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It's Just a Cataract: How a Simple Thing Can Go Bad

Michael Pilla, M.D.
Vanderbilt University School of Medicine, Nashville, TN

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Stem Case and Key Questions Content

A 64 year-old male presents to your ambulatory surgery center (ASC) for same day cataract surgery, scheduled as a cataract extraction and intraocular lens (IOL) placement secondary to senile cataracts, to be performed under monitored anesthesia care (MAC). His past medical history is significant for hypertension, diet controlled hyperglycemia, hypercholesterolemia, gout, cervical stenosis, and moderate gastroesophageal reflux disease (GERD). Past surgical history includes tonsillectomy and adenoidectomy at age 2, appendectomy at age 18, an anterior cervical discectomy and fusion of C5-7 at age 50, and a pacemaker insertion at age 58 for an "irregular heartbeat". He reports no known drug allergies. His medications include: lisinopril, 10 mg every day (QD), atorvastatin, 20 mg QD, furosemide, 40 mg QD, aspirin (ASA), 81 mg QD, tamsulosin, 0.4 mg QD, allopurinol, 100 mg QD, and ibuprofen, 800 mg as needed. He is a current smoker with a 60-pack year smoking history, and admits to having 1-2 drinks per night. His wife reports that he snores so loudly that she at times is forced to sleep in an adjoining room. Physical examination reveals a BP of 185/92, HR 87, RR 16. He has a body mass index (BMI) of 38. Airway examination reveals a Mallampati grade 3 view with adequate mouth opening, 4-finger breath thyromental distance, and reduced flexion/extension. The remainder of his physical examination is within normal limits.

He arrives at 7:00 AM, having driven from 150 miles away, with no prior preoperative evaluation and testing, and no other paperwork other than a hand-carried note written on a prescription pad from a cardiologist stating "cleared for surgery". He is scheduled for a first start at 7:30am. He has not taken any of his medications, and was told to stop his aspirin 10 days prior to surgery.

What other information, if any, do you require? Do you need any other labs? Do you need an EKG on this patient? Are you okay with the patient having stopped his medications the morning of surgery?

You inquire as to the type of pacemaker device the patient has implanted, and the patient produces a card from his wallet that lists only the manufacturer, model number, date of implantation, and physician who placed the device. When you ask why the device was implanted, the patient replies, "Because my physician told me to get it".

Why does it matter what type of device is implanted? Will your plan change if it is a pacer

only, implantable cardiac defibrillator (ICD) only, or pacer/ICD? How so? How would you manage these devices in your ambulatory surgery center (ASC)?

The surgeon arrives and after discussion with the patient, asks that the procedure be done under retrobulbar and peribulbar blocks with sedation.

How do you respond? What is the difference between retrobulbar and peribulbar blocks? What are the risks of these blocks? How do these blocks differ from a parabulbar block? Which block is safest? Is there any information that you need to provide to the surgeon that could impact the surgery itself?

You proceed with the anesthesia as planned. The patient is given midazolam, 1 mg IV and propofol, 50 mg IV. Following loss of lid reflex, the surgeon places a combination of retrobulbar and peribulbar blocks, which the patient tolerates well. The surgery proceeds without problem. After approximately 25 minutes, the surgeon announces that this is the most complicated cataract she has ever seen, it is difficult to remove and will likely take another 30 minutes or so. During this time, the patient begins to complain about back pain and you administer fentanyl, 50 ug IV. The patient gets comfortable and the surgery continues. The pulse oximeter has been working erratically and the SpO2 has been reporting values in the 50-70% range intermittently. The fourth time it drops to 55% you readjust the probe and cover the patient's hand with a warm towel. Five minutes later, the patient develops sinus bradycardia with a HR of 40. The surgeon asks if everything is all right.

How do you respond? What do you think is going on? What will you do now?

The surgery is completed and the patient is taken to the post anesthesia care unit (PACU). In the PACU, you look at the monitor and notice EKG changes including an ST segment elevation most prominent in lead II. You order a 12 lead EKG, and the tracing is consistent with the diagnosis of an acute inferior wall myocardial infarction (MI). The patient is transferred by ambulance to your local hospital and admitted to the cardiac care unit (CCU). The patient is taken to the cath lab, and a drug-eluting stent is placed in the patient's right coronary artery. Post-procedure, the patient is taken from the recovery area to the floor for overnight observation. You are on call and are asked for your advice as how to deal with the patient's inability to maintain his oxygen saturation while supine at night.

