Optimizing Perioperative Beta Blockade 2008?

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- Baxter (speakers' bureau)
  - Esmolol
- The Medicines Company
  - Clevidipine

Merin 1972

- *"The cardiothoracic anesthesia group at the Cleveland Clinic …. Four patients who had been receiving from 120-160 mg./day of propranolol within 24 hours of surgery died from intractable heart failure immediately after coming off bypass for CABG….This group will no longer anesthetize a patient for any but the most emergent surgery unless he has been off propranolol for 2 weeks."*

Merin 1972

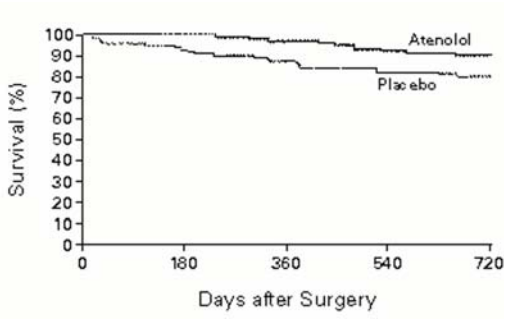
- *"On the other hand, several patients at the Massachusetts General Hospital who were taken off propranolol before coronary bypass operations suffered myocardial infarctions before the operation."*

Outline

- Small clinical trials prove efficacy
  - Secular increase in beta blockade
- Effectiveness and generalizability?
  - Those with conditions excluded in trials
    - CHF
    - Regional anesthesia
    - Advanced age
- Clinical guidelines
- New studies raise safety questions
- Where do we go from here?

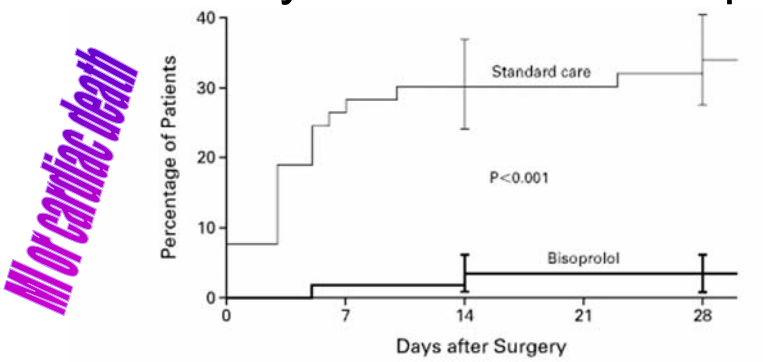
Mangano/Wallace

- Atenolol Rx ↓ postop Holter ischemia
  - –39% to 24%
- Atenonol Rx ↓
  - –87 to 75 bpm



Poldermans

- Bisoprolol preop
- Metoprolol periop prn HR > 80
- ↓ HR day 1 from 82 to 71 bpm



Practice starts to change

- Secular increase in beta blockade
  - Chronic
  - Oral preoperative
  - Oral and intravenous perioperative
- 1997-99 @ U Chicago
  - 33% vascular patients on chronic β-blocker
- 2001-2002 @ Yale
  - 48% vascular patients on chronic β-blocker

Efficacy vs. Effectiveness

- Efficacy
  - How does the treatment perform in the ideal circumstances (e.g. RCT).
  - Maximum achievable effect.
- Effectiveness
  - How does the treatment performs in real circumstances?
  - Benefits vs. side effects

Do the pivotal trials have patients like this one in them?

Included in pivotal trials?

	CHF	Regional	Asthma	Abnormal ECG (Holter)
Mangano	No	No	No	No
Raby	Yes	Yes	Yes	No
Urban	No	Yes (100%)	No	No
Poldermans	Yes (12%)	Yes (42%)	Yes	Yes
Zaugg	Yes	Yes	Yes	No (non-sinus)

How to handle this?

- 75 yo BM
  - COPD
- Scheduled for VATS +/- open lung bx
  - Suspected Ca
- Preop stress thallium
  - EF 40%
  - LAD area redistribution
- Preop anesth consult recommends beta blockade; **not yet given**

Please vote

- Toprol XL 50 mg po premed?
- Metoprolol 5 mg iv preinduction?
- Metoprolol 1 mg iv prn?
  - HR > 80
  - BPs > 100
- Esmolol infusion?

Please vote

- Place epidural, dose epidural, and see?
- Place epidural, beta-block in OR, start epidural infusion postop?
- No epidural, hope they don't open?
  - Place epidural at end of surgery if they do open?

Who in the audience has quality improvement or administrative duties?

Does this change your view of the world?

How to provide beta blockade?

- Preop oral dosing
  - Atenolol or Metoprolol
  - 25 – 100 mg po qd
  - Titrate to HR = 60
  - Ideally started and adjusted at home

How to provide beta blockade?

- Intraoperative intravenous
  - Esmolol 25-300 mcg/kg/min
  - Metoprolol 2.5 - 5 mg prn
  - Titrate to HR < 80, MAP +/- 20%

How to provide beta blockade?

- Postoperative intravenous
  - Metoprolol 2.5 - 5 mg prn HR >80
    - Hold for HR < 60
    - Hold for BPs < 110
    - Hold for wheezing
  - Esmolol 25-300 mcg/kg/min
    - Titrate to HR < 80, MAP +/- 20%

What do people really do? What do they really believe?

Survey research

A mail survey of beta blockade

- Questionnaire mailed to 2000 anesthesiologists in the US
  - 439 surveys were returned
- In the surveys, a patient scenario was described, but different aspects were changed
  - MS Word Mail Merge

Ellis JE, Tung A. Submitted IARS 2005

Baseline scenario

- Mrs. Jones is a 65 year old hypertensive black woman who presents to you for a femoral distal bypass for foot ulcers. She has hypertension, no chest pain or shortness of breath, and takes Lisinopril. EKG shows LVH without ischemic changes. She lives in a nursing home.

