

Rocky Mountain Hospital  
Medicine Symposium -  
Preoperative CV evaluation

October 7, 2011  
Brian Wolfe, MD

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75 yo ♀ with obesity, DM, HTN and CKD (SCr 2.2) preop for knee replacement. Uses walker because of knee pain  
Meds: diltiazem, HCTZ, glargine insulin  
No history of MI or other heart disease  
Pulse 92 BP 165/95  
No murmur, clear lungs

- A. Counsel patient/surgeon against surgery
- B. Stress test and revascularization if reversible ischemia is found
- C. Stress test and cancel surgery if reversible ischemia is found
- D. No further workup indicated, proceed to operating room

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A. Counsel patient/surgeon against surgery

What is her risk?

What is her (and her surgeon's) risk tolerance?

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## Revised Cardiac Risk Index

- High risk surgery (intra-thorac, abd, vasc)
- Ischemic heart disease (Q waves, MI >1mo)
- History of CHF (compensated)
- History of CVA
- Insulin-requiring diabetes
- Creatinine >2gm/dL

Lee, et al. *Circulation* 1999; 100:1043-1049

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## Revised Cardiac Risk Index

Risk of periop MI or CV death

- 0 points – 0.4% (0.1-0.8)
- 1 point – 1.0% (0.5-1.4)
- 2 points – 2.4%
- 3 points or more 5.4% (2.8-7.9)

Lee, et al. *Circulation* 1999; 100:1043-1049

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## B. Stress test and revascularization if reversible ischemia is found

- No prospective data supports this choice
- What is the reasoning behind this answer?
  - Fixed coronary stenosis limit the hearts ability to increase coronary flow to meet increases in cardiac oxygen demands
  - Some evidence supports that perioperative infarctions occur because of increase demand over these fixed coronary lesions
  - Opening these vessels would decrease risk of supply-demand mismatch
- CASS trial- showed decreased cardiac events in patients undergoing non-cardiac surgery who had previously undergone bypass vs. medically managed patients

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### Prospective Data:

#### Coronary Artery Revascularization Prophylaxis (CARP)

- 500+ preop vascular surgery patients were enrolled with >70% epicardial stenosis seen on diagnostic cath
- ½ had 2 or more RCRI points
- Randomized to revascularization CABG/PCI (41%/59%) vs. conservative management
- At 30 days 12 v 14% (non-significant) had elevations in cardiac biomarkers at 1 month
- At 2+ years, no difference in mortality 22 v 23%

McFalls EO, et al. *NEJM*.2004;351:2795

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### Prospective Data:

#### DECREASE V – Pilot Study

- Of 430 preop vascular surgery with 3 or more RCRI points, 101 had stress tests with extensive areas of ischemia
- 101 Randomized to undergo revascularization with PCI/ CABG (65%/35/5) or conservative therapy
- Primary Outcome: all cause death and non-fatal MI
- 43% in revascularization group vs. 33% in conservative group reach endpoint (not significant)
- No difference at one-year

Poldermans D et al. *JACC*. 2007;49:1763-9

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### The debate rages on...

- Multiple retrospective, cohort trials show benefit of stress-testing and subsequent revascularization
  - 200,000 patients underwent non-cards surgery RCRI>1 or greater, decreased LOS and decreased mortality at 1 year associated with stress-testing
- Until a prospective RCT shows benefit, an aggressive strategy is not warranted

Wijeyesundera *BMJ* 2010;340:b5526

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C. Stress test and cancel surgery if reversible ischemia is found

- Several trials have shown stress-testing can enhance an index's ability to discern risk
- Depending on the findings a risk of 2.4% generated by the RCRI might decreased to <0.5% with a normal stress or increase to >5% with a severely abnormal stress
- This could be a correct answer if this change in risk presentation would change the patient's management (or her choice to pursue surgery)

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D. No further workup indicated, proceed to operating room

- Ultimately, our understanding of the pathophysiology of perioperative myocardial ischemia and infarction is incomplete
- Non-invasive stress testing and cardiac catheterization are tools with unclear use in asymptomatic preoperative non-cardiac patients

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75 yo ♀ with obesity, DM, HTN and CKD (SCr 2.2) preop for knee replacement. Uses walker because of knee pain  
Meds: diltiazem, HCTZ, glargine insulin  
No history of MI or other heart disease  
Pulse 92 BP 165/95  
No murmur, clear lungs  
OR Time: 7:30a.m. the following day

