Evaluation of the Patient Before Ophthalmic Surgery

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Goals of preoperative evaluation: quantify risk to patient; optimize patient for surgery; reduce chance for delays on day of surgery (DOS)

Evaluation process: history and physical examination (H&P)

1. Use key elements of the history and physical examination (H&P) key to determining whether laboratory tests and electrocardiography (ECG) needed; unnecessary tests increase costs and may harm patient (eg, cause delay, require additional tests, increase morbidity and mortality secondarily, increase medicolegal liability from abnormal results); Schein study (2000) of ≈20,000 patients undergoing cataract surgery showed no difference in rate of intraoperative or perioperative complications in patients who had full routine preoperative testing, compared with those with testing only as directed by H&P; preoperative testing guidelines from Massachusetts Eye and Ear Infirmary (MEEI) dictate healthy patients of any age do not require routine testing (studies ordered based on H&P findings)

Cardiovascular overview: American College of Cardiology/American Heart Association 2007 Guidelines on Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery — ophthalmic surgery considered low risk (ie, risk for perioperative cardiac complications <1%; however, patients undergoing eye surgery frequently have cardiac comorbidities); cardiac contraindications to ophthalmic surgery include unstable angina, recent myocardial infarction (MI), decompensated congestive heart failure (CHF), significant arrhythmia, or severe valvular disease (valvular disease most concerning in patients undergoing general anesthesia [GA])

Hypertension (HTN): estimated to be present in ≈70% of patients >70 yr of age; defined as blood pressure (BP) >140/90 mm Hg; often elevated on DOS; data suggest no increase in cardiovascular risk with systolic blood pressure (SBP) <180 mm Hg and diastolic blood pressure (DBP) <110 mm Hg; study demonstrates no difference in outcome when patient hypertensive on DOS referred back to primary provider for optimization, vs treated with sublingual nifedipine and having surgery; patients hypertensive on DOS with previously well-controlled BPs treated with normal oral medications, sedation, additional antihypertensives, as indicated; β-blockers good choice if not contraindicated (eg, labetalol 10 mg intravenously [IV]; may also decrease risk for perioperative cardiac complications); patients treated

with IV antihypertensives should be observed 2 to 4 hr postoperatively due to risk for hypotension

CHF: patient should be optimized; level of brain natriuretic peptide >100 pg/mL indicative of decompensated CHF; optimized patients should continue medications on DOS; prolonged supine position can precipitate pulmonary edema (elevate head of bed pre- and postoperatively to minimize risk)

Heart murmurs: aortic flow murmur present in 25% of patients >65 yr of age; most not clinically significant; 2% have aortic stenosis (AS); moderate to severe AS increases risk associated with GA; proceed with monitored anesthesia care (MAC) for asymptomatic patients who can lie flat; if GA required, murmur must be characterized (traditionally, with echocardiography); clinical absence of radiation of aortic murmur to right carotid area rules out AS in 90% of cases; confirm AS with delayed carotid upstroke, decreased or absent second heart sound, and mid to late systolic murmur; clinical recommendations — in patients with asymptomatic systolic murmur requiring GA, no echocardiography needed if AS ruled out by examination and ECG normal; if patient symptomatic, has diastolic murmur, or AS not ruled out by examination, echocardiography necessary before proceeding

Cardiac stents: research suggests patients with recent stent placement at increased risk for stent thrombosis if acetylsalicylic acid (aspirin; ASA) or thienopyridine (eg, ticlopidine [Ticlid], clopidogrel [Plavix]) stopped perioperatively; antiplatelet drugs should not be stopped within 12 mo after insertion of drug eluting stent (4-6 wk for bare metal stent); in emergent cases, continue ASA, hold thienopyridine, restart when possible postoperatively, and consult cardiologist for recommendations

Antithrombotic drugs: cataract surgery — multiple retrospective studies reviewing ASA and warfarin (eg, Coumadin, Jantoven, Marevan) and small number assessing clopidogrel consistently show no increase in risk for serious bleeding (eg, retrobulbar hematoma, intraocular hemorrhage); many studies demonstrate increased risk for minor bleeding (of, eg, conjunctiva, eyelid); recommendation — continue ASA, clopidogrel, and warfarin in therapeutic doses in high-risk patients; at MEEI, International Normalized Ratio checked to verify therapeutic range when warfarin taken within 5 days preoperatively; vitrectomy surgery — mixed results seen in studies evaluating risk for bleeding associated with therapeutic warfarin; speaker recommends consulting internist and ophthalmologist about risks of stopping medications perioperatively; consider bridging therapy