Cases differed by 6 variables

- **Age**
  - 65 yo
  - 85 yo
- **Race**
  - White
  - Black
- **Gender**
  - Male
  - Female
- **Surgery**
  - Aortobifemoral bypass
  - Femoral distal bypass
- **Comorbidities**
  - HTN
  - HTN, DM, s/p MI, exertional dyspnea
- **Functional Status**
  - Gardens; lives with daughter
  - Nursing home

Questions about beta blockade

10. Would you provide prophylactic beta blocker? *Never* 1 2 3 4 *Always* 5

11. What is the highest sustained heart rate you would tolerate before giving a Beta blocker?
- Before surgery _____ BPM (preop)
- During surgery _____ BPM (intraop)
- After surgery _____ BPM (postop)

Predictors of beta blockade

- Caucasian anesthesiologist
  - Many respondents chose not to identify race
- Larger community hospitals
- Fellowship training
- Never anesthetize patients > 85 yo

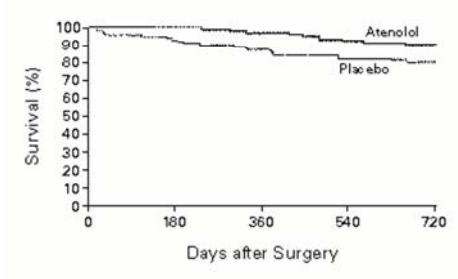
- PHYSICIAN FACTORS DOMINATE!

Surgery type affects HR triggers for beta blockade?

- For “healthy” patients preop
  - HR = 89.1 ± 23 bpm (mean ± SD) for a fem-distal bypass operation
  - HR = 81.7 ± 26.3 bpm for an aorto-bifemoral graft procedure
  - ($p<0.05$).
- This difference persisted for trigger HRs during and after surgery.
- No difference in trigger HRs between “healthy” and “sick” patients receiving the same operation were found.

Mangano/Wallace

- Atenolol Rx ↓ postop Holter ischemia
  - 39% to 24%
- Atenonol Rx ↓ HR
  - **87 to 75 bpm**



Poldermans

- Bisoprolol preop
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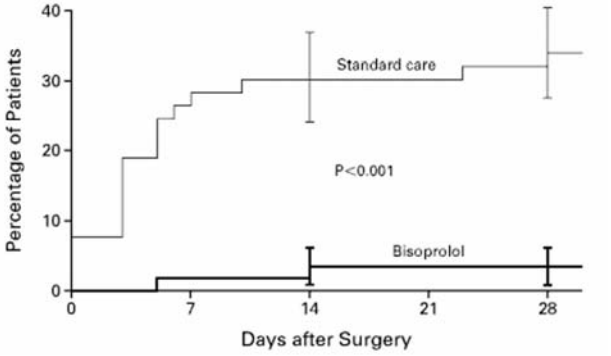
MI or cardiac death



What followed?

Guidelines

Quality improvement

P4P

Pre-printed orders
Clinical pathways

(Facility name)

PHYSICIAN'S ORDERS

Patient Name & MR#

WEIGHT (KG) DRUG SENSITIVITIES

Please use ballpoint pen and press firmly.

ORDER AND SIGNATURE	TRANSCRIPTION & RN NOTES
PREOPERATIVE METOPROLOL FOR CARDIAC RISK REDUCTION ORDERS	
NOTE: Refer to instructions on reverse.	

Anesthesiology Preoperative Orders:

1. ☐ *For Same Day Admission Patients:*
If patient NOT taking regular beta blockers or patient HASN"T taken their usual beta blocker on morning of surgery:
Give metoprolol on arrival to Preop Holding as follows *(choose one):*
☐ Metoprolol 50 mg PO with sip of water *(recommended for weight < 50 kg).*
OR
☐ Metoprolol 75 mg PO with sip of water *(recommended for weight 50-75 kg).*
OR
☐ Metoprolol 100 mg PO with sip of water *(recommended for weight > 75 kg).*

2. ☐ *For inpatients:*
If regularly receiving beta blockers, give usual dose of _____(*drug*) _____(*mg*) on the morning of surgery with a sip of water.

If not on chronic beta blocker give metoprolol 2 hours preoperatively as follows *(choose one):*
☐ Metoprolol 50 mg PO with sip of water *(recommended for weight < 50 kg).*
OR
☐ Metoprolol 75 mg PO with sip of water *(recommended for weight 50-75 kg).*
OR
☐ Metoprolol 100 mg PO with sip of water *(recommended for weight > 75 kg).*

3. Assess BP and HR prior to giving metoprolol. If systolic BP < 90 mmHg or HR < 50 beats/min, hold metoprolol and call attending anesthesiologist.

4. *Complete a Postoperative Metoprolol for Cardiac Risk Reduction Order form before patient leaves PACU (for implementation postoperatively)*

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4. *Complete a Postoperative Metoprolol for Cardiac Risk Reduction Order form before patient leaves PACU (for implementation postoperatively)*

Inclusion Criteria:

1. Patients undergoing surgical procedures of moderate to high risk:
   a. All vascular surgical procedures: aortic, peripheral, carotid
   b. Major orthopedic, total joints, open back
   c. Open abdominal/pelvic, GI, urologic, gynecologic
   d. Open thoracic
   e. Major neurosurgical- craniotomy, spinal
   f. Major head and neck

AND

2. Known coronary artery disease,
   OR
   At least two of the following risk factors for coronary artery disease:
   a. Age >65
   b. Current smoker or recent heavy smoker
   c. Diabetes mellitus
   d. Hypertension
   e. Hypercholesterolemia
   f. Peripheral vascular or carotid arteriosclerosis
   g. Renal insufficiency (cr >2.0)
   h. Cerebrovascular disease (stroke, TIA)

Exclusion Criteria:

1. Pulmonary disease with significant reactive component, on bronchodilators
2. Acute congestive heart failure or severe LV dysfunction (EF< 0.30)
3. Second or third degree AV block
4. Hemodynamically unstable, dependent on intact sympathetic responses
5. Known sensitivity to beta blockers
6. Systolic BP <90 or HR <50

Please use ballpoint pen and press firmly.