- A. Start metoprolol 25-50mg PO now and reassess BP/HR in a.m.
- B. Give clonidine 0.1-0.2 mg PO q12hrs, holding for hypotension/bradycardia
- C. Continue home diltiazem only
- D. Monitor HRs and add metoprolol if patient becomes more tachycardic

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## Beta blockers DECREASE IV

- Intermediate risk pts undergoing non-cardiac, non-vascular surgery
- 1000 pts randomized to bisoprolol vs placebo
- Bisoprolol started 1 month prior to surgery, titrated to HR <70
- Combined CV endpoint
  - 2.1% bisoprolol
  - 6% placebo
- No difference in stroke, hypotension, bradycardia

Dunklegrun M et al. *Ann Surg.* 2009;249(6):921

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## Beta blockers MaVS

- 496 pts undergoing major vascular surgery
- Randomized to metoprolol or placebo
  - 2 hours before surgery to POD 5
  - >80% pts had RCRI  $\leq 2$
- Composite Primary outcome at 30 days
- Primary outcome:
  - 12% placebo
  - 10.2% metoprolol
  - No change by RCRI
- Increased incidence hypotension and bradycardia in metoprolol arm

Yang H et al. *Am Heart J.* 2006; 152:983-90

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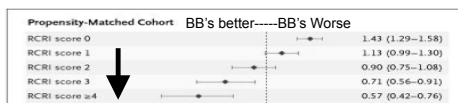
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## Effect of Beta Blockers on Mortality



Lindenauer PK et al. *NEJM* 2005;353(4):349

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## POISE

- 8300 pts
- Patients >45 undergoing non-cardiac surgery who had a history of CAD, PVD, CVA, CHF; or major vascular surgery
- Randomized to placebo or metoprolol 200 mg/day for 30 days.
- Primary endpoint was a 30 day composite of cardiovascular death, non-fatal myocardial infarction or non-fatal cardiac arrest.

Devereaux PJ et al. *Lancet*. 2008;371:1839-47

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## POISE

	Metoprolol (n = 4174)	Placebo (n = 4177)	p value
Primary endpoint	5.8%	6.9%	.04
Non Fatal MI	3.65%	5.1%	.0007

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## POISE

	Metoprolol (n = 4174)	Placebo (n = 4177)	p value
Primary endpoint	5.8%	6.9%	.04
Non Fatal MI	3.65%	5.1%	.0007
Total Mortality	3.12%	2.3%	.03
Stroke	1.0%	0.5%	.005

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## Beta Blockers - Data Review

- DECREASE IV suggests starting BB early is associated with improved outcomes
- DECREASE IV established safety and efficacy of titrated beta blockade in intermediate risk patients
- MaVS suggest starting immediately preoperatively not helpful
- Lindenauer's paper suggests harm in low risk patients with increasing efficacy as the patient-specific risk increases
- POISE showed BB reduced perioperative MI with the adverse effect of causing stroke

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75 yo ♀ with obesity, DM, HTN and CKD (SCr 2.2) preop for AAA repair. Uses walker because of knee pain  
Meds: diltiazem, HCTZ, glargine insulin  
No history of MI or other heart disease  
Pulse 92 BP 165/95  
No murmur, clear lungs

- A. Risk is unchanged (from TKR) as the RCRI was established in patients undergoing AAA repairs
- B. Other validated risk indices perform better than the RCRI in vascular surgery patients
- C. New biomarkers have been validated to reliably establish risk and outperform clinical risk indices
- D. Risk with open AAA repairs has decreased substantially, making this an "intermediate" risk surgery

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## Risk indices

Original cohort showed poor test characteristics with aortic repairs

Other indices now exist:

- Vascular Surgical Group of New England published 9 clinical variable model, internally validated that performed better than RCRI
- Patients risk varied from 2.6% to 14.3% with an AUC of 0.722 for open AAA surgery (compared with 0.4 and 5.4% risk variance in RCRI)
- None have the RCRI's length of use or external validation

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## Biomarkers? The future

- Several biomarkers associated with increased risks: BNP, CRP, Coleptin
- BNP most robustly studied
- Multiple studies indicate BNP varies directly with cardiac risk
- No validated prospective studies use BNP with other clinical factors, but likely to be available in near future

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Thank you

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