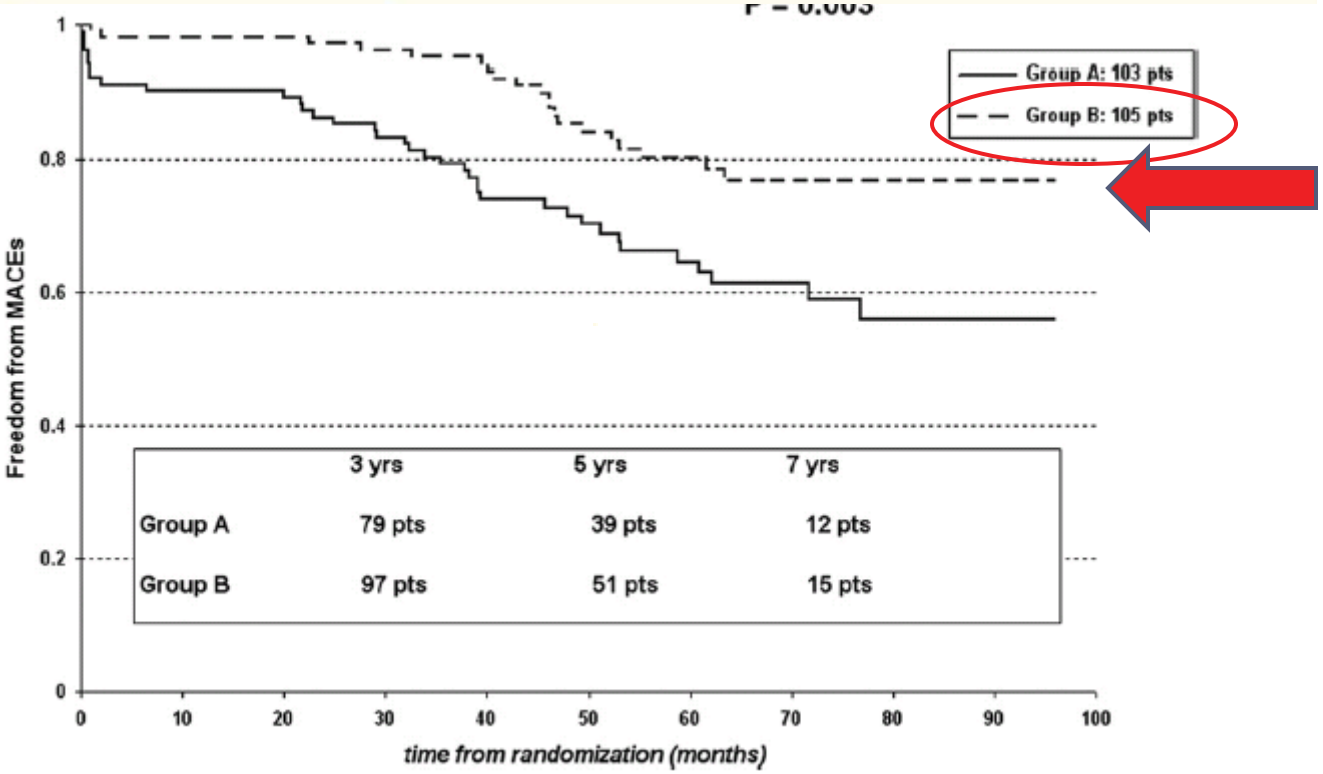


Figure 2 Freedom From Major Cardiac Events

Systematic Strategy of Prophylactic Coronary Angiography Improves Long-Term Outcome After Major Vascular Surgery in Medium- to High-Risk Patients

A Prospective, Randomized Study

For patients at medium to high risk for cardiac events – presenting for elective vascular surgery, a systematic angiographic approach guiding cardiac therapy confers a survival benefit.

What to do.

- **Class I:** Revascularize pts with significant left main disease (CABG), 3 vessel disease, 2V disease + proximal LAD lesions, high risk unstable angina or with acute ST-elevation MI.

