Lesson S09: PreAnesthetic Assessment of the Geriatric Patient for Cataract Extraction

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TIME TO COMPLETE ACTIVITY: 2 hours
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Needs assessment

Preoperative testing is a routine part of clinical practice throughout the world regardless of the patient’s age or circumstances. Multinational and multi-institutional studies performed over more than two decades have demonstrated that preoperative testing is extremely costly, offers little or no useful information, may be harmful to the patient, rarely influences perioperative management and should be largely abandoned in otherwise healthy individuals. Nevertheless, many groups of physicians believe that such testing is necessary to protect against potential malpractice lawsuits should the patient suffer an adverse outcome. Cataract extraction is a common procedure in geriatric patients. It is very important for clinicians to understand the facts surrounding appropriate preoperative evaluation of geriatric patients undergoing this procedure.
Objectives

At the end of the lesson, the participant will be able to:

1. Outline a preoperative evaluation plan for a healthy geriatric patient.
2. Advise hospital administrators regarding preparation of a policy manual for preoperative testing.
3. Identify preoperative tests for patients with hypertension.
4. Appreciate the lack of association between test abnormalities and perioperative morbidity.
5. Realize the economic impact of routine testing.
6. Appreciate the lack of association between abnormal preoperative results and risk factors.
7. Discuss the appropriateness of ordering EKGs and chest X-rays preoperatively.
8. Educate other colleagues in identifying essential, patient specific, tests.
9. Identify appropriate testing for common disease states.
10. Quote the average incidence of abnormal test results obtained preoperatively.

Case Presentation

An 86 year old man was scheduled for cataract extraction. He reported increased difficulty seeing over the last few years, especially when driving at night when he drove. He received annual checkups, ceased smoking for the last 2 years, and drank wine daily. His personal doctor informed him that his blood pressure was slightly elevated but did not prescribe treatment with medication. Previous surgery consisted of a hernia repair and appendectomy, both many years ago. The nurse at the ophthalmologist’s office advised the patient that several tests were required before the cataract extraction. The patient reported that he felt healthy and did not want the tests. In addition, he lived a long distance from the hospital and the preoperative testing was a major inconvenience. The nurse informed the patient that the anesthesiologist would have to determine the necessity of preoperative testing prior to the procedure.

Introduction

Ambulatory surgical centers were introduced in the 1970’s and viewed as alternative sites for performing procedures on young and otherwise healthy individuals. Geriatric patients were excluded for many reasons: more intensive screening was required because of the likelihood of multiple medical problems; required tests could not be easily done in an outpatient facility because of equipment costs; elderly patients were more likely to suffer discomfort and sustain complications; relatives were not equipped to take care of debilitated elderly family members at home; surgeons were not comfortable performing procedures without hospital backup resources, and so on. There are no statistically significant studies that validate any of these reasons for excluding elderly patients from ambulatory surgical care.

In the 1980s, hospital costs rose sharply and the available beds were reduced as a cost-saving measure. The population was living longer thereby increasing the numbers of geriatric patients. Surgical techniques became less invasive and anesthetic agents became safer, shorter acting and were accompanied by fewer side effects and complications. This combination of factors fostered the growth of ambulatory outpatient surgery in the geriatric population.
Routine Testing

Routine testing generally includes an EKG, complete blood count, urinalysis, chest X-ray, electrolyte screen, BUN and creatinine, blood glucose level, type and screen and PT/PTT measurements. In 1985, one of the first large studies to challenge the usefulness of such routine preoperative laboratory screening was conducted over a four month period with a population of 2,000 preoperative patients of all ages. The tests included complete and differential blood cell counts, prothrombin time and partial prothrombin time, platelet count, six-factor automated multiple analysis, and glucose level. The authors estimated that sixty percent of these routinely ordered tests would not have been performed if testing was solely based on recognizable indications. In 0.22% of this group, abnormalities that might influence perioperative management were noted but no changes were made to the planned procedure. Furthermore, chart review indicated that no action was taken to address the abnormalities and no adverse anesthetic or surgical consequences resulted. The researchers concluded that in the absence of specific indications, routine preoperative laboratory tests contribute little to patient care, and could be reasonably eliminated. Even when an irregular result was revealed, therapy was not changed. Abnormal results were mostly ignored because the results were frequently not read by the physician who ordered the tests.

