

Session: L001

Session: L085

A High Risk Patient for Low Risk Outpatient Surgery: Is There Value in a Surgical Home for a Patient Going Home?

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Stem Case and Key Questions Content

A 91 year old man presents to the preoperative evaluation clinic in preparation for a right inguinal hernia repair. The surgery is scheduled for 4 days from now.

When you meet the patient, you learn that his past medical history is significant for severe Chronic Obstructive Pulmonary Disease (COPD) (he wears supplemental oxygen at 2 liters per minute), aortic stenosis, atrial fibrillation, coronary artery disease status-post multiple cardiac stents, congestive heart failure, peripheral vascular disease, significant Gastroesophageal Reflux Disease (GERD), hypothyroidism, hypercholesterolemia, benign prostatic hypertrophy and an idiopathic seizure disorder. The patient hands you this medication list:

DAILY MEDICATION LIST

levalbuterol nebulizer 8 times daily

theophylline 200mg daily

tiotropium bromide 2 puffs daily

dabigatran 150mg twice daily

clopidogrel 75mg daily

cilostazol 100mg twice daily

aspirin 325mg daily

digoxin 125 mcg daily

amiodarone 200mg daily

diltiazem 240mg daily

losartan 25mg daily

furosemide 60mg daily

potassium 20mEq daily

levothyroxine 112 mcg daily

pantoprazole 40mg daily

sucralfate 1g three times daily

fluticasone spray as needed

azelastine spray as needed

phenytoin 100mg twice daily

finasteride 5mg daily

silodosin 4mg every evening

atorvastatin 40mg every evening

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On further questioning, the patient reports a 1/4 block exercise tolerance due to dyspnea with exertion as well as claudication in his lower extremities. You ask him how many pillows he sleeps on at night and he replies "a stack". He attributes this both to his orthopnea as well as the fact that when he is at <45 degrees upright, he experiences severe regurgitation that is not well controlled on the sucralfate and pantoprazole. The surgery will be performed by the Chairman of the Department of Surgery. According to his note, the hernia has never incarcerated. The patient reports that he approached this surgeon to perform the surgery because they have been long time neighbors. The patient desires a surgical repair of the hernia because it is causing him discomfort whenever he coughs (which is often). His Past Surgical History includes several prior cardiac catheterizations with placement of cardiac stents (1998, 2002 and 2012), and a laparoscopic cholecystectomy in 2003. His only known allergy is to pineapple. He does not currently smoke or drink alcohol. On physical exam, you note that he is 65 inches tall and weighs 117 pounds (Body Mass Index = 19.5) He is sitting with his hands on his thighs, hunched forward and coughing up creamy beige sputum throughout the exam. You notice clubbing of his fingertips. He is edentulous and his airway exam reveals a Mallampati class 2 airway, with good mouth opening and extremely limited neck extension. Auscultation of his heart and lungs reveals diffuse rhonchi and a systolic murmur. The patient's room air saturation is noted to be 88% and rises to 94% with supplemental oxygen. His heart rate is 77 beats per minute and irregular and his blood pressure is 122/78.

1. What preoperative tests will you require the patient to have in order to proceed with the surgery? Can you justify how the results of the tests will influence the patient's perioperative outcome?

He has had a complete blood count (CBC), basic metabolic profile (BMP), hepatic panel and thyroid stimulating hormone (TSH) level within the past month and all results are within normal limits. His electrocardiogram reveals atrial fibrillation. An echocardiogram report from 6 months ago revealed normal left ventricular ejection fraction, but the left ventricular filling pattern is consistent with impaired relaxation. There is severe aortic stenosis. The aortic valve area is 0.8 cm². There is no right atrial dilatation and the right ventricle is normal in size.

You contact the patient's pulmonologist from another nearby academic institution to discuss the extent of the patient's pulmonary disease. She offers to send you the results of his most recent pulmonary function testing, as well as a Chest X-Ray that was performed in the past month. His Pulmonary Function Tests (PFT) reveal severe expiratory airflow limitation with FVC: 1.43 (53% predicted), FEV1: 0.74L (36% predicted), FEV1/FVC: 52. Flows show no improvement with bronchodilator. Diffusing capacity severely reduced. The Chest X-Ray report includes the following line: "aspiration pneumonia remains a consideration". Along with the medical records, she sends a consultation letter stating that the "severity of the patient's pulmonary disease, poor pulmonary function and chronic productive cough put this patient at extremely high risk for pulmonary complications including respiratory failure and pneumonia". She writes that the patient is "too high a risk for anesthesia" and "will not clear him" for the proposed surgery.

