

Perioperative Management of the Cardiac Patient Undergoing Non-Cardiac Surgery  
Part 2 - May 11, 2009  
J. Lewis, MD

1. A 76 year old man needs elective surgery to reverse a colostomy. He had a drug-eluting coronary stent placed two months ago for a 95% LAD lesion and a cardiac pacemaker and defibrillator were implanted two years ago for complete heart block in the setting of CHF with a 30% ejection fraction. His medications are carvedilol, lisinopril, aspirin, clopidogrel, and spironolactone. What is the best set of management options?
  - a. Stop clopidogrel in 10 months and operate two weeks later, interrogate the pacemaker pre and post operatively, convert the pacemaker to asynchronous mode during surgery, and inactivate the ICD intraoperatively.
  - b. Stop the clopidogrel and aspirin now, operate in one to two weeks, and avoid the use of a cautery.
  - c. Stop the clopidogrel in six weeks, operate two weeks later, interrogate the pacemaker pre and postop and inactivate the ICD intraoperatively.
  - d. Because of the high risk associated with both the cardiac stent and the ICD perioperatively, recommend that the patient not undergo this elective surgery.
  
2. A 71 year old woman presents with rectal bleeding for several weeks along with increasingly frequent activity-related chest pain. She also has well-controlled type 2 diabetes mellitus and hypertension. Her hematocrit on admission is 23, and she receives two units of PRBCs with subsequent hematocrit of 31. EKG shows non-specific T-wave abnormalities. Colonoscopy identifies a large mass in the sigmoid colon which is biopsy-confirmed as adenocarcinoma. Cardiac catheterization reveals a 95% LAD lesion. What is the optimal approach to management?
  - a. Do not stent the cardiac lesion, continue aspirin, and send the patient promptly for colon resection.
  - b. Place a drug-eluting stent, and send the patient for colon resection on both aspirin and clopidogrel
  - c. Place a bare metal stent and send the patient for colon resection in 5-6 weeks on aspirin alone
  - d. Place the patient on a beta blocker and send her promptly for surgery.
  
3. What is the best recommendation on how to evaluate for intraoperative and postoperative myocardial infarction in intermediate/high risk patients with known or suspected CAD undergoing intermediate/high risk procedures?
  - a. Evaluate symptomatic patients only with an EKG and a troponin level
  - b. Obtain EKGs in the recovery room and daily X two.
  - c. Obtain EKGs in the recovery room and on the floor daily X two. Also check a troponin in the recovery room and again on the first postoperative day.
  - d. Place all such patients on a monitor for 24 hours to measure ST-T wave changes.
  
4. What is the medication of choice to reduce the incidence of atrial fibrillation in open heart and CABS procedures?
  - a. Beta blocker
  - b. Amiodarone
  - c. Hydrocortisone
  - d. Magnesium
  - e. Sotalol

5. A 72 year old man is referred for preoperative evaluation prior to surgery for an enlarging abdominal aortic aneurysm. His medical problems include diabetes mellitus, hypertension, stroke with minimal residua, osteoarthritis, and coronary artery disease with an MI six years ago. He is currently taking insulin, aspirin, simvastatin, acetaminophen, lisinopril, and metoprolol. His functional capacity is poor because of his arthritis. He denies chest pain. An EKG is unchanged. The last hemoglobin A1C done within one month is 6.2. What additional workup besides a routine CBC, CXR and BMP is needed to prepare this patient for surgery?
  - a. No additional evaluation is needed
  - b. Echocardiogram
  - c. Dipyridamole/sestamibi scan
  - d. Cardiac catheterization
  
6. A 55 year old man with stable angina, hyperlipidemia, and hypertension is referred for preoperative evaluation prior to a scheduled carotid endarterectomy. He had a TIA about one week ago with a tight right carotid stenosis found. His medications are atenolol, simvastatin, clonidine, hydrochlorothiazide, lisinopril, and aspirin. His blood pressure is controlled at 137/87. Which of his medications is safest to stop at surgery?
  - a. Atenolol
  - b. Simvastatin
  - c. Clonidine
  - d. Hydrochlorothiazide
  - e. Lisinopril
  - f. Aspirin

## Answer Sheet

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  - a. **Stop clopidogrel in 10 months and operate two weeks later, interrogate the pacemaker pre and post operatively, convert the pacemaker to asynchronous mode during surgery, and inactivate the ICD intraoperatively.**
  - b. Stop the clopidogrel and aspirin now, operate in one to two weeks, and avoid the use of a cautery.
  - c. Stop the clopidogrel in six weeks, operate two weeks later, interrogate the pacemaker pre and postop and inactivate the ICD intraoperatively.
  - d. Because of the high risk associated with both the cardiac stent and the ICD perioperatively, recommend that the patient not undergo this elective surgery.

Teaching Point: Drug-eluting stents should have double antiplatelet therapy continued if possible for a full 12 months. At that point it would be safe to stop the clopidogrel and undergo the surgery one week later on aspirin alone. Patients with pacemakers can be accidentally reprogrammed with an electrocautery. Contact the pacemaker representative who will interrogate the pacemaker pre and post op and convert the pacemaker to an asynchronous mode during surgery. Alternatively, if the patient is not pacemaker dependent, the pacemaker can simply be turned off. A cautery can set off the ICD. The ICD representative can temporarily suspend detection of tachyarrhythmia events by ICDs. Always have an external temporary pacemaker and defibrillator available. Avoid direct contact between the electrocautery system and the cardiac implantable devices. Use a bipolar cautery system or ultrasonic scalpel if possible.

