



HAND BOOK FOR
SURGICAL OPHTHALMIC ASSISTANT
(OPERATION ROOM SERVICES)



OAS

Ophthalmic Assistant Training Series



A R A V I N D E Y E C A R E S Y S T E M



The Training in Ophthalmic Assisting Series and Training in Eye Care Support Services Series were born from the vision and inspiration of one very special man, Dr. G. Venkataswamy, founder of Aravind Eye Hospitals and guiding light in the world of eye care and community ophthalmology.

We dedicate this effort to him.

Intelligence and capability are not enough. There must also be the joy of doing something beautiful. Being of service to God and humanity means going well beyond the sophistication of the best technology, to the humble demonstration of courtesy and compassion to each patient.

- Dr. G. Venkataswamy

Ophthalmic Assistant Training Series (OATS)

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Foreword

The discipline of eye care requires a number of appropriately trained personnel working as a team to deliver comprehensive eye care. The services that are delivered must include the promotion of eye health, the preservation of sight and the prevention of vision loss, restoration of sight when it is lost, the enhancement of vision and functional vision, where feasible and facilitation of rehabilitation through vision substitution. Various cadres of trained personnel, with complementary skills contribute to the work of the team.

In an ideal world, with infinite resources there would be a temptation to use the most highly trained personnel to carry out these tasks. This is neither appropriate nor cost effective, given that human resources for health care comprise the most expensive component of the recurring health budget.

It has been possible to select, train and deploy different cadres of human resources, to carry out tasks in a safe and effective manner to help achieve the goal of eliminating avoidable blindness. One of such cadres is variously referred to as Ophthalmic Assistants, mid level personnel or by their primary functions, such as Nurses, Refractionists etc. Where they exist and function in a stipulated manner, it is acknowledged that they constitute an effective backbone for eye care services. However a critical element to their success lies in the adequacy and appropriateness of the training imparted to them.

There have been several training programmes put in place around the world to train such mid-level personnel depending on the one hand, on the human resource needs for eye care in the country, and the local human resource policies, rules and regulations, on the other.

The Aravind Eye Care System, over the years has developed a cadre of Ophthalmic Assistants who have specific job descriptions. To enable them to perform effectively as part of the eye care team, their training has been task oriented with defined requisite knowledge, skills, competencies and attitudes, to carry out the tasks.

This manual sets out in several sections a step by step method for imparting such task oriented training through didactic, hands on and practical training in real life situations. The sections relate to tasks required of such personnel in different settings in the eye care delivery system such as the out-patient department (general and specialist clinics), wards, operating rooms, optical departments etc. Considerable emphasis has been paid to diagnostic technology, which is increasingly a part of the armamentarium in eye care practice.

Finally the manuals include sections for self assessment as well as for continuing monitoring of the achievements of task oriented objectives. The manual lends itself to translation into local languages where required proficiency in English may not exist. The Human resource Development team at Aravind Eye Care System need to be complimented on their efforts to share there wide and successful experience in this field with others who are already involved in or are planning to venture into such training programmes, particularly in the context of VISION 2020: the Right to Sight.

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Past President, IAPB, Co Chair,
Human Resource Programme Committee, IAPB.

Preface

In recent years there have been significant advances in eye care, both in technology and in the increasing resolution to address the scourge of needless blindness. Achievements in medical technology have vastly improved diagnosis, treatment and surgery in all aspects of eye care, and efforts like the global initiative "VISION 2020: The Right to Sight" -- which calls for the elimination of avoidable blindness by the year 2020 -- have galvanized support for those working to improve the quality of eye care at the grassroots level around the world.

It has become increasingly evident that trained personnel is one of the most important elements in achieving this goal, and that the effective practice of eye care is a team effort that must combine the talents of ophthalmologists, ophthalmic assistants, ophthalmic technicians, orthoptists, counsellors, medical record technicians, maintenance technicians, and others.

Currently the focus in human resource development continues to be on the training of ophthalmologists. But in many successful eye hospitals it has been shown that four or five trained ophthalmic assistants are engaged to supplement and support the work of an ophthalmologist. When such assistants are used effectively by eye care centres, doctors can treat more patients in less time while still ensuring a high standard of care. It is therefore vital that more attention be paid to the structured training of other ophthalmic personnel.

Over the past three decades, Aravind Eye Hospital has developed and refined a system of structured training programmes for ophthalmic assistants and support services personnel. These series were created to bring together the lessons we have learned over the years, and to share our insights with other eye care programmes and the community at large.

Dr. G. Natchiar

Vice-Chairman, Aravind Eye Care System

Blindness Prevalence

World wide it is estimated that at least 38 million people are blind and that an additional 110 million have severely impaired vision. In all, about 150 million people are visually disabled in the world today, and the number is steadily increasing because of population growth and aging. Overall, the data shows that more than 90% of all blind people live in developing countries and that more than two-thirds of all blindness is avoidable (either preventable or curable). Unfortunately, little information is available on the incidence of blindness around the world; it seems probable, however, that there are some 7 million new cases of blindness each year and that despite every intervention, blindness in the world is still increasing by 1 to 2 million cases a year. Thus, trend assessment points to a doubling of world blindness by the year 2020 unless more aggressive intervention is undertaken.

A major cause of preventable blindness is cataract. Presently, an estimated 7 million cataracts are operated on each year. There is a backlog of 16 million cases that have not yet been operated on. If this backlog is to be eliminated in the next two decades... a staggering 32 million cataract operations must be performed annually by the year 2020.

In addition, there must be an improvement in technology because more than 50% of cataract surgeries in the least developed countries today are still performed without intraocular lens implantation. Thus, most of the developing countries need more surgery facilities, supplies and equipment, and an increased number of trained surgeons. Furthermore, particularly in sub-Saharan Africa, India, China and other parts of Asia, the volume of cataract surgeries must increase greatly. Although considerable progress is being made in some of these countries, the provision of good quality, affordable cataract surgery to all those in need will nevertheless remain the main challenge for ophthalmology world wide for many years to come.

An important aspect of combating cataract blindness is human resource development. To increase the efficiency of ophthalmologists in clinical work, further training of support staff such as paramedical ophthalmic assistants, ophthalmic nurses and refractionists is essential.