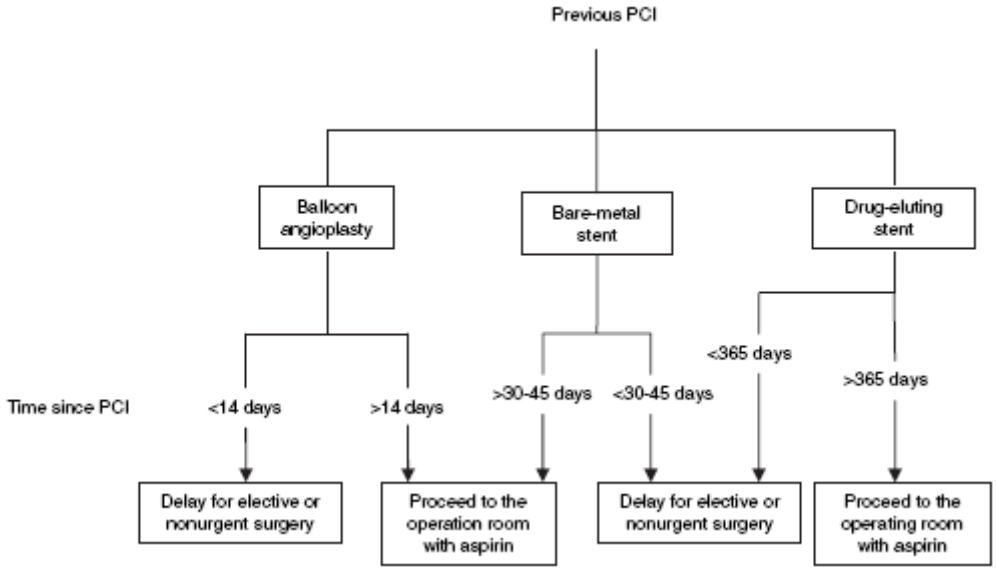
What not to do.

- **Class III, Level B:** Due to elevated risk of re-stenosis, and lack of support by current clinical trials PCI is not routinely recommended unless patient has active cardiac condition amenable to intervention.
- **Class IIb:** PCI not well established for pts with abnormal stress echocardiography (low or high risk).

