

Peri-Operative Management and Care Coordination

Core Curriculum for the Cardiovascular Clinician

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Disclosures

Biosense Webster (a J&J Co.) consultant



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A Word About Consultation

- consultation is an art
- it takes lots of practice
- tough to teach in 30-40 minutes but we will give it a try.
- will concentrate on pre-op evaluation



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What is the Purpose of a Cardiology Consultation?

- evaluate the patient's medical status
- provide an assessment of risk
- recommendations for management
- treatment of modifiable risk factors

- Remember you are the expert!!!



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Differences Between Surgeons and Non-surgeons in Consult Preferences

Table 1. Differences Between Surgeons and Nonsurgeons in Consult Preferences

Question	% Agreement*		P Value
	Surgeons (n = 153)	Nonsurgeons (n = 170)	
Consults should be limited to a specific question	41	69	<.001
Consultants should not write orders unless discussed with the primary team	37	59	<.001
A comanagement relationship is desired	59	24	<.001
Literature references are useful as part of the consult	18	41	<.001
Consult recommendations should have a description of importance and urgency	78	69	.05
Making over 5 recommendations limits compliance with the consult	22	21	>.05
Recommendations are preferred at the beginning of the consult	41	54	.02
Initial recommendations should be discussed verbally with the referring service	69	79	.05
Regardless of the patient's acuity of illness, daily progress notes from consultants are desired	78	67	.03
I find informal "curbside" consults helpful in caring for patients	53	83	<.001

*Scores of 4 or 5 on a 5-point Likert scale.

Ten Commandments of Effective Consultation

- determine the customer
 - ask how you can help if question not obvious
- establish urgency
 - decide if emergency, urgent, or elective
- look for yourself
 - most effective when data gathered by consultant
- be brief as possible
 - no need to repeat in full detail what is already recorded
- be specific, thorough, and descend from the ivory tower to help when needed
 - leave specific recommendations, ask if need order writing

Ten Commandments of Effective Consultation

- provide contingency plans and discuss execution
 - anticipate potential problems, document contingency plans, provide 24 hour contact for help if needed
- thou may negotiate joint title to thy neighbor's turf
 - discuss who manages what and OK to co-manage
- teach with tact and pragmatism
 - leaving references tailored to specialty, level of training, and urgency of consult
- talk is essential
 - no substitute for direct contact with primary physician
- follow up daily
 - daily follow-up desirable, discuss when signing off

2014 ACC/AHA Perioperative Guidelines

Practice Guideline: Executive Summary | August 2014

2014 ACC/AHA Guideline on Perioperative Cardiovascular Evaluation and Management of Patients Undergoing Noncardiac Surgery: Executive Summary

A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines

FREE

Lee A. Fleisher, MD, FACC, FAHA; Kirsten E. Fleischmann, MD, MPH, FACC; Andrew D. Auerbach, MD, MPH; Susan A. Barnason, PhD, RN, FAHA; Joshua A. Beckman, MD, FACC, FAHA, FSVM; Biykem Bozkurt, MD, PhD, FACC, FAHA; Victor G. Davila-Roman, MD, FACC, FASE; Marie D. Gerhard-Herman, MD; Thomas A. Holly, MD, FACC, FASNC; Garvan C. Kane, MD, PhD, FAHA, FASE; Joseph E. Marine, MD, FACC, FHRS; M. Timothy Nelson, MD, FACS; Crystal C. Spencer, JD; Annemarie Thompson, MD; Henry H. Ting, MD, MBA, FACC, FAHA; Barry F. Uretsky, MD, FACC, FAHA, FSCAI; Duminda N. Wijeyesundera, MD, PhD

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2014 ACC/AHA Guidelines on Perioperative Beta Blockade in Noncardiac Surgery

Practice Guideline | August 2014

Perioperative Beta Blockade in Noncardiac Surgery: A Systematic Review for the 2014 ACC/AHA Guideline on Perioperative Cardiovascular Evaluation and Management of Patients Undergoing Noncardiac Surgery

A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines

FREE

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2014 ACC/AHA Guidelines: Take Home Points About Perioperative Evaluation

- not “clearing” a patient for surgery
- assessment of perioperative risk
 - should patient have surgery?
 - what type of surgery?
- should there be changes in management?
- identify risk factors for long-term management
- really the same evaluation as for non pre-op pts.



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2014 ACC/AHA Guidelines: Take Home Points About Perioperative Evaluation

- collaborative approach to decision making
 - surgeon
 - anesthesiologist
 - primary caregiver
 - consultants
- don't forget to involve the patient
 - accommodate their preferences
 - shared decision-making



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2014 ACC/AHA Guidelines: Take Home Points About Perioperative Evaluation

- 2009 guidelines – low-, medium-, or high-risk
- 2014 guidelines
 - low-risk (<1% risk of major adverse cardiac events)
 - elevated risk (\geq 1% risk of cardiac events)
- Risk prediction models
 - Revised Cardiac Risk Index – RCRI
 - 0-1 low risk, >1 elevated risk
 - ACS NSQIP MICA
 - (<http://www.surgicalriskcalculator.com/miorcardiacarrest>)
 - ACS NSQIP Surgical Risk Calculator
 - (www.riskcalculator.facs.org)

Revised Cardiac Risk Index (RCRI)