Introduction

In the past three decades, a number of auxiliary professionals such as ophthalmic assistants, opticians, certified orthoptists, research assistants and ultrasonographers have come to be identified as allied health personnel in ophthalmology. Although each of these groups provides a specific meaningful role in the ophthalmic field, it is the ophthalmic assistant (OA) who carries out or helps with certain tasks that were traditionally and uniformly performed by the ophthalmologist.

These tasks involve collecting data and recording measurements on patients, preparing patients for surgery, assisting with surgery, offering postoperative care, and counseling patients. However, these tasks do not involve any judgments or conclusions such as diagnosis, disposition of treatment, or prescription. Ophthalmic assistants do not (and can not) supplant the physician but rather supplement the ophthalmologist by rendering support services. Their broad areas of work include outpatient and refraction departments, operation theatre, wards, and patient counseling.

The ophthalmic assistants in all these areas make vital contributions to the achievement of high quality, high volume, and financially sustaining eye care in large volume settings.

Ophthalmic Assistant Training

Objective

To provide eye care programmes/hospitals/practitioners in developing areas with lessons learned regarding the work of trained ophthalmic assistants and their critical contributions to high quality, large volume, sustainable eye care.

To describe the valuable role of trained OAs and patient counselors in outpatient and refraction departments, operating theatres, wards and patient counseling. To illustrate ways for existing programmes to increase their volume, quality and sustainability through the development and utilization of paramedical personnel.

To provide curriculum and materials for training the OAs in all areas. To elicit feedback from users regarding the strengths and weaknesses of this first edition.

Definitions

The ophthalmic assistant (OA) is a skilled person whose academic and clinical training qualifies to carry out ophthalmic procedures. These are done under the direction or supervision of an ophthalmologist or a physician licensed to practice medicine and surgery and qualified in ophthalmology.

At Aravind, based on their skills and performance, an ophthalmic assistant with at least five years of experience is upgraded to an ophthalmic technician. At Aravind the term nurse usually refers to registered nurse (RN) fully trained elsewhere in all aspects of nursing care. However, the term is some times used at Aravind in traditional operating theatre terminology, as in scrub nurse, running nurse, etc.

Ophthalmic assistant training

Recognizing the importance of ophthalmic assistants in eye care service delivery, Aravind established its in-house training program to meet its own need for trained Ophthalmic Assistant staff. Yearly two batches of 17 to 19 year old candidates (35-40 students in each batch) who have cleared their high school examinations (plus two) are selected based on the eligibility criteria deemed appropriate by the institution.

Structure of the OA training programme at Aravind

Basic training: Four months observation and classroom learning

Specialisation: Eight months demonstration training and practice

Probationary Period: One year on the job training under constant supervision

The basic training portion includes studies and practice in

- Basic general anatomy and physiology
- Ocular anatomy, eye diseases and emergency management
- Skills such as
 - Visual acuity testing
 - Tonometry
 - Lacrimal duct patency
 - Blood pressure management
 - Bed making
 - Human relations, communication skills and compassion

On completing the four-month basic training, students take one of the specialization courses:

- Outpatient care (OPD)
- Operation theatre assistance
- Inpatient care (Wards)
- Refraction

The next eight months are spent training in the specialty with lectures in the morning and supervised practical work in the afternoon. For the final 12 months, candidates work under close supervision.

The Aravind model of Ophthalmic Assistant staffing

The role of trained Ophthalmic Assistant staff in facilitating high quality, large volume sustainable eye care is central to Aravind's successful large volume eye services. The principle of division of labor helps to maximize the skills of the ophthalmologist by developing a team approach with auxiliary personnel. Efficient eye care service delivery depends on optimum utilization of all categories of resources – human resources, equipment, instruments, beds and financial.

At Aravind, the concept of human resource development evolved in response to increasing need for OAs and to provide adequate clinical experience to develop their professional competence.

Human resource development is one of the important components of large volume eye care. The history of Aravind's Ophthalmic Assistant training can be traced back to 1970-1972 when its founder, Dr. G. Venkataswamy, was Professor and Head, Department of Ophthalmology, Madurai Medical College.

Trained and skilled human resources are critical and therefore must be utilized optimally. Typically, an ophthalmologist's repertoire of work involves administrative tasks, skilled but repetitive tasks, and judgement-based tasks. An ophthalmologist's unique competence lies in judgement-based tasks such as interpreting investigative findings and decision-making tasks such as delineating the line of treatment or surgery.

Administrative and repetitive tasks can often be done (and better also) by a non-ophthalmologist who has been adequately trained.

In large volume eye care programs, efficient and knowledgeable Ophthalmic Assistants play a vital supportive role in many areas of ophthalmic care.

About the Ophthalmic Assistant Training Series (OATS)

The Ophthalmic Assistant Training Series responds to the desire of many organizations and institutions around the world to provide high quality, high volume eye care.

The contribution of the ophthalmic assistants to this work is fundamental.

The Ophthalmic Assistant Training Series is a set of manuals explaining the principles and techniques for increasing high quality, high volume eye care through the use of paramedical staff.

Each module is based on the practices of Aravind Eye Hospitals in South India.

The intent of this series is to provide a format for Ophthalmic Assistant Training based on Aravind Eye Hospital's "best practices", based on over 30 years of growing, changing, and learning from mistakes.

The five modules of OATS

1. Introduction to Basics of Ophthalmic Assisting : This is the foundation of the entire Ophthalmic Assistant Training. All the trainees are given general knowledge and training for the fundamentals necessary for their duties, as well as specific information about all activities required in their work.

2. Clinical Ophthalmic Assisting (Outpatient and Inpatient Services):

Out-patient Department (OPD): This includes theory and practice of initial patient evaluations. An introduction to refraction is presented as well as steps for assisting the doctor.

Ward: This contains all the information necessary for the smooth running of a Ward. Pre and post operative procedures and patient instructions, as well as management of emergency and post operative complications are discussed. Ward set-up and management and laboratory functions are covered.

3. Surgical Ophthalmic Assisting: Contains background and practical steps to the smooth running of a sterile theatre. Personnel requirements, roles and duties of theatre personnel including management of emergencies and medications, and assisting in specific procedures are detailed.