2. Are you willing to go against the patient's pulmonologist's recommendations that the patient NOT undergo this surgery? What do you tell this patient?

You call the surgeon to discuss your assessment of this patient's perioperative risk and to

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devise a perioperative plan to see him through surgery and the recovery safely. He agrees to a meeting with you and the patient. The surgeon reassures the patient that this is a very simple procedure. He informs you that he performs this surgery under local anesthesia “all the time” and that he just wants you there to make sure that the patient “won’t cough” while he is operating.

3. How do you respond to the surgeon? Is this really the extent of your role in this patient’s care? Is there anything else that you would like to discuss with him?

You address the pulmonologist’s concerns with the patient and the surgeon. You also point out that the patient is unable to lie supine due to dyspnea, a chronic cough and regurgitation of gastric contents. The surgeon is not concerned by this, pointing out that the patient underwent a cardiac catheterization procedure as recently as 2 years ago and was able to tolerate lying supine. Furthermore, he is concerned that if the hernia is left untreated, it may eventually become incarcerated and strangulate requiring emergency surgery, which he feels would put the patient at even greater risk than undertaking an elective repair. The patient insists that he wants to proceed with the surgery as planned. The surgeon advises the patient to discontinue his dabigatran, clopidogrel, cilostazol and aspirin starting today.

4. The surgery is 4 days away. How do you feel about the surgeon’s recommendations for discontinuing anticoagulation and antiplatelet agents? Is there an indication for bridge therapy in this patient?

You contact the patient’s cardiologist to discuss the plan for perioperative management of his anticoagulation and antiplatelet therapy. The cardiologist is hesitant, and feels that the risk of thromboembolism in this patient is higher than the risk of catastrophic bleeding during a hernia repair. He advises the patient to remain on his current regimen perioperatively. He calls the patient and instructs him to continue all of his current medications.

Next you call your colleague who has been assigned to the case to give her a full report on the patient and to discuss the intraoperative anesthetic plan.

5. She requests that the surgery be postponed so that the patient will have discontinued clopidogrel, cilostazol and dabigatran for at least 7 days to adhere to current American Society of Regional Anesthesia guidelines, because she feels that neuraxial anesthesia should be an option. Who makes the final decision on perioperative anticoagulation and antiplatelet therapy?

6. Was this patient’s visit to the preoperative clinic warranted?

Model Discussion Content

The current reform of our national healthcare delivery system includes a movement toward cost-effective, coordinated care with an emphasis on comparative effectiveness research^{1,2}. With this paradigm shift comes tremendous opportunity for anesthesiologists. As Drs. Grocott and Pearse proclaimed in a 2012 editorial in the *British Journal of Anaesthesia*, “Perioperative medicine is the future of anaesthesia, if our specialty is to thrive”³. As leaders of the perioperative team, our goals are several-fold: risk stratification and medical optimization, facilitation of communication among all members of the interdisciplinary team (including the patient) and patient education.