How do you respond? Why do you think the patient is having difficulty maintaining his SpO2? What is the STOP-Bang questionnaire? What is this patient's STOP-Bang score likely to be?

The patient is discharged home the following day. Two days later while you are on call, the ophthalmologist contacts you and says she needs to perform an emergent shunt on this same patient as he has developed postsurgical glaucoma with intraocular pressures of 55 mmHg. She states she needs general anesthesia for this 90-minute procedure, and is concerned about the patient's level of anticoagulation. The patient is currently on clopidogrel in addition to his ASA, and the surgeon requests reversal of the anticoagulation with vitamin K and fresh frozen plasma.

How do you respond? What can be done for this patient given these circumstances? How will you provide anesthesia to this patient?

Six months later, the patient contacts you via his orthopedic surgeon as he is scheduled for a knee arthroscopy and since you provided such excellent anesthesia care in the past, would like you to perform his anesthetic. The patient has been doing well and has had no further complications.

How do you respond? If the patient presented for surgery at this time and stated he had been off of his ASA and clopidogrel for 10 days, how would you respond?

Model Discussion Content

Preoperative evaluation is an essential component of the anesthetic plan. Often, and especially in ambulatory facilities, patients may not be seen until the morning of the planned surgery. Though various strategies are utilized by differing practices to deal with complex patients presenting for same day surgery, all practitioners are faced with exceedingly complicated patients presenting for surgery with limited or readily available medical history. Current guidelines and practice parameters must be utilized to ensure evidence based decision-making and avoiding unnecessary cancellations and needless expenditures.

Though visits to preoperative clinics are viewed by physicians and patients as important in reducing fears and improving perceived satisfaction with anesthesia care respectively[1], many practices choose for both cost effectiveness and time efficiency to see patients immediately prior to surgery. Additionally, some groups choose to “prescreen” applicants utilizing questionnaires or phone calls in advance of the day of surgery to decide which patients may need additional workups or evaluations in person. Adequate preoperative information has been correlated with patients reporting adequate pain management[2].

The utilization of expensive preoperative studies or labs has come under fire from all insurers, and the Center for Medicare and Medicaid Services (CMS) will no longer pay for routine preoperative testing. In 2007, Fleisher et al updated the American College of Cardiology and the American Heart Association (AHA/ACC) joint guidelines to help identify risk factors and plan risk assessment for patients undergoing noncardiac surgery[3]. Routine preoperative EKGs are no longer indicated except in specific disease states, and abnormalities in EKGs should not guide decisions on further non-invasive testing[3]. In fact, some researchers believe that few if any preoperative tests yield any benefit in otherwise healthy patients undergoing low or medium risk surgery in the outpatient setting, even suggesting the elimination of preoperative testing in ambulatory patients[4].

Although there is some controversy as to whether angiotensin converting enzyme (ACE) inhibitors and angiotensin receptor blockers (ARBs) should be discontinued prior to surgery, most antihypertensive agents should be continued up until the time of surgery[5]. Though aspirin

and non steroidal anti-inflammatory drug (NSAID) therapy is generally discontinued prior to surgery, discontinuation of aspirin therapy in patients with indwelling coronary stents, significant peripheral vascular disease, or with increased risk of MI or stroke may be contraindicated as there is increasing evidence that continuation of aspirin therapy may be warranted unless bleeding risks outweigh benefits[6, 7]. Additionally, statins should be continued as abrupt discontinuation of statin therapy has been associated with increased risk[8].

While many practitioners believe that placing a magnet over a pacemaker or implantable cardiac defibrillator is an appropriate treatment to handle the device intraoperatively, this practice may be both unwarranted and/or unsafe in a variety of circumstances. In 2011, the American Society of Anesthesiologists, in collaboration with the American Heart Association and the Society of Thoracic Surgeons developed a consensus statement on the perioperative management of these devices[9]. As device types and responsiveness to electrical interference vary among these devices, essential information must be gathered prior to accepting these patients for surgery in an ASC. Although the type of device (pacer only vs. ICD/pacer combo) may be determined from patient history (if known) or the product card (if available), the most complete method of evaluation is through direct interrogation at the time of surgery. For most ASCs this is impractical and not available. Some centers have support personnel provided by device manufacturers who can assist in determining the type and responsiveness of these devices, though preoperative timing may not permit adequate advance notice to take advantage of this service if available. A simple method for differentiating pacer only vs. ICD is to examine the size of the device either on a radiograph (if available) or by direct palpation, as an ICD is significantly larger than a pacer-only device.