A review article published some years later pointed out that $40 billion a year (a figure that has now doubled) was spent in the United States on preoperative testing and evaluation. The author concluded that extraneous testing spawns iatrogenic disease by pursuit and treatment of borderline and false positive results. Also, legal liability increases when an abnormal result is obtained and not addressed. The author also suggested that perioperative physicians demonstrate to patients and insurance companies that these inefficiencies are best replaced with inexpensive technologies that save money and improve care. Unfortunately, unnecessary preoperative testing is frequently reimbursed without question by insurance companies leaving no incentive for change.

Several studies examined the usefulness of preoperative tests. A Chicago study reported that 60% of routine preoperative tests did not provide any information relevant to the scheduled procedure or operation. In another report, a protocol was devised to administer tests only after definitive criteria were met. This led to the performance of only 33% of routine tests and there were no adverse effects on the quality of care provided.

Another investigation, published in 1991, evaluated the ability of preoperative laboratory testing to predict postoperative complications. In a group of 520 patients undergoing elective surgery, the following patient data was collected: American Society of Anesthesiologist’s risk classification assignment, body mass index, electrolyte values (including glucose), blood urea nitrogen/creatinine values, blood counts, coagulation studies, total protein/albunin/lymphocyte count, EKG, chest X-ray, urinalysis, pulmonary function tests, type of anesthesia and operation. The authors found that postoperative complications were strongly associated with higher ASA classification, long duration and greater severity of the surgical procedure. Electrocardiograms, chest X-rays and nutritional status measurements showed some value in predicting complications. Advanced age correlates with the likelihood of more serious surgical corrections that have a higher risk of complications. The researchers concluded that preoperative laboratory testing should be reserved for specific indications.

Adams and Weige studied 169 adults scheduled for elective hernia repair. The patients were divided to 2 groups. Group 1 had no disease or known pathology other than the hernia; and group 2 had
evidence of another disease process. Abnormal results not predicted by history were found in 1% of group 1 patients and in 1.4% of group 2 patients (not statistically significant). Anesthetic or surgical treatment was altered by preoperative findings in only 2% of patients. The authors concluded that routine preoperative testing in this patient population was of little value. In a similar study of preoperative testing of patients prior to elective surgery, Macpherson found that the frequency of unanticipated abnormalities was too low to justify the practice pattern of routine testing and there was no evidence of any association between test abnormalities and perioperative morbidity. Chung et al analyzed a total of 1061 patients with and without preoperative testing and found that there was no increase in perioperative adverse events in either group. The authors suggested that even indicated testing may be eliminated in selected patients.

Despite the evidence that routine testing is not warranted, batteries of laboratory evaluations continue to be ordered by physicians. To examine this practice more closely, a study was designed to compare the number of tests ordered and length of hospital stay (both pre and postoperative) when either the surgeon or the anesthesiologist was responsible for preoperative assessment. Over 6,000 patients were reviewed. The percentage of patients subjected to laboratory tests, EKG or chest X-ray decreased from 90%, 55%, and 50% respectively when the surgeon was in charge to 53%, 43% and 10% when the anesthesiologist did the ordering (even when surgeons were allowed to add any tests that they felt appropriate). Admission on the day of surgery and reduction in length of hospital stay was more likely in the group managed by anesthesiologists. There were no differences in outcome between the groups. Several researchers similarly demonstrated that preoperative testing was best managed by an anesthesiologist who ordered individualized tests as compared to a standardized preoperative form with standing orders. Another study compared costs, number of tests, rate of cancellation and outcome between a group of patients for whom tests were ordered solely by surgeons and a second group managed by anesthesiologists with some input from surgeons. Results showed that far fewer tests were ordered by anesthesiologists. There was no increase in cancellation rate and no adverse outcome. On average, 72.5% of tests ordered by surgeons were considered not indicated by anesthesiologists. The difference was estimated to result in an annual cost savings of at least $80,000 for a small hospital.