Educational Objectives

The goals of this program are to improve preoperative evaluation of the ophthalmic surgery patient and anesthetic management during vitreoretinal surgery. After hearing and assimilating this program, the clinician will be better able to:

1. Use key elements of the history and physical examination to focus the preoperative evaluation.
2. Appropriately evaluate and treat abnormal findings on the day of surgery to avoid delays.
3. Differentiate between benign and clinically significant findings in the preoperative setting.
4. Appropriately counsel patients in preparation for vitreoretinal surgery.
5. Demonstrate proper management techniques in patients with an air or gas bubble.

Faculty Disclosure

In adherence to ACCME Standards of Commercial Support, Audio-Digest requires all faculty and members of the planning committee to disclose relevant financial relationships within the past 12 months that might create any personal conflicts of interest. Any identified conflicts were resolved to ensure that this educational activity promotes quality in health care and not a proprietary business or commercial interest. For this program, the following has been disclosed: Dr. Charles is a consultant for Alcon. Dr. Bayes and the planning committee reported nothing to disclose.
with low-molecular-weight heparin (dalteparin, enoxaparin [Lovenox], tinzaparin) in high-risk patients
Pacemakers and implantable cardioverter defibrillators (ICDs): frequently present in patients undergoing eye surgery; reliable; when interrogated, 5% of batteries found to be near end of life; MEEI guidelines require preoperative interrogation within 3 mo for ICDs and 6 mo for pacemakers; form submitted to patient’s cardiologist or electrophysiology laboratory (EPL) requesting details of device and estimate of battery life; alternatives include consulting in-house EPL or manufacturer representative, delaying case, or having trained individual interrogate device

Pulmonary complications: second most common cause of perioperative morbidity and mortality; risk factors include smoking, American Society of Anesthesiologists (ASA) class ≥3, age >70 yr, chronic obstructive pulmonary disease (COPD), intermediate-risk surgery, GA, dyspnea on exertion (DOE), and body mass index (BMI) >30; risks do not include asthma, abnormal pulmonary function tests (PFT), or abnormal chest radiograph; general management — optimize patients preoperatively; continue bronchodilators, steroids, and antibiotics currently prescribed; baseline O₂ saturation helpful; no PFTs or chest x-rays unless pneumonia suspected
Pulmonary HTN: less common, but risk more serious than with COPD; dramatically increases risks of GA; risk much lower with MAC; suspect pulmonary HTN with, eg, dyspnea out of proportion to underlying condition, severe DOE with minimal exertion, right heart failure; cardiac catheterization required for confirmation; management — discuss high risk of GA and explore whether MAC appropriate; involve pulmonologist, ophthalmologist, and patient; ensure patient optimized; continue medications perioperatively; have appropriate medications and precautions available (eg, nitric oxide [NO], inhaled prostaglandins, vasopressors, vasodilators, arterial line, central monitoring); maintain intraoperative pressures and fluid status close to baseline to avoid right heart failure

Diabetes management: tight control of blood glucose (BG) shows limited benefit; usual DOS goal BG >80 mg/dL and <200 mg/dL; MEEI protocol — oral medications held on DOS; half to full dose of long-acting insulin given night before, and half dose of long-acting insulin on morning of surgery; maintain BG ≤180 mg/dL with sliding scale of rapidly acting insulin; IV dextrose given on DOS if BG <250 mg/dL

Obstructive sleep apnea (OSA): perioperative risks — difficult mask ventilation and intubation; increased sensitivity to narcotics; increased risk for respiratory failure, admission to intensive care unit, and postoperative death; 80% to 90% of cases undiagnosed; “STOP” questions — snore, tired in daytime, witnessed obstructed airway, HTN (elevated pressure); if 2 of 4 questions answered affirmatively, sensitivity 75% for moderate to severe OSA

Neurologic concerns: consider GA in patients with history of claustrophobia, head tremor, or communication issues