ORDER AND SIGNATURE	TRANSCRIPTION & RN NOTES
POSTOPERATIVE BETABLOCKER FOR CARDIAC RISK REDUCTION ORDERS *NOTE: Refer to instructions on reverse.*	
Anesthesiology Suggests the Following Postoperative Medications: 1. For patients NOT on chronic betablockers preoperatively give metoprolol _____mg at _____(*time*) beginning _____(*date*). For patients on chronic preoperative betablockers give _____(*usual drug*) _____mg at _____(*time*) beginning _____(*date*) 2. *Choose ONE of the following:* ☐ *For patients who can tolerate PO or NG medications:* Give PO/NG metoprolol as follows: Metoprolol 50 mg PO/NG bid if predose heart rate is between 50 and 60 beats/min. Metoprolol 75 mg PO/NG bid if predose heart rate is between 61 and 80 beats/min Metoprolol 100 mg PO/NG bid if predose heart rate is > 80 beats/min. *OR* ☐ *For patients on cardiac monitoring who cannot tolerate PO medications:* Give IV metoprolol as follows: Metoprolol 5 mg IV q6 h if predose heart rate is between 50 and 60 beats/min. Metoprolol 10 mg IV q6 h if predose heart rate is between 61 and 80 beats/min. Metoprolol 15 mg IV q6 h if predose heart rate is > 80 beats/min 3. Hold metoprolol dose if systolic BP < 90 mm Hg or heart rate < 50 beats/min and reassess with the next scheduled dose. 4. Reassess BP and HR after infusing half of each IV dose over 15 min. If systolic BP ≥ 90 AND HR ≥ 50, give remaining half of infusion over the next 15 min. Once patient is able to tolerate PO or NG medications, have physician complete a Postoperative Oral Metoprolol For Cardiac Risk Reduction Order form. 5. Do not give other beta blockers while patient is receiving metoprolol	
Anesthesiologist Signature:	
Printed Name:	
Date & Time:	
Attending/Resident Surgeon Signature:	
Printed Name:	
Date & Time:	

Anesthesiology Suggests the Following Postoperative Medications:

1. For patients NOT on chronic betablockers preoperatively give metoprolol _____mg at _____(*time*) beginning _____(*date*).

   For patients on chronic preoperative betablockers give _____(*usual drug*) _____mg at _____(*time*) beginning _____*date*)

2. *Choose ONE of the following:*

   ☐ *For patients who can tolerate PO or NG medications:*
   Give PO/NG metoprolol as follows:
   Metoprolol 50 mg PO/NG bid if predose heart rate is between 50 and 60 beats/min.
   Metoprolol 75 mg PO/NG bid if predose heart rate is between 61 and 80 beats/min
   Metoprolol 100 mg PO/NG bid if predose heart rate is > 80 beats/min.

   OR

   ☐ *For patients on cardiac monitoring who cannot tolerate PO medications:*
   Give IV metoprolol as follows:
   Metoprolol 5 mg IV q6 h if predose heart rate is between 50 and 60 beats/min.
   Metoprolol 10 mg IV q6 h if predose heart rate is between 61 and 80 beats/min.
   Metoprolol 15 mg IV q6 h if predose heart rate is > 80 beats/min

3. Hold metoprolol dose if systolic BP < 90 mm Hg or heart rate < 50 beats/min and reassess with the next scheduled dose.

4. Reassess BP and HR after infusing half of each IV dose over 15 min. If systolic BP ≥ 90 AND HR ≥ 50, give remaining half of infusion over the next 15 min.

Once patient is able to tolerate PO or NG medications, have physician complete a Postoperative Oral Metoprolol For Cardiac Risk Reduction Order form.

5. Do not give other beta blockers while patient is receiving metoprolol

Anesthesiologist Signature:
Printed Name:
Date & Time:
Attending/Resident Surgeon Signature:
Printed Name:
Date & Time:

This is a more difficult than DVT prophylaxis or aspiration prophylaxis

2006 AHA/ACC Beta Blocker Guideline Update

Journal of the American College of Cardiology
Vol. 47, No. 11, 2006

Published by Elsevier Inc.
ISSN 0735-1097/06/$32.00
doi:10.1016/j.jacc.2006.02.028

ACC/AHA PRACTICE GUIDELINES

ACC/AHA 2006 Guideline Update on Perioperative Cardiovascular Evaluation for Noncardiac Surgery: Focused Update on Perioperative Beta-Blocker Therapy

A Report of the American College of Cardiology/
American Heart Association Task Force on Practice Guidelines
(Writing Committee to Update the 2002 Guidelines on Perioperative Cardiovascular Evaluation for Noncardiac Surgery)
Developed in Collaboration With the American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, and Society for Vascular Medicine and Biology

2006 AHA/ACC Beta Blocker Guideline Update

http://www.acc.org/clinical/guidelines/perio/periobetablocker.pdf

2. PERIOPERATIVE MEDICAL THERAPY

2.1. Perioperative Beta-Blocker Therapy

Recommendations for Beta-Blocker Medical Therapy (Table 1):

Class I

1. Beta blockers should be continued in patients undergoing surgery who are receiving beta blockers to treat angina, symptomatic arrhythmias, hypertension, or **other ACC/AHA Class I guideline indications.** *(Level of Evidence: C)*
2. Beta blockers should be given to patients undergoing vascular surgery at high cardiac risk owing to the finding of ischemia on preoperative testing. *(Level of Evidence: B)*

Class IIa

1. Beta blockers are probably recommended for patients undergoing vascular surgery in whom preoperative assessment identifies coronary heart disease. *(Level of Evidence: B)*
2. **Beta blockers are probably recommended for patients in whom preoperative assessment for vascular surgery identifies high cardiac risk as defined by the presence of multiple clinical risk factors.*** *(Level of Evidence: B)*

3. Beta blockers are probably recommended for patients in whom preoperative assessment identifies coronary heart disease or high cardiac risk as defined by the presence of multiple clinical risk factors* and who are undergoing intermediate- or high-risk procedures as defined in these guidelines. *(Level of Evidence: B)*

Class IIb

1. Beta blockers may be considered for patients who are undergoing intermediate- or high-risk procedures as defined in these guidelines, including vascular surgery, in whom preoperative assessment identifies intermediate cardiac risk as defined by the presence of a single clinical risk factor.* *(Level of Evidence: C)*
2. Beta blockers may be considered in patients undergoing vascular surgery with low cardiac risk (as defined in these guidelines) who are not currently on beta blockers. *(Level of Evidence: C)*

Cardiovascular Anesthesiology
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Special Article

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)