In the office setting, the patient history and physical examination are the major source of information for the development of a preoperative treatment plan. Laboratory data has little or no effect on decisions regarding patient management. A review of 458 patients, who received general anesthesia for dental surgery, showed that approximately 3% of patients had aberrant laboratory values (low Hct, hematuria, elevated white cell counts). Surgery was deferred for only two patients - one was found to be pregnant and one was a diabetic with glycosuria.

Geriatric Patients

There has been much debate about tests that are appropriate for the preoperative evaluation of elderly patients undergoing cataract extraction. A North American national survey of randomly selected ophthalmologists, anesthesiologists and internists was conducted to examine the generally accepted doctrine of routine testing for all older patients. Responses were obtained from 538 of 655 eligible ophthalmologists (82%); 109 of 143 anesthesiologists (76%); and 54 of 122 internists (44%). Fifty percent of ophthalmologists, 40% of internists and 33% of anesthesiologists reported that they frequently or always obtained chest X-rays, while 20% of ophthalmologists, 27% of internists and 37% of anesthesiologists never obtained chest X-rays unless dictated by another medical condition (P<.01 for differences between ophthalmologists and other specialists). Similarly, 90% of ophthalmologists,
79% of internists and 41% of anesthesiologists reported that they frequently or always obtained a complete blood count, electrolyte panel and EKG. On the other hand, 11% of ophthalmologists, 17% of internists and 28% of anesthesiologists never obtained these tests. The majority of responders (32-80%) believed that the tests were unnecessary but cited reasons for doing them. Some felt that the preoperative testing was important to reduce legal liability. Such preoperative evaluation was also viewed as a good opportunity to evaluate patients for underlying disease processes. Also, each specialist believed that other physicians required the tests and that the hospital had regulations mandating them preoperatively. This latter view is also widely held by nurses who are responsible for checking that all requirements have been fulfilled before the patient enters the operating room. Marked variation existed within and across physician specialties in the rationale for medical testing for elderly patients undergoing cataract surgery.

The Barcelona Medical Association of Ophthalmologists conducted a postal survey of a representative sample of their constituents (with a response rate of 70%). The questionnaire included information about common perioperative practices, sociodemographic data and professional data. The study found that up to 20% of ophthalmologists performed eye examinations that were not indicated or of unproven benefit. Also, an average of seven medical tests per patient was routinely included. Private practitioners were most likely to perform unnecessary testing. Researchers concluded that there was potential for cost containment and more appropriate care. A similar survey carried out in Canada examined the cost savings to be realized by eliminating routine testing. In a study of 1231 patients, with half tested and half untested, there was no difference in outcome. Elimination of unnecessary testing reduced laboratory costs from $40.00 to $4.00 (Canadian) per patient.

A large study of 19,557 patients showed that routine testing is of no value or importance in geriatric patients undergoing cataract removal. Patients were randomly assigned to two groups. One group underwent a complete battery of tests including EKG, complete blood count, serum electrolytes, BUN, creatinine, and glucose. In the second group, no testing was performed. A complete history and physical examination was completed for all patients. Adverse medical events and interventions were recorded on the day of surgery and for a period seven days following surgery. The most frequent medical events in both groups were treatment for hypertension and bradycardia. The overall perioperative complication rate between the two groups was the same at 31.3 events per 1000 operations. There were no differences in the incidence of intraoperative events (19.2 and 19.7 events respectively per 1000 surgeries) or postoperative problems (12.6 and 12.1 per 1000 surgeries). Analyses stratified to age, sex, ASA classification and medical history revealed no benefit to the tests performed. In other words, routine medical testing before cataract surgery did not measurably increase the safety of surgery. In fact, in many cases, test results which had been sealed and taped to the hospital chart remained unopened at the time of discharge. Legal liability is considerably increased when the results of tests that have been ordered for a specific reason are neglected by the practitioner.