Circ 100:1043-1049, 1999

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

- Non emergent, non cardiac, estimated LOS ≥ 2 days
- 4315 pt: 2893 pt in derivation group, 1422 in prospective validation group
- Six risk factors: one point each

high risk surgery- peritoneal, thoracic, pelvic vascular

ischemic heart disease- history or findings

heart failure- history or findings

CVA/TIA

insulin requiring diabetes

creatinine ≥ 2



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Revised Cardiac Risk Index (RCRI)

Major Cardiac Event Rates by the Revised Cardiac Risk Index*

Class	Events/Patients, <i>n/n</i>	Event Rate (95% CI), %
I (0 risk factors)	2/488	0.4 (0.05–1.5)
II (1 risk factor)	5/567	0.9 (0.3–2.1)
III (2 risk factors)	17/258	6.6 (3.9–10.3)
IV (≥ 3 risk factors)	12/109	11.0 (5.8–18.4)
ROC curve area	0.806†	

† $P = 0.034$ versus original cardiac risk index (ROC curve area, 0.701), modified cardiac risk index (ROC curve area, 0.582), and American Society of Anesthesia Classification (ROC curve area, 0.697). Major cardiac events include myocardial infarction, cardiac arrest, pulmonary edema, and complete heart block. Risk factors are high-risk surgical procedure (intraperitoneal, intrathoracic, or suprainguinal vascular reconstruction), history of ischemic heart disease (excluding previous revascularization), history of congestive heart failure, history of stroke or transient ischemic attack, preoperative insulin therapy, and preoperative serum creatinine levels $> 152.5 \mu\text{mol/L}$ ($> 2.0 \text{ mg/dL}$).



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Calculation of Risk to Predict Perioperative Cardiac Morbidity

Multivariate Risk Indices

Recommendations	COR	LOE
A validated risk-prediction tool can be useful in predicting the risk of perioperative MACE in patients undergoing noncardiac surgery.	IIa	B
For patients with a low risk of perioperative MACE, further testing is not recommended before the planned operation.	III: No Benefit	B

J Am Coll Cardiol 2014;Aug 1:[Epub ahead of print].

Patient #1

- 68 yo male with DM, HTN, ↑Lipids, aortic stenosis
- presents after non-syncopal fall with R hip fx
- no other complaints and ORIF is planned
- “medical clearance” is requested



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What Are They Asking For?

- What they are really asking for is a pre-operative assessment of the risk for peri-operative cardiac death and MI!!

Why is this important?

- Coronary artery disease
 - the most frequent cause of peri-operative cardiac morbidity and mortality following non-cardiac surgery

Triggers of Peri-Operative Myocardial Injury

(Devereaux PJ et al CMAJ 2005;173(6);627-634)