4. Optics and Refraction: All aspects of refractions are covered, including step- by step instruction for subjective and objective refraction, room set up, and equipment required. All types of refractive error are described as well as the methods of assessing them. The theories and practice of visual fields, ultrasonography, contact lens fitting, low vision aids and optical dispensing are included.

5. Role of Counselling in Eye Care Services: Helping patients help themselves. The importance and types of patient interaction are discussed in detail. Basics of communication and specific examples are presented.

About Training in Eye Care Support Services Series (TECSSS)

The Training in Eye Care Support Series (TECSS) responds to the desire of many organizations and institutions around the world to train support services personnel to provide high quality, high volume eye care.

The Training in Eye Care Support Series is a set of manuals explaining the principles and techniques for the effective procedures to be followed by the support services personnel.

Each module is based on the practices of Aravind Eye Hospitals in South India.

The intent of this series is to provide a format for Training in Eye Care Support Services based on Aravind Eye Hospital's "best practices", based on over 30 years of growing, changing, and learning from mistakes.

The three modules of TECSSS

- 1. Housekeeping in Eye Care Services:** The invisible "bottomline" for patient safety and satisfaction. Cleanliness, appearance, maintenance, attitude are all essential for the entire hospital and OPD. Duties, responsibilities and specific tasks are covered.
- 2. Medical Records Management in Eye Care Services - A practical guide :** A complete guide to establishing and running an efficient medical records department: information retrieval, generating statistics, personnel requirements, importance of accuracy.
- 3. Optical Sales and Dispensing:** This gives clear guidance about the various spectacle lenses and frames, how to fit the lens into frame, the technical measurement and sales procedure.

HANDBOOK FOR

SURGICAL OPHTHALMIC ASSISTANTS

(OPERATION ROOM SERVICES)

Ophthalmic Assistant Training Series

Acknowledgements

We take great pleasure in presenting the 'Introduction to Basics of Ophthalmic Assisting' which is the consummation of many years of experience and tireless efforts by Aravind's ophthalmic assistant training department.

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Finally we sincerely thank the senior leadership team of Aravind Eye Care System particularly our Vice –Chairman Dr. Natchiar for the constant support and encouragement.

The Ophthalmic Assistants team

Aravind Eye Care System

HANDBOOK FOR

SURGICAL OPHTHALMIC ASSISTANTS

(OPERATION ROOM SERVICES)

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CHAPTER 1 ORIENTATION TO OPERATION THEATRE

CONTENTS

Aseptic operation theatre location
Orientation to septic operation theatre
Roles of OA in operation theatre
Dress code
Operation theatre discipline

GOALS

To enhance the ophthalmic assistants' understanding of the operation theatre set-up, and its functions

OBJECTIVES

- The OA will be able to
- Describe the OT location
 - Classify different zones in the theatre
 - Estimate allocation of space for surgical rooms
 - Discuss the uses of septic and aseptic operation theatres
 - Formulate the staffing pattern
 - Follow the dress code in theatre
 - Recognize the roles of OAs in theatre
 - Practice operation theatre discipline

CHAPTER 1

Orientation to Operation Theatre

The operation theatre is the heart of an eye hospital. In some hospitals the operation theatre (OT) is called operating room. A team of skilled surgeons, nurses, OAs and anaesthetists operate on and care for patients in OT. Detailed scientific planning is imperative when designing an OT for effective utilisation and also for smooth functioning. When planning the operation theatre location, the placement of both the septic and aseptic theatres is to be finalised. The aseptic theatre can be one or many depending on the volume of operations done in the hospital. In aseptic theatre, cataract and other clean cases are done. Septic theatre is the place where enucleation of eye, dacryocysto rhinostomy and other 'not clean' surgeries are done. It is called a minor theatre because it is small in size compared to aseptic theatre and there is usually only one in a hospital. It is best to have septic theatre away from aseptic theatre.

It is often the theatre personnel who have the best knowledge about arrangement in the OT. The architect needs to work closely with theatre staff at the designing stage, to meet their specific requirements while constructing the OT. The theatre should be designed keeping in mind its future expansion plans.

Planning of the operation theatre

An operation theatre should have

- A high standard of asepsis
- Maximum standards of safety for patients and staff from hazards due to electricity problem, fire etc.
- Optimum utilisation of space and staff time

Aseptic operation theatre location

The location of the operation theatre should be

- Free from general traffic i.e. away from the road side
- Free from noise and other disturbances

- Free from contamination and possible sources of infection especially toilets.
- Closer to the ward so that patients are transferred easily to and from wards.

The OT should have an entry and an exit point for patients. After surgery the patient should be guided out through the exit gate. While planning, the following points should be noted:

1. Patient load

The number of cases optimally expected for various ocular surgeries at a given time must be taken into consideration. In case of larger eye care institutions with high patient turn over, when high volume of patients is expected, OT should be designed in such a way that more than one operation theatre can be working at the same time.

2. Size

The size of each OT is to be functionally optimal. Large size operation rooms will give rise to problems in air conditioning, washing and cleaning. The optimum size is 6 X 6 meters width and it should not be more than 7 X 7 meters in length.

3. Walls and ceiling

These should be made of smooth plaster, and painted in off- white for easy and effective dusting and cleaning. The ceiling should be smooth to avoid any dust settling in it.

4. Floor

Floor should be of smooth surface without many joints and at the same time there should be no stagnation of water after the floor has been washed. Tiles should not be used because they may be slippery for both the patient and staff, especially when there is an emergency.

5. Doors

The OT doors should be wide enough to allow easy movement of patients, equipment, staff and materials. Doors could be of two-leaf type, double acting and at least 2 ½ meters wide.

6. Electricity sockets

All the sockets should be double and a fuse box should be kept in the operating room with provision to increase electrical capacity if needed. The position of the operating table should be decided before placing the electrical sockets. Sockets should be close to the equipment and must be properly earthed. Uncovered wires lying around the floor are hazardous. Socket outlets should be mounted on walls or ceiling or sunk into the floor. This needs to be carefully planned because there may be water leakage problem while cleaning and washing the room with water.

7. Efficient lighting

Efficient lighting is essential in an OT. Electric switches should be 1.5 meters above the floor and switches should be labeled to identify the correct switch and save time.

8. Air conditioning

Air conditioning helps in maintaining an aseptic environment in the OT by allowing only controlled air inside. This helps in providing optimum comfortable environment for surgeons as well as patients. The air conditioning system should be cleaned once, weekly.

