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Pre-Operative Evaluation

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1. Introduction

Cataracts are the most prevalent cause of visual loss around the world. Their only effective treatment is surgery; which has fortunately become one of the safest, most successful, and most frequently performed outpatient surgeries.

Most cataract patients tend to be elderly and to have serious coexisting illnesses; which puts them at a higher risk for peri-operative complications (Lira et al., 2001). The eye procedure is however, minimally invasive and considered low risk. A thorough pre-operative evaluation by the anaesthesiologist should therefore be performed before these patients can be considered eligible for surgery.

Pre-operative preparation is the first stage in the enhanced recovery process of modern day cataract surgery. If it goes wrong it will adversely impact on the peri- and post-operative stages of enhanced recovery. If done well it enables enhanced recovery (Swart and Houghton, 2010).

According to Hepner (2009), the goals of pre-operative evaluation are the following:

1. To evaluate patient readiness for anaesthesia and surgery;
2. To optimize the patient's health before surgery;
3. To enhance the quality of peri-operative care;
4. To reduce surgical morbidity and length of hospital stay;
5. To answer all questions and obtain informed consent.

This chapter discusses the steps in management and reasons behind them that should be followed in the pre-operative evaluation by the anaesthesiologist before patients can be considered eligible for surgery. It will focus on the following topics: (1) history, (2) physical examination, (3) investigations, (4) fasting guidelines, (5) functional classification, (6) pre-medication. The chapter concludes by recommending that there is an argument for all patients receiving a pre-operative anaesthetic assessment before cataract surgery as the anaesthesiologist is in many centres the final physician who questions and determines the patient's appropriateness and stability for surgery.

2. The pre-operative assessment clinic

The pre-operative assessment clinic or evaluation centre provides the opportunity for anaesthesiologists to see those patients who have been identified by screening and assessment as presenting potential anaesthetic problems. The clinic tends to be cost-effective, as it keeps consultations and redundant provider interviews to a minimum,

encourages more targeting of tests, reduces unnecessary laboratory testing, and help avoid last-minute operating room delays and cancellations. It is also associated with increased patient satisfaction, because patients get to meet the surgical team and have risks, side effects and possibility of post-operative intensive care admission explained to them.

3. Pre-operative assessment

3.1 History

3.1.1 Medical history

3.1.1.1 Hypertension

Hypertension is one of the most common diseases in the world and it is clear that its prevalence increases with aging. Most of the patients undergoing cataract surgery are over 60 years old, the group most affected by hypertension. In the study by Motiang and Rantloane (2009) they found a positive correlation between an increase in systolic blood pressure and intraocular pressure. This increase in intraocular pressure may force the intraocular contents towards the surgical incision. The iris, lens or vitreous may prolapse either immediately or when the surgeon attempts to move the lens (Motiang and Rantloane, 2009). Lira et al. (2010) confirmed that hypertensive patients, even those with a history of good blood pressure control, are at increased risk for rise in blood pressure in the peri-operative period (Lira et al., 2010).

Hypertension should be well controlled before the patient is scheduled for surgery and should not be lowered immediately prior to surgery. It is generally recommended that elective surgery be delayed for severe hypertension until the blood pressure is below 180/110mmHg.

3.1.1.2 Diabetes mellitus

Diabetic patients should have their blood sugar controlled pre-operatively. Those with longstanding disease should be assessed in conjunction with a Physician because they have an increased incidence of associated renal and cardiac disease. If the patient is required to fast after midnight on the day of surgery, oral hypoglycaemic agents should be withheld on the day of surgery. Insulin-dependant patients should have their usual insulin dose adjusted. All diabetic patients should have intravenous access peri-operatively in order to treat a potential hypoglycaemic reaction (American Academy of Ophthalmology, 2008-2009). If surgery is planned under local anaesthesia, they should have their usual medication and oral intake.