**Necessary Investigation**

Although routine testing cannot be substantiated, tests may be indicated on the basis of history and physical examination. In the case presented, an elderly male patient with questionable hypertension and a smoking history, cardiac and respiratory problems should be considered.
Evaluation of cardiac disease

Although the definition of hypertension is arbitrary, it is generally accepted to be a systolic blood pressure greater than 140-160mmHg or a diastolic blood pressure greater than 90mmHg, or both, regardless of age. Hypertension is the most common circulatory derangement, affecting an estimated 60 million North Americans. Essential hypertension accounts for more than 90% of afflicted patients and has no identifiable cause; secondary hypertension has a demonstrable etiology. Essential hypertension is sometimes attributed to increased sympathetic nervous activity or increased arteriolar sensitivity to circulating catecholamines. These factors are associated with increased systemic vascular resistance and adaptive hypertrophy of arterioles.

Adrenergic neural activation and adrenal release of catecholamines occur in response to a wide variety of stimuli before, during and after anesthesia and surgery. Preoperative evaluation includes a determination of adequate blood pressure control, review of antihypertensive medications and detection of any dysfunction of organs such as the brain, heart and kidneys. A preoperative diagnosis of hypertension is present in 28% of adult non-cardiac surgery patients and 61% of patients with ischemic heart disease. Patients with untreated or uncontrolled hypertension should not be scheduled for elective surgery.

The American College of Cardiology and the American Heart Association have provided perioperative evaluation and management guidelines for assessing risk in noncardiac surgery. Cinello et al note that even if previously validated as safe, there is often a gap between clinical practice and the recommendations and guidelines of the ACC/AHA. A study of 164 patients indicated that guidelines implementation reduced preoperative cardiology consultation by 21% and preoperative non-invasive testing by 1%. A low rate of perioperative cardiac complications was preserved. Essentially cardiac risk is predicted based on clinical predictors, surgery specific risk and a point score summary. (See Tables 1, 2, and 3.)

Table 1: Clinical predictors

<table>
<thead>
<tr>
<th>MAJOR</th>
<th>INTERMEDIATE</th>
<th>MINOR</th>
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<tbody>
<tr>
<td>Unstable coronary symptoms</td>
<td>Mild angina pectoris</td>
<td>Advanced age</td>
</tr>
<tr>
<td>Decompensated CHF</td>
<td>Prior MI</td>
<td>Abnormal EKG</td>
</tr>
<tr>
<td>Significant dysrhythmias</td>
<td>Compensated or prior CHF</td>
<td>Rhythm other than sinus</td>
</tr>
<tr>
<td>Severe valvular disease</td>
<td>Diabetes mellitus</td>
<td>Low functional capacity</td>
</tr>
<tr>
<td></td>
<td>Renal insufficiency</td>
<td>Stroke/uncontrolled systemic</td>
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<tr>
<td></td>
<td></td>
<td>hypertension</td>
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</tbody>
</table>

Table 2: Surgery-Specific risk

<table>
<thead>
<tr>
<th>HIGH</th>
<th>INTERMEDIATE</th>
<th>LOW</th>
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<tbody>
<tr>
<td>Emergent major operations,</td>
<td>Carotid endarterectomy</td>
<td>Endoscopy</td>
</tr>
<tr>
<td>especially elderly</td>
<td>Head and neck surgery</td>
<td>Superficial procedures</td>
</tr>
<tr>
<td>Aortic or major vascular</td>
<td>Intraperitoneal/intrathoracic</td>
<td>Cataract</td>
</tr>
<tr>
<td>Peripheral vascular</td>
<td>Orthopedic/prostatic</td>
<td>Breast</td>
</tr>
<tr>
<td>Anticipated long surgery with</td>
<td></td>
<td></td>
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<tr>
<td>major fluid shifts</td>
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Table 3: Point Score Summary