Developed in Collaboration With the American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society for Vascular Medicine and Biology, and Society for Vascular Surgery

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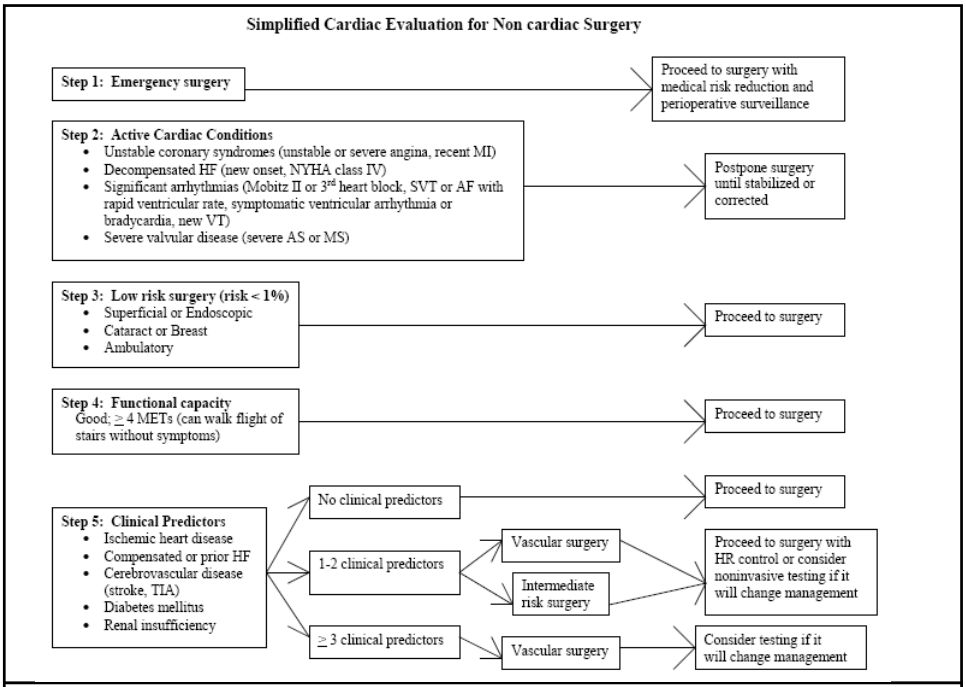

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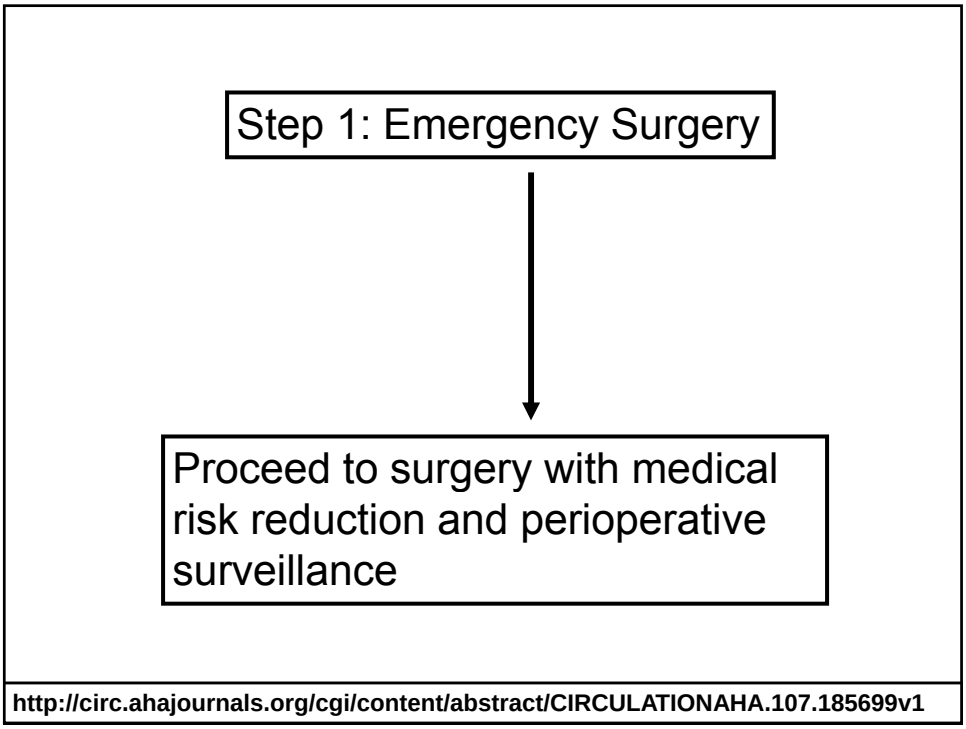