9. Generators

The theatre must have an alternative electrical supply (generator) in case of power failure or other emergencies. The operating microscope light and flash autoclave should be capable of being powered by a generator. Generator must be of sufficient capacity to simultaneously support flash autoclave, microscope and other lighting.

If the power supply in the electrical system is not reliable, it is also worth while to put all machinery on to voltage regulators. These stabilise the equipment from fusing off.

10. Water

Water is essential for the effective running of operation theatre. Clean sterile filter water should be used for cleaning the instruments and scrubbing hands before the surgery. Ordinary tap water can be used for cleaning the theatre. If the water supply is unreliable ensure that containers with clean water are available in the scrub area. A separate reserve emergency overhead tank should be provided for the OT and should be periodically cleaned. Periodic microbiological examination of the source of water is essential.

11. Other conditions

Oxygen and nitrous oxide cylinders must be placed in a separate room away from naked flames. Easy access must be possible at all times.

There is always a high risk of fire accident in an operation theatre. Fire extinguishers should be fixed at strategic points.

The OT waste must be disposed after every surgery in a proper way to avoid infections.

B. Operation theatre zones

OT can be divided into 4 zones and they are as follows:

- Sterile zone
- Clean zone
- Protective zone
- Disposal zone

Sterile zone: This zone provides facilities such as

- Operation room
- Scrub room
- Anaesthesia room
- Instrument sterilisation

Clean zone: This zone provides facilities such as

- Pre-operating or block room
- OAs' work room
- Recovery room
- Anaesthesia / medication store

Protective zone: This unit usually provides facilities such as

- Reception room
- Waiting room for relatives of patients
- Dress changing rooms
- Pre anaesthesia room
- General store room
- Main autoclave room
- Trolley lay (store for OT trolleys)
- Control area for electricity

Disposal zone: This zone provides facilities such as

- Dirty / blood stained linen disposal
- Used head caps, masks, and socks disposal

All soiled materials both disposable and non-disposable should move without crossing sterile and clean zones.

C. Operation room set - up

Planning of space for the operating room area:

In the operating area the operating table, an adjustable chair for surgeon, instrument trolley, microscope and other necessary equipment have to be arranged. The sterilisation room should be adjacent to the operating room.

Size of operating table

Length	180cm
Height	70cm
Width	47.05cm

Size of instrument trolley

Length	67cm
Height	90cm
Width	45cm

A working space of 1.2 meters around the operation table is required. More space is needed if the theatre needs an anaesthetic machine, vitrectomy machine, monitor, etc., (Fig1.1).

The operating table must be of an adjustable type and needs to be firm and steady. It must be at a good working height especially if an operating microscope is used.

The surgeon's chair height should be such that it allows space for surgeon's feet to touch the floor

comfortably and to use the microscope foot pedals. Surgeons' chair should be well padded, have wheels in case of movements, adjustable height control and with back support. One bowl-stand for rinsing hands with sterile water and a IV - stand with tray and fluids are to be kept near the table.



Fig . 1.1 - Operation room set - up

Operating microscope

If the operation theatre set up is to be used for teaching purposes, there must be an observer's side scope, C.C.T.V, camera and monitor facility fitted on the operating microscope.

Instruments

There should be different sets of surgical instruments for different ocular surgeries

- Bipolar diathermy with points
- Vitrectomy machine with vitrectomy probes
- Boyle's apparatus for general anesthesia (when needed)

Sub-sterilising area

- a. Instaclave with cheattle forceps and container
- b. Stainless steel basin for cleaning instruments
- c. Electric water drums for boiling water or drum with clean sterile water. Adequate water supply, preferably distilled water, or sterile filter water for cleaning the surgical instruments and flushing the simcoe cannula and other tubes should be available
- d. Soft brush for cleaning surgical instruments
- e. Waste bucket

Scrub area

In the scrubbing area a sink is installed with running water. The sink must be deep enough to enable the staff to comfortably scrub their hands from fingers to elbows. Their hands should not touch the surface of the sink. The height of the tank should be 1 meter from the floor. If there is provision of clean water source, taps should have long knobs, which can be handled with elbows. If this is not available, a sterile water jug is kept for pouring sterile water for hand washing in the scrub area by one of the theatre OAs. There should be sufficient space to keep sterile water jugs, soap, solution, brush etc. The area must be very clean and tidy (Fig 1.2).



Fig . 1.2

Orientation to septic operation theatre

Septic operation theatre is a place where the surgeries with risk of infection are performed, like evisceration, abscess drainage, dacryocystectomy, and dacryocystorhinostomy. It is essential to organise and plan the location of the septic OT to prevent postoperative and intra operative infections in aseptic cases.

Location

It should be away from the main theatre. All the instruments and clothing used in septic OT should be separated from the main theatre by different colour codes.

It should be located at a place with limited access to patients.

- Should be a place from where patients can be easily transferred, but routine clean surgery patients have no access.

- Septic OT should have a separate clothing room and scrub room
- Should have a separate sterilization room away from the main theatre section, to prevent cross infection in places where asepsis is strictly maintained.
- The instruments and eye towels should be sterilised separately from other linen like coats. Sterilisation of septic operation theatre instruments should be in a separate area away from routine sterilisation area.
- Should have good ventilation to prevent infection.
- Most of the surgeries in septic OT are done without a microscope so the lighting system



Fig . 1.3

should give good illumination and be adjustable according to the surgeon's need (Fig. 1.3).

- A flash autoclave should be available to provide routine instruments in between the cases.

Staffing pattern

The OT manager is usually the OT nursing officer. It is the OT manager who takes care of the day to day running and the efficient management of theatres.

The OT manager ensures

- The availability of facilities, equipment, instruments and nursing staff for scheduled surgeries
- Proper care and maintenance of equipment
- Theatre cleanliness and sterility
- Adherence to work discipline
- Maintenance of OT records
- Good working relationships with other departments and administration

Some hospitals with high surgical volume have dedicated staff allocated for theatre. The OT manager obtains the list of surgeries to be done the next day. Under their guidance necessary preparations are done such as allocation of cases to surgeons, OAs duties, instruments to be sterilised, etc.