3.1.1.3 Coronary artery disease

Patients with myocardial infarction should not have surgery within three months of the infarct. Angina should be controlled by the patient's usual medication.

3.1.1.4 Chronic obstructive pulmonary disease (COPD)

COPD patients should have their pulmonary function assessed and maximized pre-operatively. They should be encouraged to bring their inhalers into the operating room. These patients may have increased venous pressure, which may increase intraocular pressure and make the surgery riskier.

Monitored local anaesthesia is preferred in these patients. General anaesthesia can be considered if the patient can tolerate it but cannot endure the required operating table position due to inability to lie flat. Those with severe pulmonary disease may require long

term oxygen therapy, which may increase the risk of peri-operative endophthalmitis (American Academy of Ophthalmology, 2008-2009).

All efforts should be made to ensure that the patient does not cough peri-operatively.

The choice of topical, local or general anaesthesia will be influenced by factors limiting the patient's ability to co-operate in the operating room table, which include:

- Arthritis – patients with severe arthritis may be less able to co-operate during surgery because of discomfort. The patient's position on the operating table may have to be adjusted to optimize comfort, but that may create technical difficulties for the surgeon such as not being able to access the patient's eye. A compromise position should be found to allow the patient to lie still and give the surgeon adequate access to the eye. General anaesthesia should be considered if such a compromise cannot be reached.
- Claustrophobia – all patients should be questioned pre-operatively about their ability to tolerate having their face covered during surgery. These patients are better done under general anaesthesia.
- Cognitive function – the patient's caregiver should be questioned about whether the patient can co-operate if local anaesthesia is used. Sedating a patient with a mental disability may cause confusion and increased agitation. General anaesthesia should be used if the patient cannot co-operate but is otherwise in good health. Regression in mental status following general anaesthesia is not uncommon in patients with dementia.
- Hearing loss – good communication with the patient is a definitive advantage if local anaesthesia is planned. Patients with a hearing loss should be reminded to wear a hearing aid into the operating room. An interpreter or family member can be brought into the operating room if the patient and the surgeon do not speak the same language.

3.2 Previous anaesthetics and operations

The patient should be questioned regarding any difficulties with previous anaesthetics. This should include checking records of previous anaesthetics to rule out problems like difficult intubation, drug allergy or adverse reactions, e.g malignant hyperthermia. Details of previous operations like cardiac surgery, may reveal potential anaesthetic problems.

3.3 Family history

Patients should be questioned about any inherited diseases in the family, e.g. porphyria. Family members' experiences with anaesthesia should also be documented. An unexplained death suggests malignant hyperthermia and a history of prolonged apnea suggests butyrylcholinesterase deficiency.

3.4 Drug history

3.4.1 Prescription drugs

Information regarding the patient's medication should be obtained. This will not only provide insight regarding their medical status, but may also alert the anaesthesiologist to possible drug interactions as well as helping to determine which drugs to withhold pre-operatively.

There is normally very little reason to discontinue medications for cardiovascular disease, except for diuretics to minimize need for micturition.

Antihypertensive drugs can potentiate the hypotensive influences of sedatives and anaesthetics, but there is even greater risk of acute rebound hypertensive episodes, if long term medications are withheld. This may pose a risk of an increase in intraocular pressure.

All chronically prescribed psychoactive agents should be continued pre-operatively. The use of meperidine is contraindicated in patients taking monoamine oxidase inhibitors because their interaction can precipitate a seizure and a hypertensive crisis.

In the case of corticosteroids, supplementation should be considered in patients who received more than 10mg prednisone (or equivalent) per day in the last three months. These patients present a potentially impaired stress response due to hypothalamic-pituitary-adrenal (HPA) suppression. They should take their usual prednisone dosage on the morning of surgery, or 25mg hydrocortisone intravenously at induction.

The use of anticoagulation therapy is not associated with an additional risk of peri-operative bleeding in the eye, but can potentiate bleeding should it occur.