If a pacer or ICD cannot be reprogrammed or turned off immediately prior to surgery, first determine the site of the surgery. For all surgeries below the umbilicus, no reprogramming may be necessary. Additionally, if electrosurgical units (ESUs) are not utilized for the procedure, or only bipolar cautery is used, there is no need to reprogram or deactivate the device since there is essentially no risk of electrical interference being sensed by the device and mistakenly interpreted as an arrhythmia. In general, most pacer-only devices reset to a VOO mode with the placement of a magnet, and return to previous programming once the magnet is removed. The placement of a magnet over an ICD will deactivate the arrhythmia-detection function of the device, and will reactivate once the magnet is removed. However, if an ICD also contains a pacemaker, the placement of a magnet will only effect the ICD portion of the device and have no effect on the pacer function. Figure 1 below shows a simple algorithm to follow for management of these devices in the perioperative period.

Regional anesthesia for eye surgery is still a common practice in some surgical arenas, though a majority of cataract surgery is now done under topical anesthesia with MAC for sedation as needed. Despite this, many ophthalmologists in various areas still choose to provide regional anesthesia for cataract and other ocular surgery as needed, due to prior convention and surgeon preference or patient need. Based on this practice variety, anesthesiologists should be familiar with ocular and non-ocular regional anesthetic indications and risks.

Retrobulbar anesthesia is the injection of local anesthesia into the retrobulbar space behind the eye. In addition to providing sensory block of the conjunctiva, cornea, and uvea, it provides motor blockade of the extraocular muscles. Also, this block affects vision, as cranial nerve (CN) II is blocked as well. Following adequate sedation, a small gauge needle is passed along the inferiolateral border of the bony orbit until it passes the globe, and then directed cephalad until a "pop" is felt as it enters the retrobulbar space. Following aspiration, several mls of local anesthetic are injected. In addition to local anesthetic toxicity, complications include globe perforation, optic nerve damage, blindness, hematoma formation, injection of local anesthesia into the cerebrospinal fluid (CSF) and brainstem, and oculocardiac reflex stimulation.

Peribulbar block consists of two injections of local anesthetic, one above and one below the orbit, injected directly around the globe in the extraconal space. Adequate anesthesia is provided to the surface of the eye for cataract surgery and vision is temporarily compromised as CN II is again blocked, though this block may not provide as dense and complete a block as the retrobulbar block. Though several of the risks associated with retrobulbar block are not found with peribulbar anesthesia, risks do include hematoma and ecchymoses formation, and unwanted spread of local anesthetic resulting in contralateral eye blockade.

A parabulbar block (or sub-Tenon's block) has been suggested as more safe but relatively underutilized block for some ophthalmic surgery[10]. Though this block has fewer complications associated with it, it is usually performed by retina and glaucoma surgeons exclusively due to the need to separate the conjunctiva and place a small catheter to instill local anesthetic under the Tenon's capsule.

The patient is on tamsulosin, an α-1a adrenergic receptor antagonist specific for prostate receptors, to help improve urinary flow in benign prostatic hypertrophy. The intraoperative floppy iris syndrome, first described in 2005[11], is strongly associated with the use of the α-1a adrenergic receptor blocker tamsulosin and leads to potential surgical complications if appropriate precautions are not undertaken when beginning cataract surgery[12].

Bradycardia during ocular surgery under retrobulbar and peribulbar blocks may have several causative factors, and the concomitant drop in the SpO_2 demands immediate attention.
The oculocardic reflex is an arc consisting of afferent input from the ophthalmic division of the trigeminal nerve and efferent output of the parasympathetic system via the vagus nerve. This reflex can be brought on via traction of the extraocular muscles or through initial injection of local anesthetic during placement of a retrobulbar or peribulbar block. It is uncommon that this reflex is elicited via traction of the extraocular muscles after they have been adequately anesthetized by local anesthetic infiltration. Other potential diagnoses of bradycardia include primary cardiac pathology such as acute myocardial infarction, or may be the result of acidosis secondary to hypoxia and hypercarbia from hypoventilation syndrome.

As in all similar cases, a visit to the patient's bedside for careful evaluation is warranted. Differential diagnosis of low O_2 saturations in this postoperative scenario could be secondary to

many factors, including residual anesthetics, narcotic/opioid administration and reduction in responsiveness to rising CO_2, hypoventilation/obstructive sleep apnea (OSA) syndrome and aspiration.