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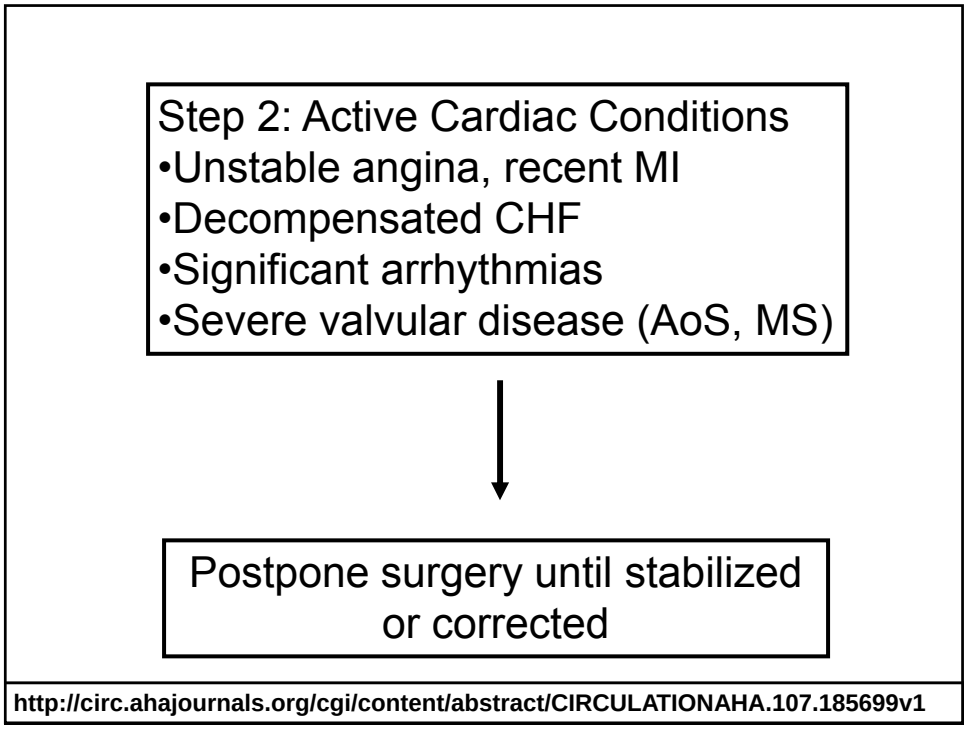
Step 2: Active Cardiac Conditions
•Unstable angina, recent MI
•Decompensated CHF
•Significant arrhythmias
•Severe valvular disease (AoS, MS)
Postpone surgery until stabilized or corrected
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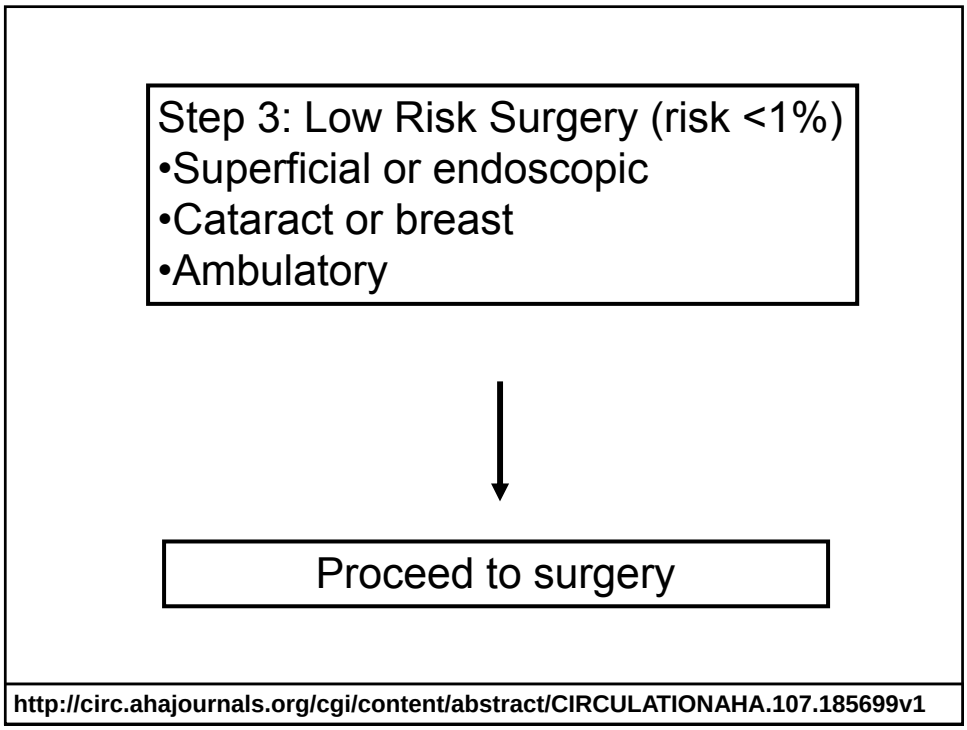
Step 3: Low Risk Surgery (risk <1%)
•Superficial or endoscopic
•Cataract or breast
•Ambulatory
Proceed to surgery
http://circ.ahajournals.org/cgi/content/abstract/CIRCULATIONAHA.107.185699v1

Step 4: Functional Capacity
- Good
- > 4 METs
  - Can walk flight of stairs without symptoms

Proceed to surgery

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STEP 5

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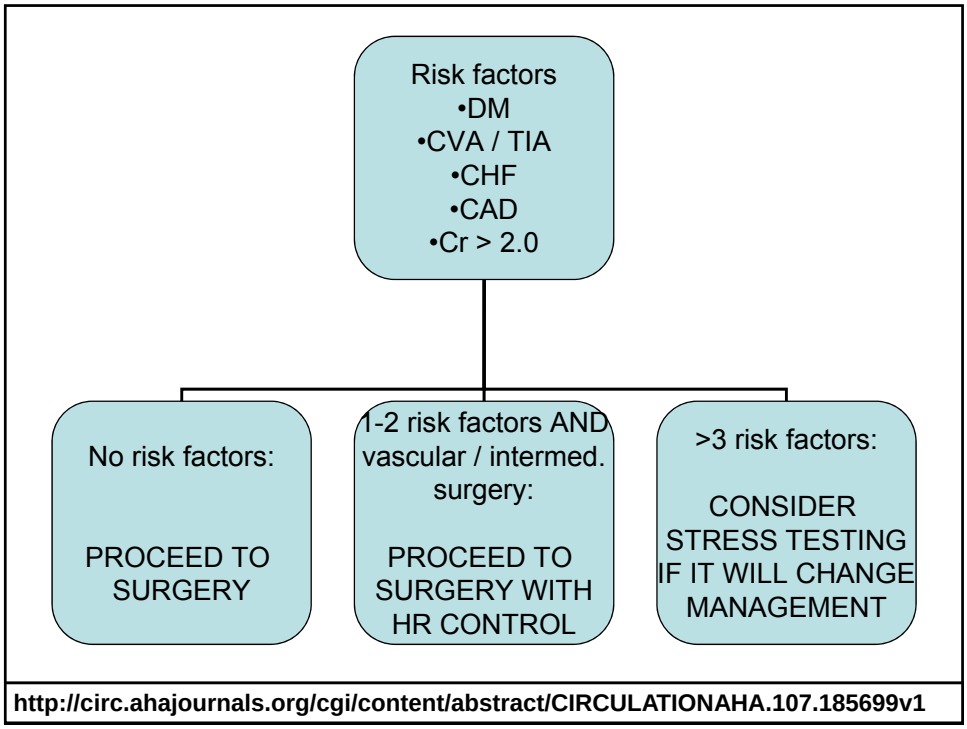