The number of staff allocated to work in the theatre depends upon workload for the specific operating session: number of surgeons operating, and types of surgery to be performed.

In smaller hospitals, where surgical volume is low or where surgery is done only weekly, they may not have separate staff for OT. Cross-trained OAs will be posted in OT whenever needed. These OAs are cross trained in OP, theater and in the ward. Sometimes an OA is given specialised training in glaucoma or retina clinic and if they are called for OT duty, the department may be reluctant to send them. One solution is to have part-time staff or staff from outside. They are given prior information about surgery, so that they can do necessary preparations for surgery. If OT training is given to all nurses in it will be easier to handle any situation.

Staff allocation in key areas

Operating area

- Scrub OA – two persons per surgeon (if surgeon operates on two tables simultaneously)
- Circulating OA – one person per surgeon
- Local block room – 1-3 persons depending upon the volume of cases
- General anaesthesia – 2 persons

Information board

At the entrance of the OT there is a notice board. The daily operation schedule is displayed. Notice boards are also called information boards. They give information about workload in the theatre for the day, and enable the theatre staff to plan. All hospitals may not have separate operating rooms for different types of surgeries. For example they may perform cataract, orbit and retina surgery in the same theatre and the time schedule is planned accordingly. Retinal surgery may require longer than a simple cataract

surgery, so the OA responsible for setting up of the instrument trolley has to arrange it first and inform the patient the time of operation. The information displayed on the notice board helps the OA to begin the preparations without delay. The name of the operation will determine which drape pack, instrument set and supplies to select. All of the information on the notice board is important to the OA.

The OT information board should have the following details

- A.
 1. Patients name
 2. Medical record number
 3. Eye to be operated
 4. Type of surgery
 5. Name of the surgeon
 6. Name of the anaesthetist for general anaesthesia cases
 7. Name of the physician in case of high risk patients who need monitoring
- B.
 1. Total number of cases
 2. Specific and complicated cases. e.g. high risk cases, high myopia, complicated cataract, traumatic cataract etc
- C.
 1. General anaesthesia cases

Roles of the OA in the operation theatre

The OAs in the operation theatre play different roles for the effective and smooth running of the theatre. The OA may work as a scrub OA or as a circulating OA in the OT.

The circulating OA plays a vital role in providing the smooth flow of patients before, during and after surgery. In the circulating role they help the surgeon. They check the case sheet of the patient to verify that all necessary tests have been completed. The OA helps the doctors giving local anaesthesia and counsels patients about the same. They provide the sterile instruments and supplies needed for surgery. They also function as a vital link in communication between members in the sterile field and the unsterile area including patients' attenders.

The scrub OA

The scrub OA is well trained and familiar with the procedure with which they assist. The OA scrubs, wears sterile gown and enters the sterile field. They arrange the instrument trolley and other emergency instruments which may be needed (like vitrectomy machine in case of posterior capsular rupture). The OA assists the surgeon throughout the surgery by handing over the necessary instruments.

The different roles of the scrub OA in the operation theatre are elaborately dealt in the speciality surgery Chapter.

Dress code in operation theatre

The theatre has a separate dress code. All medical personnel should strictly adapt the dress code inside the theatre and maintain the necessary standards of cleanliness. The theatre staff wears special theatre dress to minimise the risk of cross infection. The medical personnel wear only sterile clothes inside the operation room. They should not move around various zones while wearing sterile clothes as this may cause cross infections. The staff should not leave the OT with theatre linen.

Dress code

- Dress as suitable (gown, pant, shirt)
- The material should be cotton or polyester /cotton for easy washing and drying
- Gown, pant and shirt should have pockets and be available in different sizes like small, medium and large.
- If wearing the trouser suit, the shirt bottom must be tucked in to the trouser.
- Dress should be any light colour preferably light blue, green or pink. (Fig. 1.4 & Fig. 1.4a)

Caps and face masks

Caps must be worn to cover the hair completely

- Hair is a potential source of infection even if it is clean
- Caps can be made out of cotton cloth with an adjustable tie to allow for different head sizes.
- Caps and face masks are available in reusable or disposable form. In high volume set ups reusable



Fig 1.4

Fig 1.4a

masks and caps are used. Disposable caps and face masks can be used but they are costly.

- A separate container is kept outside the OT to collect the used caps and face masks for washing purpose.

Slippers and over shoes

- Before entering the theatre, OT staff should remove personal slippers outside the theatre and they should be kept in the place allocated for them. Mud attached to footwear is a potential source of the microorganism nocardia, which is a common cause of eye infection. Feet must be washed thoroughly. Clean slippers dedicated to OT should be available in various sizes and should be kept at the entrance of the OT. These are also available in disposable forms
- Theatre slippers are normally made up of rubber for easy cleaning
- Slippers should be scrubbed daily after use
- Theatre slippers should not be used outside the theatre

A dedicated theatre OA

- Should have a sense of sincerity, honesty, punctuality and compassion for all the patients.
- Should have sufficient knowledge of medical terms to enable them to write notes.

Operation theatre discipline

The OA should come early before the start of surgery. They are responsible for the operation room

arrangements, arranging the table and instruments. Theatre personnel should wash their hands thoroughly with antiseptic before entering the theatre. Theatre personnel should change into proper OT dress. Dress is to be provided for both male and female staff. Sterile caps and masks should be worn properly. Eating and drinking are strictly prohibited in OT area.

Personal hygiene

- Staff must be meticulous about their own personal hygiene
- Hair and nails must be kept clean and short. If hair is long it must be tucked up neatly
- No nail polish or jewels like rings or bangles may be worn in the theatre
- Cuts and abrasions should be treated and reported to the person in charge, who will decide if action needs to be taken. This will prevent spread of infections both to the patient's eyes and to other patients
- Infectious diseases like common cold should get prompt and complete medical treatment to prevent spread of infection. Most of the infections are caused by droplet spread, so avoid coughing and sneezing in the sterile zone areas.

