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RESEARCH COLLECTION ON

# CATARACT SURGERY AND VITRECTOMY

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## **Research Collection on Cataract Surgery And Vitrectomy**

<http://dx.doi.org/10.5772/58069>

Chapters from books edited by: **Farhan Zaidi** and **Zongming Song**

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# Contents

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## **Cataract Surgery 9**

Anaesthetic Management in Cataract Surgery 11

The History of Cataract Surgery 31

Intracameral Mydriatics in Cataract Surgery 47

Complications Associated with Cataract Surgery 71

Early Post-Operative Complications in Cataract Surgery 95

Post-Operative Infections Associated with Cataract Surgery 109

Toxic Anterior Segment Syndrome (TASS) and Prophylaxis Against Postoperative Endophthalmitis 115

Macular Edema and Cataract Surgery 137

Cataract Surgery and Dry Eye 151

Cataract Surgery in Retina Patients 165

## **Vitrectomy 185**

Vitrectomy in Endophthalmitis 187

Retinotomy/Retinectomy 203

Small Gauge Pars Plana Vitrectomy 219

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# Contents

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  - The History of Cataract Surgery 31
  - Intracameral Mydriatics in Cataract Surgery 47
  - Complications Associated with Cataract Surgery 71
  - Early Post-Operative Complications in Cataract Surgery 95
  - Post-Operative Infections Associated with Cataract Surgery 109
  - Toxic Anterior Segment Syndrome (TASS) and Prophylaxis Against Postoperative Endophthalmitis 115
  - Macular Edema and Cataract Surgery 137
  - Cataract Surgery and Dry Eye 151
  - Cataract Surgery in Retina Patients 165
- Vitrectomy 185**
  - Vitrectomy in Endophthalmitis 187
  - Retinotomy/Retinectomy 203
  - Small Gauge Pars Plana Vitrectomy 219



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## Preface

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This book brings together current knowledge and techniques on two common surgical procedures for treating eye disorders. In the first part, cataract surgery is considered. Cataracts are the leading cause of blindness worldwide, and cataract surgery is performed more often than any other type of surgery. Topics include the history of cataract surgery, anaesthesia, associated post-operative complications and infections, macular oedema and cataract surgery, and surgery with special considerations, such as for patients with dry eye and retina patients. In the second part, the principles, theory and techniques of vitrectomy, a procedure for treating numerous conditions such as retinal detachment and tears, epiretinal membrane and macular hole, are considered. Topics include vitrectomy in endophthalmitis, retinotomy and retinectomy, and small gauge pars plana vitrectomy. This book provides an excellent source of information, surgical approaches and up-to-date insights that ensure it will be essential for clinicians in ophthalmic surgery as well as for students and researchers in ophthalmology.



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# CATARACT SURGERY

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Edited by **Farhan Husain Zaidi**



# Anaesthetic Management in Cataract Surgery

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## 1. Introduction

Cataract surgery is one of the most commonly performed surgical procedures in our ageing world. The majority of patients have concurrent disorders including hypertension, diabetes mellitus and coronary artery disease. The anaesthetic management varies between topical anaesthetic applications, regional blocks to general anaesthesia. The patients' medical/mental condition and current medications are of prime importance in terms of their implications for anaesthesia. It is also prudent to define and prevent drug interactions of ocular medication that are required during the perioperative or postoperative period. The type of intervention and skill of the surgeon are variables that influence the selection of the anaesthetic regimen. Preoperative evaluation is therefore as important as anaesthetic care for this surgical population.

Cataract surgery performed in the setting of an office-based, day case surgical set-up is considered in this chapter. Unsutured incisions and less invasive techniques are increasingly popular. Extraocular muscle akinesia is important for an optimum operating field.

Topical anaesthesia includes local anaesthetic applied to the cornea as drops or ointment. Benoxinate, tetracaine, ametocaine, lignocaine, and bupivacaine are common ester and amide types of local anaesthetic used for this purpose. Lack of ocular akinesia and insufficient analgesia are considered as disadvantages of topical methods.

Retrobulbar block was one of the most frequently implemented techniques. It is performed via introduction of a needle at the infero-lateral rim of the lower eyelid passing through the muscle cone with advancement in a medial and superior direction at about 10° and injecting 4-8 mL of local anaesthetic / hyaluronidase mixture behind the globe. Maintaining a short advancement distance and use of blunt-tipped needles are advised for this practice. Besides the advantages, including obtaining ocular akinesia and sufficient analgesia, the procedure can for this reason still be considered and useful where other procedures are unsuitable, though this is rare. There is a risk of damage to surrounding structures including globe perforation, as well as penetration into the cerebrospinal fluid and vascular structures behind the eye, causing respiratory depression and cardiovascular collapse. While rare these are significant and limit its use in practice, especially in view of newer 'blunt needle' techniques.

Peribulbar block is performed as a retrobulbar block with straight advancement of a short needle from the infero-lateral border of the lower eyelid. This technique is infrequently utilized due to the disadvantages such as high rate of chemosis, lower quality of akinesia, increased local anaesthetic requirements and longer latent period requirement for akinesia.

Sub-Tenon's block (a type of 'blunt needle' block) is performed by introducing a cannula between the conjunctiva and Tenon's capsule after delicate but mainly blind dissection of the sub-Tenon's space. Advantages are reduction of complication rates especially in myopic eyes and it offers the option of re-injections to top up the anaesthetic during surgery. Local anaesthetic leakage, need for dissection and possible need for sutures are limitations.