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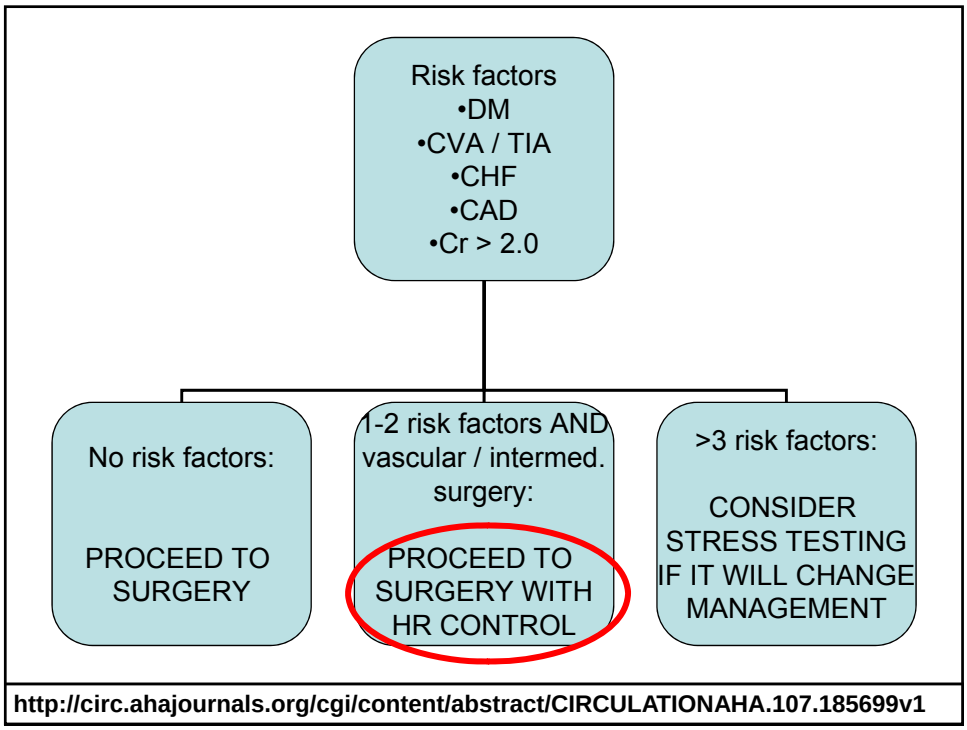


http://circ.ahajournals.org/cgi/content/abstract/CIRCULATIONAHA.107.185699v1

Newest randomized trials

- Metoprolol after Vascular Surgery (MaVS) trial (N=497)
  - **Negative results**
- DECREASE-V
  - Rotterdam
  - N=770
  - Beta blockade to 60bpm = **protective**
- PeriOperative ISchemic Evaluation (POISE)
  - N= 8351
  - Australia, Canada, and the United Kingdom
  - THE definitive study?

POISE – the definitive trial??

- The dose of metoprolol:
  - 100 mg preop
  - 100 mg in the 6hr postoperative period
  - 200 mg 12 hours later
  - 200 mg daily thereafter out to 30 days
  - Doses were not titrated
  - Drug stopped for BPs < 100 mm Hg.

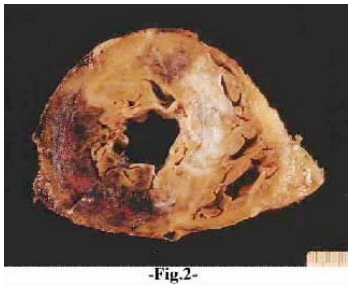
AHA 2007

POISE – the definitive trial??

Outcome	Metoprolol (n=4174), n (%)	Placebo (n=4177), n (%)	Hazard ratio	p
Primary composite	243 (5.8)	290 (6.9)	0.83	0.04
Nonfatal MI	151 (3.6)	215 (5.1)	0.70	0.0007
Total mortality	129 (3.1)	97 (2.3)	1.33	0.03
Stroke	41 (1.0)	19 (0.5)	2.17	0.005

AHA 2007

vs.



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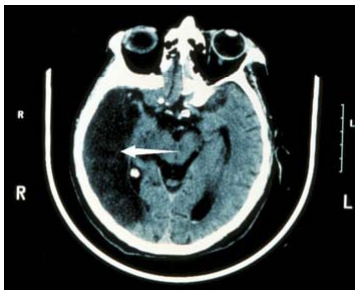

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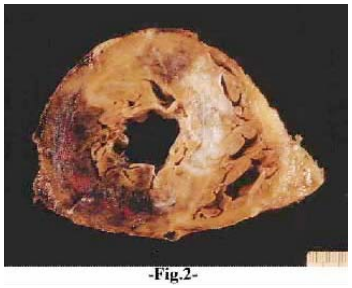
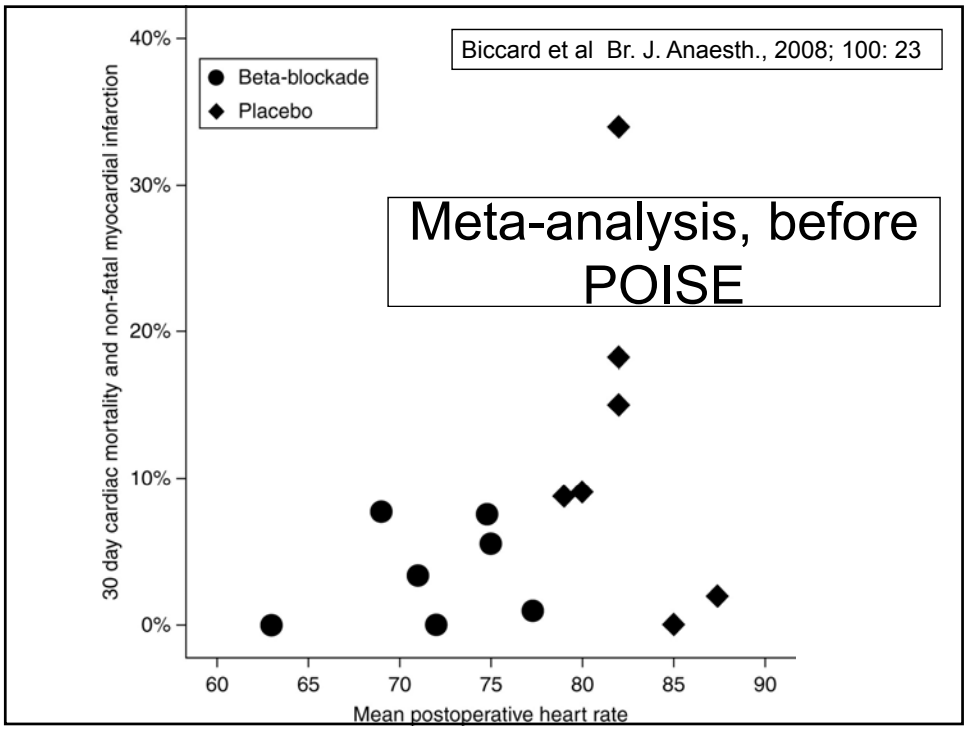


POISE – the definitive trial??