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We are successful when we can demonstrate that our efforts have led to improvement in clinical outcomes, fostered shared decision making and decreased unnecessary resource utilization. Nowhere is the opportunity to shine as Perioperative Medicine physicians as great as in participation in the Perioperative Surgical Home (PSH). Although many current surgical home models are mainly structured to apply to planned inpatient surgery, we can make the case that in patients with a high burden of pre-existing comorbidities, a surgical home model will be of benefit even in an elective low risk outpatient surgery. In line with our goal to decrease unnecessary resource utilization is the nationwide "Choosing Wisely" campaign that is currently underway by the ABIM Foundation⁴. The American Society of Anesthesiologists (ASA) and the societies of other national medical specialties are collaborating to raise awareness among physicians and patients about overuse of health care resources in the United States. Two of the goals of the choosing wisely campaign are: to eliminate unnecessary baseline preoperative lab testing and to avoid obtaining baseline cardiac testing in asymptomatic patients with known cardiac disease who are undergoing low risk surgery. Furthermore, in 2012, the ASA published an update to The Practice Advisory for the Preanesthesia Evaluation⁵. In the document, the task force recommends that preoperative tests should not be ordered routinely; rather they should be performed on a selective basis for the purposes of guiding or optimizing perioperative management. The recommendations of the ASA taskforce are that a preoperative history and physical exam are the most important components of the preanesthesia evaluation and should guide any preoperative lab testing and workup. It is also important to note that it is not recommended to repeat test results that are present in the medical record within 6 months of surgery if the patient's medical history has not changed substantially. The taskforce also recognized that in older patients or those with multiple cardiac risk factors, electrocardiogram (ECG) abnormalities may be more frequent; therefore, age alone is no longer considered an indication for a preoperative electrocardiogram. According to the 2007 American College of Cardiology/American Heart Association publication on risk stratification for non-cardiac surgery, baseline ECG abnormalities are not linked to worse perioperative outcomes in patients undergoing low risk surgery^{6,7}. In the 50th Annual Roventine Lecture, entitled "Leading Into the Future", Dr. Patricia Kapur shared her vision for the specialty of Anesthesiology⁸. Recognizing the tremendous opportunity that we have as perioperative medicine physicians, she implored us to "maintain [our] disease-based medical and diagnostic skills . . . and be prepared to regularly update [our] mental map to work in new care models". We, anesthesiologists, are the specialists in perioperative medicine. Our colleagues in internal medicine and primary care are often less familiar than we are with the specifics of the surgery, anesthetic complications and systems issues that need to be taken into account. One study even found that preoperative consultations provided by physicians who are NOT specifically trained in perioperative medicine are associated with increased hospital stay and postoperative mortality⁹. It is important to consult with our colleagues in internal medicine, cardiology and other medical subspecialties when a specific question arises about the perioperative management of the patient; however, we must also keep in mind that we are not asking permission from the patient's medical doctors to proceed with surgery and anesthesia, but rather engaging them as partners in a model of shared decision making. Major surgical complications are defined by the American College of Surgeons National Surgical Quality Improvement Program (NSQIP)¹⁰ as the following:

- Mortality
- Pneumonia
- Unplanned Intubation
- Prolonged (>48 hours) mechanical ventilation
- Deep Venous Thrombosis
- Pulmonary Embolism
- Deep Wound Infection
- Organ-space infection
- Acute renal failure
- Myocardial infarction
- Stroke
- Urinary tract infection
- Septic Shock
- Postoperative bleeding requiring transfusion
- Vascular graft loss
- Fascial dehiscence

Our proposed patient in the above vignette has comorbidities such as severe chronic

obstructive pulmonary disease (COPD), atrial fibrillation, atherosclerotic heart disease, peripheral vascular disease, and congestive heart failure that predispose him to many of the major surgical complications on this list. By screening patients preoperatively for risk factors that predispose them to the surgical complications on this list, we can devise a patient-specific perioperative plan to avoid postoperative adverse events and treat patients who do sustain these complications in a timely and appropriate manner. Independent risk factors for the development of post-operative pulmonary complications (PPC) such as pneumonia, prolonged mechanical ventilation and unplanned intubation include^{11,12}:

- Preoperative room air SpO₂ in the supine position $\leq 90\%$
- A history of respiratory infection in the month before surgery, with fever and antibiotic treatment (applies to both upper and lower respiratory tract infections).
- Age: Patients age 60 years and older are at an increased risk, with the greatest increased risk occurring in patients ≥ 80 years of age.
- Preoperative anemia (hemoglobin concentration lower than 10 g/dl) raises the risk for PPCs almost 3-fold. However, there is no clear evidence that preoperative transfusion would reduce risk.
- Surgery-related risk factors include: anatomical site (upper abdomen or intrathoracic incisions), duration of surgery longer than 2 hours, and emergency surgery.