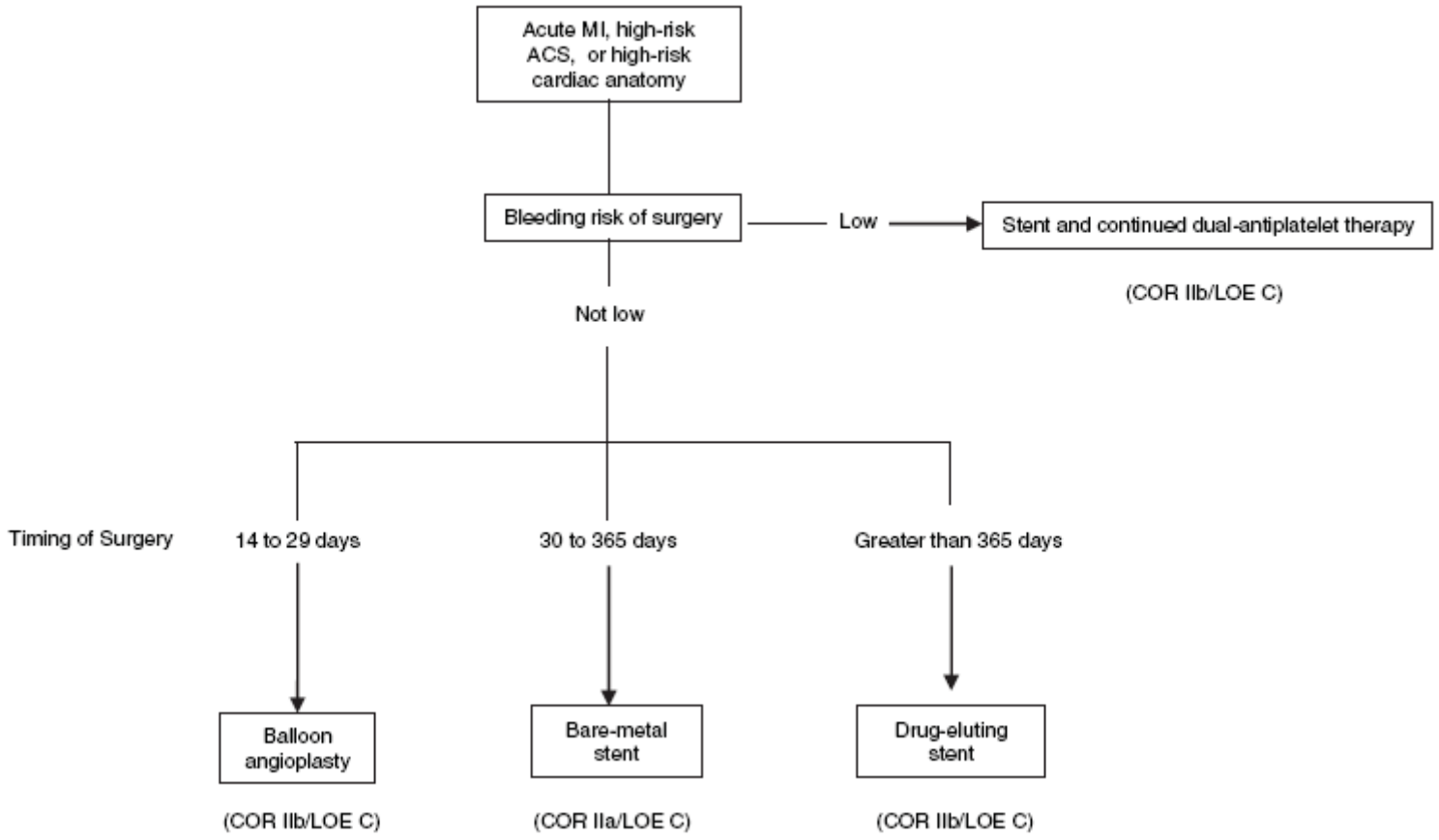
What about surgery after Stenting?

- Questions recently regarding use of bare metal stents vs drug eluting stents.
- Elevated risk of thrombosis in BMS until endothelialization occurs at 6 weeks if anti-platelet therapy stopped
- Risk of thrombosis elevated with DES for 12 months if anti-platelet drugs stopped (plavix)

Approach for previous PCI management



Need for stenting along with noncardiac surgery



Case Scenario:

- Take effort to assess physical activity
- If on Beta-blockade, ASA, and Statins then I would proceed after reducing BP in pre-op.
- Stent: Assume DES – could be justified in delaying surgery until 12 months out.
- Definite increase risk in stopping Plavix with DES before 6 mos – with low risk of stenosis after 12 months. No real data on patients 10-12 months out.

Recommended reading:

Preoperative Coronary Revascularization in High-Risk Patients Undergoing Vascular Surgery: A Core Review

Miklos D. Kertai, MD, PhD*†

Patients undergoing vascular surgery are at increased risk for cardiac complications related to the presence of underlying coronary artery disease. Preoperative cardiac evaluation may help to identify high-risk patients in whom coronary angiography may be planned with subsequent coronary revascularization for the purpose of improving perioperative and long-term cardiac outcomes. However, the indications and efficacy for type of revascularization for the reduction of cardiac complications compared to medical therapy has been controversial. My aim in this review is to summarize the role of preoperative revascularization compared to conservative medical therapy before elective vascular surgery using current evidence from published studies.

(Anesth Analg 2008;106:751–8)

Concluding thoughts:

- Use published guidelines to guide decision making
- Discuss risk with patient and outline potential options
- Most of time the OR will be the answer given ideal medical therapy
- **Documentation of discussion is vital**
- **Tight hemodynamic control is key in high risk cardiac patients**

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