Outcome	Metoprolol (n=4174), n (%)	Placebo (n=4177), n (%)	Hazard ratio	p
Revascularization	11 (0.3)	27 (0.6)	0.41	0.01
Atrial fibrillation	91 (2.2)	120 (2.9)	0.76	0.04
Significant hypotension	626 (15.0)	404 (9.7)	1.55	<0.0001
Significant bradycardia	274 (6.6)	101 (2.4)	2.71	<0.0001

AHA 2007

Other, recent articles still support beta blockade



DECREASE-V (Holland)

- The strategy of no stress testing brought surgery almost 3 weeks forward.
- Regardless of allocated strategy (stress test vs not), patients with a HR <65 bpmin had lower risk than remaining patients
  - 1.3% vs. 5.2%
  - OR 0.24
  - 95% CI 0.09 to 0.66
  - p = 0.003

J Am Coll Cardiol. 2006 Sep 5;48(5):964-9.

Lancet editorial re: POISE

- Poldermans and Fleisher suggest that patients in the POISE trial were **overdosed** with metoprolol, receiving functionally twice the dose of patients in the DECREASE-V trial.

Lancet. 2008 May 31;371(9627):1813-4.

DECREASE-V (Holland)

- They conclude:
  - "Cardiac testing can safely be omitted in intermediate-risk patients, provided that beta-blockers aiming at tight HR control are prescribed."

J Am Coll Cardiol. 2006 Sep 5;48(5):964-9.

DECREASE-V results similar to CARP trial from 2004

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

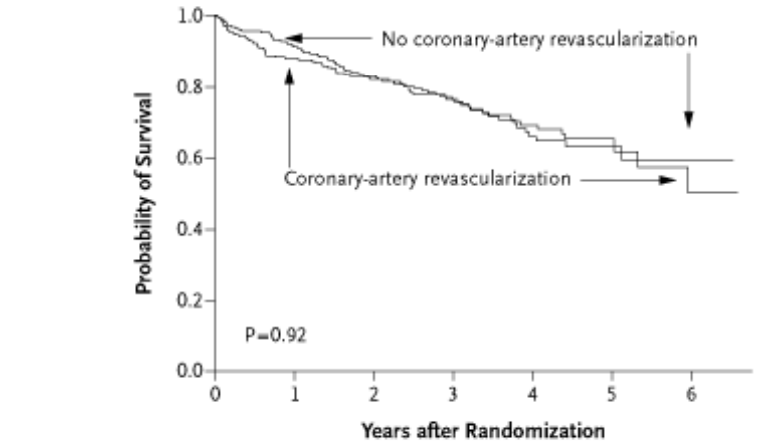
Coronary-Artery Revascularization before Elective Major Vascular Surgery

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.

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

We'd never stop beta blockers acutely, would we??

POISE author has suggested that maybe we should even stop chronic beta blockade!

Merin 1972

- *"The cardiothoracic anesthesia group at the Cleveland Clinic …. Four patients who had been receiving from 120-160 mg./day of propranolol within 24 hours of surgery died from intractable heart failure immediately after coming off bypass for CABG….This group will no longer anesthetize a patient for any but the most emergent surgery unless he has been off propranolol for 2 weeks."*

Beta blocker withdrawal

- 1997-1999
- U Chicago Vascular Surgery Service
- Preop clinic and discharge summary review
- n = 289
  - 25% on chronic beta blockers
  - Only 8% had new beta blockade started
  - 24% had beta blockade withdrawn!

Ellis JE et al. SCA 2001 (abstract)

Surgery

Perioperative β-blocker withdrawal and mortality in vascular surgical patients

Jonathan B. Shammash, MD,[a] Jeffrey C. Trost, MD,[f] Julie M. Gold, BA,[b] Jesse A. Berlin, ScD,[c] Michael A. Golden, MD,[d] and Stephen E. Kimmel, MD, MS[c,e] *New York, NY, and Philadelphia, Pa*

Am Heart J 2001;141:148-53

- 140 patients received β-blockers preoperatively.
- 50% mortality in the 8 patients who had β-blockers discontinued postoperatively
- 1.5% mortality in 132 patients who had β-blockers continued
- odds ratio 65.0, P< .001

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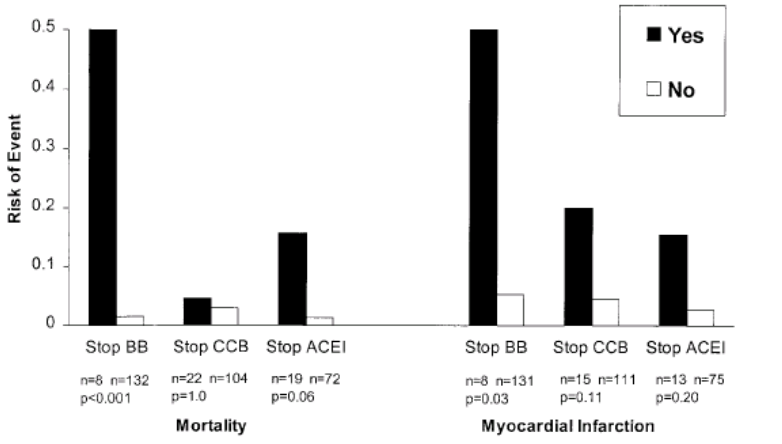


What next?