Therefore, a careful history and directed physical exam are the most important tools for evaluation and risk assessment for post-operative pulmonary complications. Although tests such as pulmonary function tests, Chest X-Ray and arterial blood gas may confirm clinical suspicions or qualify the severity of the pulmonary disease, they should be obtained only in selected patients where knowledge of the result of the test will change perioperative management. This is because pulmonary function testing and hypercarbia are not accurate predictors of post-operative pulmonary complications and only 2% of Chest X-Ray abnormalities discovered on preoperative examination led to a change in management in a systematic review. The goal of identifying patients at high risk of major surgical pulmonary complications is to enact preoperative, intraoperative and postoperative strategies to reduce this risk. Examples of preoperative strategies to reduce the risk of postoperative pulmonary complications include: smoking cessation 6-8 weeks prior to surgery, treatment of any respiratory infection or airway obstruction, patient education about proper use of inhalers and incentive spirometers, and a preoperative trial of chest physiotherapy (CPT) devices. Two examples of chest physiotherapy devices that we may consider in our proposed patient are an Acapella valve and a Vest Airway Clearance System¹³. An Acapella valve is a handheld device that helps with the clearance of mucus. The patient exhales against resistance and a flutter valve causes airway vibrations. After several exhalations the patient coughs to clear the secretions from the airway. The Vest Airway Clearance System is a vest that the patient wears. During the therapy, the vest inflates and deflates rapidly, applying light pressure to the chest wall. This device also works to loosen and clear mucus so that it can be coughed out. Either or both of these devices could be used by our patient both pre and post-operatively to improve his lung function and avoid serious pulmonary complications. Finally, scheduling the surgical procedure later in the day to allow the patient sufficient time to clear overnight accumulated secretions may also be helpful. With regard to patients who are on preoperative anticoagulation and antiplatelet therapy, we must balance the risk of catastrophic bleeding during surgery versus with the risk of NSQIP major surgical complications from venous thromboembolism (DVT, PE, MI and stroke) while off their standard regimen. The CHA₂DS₂ VASc score¹⁴ has been validated as a means to understand risk of stroke from atrial fibrillation. The CHA₂DS₂ VASc score includes:

- Age: $<65 = 0$ $65-74 = 1$ $\geq 75 = 2$
- Gender: Male = 0 Female = 1
- CHF: YES = 1 NO = 0
- HTN history: YES = 1 No = 0

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Stroke/Thromboembolism History: YES = 2 NO = 0 • Vascular disease: YES = 1 NO = 0 •
Diabetes: YES = 1 NO = 0

In order to make the best decision for the patient, we need to determine whether the planned surgery will require the patient to discontinue antithrombotic/antiplatelet therapy preoperatively. If so, we also need to determine whether bridge therapy is warranted to reduce the patient's risk of thromboembolism. For many patients who have been on long-term anticoagulation and will discontinue therapy for a brief period (≤ 5 days), they are able to safely discontinue their anticoagulation regimen preoperatively without the need for bridge therapy. However, in patients with a CHADS₂ score of ≥ 4 , bridge therapy would be recommended according to current guidelines^{15,16}. This is because the prevention of thromboembolism is valued over the potential for increased surgical bleeding. In the case of our proposed patient, the risk of surgical bleeding during a herniorrhaphy should be considered low, similar to dental extraction or superficial skin surgery, whereas his CHA₂DS₂ VASc score is 4. If he were on warfarin therapy, bridge therapy may be recommended in his case. However, recommendations for bridge therapy for patients on dabigatran and other direct thrombin inhibitors differ: although the guidelines are less well established, bridge therapy is not considered necessary in patients with normal renal function or mild renal impairment¹⁵. Finally, if neuraxial anesthesia is to be considered, it is important to keep in mind the following guidelines for the management of these agents: it is recommended that the patient discontinue clopidogrel for 7 days prior to neuraxial blockade.

Recommendations regarding dabigatran and cilostazol are less well defined, but we are advised to proceed with caution when performing a neuraxial block on a patient on these medications¹⁷. The value of various Surgical Home models is currently being analyzed using comparative effectiveness research¹. The four outcomes that the Institute of Medicine is using to compare traditional models of perioperative care to the Perioperative Surgical Home model are: enhanced patient-centered care of the surgical patient (such as reduced pain intensity), greater clinician adherence to evidence-based patient management guidelines (such as ASA standards, guidelines and practice parameters, American College of Cardiology/American Heart Association guidelines for preoperative cardiac risk assessment, and American College of Chest Physicians (ACCP) recommendations for prevention of thrombosis in patients for elective surgery), improved quality and safety of perioperative care (such as decreased rate of postoperative complications and reduction in readmission rates) and reduced overall cost. The real value in this patient's visit to the preoperative clinic lies in the ability to engage all members of the perioperative team (including the patient) in a discussion about concerns, risks and goals well in advance of the planned procedure. The aim of this discussion is to educate the patient and manage his expectations, and to advocate for a perioperative management plan that incorporates evidence-based recommendations, thus resulting in the best possible outcome for the patient.

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