Patients on warfarin should have their international normalized ratio (INR) checked to ensure that it is within the desired therapeutic range. There are potential systemic risks of stopping anticoagulation, the decision should therefore be done in conjunction with the primary care physician. Retrobulbar and peribulbar anaesthetic injections carry an increased risk of retrobulbar haemorrhage in these patients. Either a sub-Tenon's or topical anaesthesia is recommended in them. If the surgeon is not comfortable or experienced with these techniques, he should consider referring the patient to an appropriately qualified surgeon.

Aspirin is generally not discontinued prior to cataract surgery.

The Ophthalmologist should specifically enquire about tamsulosin hydrochloride (Flomax). Tamsulosin is used to treat benign prostatic hypertrophy in men and urinary retention in women. This drug, together with other α_{1A} - antagonists, is strongly associated with iris complications during phacoemulsification known as intraoperative floppy iris syndrome (IFIS), as well as with fluctuations in pupil size during cataract surgery. This syndrome is manifested by a pupil that may not dilate fully and may constrict intraoperatively. The iris may billow and prolapse through the incision. Tamsulosin binds to postsynaptic nerve endings of the iris dilator muscle for a prolonged period, causing excessive iris mobility. It should be discontinued two weeks prior to surgery, (Malhotra, 2008) though this practice is not felt to be effective by all surgeons since the effects may be chronic.

3.4.2 Non-prescription drugs

Drugs with anticholinergic properties, such as diphenhydramine, are likely to increase the risk of peri-operative delirium and should be withheld. Women and patients in the age range of 40 to 60 years are more likely to use herbal medicine. The most highly used compounds, include echinecea, Gingko biloba, St.John's wort, garlic and gingseng.

The most common potential adverse effects of herbal medicines in the peri-operative period include impaired coagulation, cardiovascular side effects, electrolyte disturbances, and prolongation of the effects of anaesthetic agents. Of concern is that unless specifically questioned, patients may not report the use of these non-prescription drugs. The American Society of Anaesthesiologists (ASA) recommends discontinuation of all alternative therapies 2 weeks before elective procedures, although there are no definitive data supporting this recommendation (Fischer et al., 2010).

3.5 Allergies

Patients should be questioned with regard to the history of allergy to drugs such as antibiotics, nonsteroidal anti inflammatory drugs, and for those undergoing local anaesthesia, ester local anaesthetics. Esters are preserved in para-aminobenzoic acid, which is responsible for the allergic reaction. Anaphylactic reactions to amide local anaesthetics are extremely rare. Muscle relaxants account for a high incidence of true anaphylactic and anaphylactoid reactions, followed by latex and antibiotics.

Latex is a milky-white sap obtained from rubber trees (*Hevea brasiliensis*) and is used in more than 40,000 medical products. Adverse reactions to rubber products should be sought for because a number of IgE-mediated reactions to latex have been confirmed, including anaphylaxis and death (Becker, 2009).

Any report of allergy should be further questioned to clarify that signs and symptoms were consistent with hypersensitivity reactions (eg. rash, pruritus, urticaria, severe hypotension, airway compromise). It is not uncommon for patients to label any adverse drug experience as an 'allergic reaction'.

3.6 Social history

3.6.1 Smoking

Patients who smoke are prone to hyper-reactive airways and bothersome episodes of coughing, which poses a problem post-operatively with the risk of lens extrusion. Coughing greatly increases the venous pressure and raises the intraocular pressure as much as 40mmHg or more (McGoldrick and Gayer, 2009). Heavy smokers have a reduction in oxygen binding sites on haemoglobin due to the presence of carbon monoxide. It is therefore wise to oxygenate them to maintain the saturation above 95% due to the leftward shift of the oxyhaemoglobin dissociation curve. Nicotine stimulates the sympathetic nervous system, causing tachycardia and hypertension. If smoking is stopped for 8 weeks it improves the airways and reduces the rate of post-operative pulmonary complications; for 2 weeks reduces irritability; and for as little as 24hrs pre-operatively decreases carboxyhaemoglobin levels, abolish nicotine effects and improve mucous clearance (Gwinnut, 2004). Because smokers often show increased airway reactivity, administering a bronchodilator pre-operatively may also be useful, especially when a general anaesthetic is planned.