Liver disease: if moderate to severe, 30-day mortality and morbidity increased with GA; evaluated by Childs-Turcotte-Pugh (CTP) scale or Model for End-Stage Liver Disease (MELD) score (calculators available online); CTP class B or MELD score ≥8 requires full preoperative evaluation with optimization before GA (GA contraindicated with CTP class C and MELD score >16)

Safety concerns: axial length of eye — always measure axial length of eye before retrolbulbar block; if >26 mm, avoid block or modify angle of approach; history of scleral buckle or myopia increase risk; gas bubbles — nitrous oxide (N₂O) increases size and causes transient increase in intraocular pressure (IOP; can result in blindness); avoid N₂O for 3 mo after gas bubble placed; consider hospital protocol using distribution of wristbands with precautions

Time out: call before starting block; includes, eg, checking patient’s name, correct eye, allergies; shown to decrease morbidity and mortality for many procedures

Information technology: consider use and development of web-based sources for rapidly accessing reference materials

Anesthesia Considerations in Vitreoretinal Surgery
Steve Charles, MD, Clinical Professor of Ophthalmology, University of Tennessee College of Medicine, Memphis

Introduction: presence of anesthesia provider recommended for all cases (although GA rarely used); many VR cases now performed in ambulatory surgery centers, with MAC greatly preferred over GA; operating times vary greatly
BP considerations: maintained to support perfusion pressure in retinal arteries; speaker uses infusion pressure of 45 mm Hg unless patient has known low systemic pressure (eg, child); normal infusion pressures 17 to 22 mm Hg; higher operative pressures allow for system resistance, prevent pupillary constriction, prevent capillary ooze, and inflate corneal dome (improves surgical view); eyes tolerate ≤90 min ischemia (however, important to minimize ischemic insult); risks for increased ischemia include retinal vascular disease, transient increases in intraocular pressure, and bleeding; speaker advises against induction of deep anesthesia to minimize patient movement (may result in decreased perfusion pressure, with increased ischemic risk)

Patient management during local MAC: patient should be awake during procedure; use of accessory muscles of respiration causes nodding of head (especially while asleep); sudden awakening dangerous (can cause large amplitude motion); with patient awake, surgeon able to explain process; speaker strongly advises against tapping patient’s head (can increase agitation and claustrophobia) and use of wrist rests by surgeons (limit arm motion, which increases risk if patient moves); awake patient able to move at surgeon’s command to facilitate access; careful patient preparation important, including need to avoid small movements of hands and feet during procedure

Local anesthetic techniques: topical anesthetic acceptable in limited cases using larger (20-g) instruments; finer (25-g) instruments required for blocks; retrobulbar blocks appropriate for all patients, even those taking anticoagulants or with highly myopic eyes (latter may require supplementation from nasal side or with cannula); subconjunctival cannula may cause chemosis (ie, ballooning of conjunctiva)

Sutureless transconjuctival microincision vitrectomy surgery (MIVS): since 2003, used in 75% of vitrectomies; uses smaller instruments and oblique wounds; involves displacement of conjunctiva (creates misalignment of holes in conjunctiva and sclera, thereby preventing vitreous wick and minimizing risk for infection); speaker considers vitreous buckle obsolete (incapable of fulfilling current patient expectations for cataract surgery)

Intracanal technique: eye in primary position; sharp 1.25-in 27-g needle produces less pain and sudden movement when septum of lower eyelid penetrated; 1.5-in needle too long; enter inferonasal corner of orbit, directly below lateral canthus; never reposition needle; assistant should support head and hold eyelid fully open during entire procedure; bisect line from optic nerve to orbital apex; direct firm pressure with palm to orbit immediately after needle removal (without moving palm or massaging) to reduce orbital bleeding; induce supplemental blocks as needed by injecting along medial orbital wall
Perforation during block: ophthalmologist should use indirect ophthalmoscope to assess retina immediately (before blood diffuses); overtreatment results in poor outcomes

Eyelid and facial blocks: rarely indicated; used only in patients with marked squeezing of eyelid
Operative pain: iris and ciliary body most painful; cryotherapy causes greatest pain (810-nm infrared laser second most painful); 532-nm green laser now most commonly used (does not penetrate into choroid, so less painful; uveal tract is source of pain); scleral depression — must be done gently; speaker prefers polished rounded-edge depressor over cotton-tipped applicator (protects conjunctiva)