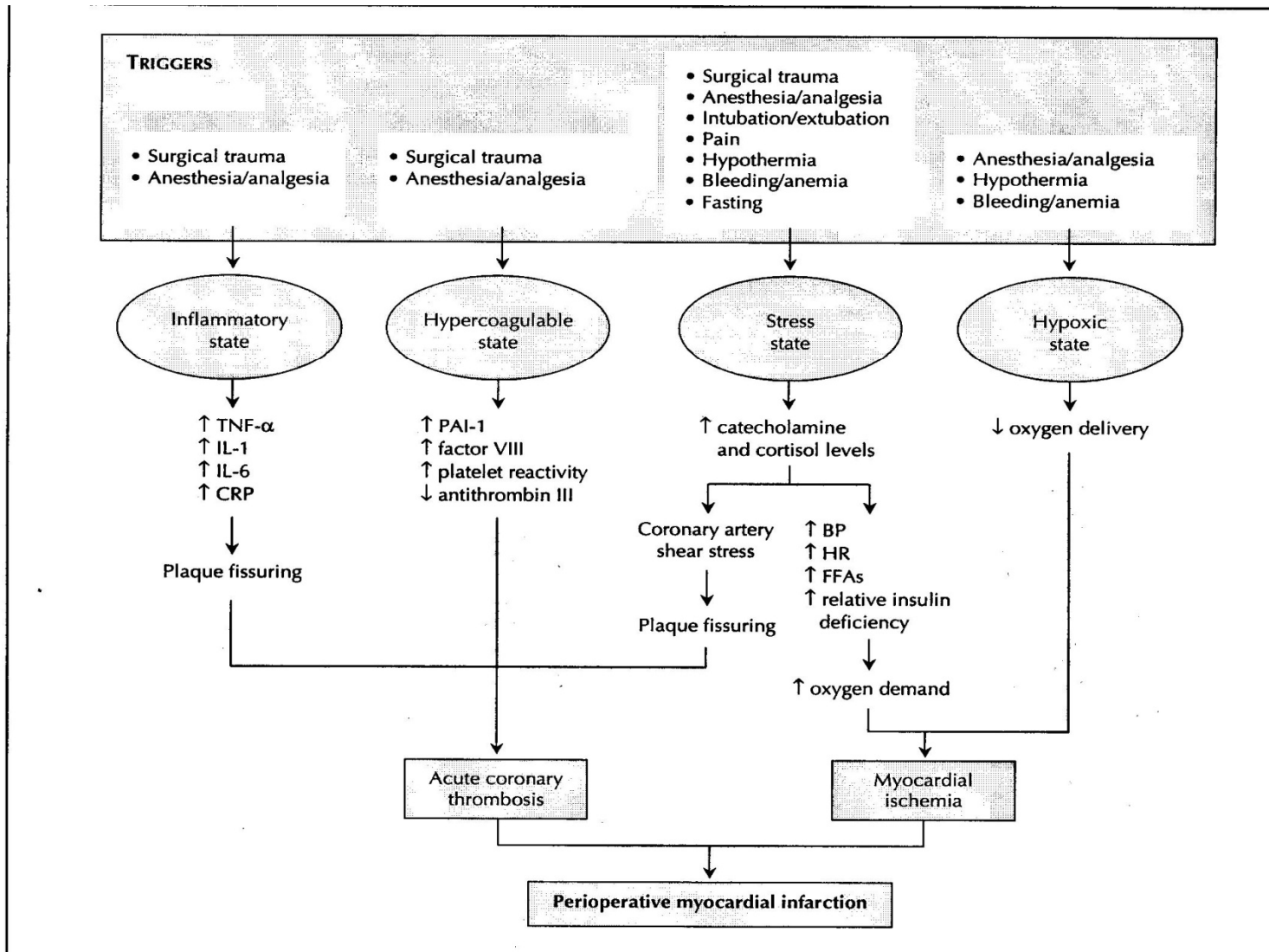


Fig. 1: Potential triggers of states associated with perioperative elevations in troponin levels, arterial thrombosis and fatal myocardial infarction. TNF- α = tumour necrosis factor- α , IL = interleukin, CRP = C-reactive protein, PAI-1 = plasminogen activator inhibitor-1, BP = blood pressure, HR = heart rate, FFAs = free fatty acids.

What Else Do We Need For Risk Assessment?

- More complete history
 - h/o CAD, prior MI, CHF, angina, arrhythmia
 - define disease severity, stability, prior therapy
 - functional status
- Physical exam
 - appearance, carotid bruits, JVD, rales, S3 gallop, murmur
- Labwork
 - Chem 8, CBC, coags, UA
- ECG, CXR, Echo, other studies as needed



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Back to our Patient #1

- 68 y/o male
- no chest discomfort or dyspnea
- PMH
 - DM, HTN, CRI, moderate aortic stenosis
 - No prior MI, CHF, arrhythmia
- Meds
 - Glyburide, lisinopril, HCTZ, aspirin, insulin
- NKDA
- SH/FH: non-contributory



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Patient #1

- VS: 98.9, 94, 18, 156/84, O2 Sat 99% room air
- PE:
 - drowsy but alert, NAD, appears well
 - carotids 1+, bilateral bruits
 - no JVD
 - 3/6 murmur, no gallop or rub
 - lungs clear
 - abdomen covered by partial brace for hip fracture, NABS, no tenderness
 - no edema, 2+ distal pulses
 - neuro intact



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Patient #1

- Labs
 - Cr 2.0 mg/dl, glucose 158
 - Coags and CBC normal
- ECG: NSR, LVH, no acute ST-T changes
- Chest X-ray is unremarkable



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Clinical Predictors of High Risk

Table 2. Active Cardiac Conditions for Which the Patient Should Undergo Evaluation and Treatment Before Noncardiac Surgery (Class I, Level of Evidence: B)

Condition	Examples
Unstable coronary syndromes	Unstable or severe angina* (CCS class III or IV)† Recent MI‡
Decompensated HF (NYHA functional class IV; worsening or new-onset HF)	
Significant arrhythmias	High-grade atrioventricular block Mobitz II atrioventricular block Third-degree atrioventricular heart block Symptomatic ventricular arrhythmias Supraventricular arrhythmias (including atrial fibrillation) with uncontrolled ventricular rate (HR greater than 100 bpm at rest) Symptomatic bradycardia Newly recognized ventricular tachycardia
Severe valvular disease	Severe aortic stenosis (mean pressure gradient greater than 40 mm Hg, aortic valve area less than 1.0 cm ² , or symptomatic) Symptomatic mitral stenosis (progressive dyspnea on exertion, exertional presyncope, or HF)



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Functional Assessment

Table 3. Estimated Energy Requirements for Various Activities

1 MET	Can you ...	4 METs	Can you ...
↓	Take care of yourself?	↓	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	Can you ...
			Participate in strenuous sports like swimming, singles tennis, football, basketball, or skiing?

METS = Metabolic Equivalent levels

Oxygen consumption (VO₂) of 70 kg, 40 y/o male at rest = 3.5 ml/kg/min = 1 MET

Risk increases when cannot meet 4 METS during activities of daily living (ADLs)

Surgical Risk Assessment

Table 4. Cardiac Risk* Stratification for Noncardiac Surgical Procedures

Risk Stratification	Procedure Examples
Vascular (reported cardiac risk often more than 5%)	Aortic and other major vascular surgery Peripheral vascular surgery
Intermediate (reported cardiac risk generally 1% to 5%)	Intraperitoneal and intrathoracic surgery Carotid endarterectomy Head and neck surgery Orthopedic surgery Prostate surgery
Low† (reported cardiac risk generally less than 1%)	Endoscopic procedures Superficial procedure Cataract surgery Breast surgery Ambulatory surgery