4. Examination

4.1 Airway assessment

The airway should be examined and the modified Mallampati classification noted, which has become the standard for assessing the relationship of the tongue size relative to the oral cavity, although it has a low positive predictive value in identifying patients who are difficult to intubate (Hata and Moyers, 2009). This is an essential component of the pre-operative assessment since airway management forms the most important aspect of patient care during sedation or general anaesthesia.

With the patient sitting upright, he is asked to open his mouth and maximally protrude his tongue. The view of the pharyngeal structures is noted and scored class I-IV. Those who have a visible epiglottis on mouth opening are scored class zero. Patients who have class III and IV airways are more difficult to intubate, more likely to obstruct, and more difficult to manually ventilate, should this become necessary.

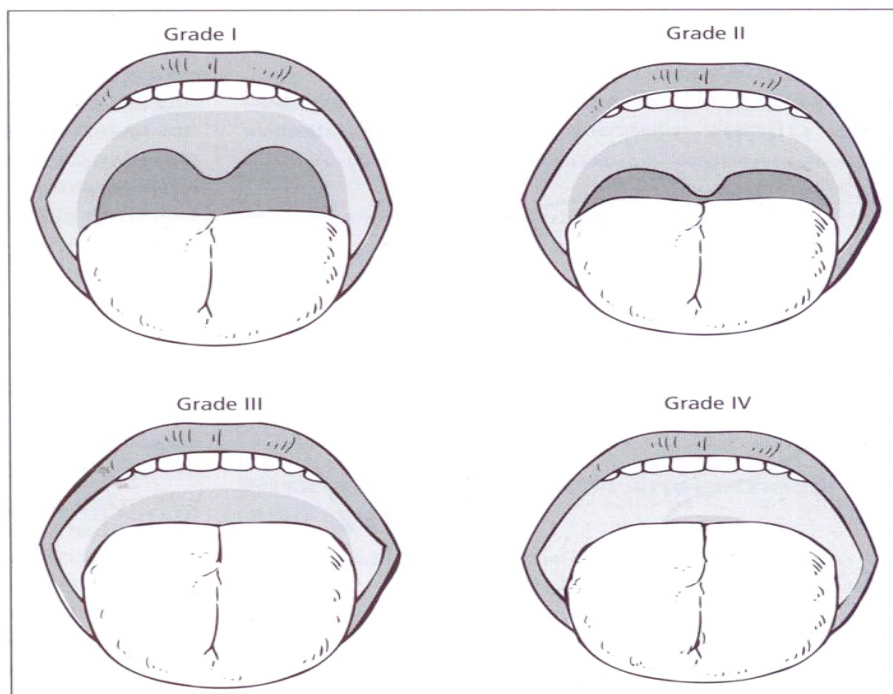


Fig. 1. The pharyngeal structures seen during the Mallampati assessment (Gwinnut 2004)

There are other simple bedside tests which include the following:

- Thyromental distance - with the head fully extended on the neck, the distance between the bony point of the chin and the prominence of the thyroid cartilage is measured. A distance of less than 7cm suggests difficult intubation.
- Wilson score - increasing weight, a reduction in head and neck movement, reduced mouth opening, and the presence of a receding mandible or buck-teeth all predispose to increased difficulty with intubation.
- Calder test - the patient is asked to protrude the mandible as far as possible. The lower incisors will lie anterior to, aligned with or posterior to the upper incisors. The latter two suggest reduced view at laryngoscopy.