Patient's hygiene

- Patients coming for surgery should have a bath and wear clean dress
- Before entering the operation theatre they should have their feet thoroughly washed
- A patient with healed diabetic ulcer, Hansen's or other infected diseases should be operated last
- Disposable head cap and over shoes for feet are provided to every patient
- These precautions are taken to prevent spreading infection

Summary

This unit deals with the proper planning of the operation theatre. The theatre area is a sterile place. It must be isolated, well set-up with clean, sterile environment and with all facilities like water, electricity, air-conditioning and dressing rooms. The medical personnel in the theatre should maintain

strict discipline in handling patients and assisting in surgeries. Behavior inside the operation room must be well disciplined to avoid distraction. Personal hygiene of medical personnel must be maintained and the patient should also be instructed in the proper manner to avoid spread of infections both to themselves and to the medical personnel. The OAs play a vital role in making preliminary arrangements for the surgery; their early presence in the operation theatre will support the smooth flow of all the activities. They should foster certain qualities like punctuality, discipline, personal hygiene, and, above all, the commitment to their profession.

Key points to remember

- *Operation theatre should be located away from pollution (noise, air and dust)*
- *The attenders / visitors are not allowed to stand in front of the operation theatre*
- *The OA checks the working condition of the equipment, electric connections, etc. prior to surgery*
- *The OA takes responsibility to make arrangements for the repair and replacement of equipment and instruments.*
- *An extra supply of instruments should be available when needed.*
- *An extra supply of all operation theatre clothes must be available for visitors and staff.*
- *The OAs should follow theatre discipline.*

Student exercises

I. Answer the following

1. *Write a short note about the location of operation theatre*
2. *Give details about the 4 zones of OT*
3. *Briefly explain about the septic OT*
4. *Write in detail about the dress code in OT*

II. Write true / false

1. *Tiles should be used on the OT floor*
2. *Sterilisation of septic operation theatre instruments need not be separate from routine main theatre instruments.*
3. *Circulating OA normally assists the surgeon.*

CHAPTER 2 THEATRE MANAGEMENT

CONTENTS

Role of OA as theatre manager
Registers and records
Providing quality assurance

GOALS

To enhance the ophthalmic assistant's knowledge about theatre management

OBJECTIVES

The OA will be able to

- Describe the responsibilities of the theatre manager
- Discuss about the registers and records maintained in the operation theatre

CHAPTER 2

Theatre Management

A well run operation theatre requires an untiring and energetic theatre manager. The person in charge is ultimately responsible for the effective day to day running of the theatre, and maintaining high standards at all times. The responsibilities of Operation Theatre manager are both administrative and educational in nature.

Specific responsibilities are

- To maintain a safe environment for the patients and staff.
- To ensure that the theatre runs to a high standard and sterility is not compromised.
- To ensure that all equipment is well maintained and damaged equipment or instruments are removed and sent for repair, informing the surgeon whenever necessary.
- To be aware of any infection caused by incorrect sterilisation or poor scrub technique.
- To observe and guide staff who need to be corrected in their techniques within the theatre.
- To maintain stores, order equipment when necessary and inform the ophthalmologist of any shortage.
- To check the theatre running stock and equipment before session commences.
- To support the ophthalmologist in the introduction of new ideas, techniques, and leadership of the team.
- To develop and maintain an applicable theatre manual with the assistance of other theatre OAs.
- To develop and supervise in-service education
- To report to the ophthalmologist any changes of staff, need for new staff or other action that may affect the running of the theatre.
- To allocate a deputy to run the theatre in their absence.

- To be aware of staff skills, potentials and ambitions, and help to develop the same as suitable.
- To assist new clinical staff with orientation.

In a smaller unit, the person in charge may also act as the circulating OA and take on responsibilities during the operation.

The theatre manager has to prepare the operation list. Efforts should be made to ensure that the cases are not postponed due to lack of sterilised instruments or shortage of theatre staff. The time between two cases in the OT must be minimal. It is important to ensure that there is no loss in operating time. Sterilised instruments must be ready in advance. If OAs in the theatre room are gowned and gloved, before the patient is sent inside the OT the duration of occupancy of the operation theatre by a particular patient will be considerably reduced.

The theatre manager is responsible for maintaining registers. They have to document/ record everything that happens in the theatre for future reference and also for hospital administrative purposes.

Role of OA as theatre manager

The OT manager must maintain various registers for different purposes.

The purpose is to keep a written record of the operations performed per year. The following data is required:

- Name of the patient
- Medical record (case sheet) number
- Date of operation
- Age and sex of patient
- Operation performed
- Complications occurring during surgery
- Name of surgeon

Each surgeon is responsible for maintaining a record of operations they perform. Theatre manager also enters the details in a register. Entries to the record should be made daily, and summaries compiled regularly by the theatre manager.

There should be a separate register for the following

- Weekly summary of operations performed by each surgeon.
- Monthly summary of the operations performed in each category using the following data:
 - Category
 - Number
 - Name of the surgeon
 - Complications
 - Patient's name and medical record number

These details will provide a comparison to figures from previous years and can be used for research statistics and surgery audits. An operating register can be written in a book, or it can be in a computerised system.

1. Written record

Advantages

- Simple
- Easy to use
- Reliable

Limitations

- Does not hold much information
- Sometimes illegible
- Difficult to trace the information quickly
- Bulky to store

2. Computer record

Advantages

- Holds more information if a good data system is used
- Annual, monthly and weekly statistics are easily obtained

- Excellent for research and recalling information, e.g. lost patient numbers
- Audit of surgical results.

Limitations

- Expensive
- Difficult to maintain
- Initially needs a manual back-up, thus not time saving

Register and records

The theatre manager must carefully maintain

- a. Stock register
- b. Staff meeting register

Stock register

All the materials needed for the theatre should be stored in the store room and the theatre manager should have control over it. A stock register is maintained and all entries must be registered. Stock cards should be maintained. The stock should have all the following details.

- Name of the equipment/instrument
- Serial numbers (necessary for hospital insurance policy)
- Cost of item
- Date of purchase
- Manufacturer's details
- Spare parts required for its maintenance

Staff meeting register

Theatre staff meetings

These are held on a regular basis when the theatre is quiet. They allow the staff time to air their thoughts. The meetings also allow time to introduce and inform staff about changes that may be occurring. Staff meetings can be department based (that is just for theatre staff) or with staff from other areas, e.g. clinic, ward, etc., It is advisable to hold these general meetings from time to time for the staff to review their work, contribute ideas, introduce new

techniques and to suggest new policies. New staff should be introduced to all the staff members. The minutes of the meeting are to be recorded and maintained in the register.