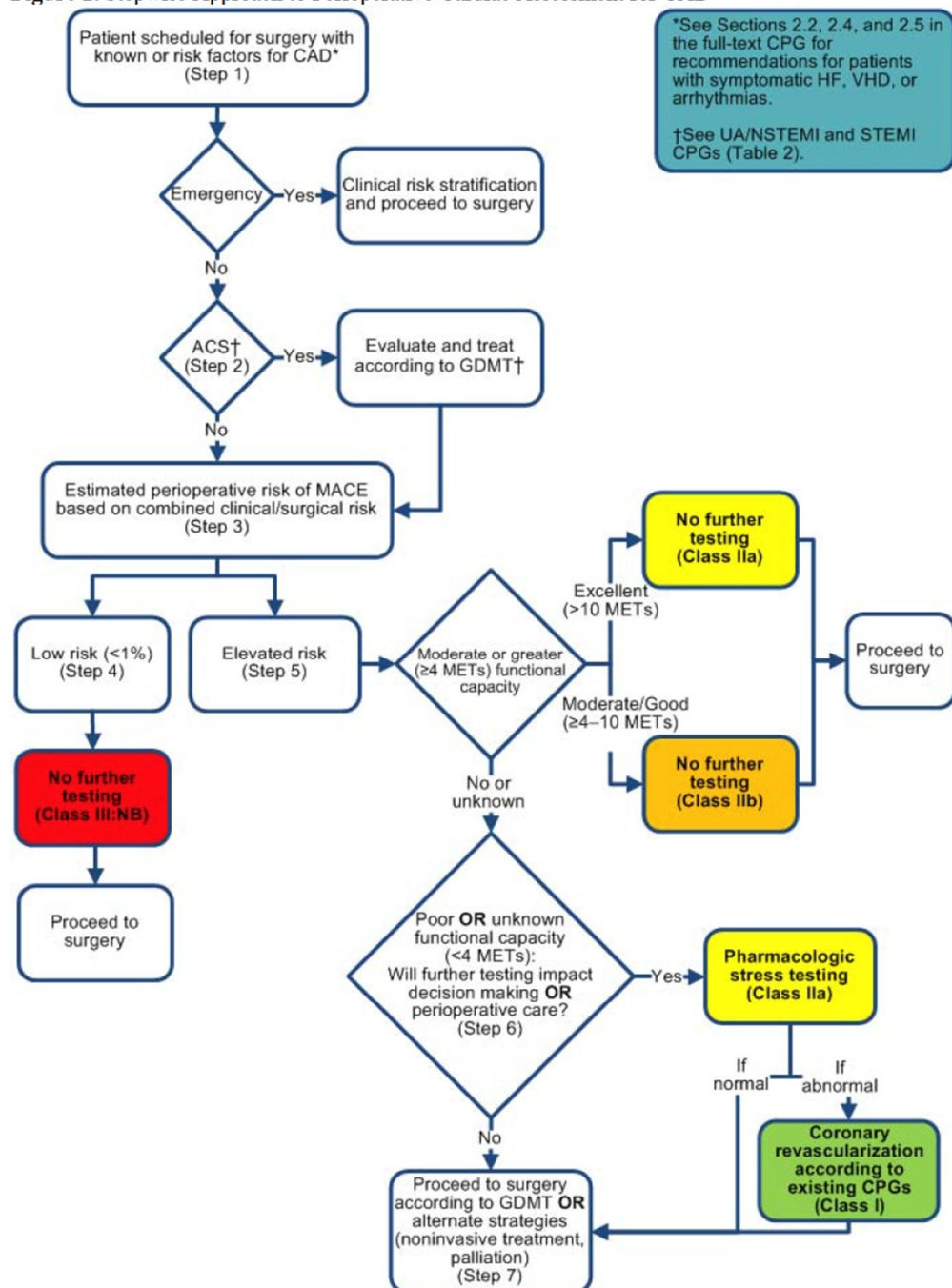
Risk Assessment Recap – Patient #1

- RCRI = 2 Elevated risk!
 - diabetes and renal insufficiency
- assess the patient's clinical risk
 - no symptoms, but has aortic stenosis
- evaluate their functional status
 - reasonable functional capacity (> 4 mets)
- determine risk of selected surgery
 - intermediate risk (orthopedic)



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Figure 1. Stepwise Approach to Perioperative Cardiac Assessment for CAD



Colors correspond to the Classes of Recommendations in Table 1.

Stepwise Approach to Perioperative Cardiac Assessment for CAD

J Am Coll Cardiol 2014;Aug 1:
[Epub ahead of print]

Let's Re-assess

- What about the patient's aortic stenosis?
 - able to do light housework and a flight of stairs
 - completely asymptomatic



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Supplemental Preoperative Evaluation

Assessment of LV Function

Recommendations	COR	LOE
It is reasonable for patients with dyspnea of unknown origin to undergo preoperative evaluation of LV function.	Ila	C
It is reasonable for patients with HF with worsening dyspnea or other change in clinical status to undergo preoperative evaluation of LV function.	Ila	C
Reassessment of LV function in clinically stable patients with previously documented LV dysfunction may be considered if there has been no assessment within a year.	IIb	C
Routine preoperative evaluation of LV function is not recommended.	III: No Benefit	B

Clinical Risk Factors

Valvular Heart Disease

Recommendations	COR	LOE
It is recommended that patients with clinically suspected moderate or greater degrees of valvular stenosis or regurgitation undergo preoperative echocardiography if there has been either 1) no prior echocardiography within 1 year or 2) a significant change in clinical status or physical examination since last evaluation.	I	C
For adults who meet standard indications for valvular intervention (replacement and repair) on the basis of symptoms and severity of stenosis or regurgitation, valvular intervention before elective noncardiac surgery is effective in reducing perioperative risk.	I	C

Clinical Risk Factors

Aortic Stenosis

Recommendation	COR	LOE
Elevated-risk elective noncardiac surgery with appropriate intraoperative and postoperative hemodynamic monitoring is reasonable to perform in patients with asymptomatic severe AS.	IIa	B