Additional factors that warn of difficulty in attaining a good mask seal for positive pressure ventilation include those who are fully bearded or edentulous, and those with a large neck circumference.

Patients with severe rheumatoid arthritis should also have their cervical spine assessed.

None of these tests, alone or in combination, predicts all difficult intubations. If problems are anticipated, anaesthesia should be planned accordingly. If intubation proves difficult, it must be recorded in a prominent place in the patient's notes and the patient be informed.

4.2 Cardiovascular system

The physical examination can be altered by age and disease. For example, a systolic ejection murmur suggesting aortic stenosis may represent aortic valve sclerosis rather than a haemodynamically significant valvular stenosis.

Examination should focus on signs of hypertension, arrhythmias, heart failure and valvular heart disease. Diabetics should be examined for signs of autonomic neuropathy, which is the best predictor of silent ischemia.

Also inspect the peripheral veins to identify any potential problems with intravenous access.

4.3 Respiratory system

Auscultate for additional or added breath sounds and look for signs of collapse, consolidation, pleural effusion and respiratory failure.

4.4 Other systems

Examination of other systems should be guided by problems that are relevant to anaesthesia that are identified in the history.

Since most of the cataract patients are elderly, any evidence of dementia should be documented as it will be useful in evaluating any concerns regarding residual influences of sedatives or anaesthetic agents post-operatively. A discussion with family members should be sought if clinical data is unclear, cognitive impairment is profound, or the responses are misleading.

5. Investigations

Routine investigations have been found to be unnecessary as they do not increase the safety of cataract procedures. They should only be done if medical history or physical examination reveal a new or worsening medical disease. According to Fleisher, pre-operative testing should only be performed if it will actually be used to modify care (Fleischer, 2001). They have also been found to be important as baseline information if problems develop.

Most abnormalities in laboratory values can be predicted from the patient's history and findings on physical examination; moreover, laboratory abnormalities, when discovered, rarely lead to changes in peri-operative treatment. A study by Schein et al. (2000) demonstrates that peri-operative morbidity and mortality are not reduced by routine use of commonly ordered pre-operative medical tests. These tests have been shown to be of no benefit in either predicting patients liable to suffer peri-operative complications or in lowering operative risk. All tests should be interpreted within the context of the clinical situation.

Except for the electrocardiogram (ECG), banks of pathology tests and radiology examinations can be avoided (MacPherson, 2004). The resting 12-lead ECG is however not appropriate for identifying patients with an increased peri-operative cardiac risk scheduled for low-risk surgery. In cataract surgery it is recommended only for those patients with recent episodes of chest pain and asymptomatic patients with long standing diabetes mellitus. (Kubitz and Motsch, 2003).

The ASA issued the following guideline for general principles for avoiding unnecessary pre-operative testing:

- Routine laboratory tests are not good screening devices and should not be used to screen for disease.
- Repetition should be avoided: there is no need to repeat a recent test.
- Healthy patients may not need testing.
- Patients undergoing minimally invasive procedures may not need testing.
- A test should be ordered only if its results will influence management.

Four criteria for making an educated decision about whether a pre-operative test is indicated have been listed (Table1). A test that meets only one or none of the four criteria is probably not a good test, and if it meets three or four of the criteria, it is a very good test (Hepner, 2009).

Diagnostic efficacy	Does the test correctly identify abnormalities?
Diagnostic effectiveness	Would the test change your diagnosis?
Therapeutic efficacy	Would the test change your management?
Therapeutic effectiveness	Would the test change the patient's outcome?

*Adapted from Hepner (Hepner, 2009)

Table 1. Criteria for determining whether a pre-operative test is indicated

6. Fasting guidelines

The purpose of fasting is to reduce the risk of anaesthesia-related pulmonary aspiration of gastric contents and the consequent risk of aspiration pneumonia.