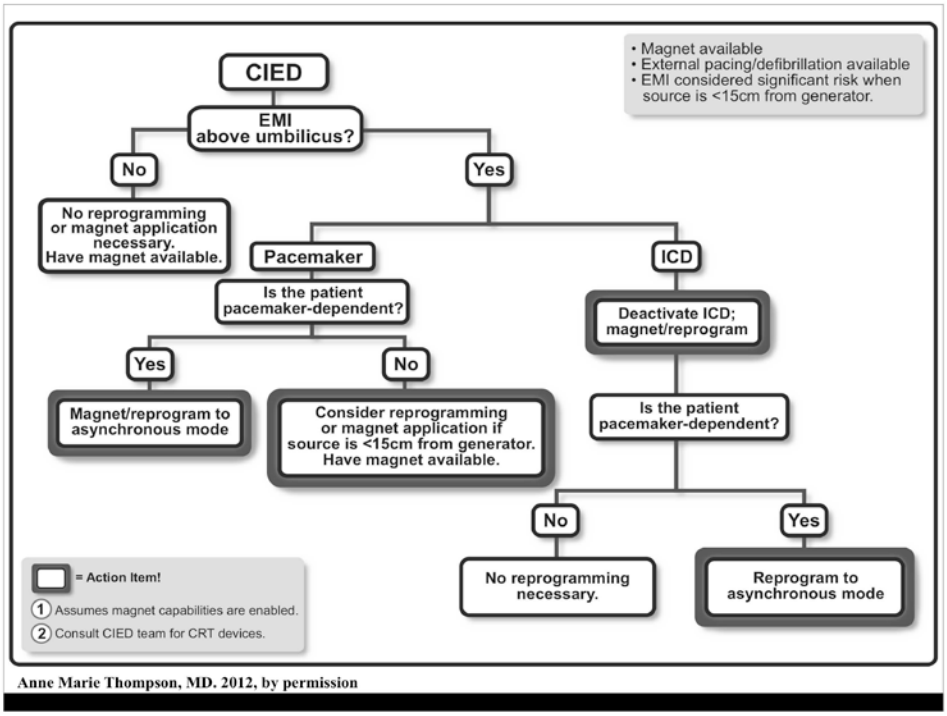
The STOP-Bang questionnaire[13] was developed by Chung et al as a tool to help easily screen for patients with obstructive sleep apnea (OSA) in the preoperative period. Using an eight-point scale, one point is given for each positive answer. Answering "yes" to three or more questions signifies a high risk of OSA, though many centers now use a score of five or more as indicative of a significantly positive test.

Based solely on the information presented for this patient in the history, this patient has a STOP-Bang score of 5 (snoring, high blood pressure, BMI>35kg/m^2, age >50, male), though additional history and other physical exam findings could yield results that may indicate a higher score (tired, observed to stop breathing during sleep, neck circumference>40cm). Even with a score of 5, this patient has a high probability of having OSA[14].

Some hospitals have developed screening tools to identify at-risk patients for OSA, or patients with known OSA, who could benefit from or may need continuous positive airway pressure (CPAP) or bilevel positive airway pressure (BiPAP) in the postoperative period and during their hospitalization. While there is no consensus to mandate continuous monitoring of these patients, many hospitals utilize continuous pulse oximetry and/or continuous respiratory monitoring of these patients during their hospitalization.

After placement of both bare metal stents (BMS) and drug eluting stents (DES), patients are routinely placed on dual antiplatelet therapy consisting of clopidogrel (or another thienopyridine) and aspirin. While standard surgical convention over many years has consisted of informing patients to discontinue all ASA containing medications and anticoagulants 10 days prior to any surgical intervention, these recommendations are now ill-informed and potentially life threatening to patients with indwelling coronary stents. Under current recommendations, dual antiplatelet therapy using ASA and clopidogrel should not be interrupted for at least one month for BMS patients and 12 months for patients in whom DES have been placed[15]. If emergent surgery is needed, it is recommended to continue current therapy if possible, and if not due to risk of bleeding in closed spaces, continue ASA therapy while discontinuing clopidogrel[16].

According to published guidelines by the American College of Cardiology, the American Heart Association, and the American Society of Anesthesiologists, all non-emergent/elective surgery should be delayed for a period of one month following BMS placement and for a period of one year following DES placement[15,16]. The risk of late stent thrombosis cannot be underappreciated in this population, especially in the setting of a surgical stress-induced hypercoagulable state. A common occurrence is the presentation of a patient on the day of surgery with either a BMS or DES in place who has stopped their antiplatelet agents due to surgeon direction or other. Though some practitioners may argue that the risk of re-thrombosis has already occurred, the contribution of a surgical stress-induced hypercoagulable event should be considered.



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