Mitral Stenosis

Recommendation	COR	LOE
Elevated-risk elective noncardiac surgery using appropriate intraoperative and postoperative hemodynamic monitoring may be reasonable in asymptomatic patients with severe mitral stenosis if valve morphology is not favorable for percutaneous mitral balloon commissurotomy.	IIb	C

Patient #1 - continued

- echo reveals moderate-severe AS
 - mean gradient 35 mm hg, AVA = 1.1 cm²
- proceeds to right hip ORIF
- stable post-op without symptoms
- discharge to rehab on post-op day #3



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Patient #2

- 72 M referred to NF VA for pre-op cardiac catheterization
- h/o CABG x 2 (LIMA-LAD, SVG-OM) and MVR in 2010, HTN, hyperlipidemia
- Catheterization in 2013 OK, negative MPS
- Repeat cath 10/2014, patent grafts, normal LVEF, no MR/MS
- Patient now presents with AAA = 5.7 cm for evaluation



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Patient #2

- A. should we proceed with cardiac catheterization?
- B. should we repeat stress testing?
- C. what about proceeding directly to surgery?
- D. maybe we need more information?



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Patient #2

- a. should we proceed with cardiac catheterization?
- b. should we repeat stress testing?
- c. what about proceeding directly to surgery?
- d. maybe we need more information?



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Patient #2

- our patient is asymptomatic
- he has good exercise capacity
- physical exam unremarkable except for pulsatile abdominal mass
- pre-op labs unremarkable except Cr = 1.8 mg/dl
- ECG: NSR with LVH and non-specific ST-T changes

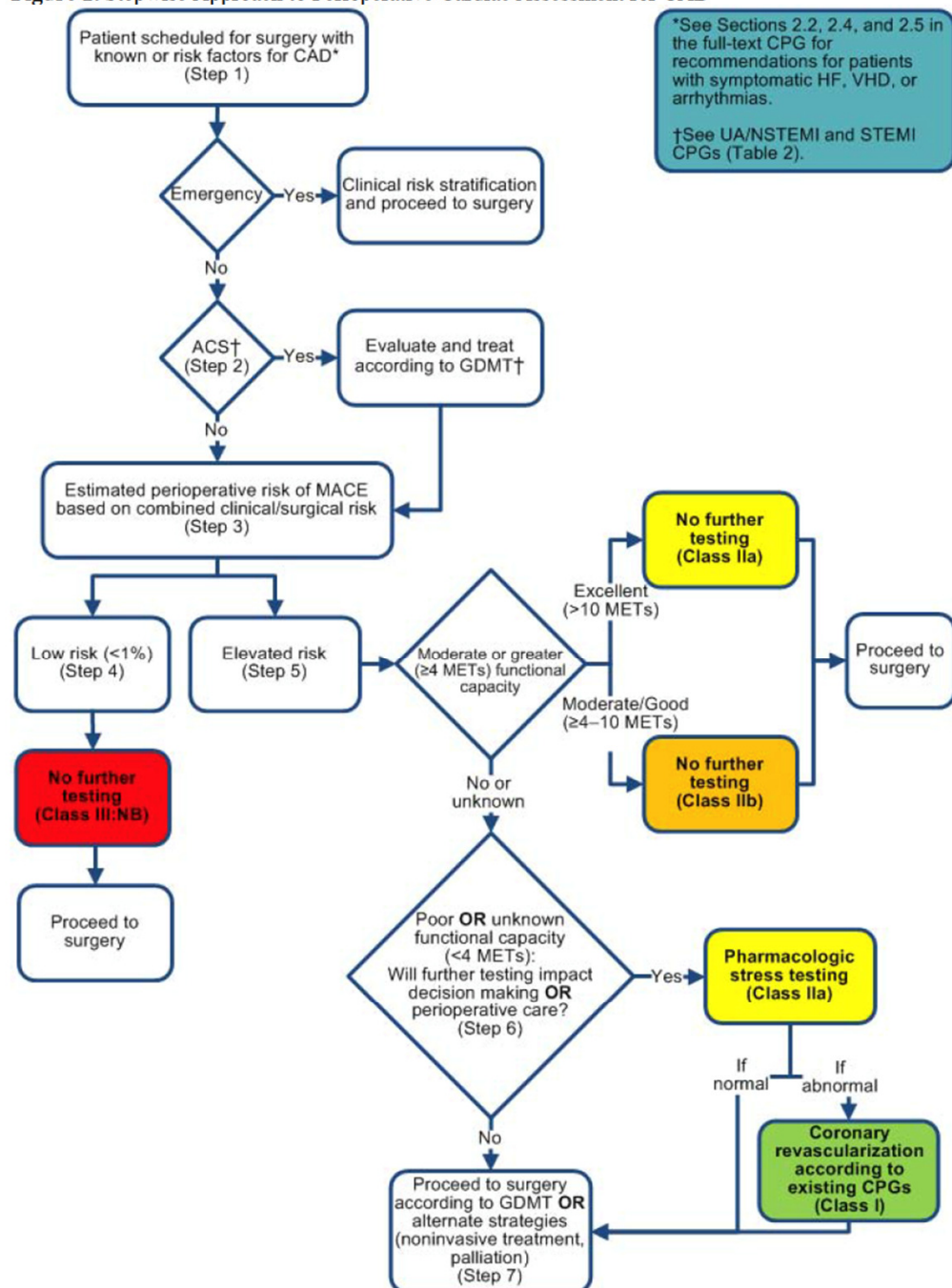
What is his surgical risk?