Education

Class room teaching is necessary but it will remain theoretical unless it is applied and interpreted in actual assistance in the theatre. The theatre manager should be a good role model for the junior OAs. The manager should tell them how to handle difficult situations and ensure smooth running of the OT. The manager must illustrate the instructions with examples, answer questions and give assignments. Even at times of emergencies they have to control emotions and face them with positive attitude. The theatre manager is responsible to teach and maintain discipline among the theatre staff. The decorum of the theatre is to be maintained at all times.

Mentoring

A mentor is assigned to the new recruit. The mentor is an experienced and reliable member of the theatre who works and trains the new member, during the probationary period. The mentor's teaching ability can also be assessed by the theatre manager.

Practical instruction

Practical training can be carried out initially by the mentor during the probationary period. The new recruit learns by watching and listening and gains more confidence by being with their mentor. Slowly they begin to take an active part in procedures. The experienced person should always be ready to offer support. This can take several operating sessions but has been found to be a very effective and safe way of teaching. The surgeon should be informed that a new colleague has joined them at the operating table.

Assessment

Assessment is useful for measuring staff progress and development. It is intended to assess the extent to which the employee's performance meets the requirements of a particular position, and to establish goals for the future.

Staff appraisals

Staff appraisals are designed to encourage effective communication among the staff about their work and potential; to provide recognition for good performance; to establish how performance can be improved; and to identify potential and agree on areas where staff needs further training and development. This could be conducted annually and the results checked. The potential of staff members can be developed by annual appraisal.

In-service training

The theatre managers must ensure that staff is kept well informed on new ideas, new equipment and surgical techniques. It is the theatre manager's responsibility to coordinate in-service training, encourage potential and further learning. The training programme must be based on the requirement of the staff. A custom-designed programme could be provided to the staff to sharpen their skills. New duties should be assigned to the staff only when knowledge base, skills and confidence are established. Each member of the operating team including the junior most OAs should be put through progressive training to bring them to a high level of efficiency. Training and education are ongoing disciplines for both the teachers and the learners. Reinforcement and encouragement is essential for successful continuing education.

New staff

When a new member is allocated to theatre they should be assigned a mentor, and learning objectives. The objectives should cover the basics of sterility, infection control and patient care in the theatre. These set a standard of work achievable in the probationary period.

Probationary period

This can vary in length, depending upon the workload, and the OA's experience. Generally, three months will give the theatre manager a good idea of the new member's standard of work and interest in

theatre work. The theatre manager should be able to find the potentials of the new comers and give training according to their capacity.

Providing quality assurance

The department should always be striving for the highest level of product and service quality and patient satisfaction as well as the satisfaction of the staff of the hospital. The process requires the CSSD to achieve standards of practice that meet the expectations of their customers (patients and hospital staff). It is important that CCSD staff be involved in developing a quality assurance protocol for the department so that the department can provide the best quality of products and services for its customers.

Monitoring: To ensure that instruments and supplies are sterile when used and the sterility of the operation theatre complex is maintained monitoring of the sterilisation process is essential.

Administrative monitoring

These consist of the written policies and procedures that are to be followed inside the operation theatre. It is necessary to stick to them strictly to ensure the sterility of the operation theatre as well as the sterile items. These policies should be constantly reviewed in case of any doubts. The person in charge should ensure the following of them. Policies and procedures can pertain to;

- Cleaning of all reusable items.
- Sterilisation methods for different types of items.
- Packaging, loading and unloading of materials into the sterilisers.
- Transferring of unsterile items to unsterile zone and sterile items to the sterile zone.
- Maintenance of record for each cycle of sterilisation
- Scrubbing procedures for the personnel.
- Attire to be followed in the operation theatre.
- Number of personnel in the operation theatre at any given time.

Mechanical indicators (for sterilisers)

To ensure the sterilisation of the items is achieved, certain indicators are incorporated into the sterilisers by the manufacturers, such as:

- Gauges, thermometers, timers, recorders, and/or other devices that monitor their functions.
- Automatic controls and locking devices present in some sterilisers.
- Alarm systems indicating improper closure of the doors or too much of loads or improper functioning of the sterilisers.

Test packs (Bowie-Dick test) should be run daily to monitor functions of each sterilizer, as appropriate. These can identify process errors in packing or loading.

Chemical indicators

A chemical indicator on a package verifies exposure to a sterilisation process. An indicator should be clearly visible on the outside of every on-site sterilized package. This helps differentiate sterilized from unsterilised items. More importantly, it helps monitor physical conditions within the sterilizer to alert personnel if the process has been inadequate. An indicator may be placed inside a package in a position most likely to be difficult for the sterilant to penetrate. A chemical indicator can detect sterilizer malfunction or human error in packaging or loading the sterilizer. If a chemical reaction on the indicator does not show expected results, the item should not be used. Several types of chemical indicators such as tape, labels, and paper strips that change colour when exposed to one or more process parameters are available.

Biological indicators

Positive assurance that sterilisation conditions have been achieved can be obtained only through a biologic control test.

A biological indicator consists of live spores that are resistant to the sterilising agent. They are available

in the form of a self-contained system, in dry spore strips, discs in envelopes, sealed vials, ampoules of spores to be sterilised and a control that is not sterilised. Some incorporate a chemical indicator also. These are then taken to the microbiological laboratory for testing.

The indicators should be used to test run new a steriliser or after major repairs. And after that the test should be repeated every month. It is important to maintain record of all the results. This will help in prevention of an outbreak or early detection of an outbreak.

The aim of microbiological cultures is to monitor the quality of air. Too much reliance on such indicators is not advisable. It is better to strictly follow the protocols of cleaning. Microbiologically cultures can be carried in cases of out break of cluster infection.

Human resources

Quality should always be holistic. Therefore, emphasis on human resources and vigilance on policies and procedures and scrupulous monitoring is essential.

Ideally every CSSD should have personnel trained in this subject. Alternatively, the hospital can devise its own training programme. The programme should be comprehensive and should include principles, significance and necessity of sterilisation, maintenance of sterile environment and asepsis and disinfection practices.

The staff of CSSD should not be rotated, if possible. This instils a sense of responsibility in them and would ensure smooth work flow in the operation theatre complex.

Well defined and clear job description is necessary to maintain the quality of services of this department.