Gentle pressure application on the globe for local anaesthetic spread after regional blocks are useful for avoiding the oculocardiac reflex. Local anaesthetic infiltration for facial nerve branches might be indicated for eyelid akinesia. Sedation and analgesia may be required during topical anaesthesia or regional blocks. In continuum and during surgery verbal contact between the anaesthetist and the surgeon is important for reducing complications at an early a stage as possible. Depending on the operation it might be preferable to use sedatives/hypnotics or opioid analgesics with a shorter half-life. In the case of repeated drug administrations, accumulating drugs should be avoided and/or a specific antidote should be given if necessary. It is not always possible to approximate additive effects of drug combinations in elderly patients and patients with co-morbidities, and using the lower doses might be important for preventing unforeseen complications though must be balanced with the need to prevent pain or awareness of surgery. Midazolam, propofol and dexmedetomidine, might be frequently used alone as a bolus or infusion, or in combination with fentanyl or remifentanyl.

General anaesthesia might be preferred in patients with limited co-operation or advanced co-existing disorders. With a few exceptions, all general anaesthetics decrease intraocular pressure. Laryngeal mask insertion with a smooth induction using etomidate, propofol or thiopentone with or without a non-depolarizing muscle relaxant is frequently chosen. Propofol infusion with fentanyl or remifentanyl might be delivered alone or with volatile anaesthetics. Besides the anti-emetic effects of propofol, the emetic and depressive effects of opioids should be remembered in the postoperative period. General anaesthesia may offer almost motionless optimal surgical conditions (though the Bell's reflex can persist at lower doses), allows bilateral surgery (rarely needed in intraocular surgery) and possesses virtually no major complication risk related to the injection. On the other hand it needs anaesthetic staff and equipment during administration and is increasingly expensive.

Analgesics and anti-inflammatory drugs might be combined with topical local anaesthetic during the postoperative period. It is important to ensure patients are free from side-effects or residual drug effects of medications to prevent further complications and re-hospitalisation.

Cataract surgery is one of the most common interventions made in day-case surgery (Cullen et al., 2009). Although lens opacification is generally a time-related process, it can be observed at an earlier period of life such as in newborns related to congenital metabolic errors and in all age groups due to trauma. The majority of the patients have concurrent disorders including hypertension, diabetes, rheumatoid arthritis, coronary artery or chronic pulmonary disease and take medication. Pre-operative evaluation, including anaesthetic and surgical planning should be performed as per the demands of co-morbidities. Cataract surgery is major surgery as it is intra-ocular surgery, technically challenging, with abundant scope for devastating complications like loss of sight, but it is from an anaesthetic perspective limited in terms of stress to the body overall. Advances in techniques including phacoemulsification and intraocular foldable silicone lens implantation through suture-less mini incisions decrease the surgical recovery period with lower complication rates and improved surgical outcomes.



2. Preoperative evaluation

The responsibility of the anaesthetist is to ensure that the patient is in an optimal condition before undergoing surgery. Pre-operative interview with anaesthetic and surgical staff may reduce anxiety and stress concerning the operation. Patients may also be informed about unexpected visual experiences during anaesthesia and surgery in order to prevent undesirable outcomes (Tan et al., 2006).

The pre-operative visit includes determinations concerning the patient’s history, habits, current disease with medications, complete systemic physical evaluation, and occult disease if not diagnosed. Patients may be referred to other physicians when concurrent pathology is not stable. Potential airway problems with a difficult airway must be evaluated and an anaesthetic plan should also be explained with informed consent. Patients may be categorized according to the American Society of Anesthesiologists (ASA) Physical Classification System that is shown in Table 1 to document their status before surgery (Davenport et al., 2006). Mild asthma or well controlled hypertension are examples of ASA Class II patients that are unlikely to have an impact on anaesthesia and surgery. More advanced disease such as renal failure on dialysis or class II congestive heart failure indicates ASA class III patients and is likely to have an impact on anaesthesia and surgery. Patients are classified as ASA class IV if disease requires special medical care e.g., acute myocardial infarction, and respiratory failure that requires mechanical ventilation with major impact on anaesthesia and surgery. The physical condition of patient over ASA III generally requires hospitalization even when performing surgery with otherwise comparatively limited potential for major systemic stress like cataract surgery.

Class	Description
I	Healthy patient without organic, biochemical, or psychiatric disease.
II	A patient with mild systemic disease. No significant impact on daily activity.
III	Significant or severe systemic disease that limits normal activity. Significant impact on daily activity.
IV	Severe disease that is a constant threat to life or requires intensive therapy. Serious limitation of daily activity.
V	Moribund patient who is likely to die without surgery.
VI	Brain-dead organ donor.

Table 1. American Society of Anaesthesiologists physical status (ASA PS) classification

The history of the patient may include social habits, cigarette and alcohol consumption, illicit drug use, allergies, past medical history including operations with enquiries about possible adverse outcomes, current medications, and questioning relatives on whether there is a family history of attack from malignant hyperthermia – thus halogenated volatile anaesthetic agents, which may trigger malignant hyperthermia, may be avoided.

Systemic evaluation must include careful examination for a difficult airway, including jaw and neck movements, mouth opening, and intra-oral pathology. Special precautions or devices must be prepared to be used for patients who are likely to have an airway problem. Patients, especially with increased body mass index, must also be questioned about snoring during their sleep and evaluated for possible sleep apnoea syndrome. The physical capacity of patients can be determined with simple questions on for instance being able to do daily activities, climbing stairs, swimming or other sports.