- RCRI – risk factors
 - high risk surgery- peritoneal, thoracic, pelvic, vascular
 - ischemic heart disease- history or findings
 - heart failure- history or findings
 - CVA/TIA
 - insulin requiring diabetes
 - creatinine ≥ 2
- RCRI = 4 (elevated risk)
- no clinical symptoms
- good functional capacity
- but high risk surgery



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Figure 1. Stepwise Approach to Perioperative Cardiac Assessment for CAD



Colors correspond to the Classes of Recommendations in Table 1.

Stepwise Approach to Perioperative Cardiac Assessment for CAD

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When to Perform Diagnostic Testing?

- should add to the risk assessment provided by the RCRI
 - consider if same recommendation without planned surgery
- beware of testing that delays planned therapy
- avoid testing that leads to additional procedures
- testing should be performed to lower risk



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Supplemental Preoperative Evaluation

The 12-Lead ECG

Recommendations	COR	LOE
Preoperative resting 12-lead ECG is reasonable for patients with known coronary heart disease, significant arrhythmia, peripheral arterial disease, cerebrovascular disease, or other significant structural heart disease, except for those undergoing low-risk.	IIa	B
Preoperative resting 12-lead ECG may be considered for asymptomatic patients without known coronary heart disease, except for those undergoing low-risk surgery.	IIb	B
Routine preoperative resting 12-lead ECG is not useful for asymptomatic patients undergoing low-risk surgical procedures.	III: No Benefit	B

Preoperative Thallium Study Performance

	N	PPV	NPV
Boucher '85	48	19%	100%
Cutler '87	116	20%	100%
Fletcher '88	67	20%	100%
Sachs '88	46	14%	100%
Eagle '89	200	16%	98%
McEnroe '90	95	9%	96%
Younis '90	111	15%	100%
Mangano '91	60	5%	95%
Strawn '91	68	6%	100%
Watters '91	26	20%	100%
Hendel '92	327	14	99%
Lette '92	355	17%	99%
Madsen '92	65	11%	100%
Brown '93	231	13%	99%
Kresowik '93	170	4%	98%
Baron '94	457	4%	96%
Bry '94	237	11%	100%
Koutelou '95	106	6%	100%
Marshall '95	117	16%	97%
Van Damme '97	142	N/A	N/A
Huang '98	106	13%	100%
Cohen '03	153	4%	100%
TOTAL	3303	12%	99%

Supplemental Preoperative Evaluation

Exercise Stress Testing for Myocardial Ischemia and Functional Capacity

Recommendations	COR	LOE
For patients with elevated risk and excellent (>10 METs) functional capacity, it is reasonable to forgo further exercise testing with cardiac imaging and proceed to surgery.	IIa	B
For patients with elevated risk and unknown functional capacity, it may be reasonable to perform exercise testing to assess for functional capacity if it will change management.	IIb	B
For patients with elevated risk and moderate to good (≥4 METs to 10 METs) functional capacity, it may be reasonable to forgo further exercise testing with cardiac imaging and proceed to surgery.	IIb	B

Supplemental Preoperative Evaluation

Exercise Stress Testing for Myocardia Ischemia and Functional Capacity (cont'd)

Recommendations	COR	LOE
For patients with elevated risk and poor (<4 METs) or unknown functional capacity, it may be reasonable to perform exercise testing with cardiac imaging to assess for myocardial ischemia if it will change management.	IIb	C
Routine screening with noninvasive stress testing is not useful for patients at low risk for noncardiac surgery.	III: No Benefit	B

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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.

- 5859 pt screened and 510 randomized; 49% with RCRI ≥ 2 ;
- Stable CAD; all cath'd; AS, LM and EF <20 excluded
- EF $54-55 \pm 12\%$, majority with 1 or 2 vessel disease
- Randomized to OMT v. OMT+ revascularization
59%PCI/41%CABG
- No mortality difference within 30d or 2.7 years




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CLINICAL RESEARCH

Clinical Trials

A Clinical Randomized Trial to Evaluate the Safety of a Noninvasive Approach in High-Risk Patients Undergoing Major Vascular Surgery

The DECREASE-V Pilot Study

 Don [redacted] MD,* Olaf Schouten, MD,† Radosav Vidakovic, MD,‡ Jeroen J. Bax, MD,§
Iain K. Thomson, MD,|| Sanne E. Hoeks, MSc,‡ Harm H. H. Feringa, MD,‡
Martin Dunkelgrün, MD,† Peter de Jaegere, MD,‡ Alexander Maat, MD,¶
Marc R. H. M. van Sambeek, MD,† Miklos D. Kertai, MD,* Eric Boersma, PhD,‡
for the DECREASE Study Group

Rotterdam and Leiden, the Netherlands; and Winnipeg, Canada

Feasibility study of prophylactic revascularization
in patients with extensive stress induced ischemia.

≥3 factors (age>70, IHD, CHF, IDDM, CRF, CVA/TIA)

DSE (88) or Dob-MPS (13) with ≥5 ischemic segments or ≥3 ischemic walls

All patients received β blockers

2 vessel disease 24%, 3 vessel disease 67%, LM disease 8%

PCI 32 pt (30 DES) and 14 CABG



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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§

Castelvolturmo, Naples, and Perugia, Italy

208 pts (672) with RCRI ≥ 2 for major vascular surgery
103 “selective”, 47 abnormal stress tests, 46 with significant CAD
42 underwent revascularization

105 “systematic”, 65 with significant CAD
61 underwent revascularization

In-hospital MACE showed no significant difference
58+/- 17 months, survival ($p=0.01$) and freedom from death/CV events ($p=0.003$)
improved in the systematic group.