The Canadian Anesthesiologists' Society's Guidelines to the Practice of Anesthesia (Lindley, 2009) states that fasting policies should vary to take into account age and pre-existing medical conditions and should apply to all forms of anesthesia, including monitored anesthesia care. However, the ophthalmological Society in Canada states that fasting is not necessary if topical anesthesia, without intravenous opiate or sedative, is administered for cataract surgery. In 2004, the Royal College of Ophthalmologists decided that it is unnecessary to fast patients for local anesthetic cataract surgery (Lindley, 2009).

General fasting guidelines for normal patients undergoing elective surgery, as published by the ASA are as follows:

- 2 hours for clear non-particulate and non-carbonated fluids. The volume of the liquid ingested is less important than the type of liquid ingested.
- 6 hours after a light meal.
- 8 hours after a meal that includes fried or fatty food.

7. Functional classification – American society of anaesthesiologists (ASA)

This classification was the first attempt to quantify the risk associated with anaesthesia and surgery (Table 2). The system attempts to give a subjective and relative risk based only on the patient's pre-operative medical history (i.e no consideration of diagnostic studies). Its limitation is that it cannot be used as a tool to communicate meaningful expectations to patients and other caregivers.

ASA 1	A normal healthy patient
ASA 2	A patient with mild systemic disease
ASA 3	A patient with significant or severe systemic disease
ASA 4	A patient with severe disease that is a constant threat to life
ASA 5	A moribund patient who is equally likely to die in the next 24 hours with or without surgery
ASA 6	A brain - dead organ donor

"E" added to the classification indicates emergency surgery

*Adapted from Fisher, Bader, Sweitzer (Fisher, Bader, Sweitzer, 2010)

Table 2. American Society of Anaesthesiologists Physical Status Classification

8. Premedication

Premedication is useful to control anxiety, post-operative pain, nausea, vomiting and hypnosis. Specific pharmacologic actions should be kept in mind when these drugs are administered before operation, and they should be tailored to the needs of each patient. Patients should also be advised on which chronic medication to withhold pre-operatively.

No consensus exists on the choice of pre-operative medications, but there is general agreement that most patients should enter the theatre after anxiolysis, without undue sedation, has been accomplished. The patients' physical status, age, surgical procedure and its duration should be considered in selecting the appropriate drugs for pre-operative medication (Hata and Moyers, 2009).

Although historically many classes of drugs (eg. barbiturates, antihistamines) have been used to reduce anxiety and induce sedation, benzodiazepines are currently the drugs most commonly used. Even though oral diazepam has been found to be useful in controlling anxiety in adult patients, either the day before surgery or on the day of surgery; midazolam is the benzodiazepine most commonly used pre-operatively. At proper doses, neither midazolam nor diazepam place patients at any additional risk for cardiovascular and respiratory depression (Lichter, 2009).

Melatonin is a hormone secreted by the pineal gland. In their study, Ismael and Mowafi concluded that oral premedication with melatonin provided anxiolytic effects, improved peri-operative analgesia, decreased intraocular pressure with better operating conditions, and stabilized the hemodynamic variables during cataract surgery under topical anesthesia (Ismael and Mowafi, 2009).

Possible interaction between drugs used to dilate the pupil pre-operatively and those used in premedication and anaesthesia should be considered. The commonly used mydriatics are tropicamide and phenylephrine.

Phenylephrine eye drops are α_1 agonists used as vasoconstrictors and mydriatics. Care should be taken when using them in patients on monoamine oxidase inhibitors as they exaggerate the adrenergic response. They also increase the possibility of hypertension and cardiac dysrhythmias in other patients.

9. Conclusion

The anaesthesiologist is often in many centres the final physician who questions and determines the patient's appropriateness and stability for surgery.

A satisfactory pre-operative preparation and medication facilitate an uneventful peri-operative course. Poor preparation may begin a series of problems and misadventures. All patients should receive a pre-operative anaesthetic assessment (Hata and Moyers, 2009).

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