<table>
<thead>
<tr>
<th>CLINICAL PREDICTORS</th>
<th>FUNCTIONAL CAPACITY</th>
<th>SURGERY-SPECIFIC RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major: 4 points</td>
<td>Poor: 2 points</td>
<td>High: 2 points</td>
</tr>
<tr>
<td>Intermediate: 2 points</td>
<td>Moderate or better: 0 points</td>
<td>Intermediate: 1 point</td>
</tr>
<tr>
<td>Minor: 0 points</td>
<td></td>
<td>Low: 0 points</td>
</tr>
</tbody>
</table>

*A score of 4 or more indicates the need for more cardiac evaluation.*

In general, non-invasive and invasive testing should be limited to circumstances in which results will clearly affect patient management or in which testing would otherwise be indicated.\(^\text{21}\) Beta blocker therapy should be continued in patients already on that therapy and should be started only in patients with high cardiac risk undergoing intermediate or high risk surgery.\(^\text{22}\) Antihypertensive drugs and statins should be continued throughout the perioperative period. An increased incidence of hypotension and evidence of myocardial ischemia during the maintenance of anesthesia is associated with patients who are markedly hypertensive prior to induction.\(^\text{23}\) There is no evidence that the incidence of postoperative cardiac complications is increased as long as the preoperative/perioperative diastolic blood pressure remains below 110 mmHg.\(^\text{24}\) It is important for the physician to review the pharmacology and potential side effects of antihypertensive medication and consider possible drug interactions.

Preoperative EKG testing may be helpful in the management of patients with known cardiac disease. Signs or symptoms suggestive of cardiac disease (chest pain, paroxysmal nocturnal dyspnea, exercise intolerance) and identification of significant risk factors for cardiovascular disease (smoking, family history) may give more information. Obtaining an EKG on the basis of age alone in the absence of other indicators is highly controversial.\(^\text{25}\) Despite an unproven association with outcomes, the incidence of EKG abnormalities has been shown to increase with age. A conservative approach to obtaining EKG based partly on age criteria is shown in Figure 1.

**Figure 1**

*Guidelines for Preoperative Electrocardiography*

- Male over 50 or Female over 60
- Has there been a normal ECG in the past 6 months?
- Any worsening in condition or symptoms since last study?

*Does the patient have:*
- Signs or symptoms of CV disease? Or
- Risk factors for or history of CV disease? Or
- A high risk surgical procedure (class 3)

*Perform ECG* / *Usually No ECG Required*
If hypertension is noted pre or intraoperatively, it is advisable to refer the patient to a primary care physician for further evaluation and management.

**Respiratory Disease**

Smoking has long been identified as a risk factor for adverse outcomes; however, there is little evidence that routine chest X-ray will improve patient outcome or serve as a useful marker for risk assessment. Only 1.3% of routine chest radiographs demonstrate an unexpected abnormality. Less that 0.1% of radiographic findings result in preoperative management changes and no improvement in outcome has been shown. Postoperative respiratory complications are best predicted by ASA class, type of anesthesia, nutritional status and type of operation. A baseline chest radiograph can be valuable in the interpretation of about 50% of postoperative chest radiographs. This suggests that preoperative testing is useful for procedures for which postoperative testing is considered essential. Guidelines for ordering chest radiographs are outlined in Figure 2.