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Supplemental Preoperative Evaluation

Preoperative Coronary Angiography

Recommendation	COR	LOE
Routine preoperative coronary angiography is not recommended.	III: No Benefit	C

Perioperative Therapy

Coronary Revascularization Prior to Noncardiac Surgery

Recommendations	COR	LOE
Revascularization before noncardiac surgery is recommended in circumstances in which revascularization is indicated according to existing CPGs.	I	C
It is not recommended that routine coronary revascularization be performed before noncardiac surgery exclusively to reduce perioperative cardiac events.	III: No Benefit	B

What About Our Patient?

- Cardiac catheterization performed prior to AAA repair
- LAD and circumflex disease but patent grafts, no MR and good LV function
- Post-cath had episode of hypotension, tachycardia and decreased H/H; required PRBCs x 2
- Retroperitoneal hemorrhage by CT scan
- AAA surgery delayed



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Patient #3

- 66 yo female with abdominal pain, fever
 - DM2, htn
 - prior MI with LAD stent (drug-eluting) 1 year ago
 - EF = 30-35% (6 months ago)
- planned abdominal surgery for diverticulitis
- we are asked to “clear” her for surgery



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Patient #3

- Class 1 NYHA symptoms – active until this week
- Meds
 - aspirin 81 mg daily
 - carvedilol 12.5 mg BID
 - lisinopril 5 mg daily
 - atorvastatin 40 mg daily
 - prolosec 20 mg daily
 - clopidogrel 75 mg daily



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Patient #3

- SH
 - ½ ppd smoker
 - occasional beer and wine
- PE
 - BP = 118/72 P-82 T-98.8
 - Lungs: clear
 - CV: normal S1, S2, 2/6 early ejection murmur
 - Abd: tense, decreased BS, tender to palp
- ECG: SR, normal axis, with q-waves V1-V3



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Patient #3 – How should we handle carvedilol?

- a. discontinue carvedilol
- b. increase the dose of carvedilol
- c. decrease the dose of carvedilol
- d. continue carvedilol at current dose



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Patient #3 – How should we handle carvedilol?

- a. discontinue carvedilol
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- d. continue carvedilol at current dose



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Perioperative Therapy

Perioperative Beta-Blocker Therapy

Recommendations	COR	LOE
Beta blockers should be continued in patients undergoing surgery who have been on beta blockers chronically.	I	B ^{SR}
It is reasonable for the management of beta blockers after surgery to be guided by clinical circumstances, independent of when the agent was started.	IIa	B ^{SR}
In patients with intermediate- or high-risk myocardial ischemia noted in preoperative risk stratification tests, it may be reasonable to begin perioperative beta blockers.	IIb	C ^{SR}
In patients with 3 or more RCRI risk factors (e.g., diabetes mellitus, HF, CAD, renal insufficiency, cerebrovascular accident), it may be reasonable to begin beta blockers before surgery.	IIb	B ^{SR}

These recommendations have been designated with a SR to emphasize the rigor of support from the ERC's systematic review. See the ERC systematic review report, "Perioperative beta blockade in noncardiac surgery: a systematic review for the 2014 ACC/AHA guideline on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery" for the complete evidence review on perioperative beta-blocker therapy.

Perioperative Therapy

Perioperative Beta-Blocker Therapy (cont'd)

Recommendations	COR	LOE
In patients with a compelling long-term indication for beta-blocker therapy but no other RCRI risk factors, initiating beta blockers in the perioperative setting as an approach to reduce perioperative risk is of uncertain benefit.	IIb	BSR
In patients in whom beta-blocker therapy is initiated, it may be reasonable to begin perioperative beta blockers long enough in advance to assess safety and tolerability, preferably more than 1 day before surgery.	IIb	BSR
Beta-blocker therapy should not be started on the day of surgery.	III: Harm	BSR

These recommendations have been designated with a SR to emphasize the rigor of support from the ERC's systematic review. See the ERC systematic review report, "Perioperative beta blockade in noncardiac surgery: a systematic review for the 2014 ACC/AHA guideline on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery" for the complete evidence review on perioperative beta-blocker therapy.

Patient #3 – How should we handle clopidogrel?

- a. increase clopidogrel to 150 mg daily
- b. discontinue clopidogrel
- c. continue current dose of clopidogrel
- d. decrease the dose of clopidogrel