2. A 71 year old woman presents with rectal bleeding for several weeks along with increasingly frequent activity-related chest pain. She also has well-controlled type 2 diabetes mellitus and hypertension. Her hematocrit on admission is 23, and she receives two units of PRBCs with subsequent hematocrit of 31. EKG shows non-specific T-wave abnormalities. Colonoscopy identifies a large mass in the sigmoid colon which is biopsy-confirmed as adenocarcinoma. Cardiac catheterization reveals a 95% LAD lesion. What is the optimal approach to management?
  - a. Do not stent the cardiac lesion, continue aspirin, and send the patient promptly for colon resection.
  - b. Place a drug-eluting stent, and send the patient for colon resection on both aspirin and clopidogrel
  - c. **Place a bare metal stent and send the patient for colon resection in 5-6 weeks on aspirin alone**
  - d. Place the patient on a beta blocker and send her promptly for surgery.

Teaching Point: This question will likely not appear on any board examination because the answer is controversial. However, using a bare metal stent is probably the best answer. This allows combined antiplatelet therapy for one month followed by aspirin alone for one week and then surgery. The drug-eluting stent despite its higher patency rate is clearly not the correct answer because surgery would not be feasible for over a year. While not incorrect to start a beta blocker and send the patient for surgery, there is no proof that the beta blocker would improve her operative prognosis. In fact, by POISE it might worsen her outcome.

3. What is the best recommendation on how to evaluate for intraoperative and postoperative myocardial infarction in intermediate/high risk patients with known or suspected CAD undergoing intermediate/high risk procedures?
  - a. Evaluate symptomatic patients only with an EKG and a troponin level
  - b. Obtain EKGs in the recovery room and daily X two.
  - c. **Obtain EKGs in the recovery room and on the floor daily X two. Also check a troponin in the recovery room and again on the first postoperative day.**
  - d. Place all such patients on a monitor for 24 hours to measure ST-T wave changes.

Teaching Point: The ACC/AHA 2007 guidelines are somewhat vague. However, in intermediate to high risk patients undergoing intermediate-high risk procedures, the obtaining of EKGs as noted is considered cost-effective. Also the use of cardiac specific troponin measurements seems warranted. Obviously symptomatic patients should receive the usual EKGs and troponins to exclude acute myocardial infarction.

4. What is the medication of choice to reduce the incidence of atrial fibrillation in open heart and CABS procedures?
  - a. **Beta blocker**
  - b. Amiodarone
  - c. Hydrocortisone
  - d. Magnesium
  - e. Sotalol

Teaching Point: Three drugs have been shown to reduce the incidence of atrial fibrillation following CABS. They are a beta blocker, amiodarone, and sotalol. The use of a beta blocker is the most cost effective. Atrial fibrillation occurs in up to 40% of CABS patients, and prophylactic use of one of the above medications can reduce this by 50-65%.

5. A 72 year old man is referred for preoperative evaluation prior to surgery for an enlarging abdominal aortic aneurysm. His medical problems include diabetes mellitus, hypertension, stroke with minimal residua, osteoarthritis, and coronary artery disease with an MI six years ago. He is currently taking insulin, aspirin, simvastatin, acetaminophen, lisinopril, and metoprolol. His functional capacity is poor because of his arthritis. He denies chest pain. An EKG is unchanged. The last hemoglobin A1C done within one month is 6.2. What additional workup besides a routine CBC, CXR and BMP is needed to prepare this patient for surgery?
  - a. No additional evaluation is needed
  - b. Echocardiogram
  - c. **Dipyridamole/sestamibi scan**
  - d. Cardiac catheterization

Teaching Point: This answer is controversial (some might choose a). However, the presence of three or more of the RCRI in the setting of vascular surgery indicates high risk. The dip/sesta scan if normal suggests low risk from CAD. However, a large area of ischemia would suggest that the patient might have a need for cardiac catheterization and CABS (or PCI) independent of his need for AAA surgery. Revascularizing this patient does not improve his CDV risk at surgery.

6. A 55 year old man with stable angina, hyperlipidemia, and hypertension is referred for preoperative evaluation prior to a scheduled carotid endarterectomy. He had a TIA about one week ago with a tight right carotid stenosis found. His medications are atenolol, simvastatin, clonidine, hydrochlorothiazide, lisinopril, and aspirin. His blood pressure is controlled at 137/87. Which of his medications is safest to stop at surgery?
- Atenolol
  - Simvastatin
  - Clonidine
  - Hydrochlorothiazide
  - Lisinopril**
  - Aspirin

Teaching Point: A Class I recommendation is to continue a beta blocker perioperatively. Statins appear to confer some CDV protection. Aspirin should reduce stroke and MI risk with minimal bleeding risk. Clonidine can be risky to suddenly discontinue perioperatively because of rebound and also MI risk reduction (though still debatable). ACC/AHA guidelines would support stopping ACE inhibitors in view of hypotensive effects though this is mentioned only in the body of the report. HCTZ could be stopped (and I prefer doing this), but there is no support for this in the ACC/AHA guideline.

References:

- Fleisher L et al. ACC/AHA 2007 guidelines on perioperative cardiovascular evaluation and care for noncardiac surgery. *Circulation* 2007; 116:e418-500.
- UpToDate 2009. Edition 17.1. Sections on causes of atrial fibrillation, estimation of cardiac risk prior to noncardiac surgery, and management of cardiac risk for noncardiac surgery.
- Devereaux P et al. Effects of extended release metoprolol succinate in patients undergoing non-cardiac surgery (POISE trial): a randomized controlled trial. *Lancet* 2008; 371: 1839-1847.