**Figure 2**

Guidelines for Preoperative Chest Radiography

- Significant dynamic respiratory or medical/surgical indication
- Adequate study performed in last 12 months?
- Any worsening in condition or symptoms since last study?
- Study required for postoperative comparison?
- Obtain Chest Radiograph
- Usually No Radiograph Required

Preoperative pulmonary function testing is indicated only for patients for whom the results will modify the surgical procedure, anesthetic management or the postoperative care plan. There is no evidence to suggest that pulmonary function testing is useful in determining risk assessment or modification in patients who smoke cigarettes or those with adequately treated bronchospastic disease (i.e. a patient with a history of asthma who is presently asymptomatic).

**Management of the case presented**

The anesthesiologist obtained a thorough history through a telephone conversation with the patient. The patient’s daily routine and lifestyle was noted. The patient took no medications, slept on one pillow, and usually only rose once per night to urinate. The patient had no complaints of dyspnea and
reported that he enjoyed playing softball with his grandchildren. Since cataract extraction is not associated with blood loss and can usually be completed quickly with local anesthesia, regional block and sedation, the anesthesiologist determined that no tests were required pending heart and lung auscultation and blood pressure measurement.

On the day of surgery, the elderly patient reported nervousness, especially when his clothes and dentures were removed. The first blood pressure measurement in the holding area was 195/100. Heart and lung auscultation revealed a heart rate of 92 bpm. After ascertaining that a properly signed consent was available in the chart, the anesthesiologist administered midazolam 0.5mg and requested that the patient’s dentures be restored. The anesthesiologist then spoke with the patient about the operating room environment, the monitors that would be used and the sedation that would be given. Repeat blood pressure measurement 12 minutes later was 155/88. The case proceeded without incident.

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References


1. **Statistically significant studies indicate that geriatric patients:**
   a. Are poor candidates for ambulatory procedures
   b. Benefit from general routine testing
   c. Always have more postoperative complications
   d. None of the above

2. **Routine testing:**
   a. Includes complete blood count and urinalysis on everyone
   b. Has been challenged as to usefulness for over 20 years
   c. Is still required for everyone by hospital policy
   d. Is more likely to be requested by anesthesiologists than by surgeons

3. **A true statement regarding routine preoperative testing:**
   a. Annual cost exceeds $40 billion dollars in the United States
   b. Abnormal results not indicated by history occur in about 1%
   c. About 0.22% reveal abnormalities that might influence perioperative management
   d. All of the above

4. **Abnormalities discovered on routine testing:**
   a. Are predictors of outcome
   b. Are always acted on promptly
   c. Are found in at least 50% of geriatric patients
   d. Very rarely alter the perioperative plan

5. **Postoperative complications are most likely to be predicted by:**
   a. ASA classification and degree of difficulty of surgery
   b. Discoid atelectasis on chest X-ray
   c. Preoperative HB 9.8g
   d. Elevated white cell count in the urine
6. A true statement regarding routine testing in geriatric patients for cataract surgery:
   a. Physicians order tests appropriate to the perceived needs of their specialty
   b. Anesthesiologists are most likely to require chest X-rays
   c. Many healthy elderly geriatric patients may safely undergo cataract surgery with no preoperative testing
   d. History taking must be done in a face to face interview

7. Hypertension:
   a. Always requires beta blocker therapy prior to any surgery
   b. Affects about 60 million people in the United States
   c. Is a major Clinical Predictor
   d. Does not have to be treated preoperatively as long as all cardiac drugs are discontinued before anesthesia.

8. Preoperative EKG testing:
   a. Should be obtained in all patients over 70 years
   b. Indicates an increase of abnormalities with increasing age
   c. Is not helpful in assessing patients with known cardiac disease
   d. Is an excellent risk predictor in geriatric patients

9. Risk factors for postoperative pulmonary complications:
   a. Are best assessed by pulmonary function tests
   b. Include smoking history and lung surgery
   c. Can be predicted by finding an abnormal chest X-ray preoperatively
   d. Have not been defined

10. Geriatric patients undergoing cataract surgery:
    a. May be safely managed in an ambulatory facility
    b. Often require no preoperative tests
    c. Must have a history and physical examination
    d. All of the above