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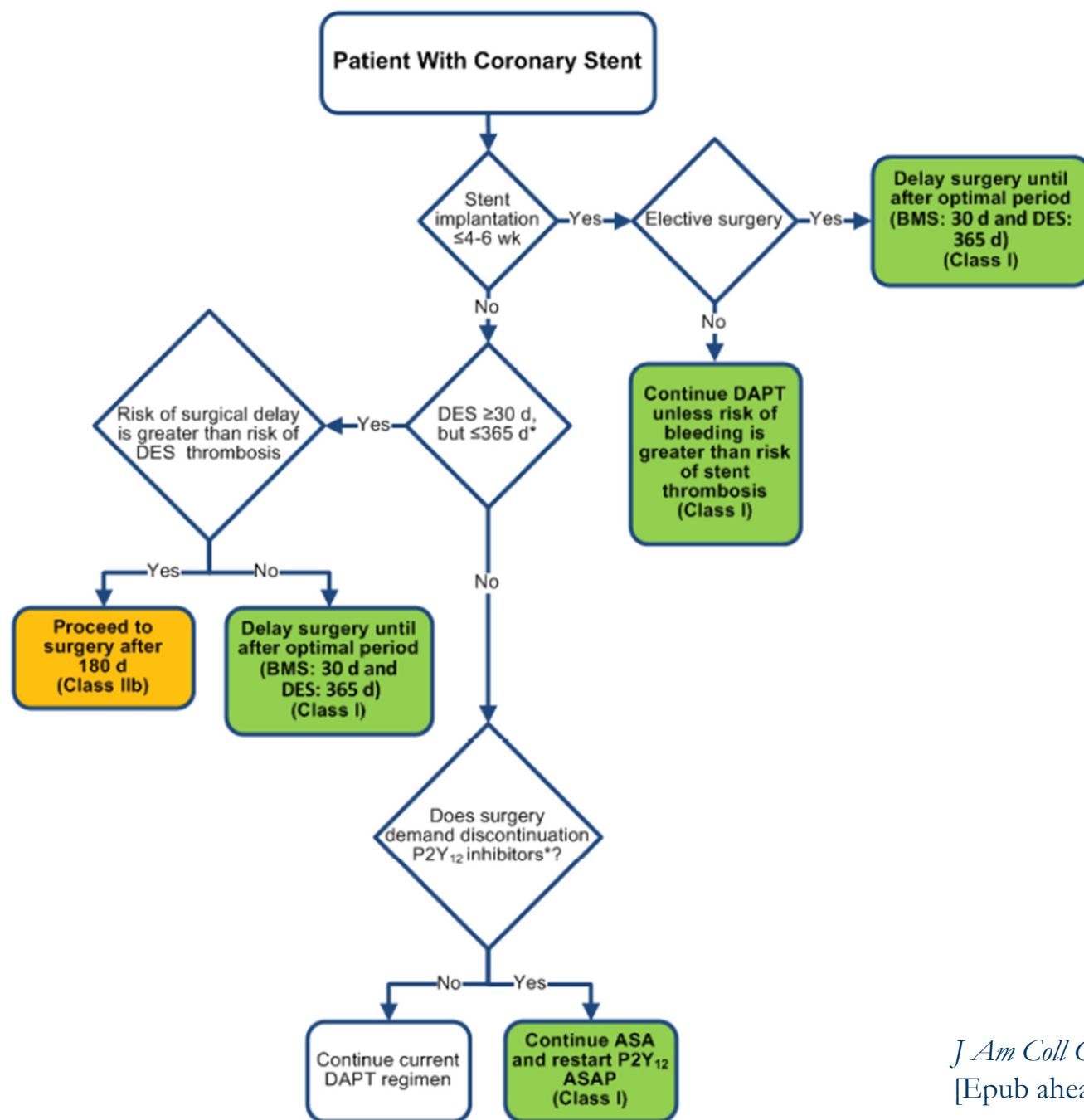
Patient #3 – How should we handle clopidogrel?

- a. increase clopidogrel to 150 mg daily
- b. **discontinue clopidogrel**
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Figure 2. Proposed Algorithm for Antiplatelet Management in Patients With PCI and Noncardiac Surgery



Perioperative Therapy

Antiplatelet Agents

Recommendations	COR	LOE
In patients undergoing urgent noncardiac surgery during the first 4 to 6 weeks after BMS or DES implantation, DAPT should be continued unless the relative risk of bleeding outweighs the benefit of the prevention of stent thrombosis.	I	C
In patients who have received coronary stents and must undergo surgical procedures that mandate the discontinuation of P2Y ₁₂ platelet receptor–inhibitor therapy, it is recommended that aspirin be continued if possible and the P2Y ₁₂ platelet receptor–inhibitor be restarted as soon as possible after surgery.	I	C
Management of the perioperative antiplatelet therapy should be determined by a consensus of the surgeon, anesthesiologist, cardiologist, and patient, who should weigh the relative risk of bleeding versus prevention of stent thrombosis.	I	C

Perioperative Therapy

Timing of Elective Noncardiac Surgery in Patients With Previous PCI

Recommendations	COR	LOE
Elective noncardiac surgery should be delayed 14 days after balloon angioplasty...	I	C
...and 30 days after BMS implantation	I	B
Elective noncardiac surgery should optimally be delayed 365 days after DES implantation.	I	B
In patients in whom noncardiac surgery is required, a consensus decision among treating clinicians as to the relative risks of surgery and discontinuation or continuation of antiplatelet therapy can be useful.	IIa	C

Perioperative Therapy

Timing of Elective Noncardiac Surgery in Patients With Previous PCI (cont'd)

Recommendations	COR	LOE
Elective noncardiac surgery after DES implantation may be considered after 180 days if the risk of further delay is greater than the expected risks of ischemia and stent thrombosis.	IIb*	B
Elective noncardiac surgery should not be performed within 30 days after BMS implantation or within 12 months after DES implantation in patients in whom DAPT will need to be discontinued perioperatively.	III: Harm	B
Elective noncardiac surgery should not be performed within 14 days of balloon angioplasty in patients in whom aspirin will need to be discontinued perioperatively.	III: Harm	C

*Because of new evidence, this is a new recommendation since the publication of the 2011 PCI CPG

Summary

- thoughtful consultation
- risk stratify, not “clear” patients for surgery
- use a collaborative ”team” approach to decision making
 - include the patient
- risk prediction tools are useful
- use additional testing cautiously
- manage anti-platelet therapy carefully
- careful use of beta blockade and rarely a reason to add



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