Marty London opines

- "What I think will happen is that it will become a class 2b indication—possibly effective but based on limited data,"
- "Like it or not, this is a bombshell in the whole area. What it means is that hospitals that have jumped on the beta-blocker bandwagon fairly aggressively, in large respect to try to boost their performance measures, will have to reconsider." http://www.medscape.com/viewarticle/574526?src=top10

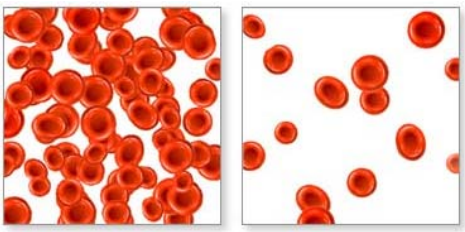
Marty London opines

- Nevertheless, there will always be patients in whom it is necessary to use beta blockers, London concludes.
- "I do a lot of high-risk surgery anesthesia, and I know if I can't control that stress period with an anesthetic drug, I will get a beta blocker out and use that sparingly and carefully. Most of the time, I don't see any big drops in BP or heart rate."

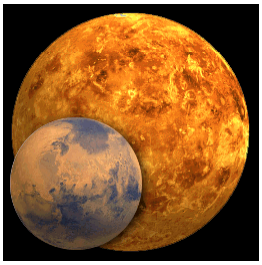
http://www.medscape.com/viewarticle/574526?src=top10

ASA 2008 – Toronto (Beattie)

- Death/MI was higher for patients administered beta blockers when Hgb decreases postop more than 30%



ASA 2008 A846



Mars and Venus?

- ~1000 vascular surgery patients evaluated retrospectively
- After risk-stratification, the high-risk women who received β-blockade had a statistically worse outcome (36.8% *v* 5.9%, *p* = 0.02) because of an increased incidence of CHF.
- By logistic regression, β-blockade improved outcomes in men but not women

Journal of Cardiothoracic and Vascular Anesthesia 2008 Vol 22 P 354-360

John Ellis opines

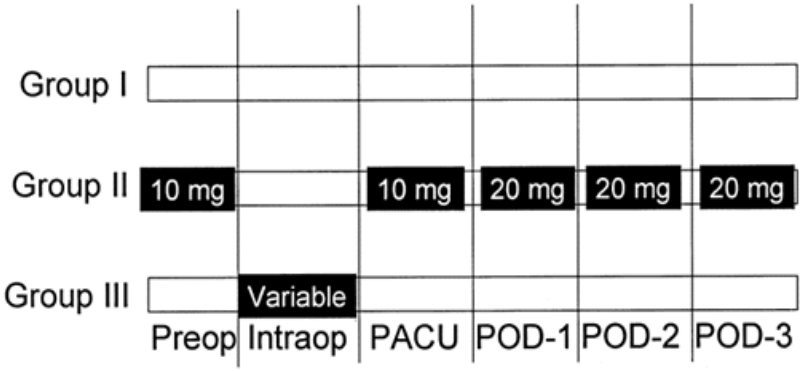
- Beta blockade may produce hypotension if:
  - Given in fixed doses
  - Other anesthetic drugs are not reduced
    - Volatile agents
    - Opiates

Anesthesiology
1999; 91:1674–86

Beneficial Effects from β-Adrenergic Blockade in Elderly Patients Undergoing Noncardiac Surgery

Michael Zaugg, M.D., Thomas Tagliente, M.D., Ph.D.,† Eliana Lucchinetti, M.S.,‡ Ellis Jacobs, Ph.D.,§ Marina Krol, Ph.D.,|| Carol Bodian, Dr.P.H.,# David L. Reich, M.D.,** Jeffrey H. Silverstein, M.D.††*

Administration Schedule for Atenolol



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- Beta blockade (BIS titrated)
  - Reduced isoflurane use
  - Reduced fentanyl use
  - Hastened extubation
  - Reduced postop pain scores
  - Reduced postop analgesia needs

The Effect of Intraoperative Use of Esmolol and Nicardipine on Recovery After Ambulatory Surgery

Paul F. White, PhD, MD, FANZCA*, Baoguo Wang, MD*†, Jun Tang, MD*†, Ronald H. Wender, MD†, Robert Naruse, MD†, and Alexander Sloninsky, MD†

*Department of Anesthesiology and Pain Management, University of Texas Southwestern Medical Center, Dallas, Texas; and †Department of Anesthesiology, Cedars-Sinai Medical Center, Los Angeles, California

	Control	Esmolol	Esmolol + nicardipine
n	15	15	15
Age (yr)	37 ± 6	41 ± 11	40 ± 16
Weight (kg)	59 ± 8	67 ± 18	67 ± 15
Height (cm)	163 ± 5	166 ± 7	166 ± 7
Anesthesia time (min)	68 ± 26	69 ± 23	82 ± 31
Surgery time (min)	46 ± 26	45 ± 24	57 ± 29
End-tidal desflurane (vol %)	4.3 ± 1.0	1.8 ± 0.3	1.9 ± 0.2
End-tidal nitrous oxide (%)	65 ± 5	66 ± 3	65 ± 4
Total maintenance esmolol (mg)	N/A	92 ± 97	76 ± 21

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	Control	Esmolol	Esmolol + nicardipine
n	15	15	15
Eyes opening (min)	6 ± 4	3 ± 2*	4 ± 2*
Extubation (min)	6 ± 3	4 ± 2*	3 ± 2*
Following commands (min)	7 ± 4	4 ± 2*	4 ± 2*
Orientation (min)	9 ± 4	5 ± 2*	6 ± 3*
Discharge home (min)	269 ± 100†	218 ± 88	202 ± 90
Antiemetic rescue [*n* (%)]	6 (40)	7 (47)	4 (27)
Opioid analgesic rescue [*n* (%)]	12 (80)†	7 (47)	6 (40)

Values are means ± SD, numbers (*n*), or percentages (%).
* $P < 0.05$ versus control.
† $P < 0.05$ versus esmolol + esmolol/nicardipine combined.

CONCLUSIONS

- Studies differ on whether beta blockers are protective or not
- Excessive beta blockade may produce hypotension and hypoperfusion
- Beta blockade may become less of a QI or P4P goal in the future
  - Except for those on them chronically