Prophylaxis of pain: hyaluronidase — mixed results reported; racemic form minimizes systemic effects (however, cardiovascular effects minimal with low volume used); adjustment of pH — mixed results seen with addition of sodium bicarbonate to lidocaine; speaker does not use (has had negative experience with it)

Complications
Postoperative diplopia: possible causes — hyaluronidase and sodium bicarbonate implicated, but not proven; orbital compression; direct muscle injury; rare with vitrectomy (more common with buckle procedure)

Hypercapnia: patient reports difficulty breathing despite normal oxygen saturation; vacuum line placed under drape prevents rebreathing CO₂ and relieves symptoms

Air or gas bubble: discontinue N₂O at least 10 min before infusion of air or gas to prevent postoperative decrease in size and lowering of IOP; more critically, use of N₂O during GA when gas bubble present in eye can cause increase in bubble size; elevation of IOP causes central retinal artery occlusion and can result in blindness

Endophthalmitis: topical lidocaine used for shallow core vitrectomy, culture, and injection of intraocular antibiotic (eg, when patient has recently eaten)

Anticoagulation: never discontinue preoperatively (risk for bleeding overstated); increased morbidity and mortality from myocardial infarction, pulmonary embolus, deep venous thrombosis, and cerebral vascular accident seen when medications stopped

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Suggested Reading


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Estimated time to complete the educational process:

- Review Educational Objectives on page 1: 5 minutes
- Take pretest: 10 minutes
- Listen to audio program: 60 minutes
- Review written summary and suggested readings: 35 minutes
- Take posttest: 10 minutes
1. Which of the following statements about the preoperative evaluation for ophthalmic surgery is true?
   (A) Includes a full laboratory work-up
   (B) Dictates what laboratory tests and studies are indicated
   (C) Is tiered based on age of patient
   (D) Should always include electrocardiography

2. Cardiac contraindications to ophthalmic surgery include all the following, except:
   (A) Unstable angina
   (B) Severe valvular disease
   (C) History of congestive heart failure
   (D) Significant arrhythmia

3. Antithrombotic agents should always be stopped 5 days before ophthalmic surgery.
   (A) True
   (B) False

4. Which of the following is considered a risk factor for pulmonary complications during ophthalmic surgery?
   (A) Age >70 yr
   (B) Asthma
   (C) Abnormal pulmonary function tests
   (D) Abnormal chest x-ray

5. Which of the following statements is incorrect?
   (A) It is important to maintain tight control of blood glucose levels in the perioperative period
   (B) Blood glucose can be managed with a sliding scale of rapidly acting insulin on the day of surgery
   (C) Many patients with obstructive sleep apnea are undiagnosed
   (D) Patients with claustrophobia should be considered for general anesthesia

6. The normal range for infusion pressure in the eye is:
   (A) 5 to 9 mm Hg
   (B) 17 to 22 mm Hg
   (C) 24 to 31 mm Hg
   (D) 40 to 45 mm Hg

7. Risks for optic ischemia include all the following, except:
   (A) Prolonged hypotension
   (B) Retinal vascular disease
   (C) Transient increases in ocular pressure
   (D) Age >75 yr

8. Which of the following statements about the use of monitored anesthesia care is true?
   (A) Taping the head makes the patient feel secure
   (B) The patient should be allowed to fall asleep
   (C) Patients should be cautioned to avoid small movements of hands and feet
   (D) Description of the procedure should be limited to prevent patient anxiety

9. When using the intraconal technique, the orbit should be massaged after needle removal to reduce bleeding.
   (A) True
   (B) False

10. Hyaluronidase and sodium bicarbonate are ________ causes of postoperative diplopia; this complication is ________ after vitrectomy.
    (A) Proven; rare
    (B) Proven; common
    (C) Implicated as; rare
    (D) Implicated as; common

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The cutoff date for logging 2012 credits is December 31. Test forms received after that date will be accrued to 2013. You should receive the current year’s history by the end of January 2013.

Note: On Audio-Digest Anesthesiology Volume 54, Issue 21, the correct answer to question 7 is A.

Answers to Audio-Digest Anesthesiology Volume 54, Issue 22: 1-D, 2-B, 3-C, 4-D, 5-C, 6-A, 7-A, 8-B, 9-D, 10-C