Regular and productive staff meetings are the key to ensure good quality of service. The employees should be given a chance to voice their opinion and concerns and can also be updated on the policies. The infection rates are also to be monitored and communicated to all involved in the meetings.

All these procedures all serve to minimize contamination and prevent accidents.

Summary

Theatre in any hospital plays a crucial role, especially in an eye hospital. The theatre manager has to shoulder a number of responsibilities and play their role effectively for the smooth running of the theatre. They have to maintain records and registers meticulously, so that whenever needed, appropriate reports can be generated. The manager is to conduct meetings regularly, not only to inform the OA about the happenings of the hospital but to have them contribute to the growth of the institution. These meetings help the trainees understand the culture of the institution. Waste management has to be handled effectively. Theatre has to be clean and tidy and be free from any type of infection.

Key points to remember

- *Theatre manager ensures a safe environment for the patients and staff*
- *A high standard of cleanliness and sterility must be maintained*
- *They must ensure that proper scrub technique is followed*
- *They are responsible to observe and correct any shortcomings in the staff*
- *New OA trainees are to be oriented and provided with a continuing education programme*

Student exercise

Answer the following

1. *What are the specific responsibilities of theatre manager?*
2. *List the five elements in theatre discipline.*
3. *List three records maintained in the operation theatre and their importance*
4. *Discuss the importance of theatre staff meetings.*

CHAPTER 3 DISINFECTION AND STERILISATION PROCEDURES

CONTENTS

Instrument cleaning and packing for sterilisation
Methods of sterilisation
Maintainence of sterility
Control of air borne infection
Decontamination process
Sterilisation of phaco emulsification instruments
Scrubbing, gowning and gloving methods
Operation theatre cleaning
Infection control

GOALS

To enhance the OAs understanding of the underlying concepts in disinfection and sterilisation and to perform these procedures effectively.

OBJECTIVES

The ophthalmic assistant (OA) will be able to

- Demonstrate practical applications of sterilisation techniques
- Perform packing and loading the sterilisers
- State the steps in preparing sterile instruments for surgery
- Illustrate the procedure for wearing and removing gloves and gown
- Analyse the source of contamination and practice infection control measures

CHAPTER 3

Disinfection and Sterilisation Procedures

Disinfection is a process where most, but not necessarily all pathogenic organisms are destroyed.

Methods of disinfection

- Physical e.g. boiling (kills vegetative bacteria but not spores)
- Chemical e.g. alcohols
 - Aldehydes
 - Phenolics
 - Halogens

Disinfectants used on living tissue (skin) are called antiseptics.

Asepsis: is a technique aimed at preventing infection by eliminating micro-organisms.

Methods of asepsis

- Following proper hand scrubbing technique prior to surgery
- Proper sterilisation of instruments
- Use of sterilised fluid for surgery
- Proper preparation of the patient's operation site.

Instrument cleaning and packing for Sterilisation

Sterilisation is defined as a process by which an article, surface or medium is made free from all micro-organisms including spores. It is much superior to disinfection.

The goal of sterilisation is to reduce the bacterial load in the operating room and prevent postoperative infections, a dreaded complication of any ophthalmic surgery. For the type of sterilisation the following parameters have to be considered

- a. Nature of materials to be sterilised
- b. Processes used

The sterilisation method depends on

1. Bio-burden - degree of contamination
2. Bio-resistance - heat or moisture sensitivity and product stability
3. Bio-shielding - nature of materials used for packing and their response towards sterilisation
4. Density - factors affecting penetration

Type of instrument	Level of infection	Categories	Method of disinfection
These come in contact with sterile tissues and blood system e.g. surgical instruments and gloves	Most serious	Critical	Sterilisation
These come in contact with mucous membrane and non intact skin e.g. scissors, cryoprobe, forceps, etc	Moderate	Semi critical	Highest level of Disinfection High level disinfection
These come in contact the intact skin e.g. hand hygiene	Mild	Non critical	Aseptic measures

Parameters

Two parameters must be considered for all types of sterilisation

- Product associated considerations
 - Bio burden - degree of contamination
 - Bio resistance - heat or moisture sensitivity
 - Bio shielding - characteristics of packaging
 - Density - factors affecting penetration
- Process associated considerations
 - Time
 - Temperature
 - Purity of agent and air
 - Penetration
 - Capacity of steriliser

Associated processes

- Temperature to achieve sterilisation
- Duration
- Concentration of the agent
- Capacity of steriliser

Methods of sterilisation

Agents of sterilisation can be classified as

1. Physical agent
2. Chemical agent

1. Physical agent

- A. Dry heat sterilisation
- B. Moist heat sterilisation

A. Dry heat (Hot air oven)

Dry heat in the form of hot air is used to sterilise items that steam or ethylene oxide gas cannot penetrate. E.g. Bulk powder, petroleum products. Death of microbial life by dry heat is caused by physical oxidation or slow burning by coagulating the proteins in the cells. The time for the sterilisation is one hour and the temperature has to be 340°F.

Advantages

- Hot air penetrates certain substances that steam or gas cannot penetrate.
- Dry heat can be used in laboratories to sterilise glassware
- Dry heat is a protective method to sterilise delicate instruments
- Instruments that cannot be disassembled can be sterilised in hot air
- Carbon steel does not become corroded or discoloured by dry heat

B). Moist heat

Boiling

All pathogenic organisms are killed by 15 minutes of boiling at 100°C. The instruments should be cleaned properly in distilled water or clean water before they are placed in the steriliser as blood or pus prevents the organisms from being killed. Protect the tips of delicate instruments with rubber tubing. Put the instruments gently in a tray with holes at the bottom to allow the boiling water to circulate. Allow the instruments to boil for 10 minutes. The lid of the steriliser should not be opened during the period (Fig 3.1).



Fig. 3.1- Boiling of instruments

Autoclave

This is a safe method of sterilisation. The mechanism is steam under pressure. Steam is water vapor. It gets saturated when it contains a maximum amount of water vapor. Direct saturated steam contact is the basis of the steam sterilisation process (Fig 3.2).



Fig . 3.2 - Autoclave

The steam must penetrate every part of the item to be sterilised for a specified time at the required temperature. Steam kills organisms by coagulation of the cell proteins. The steam will penetrate and kill the organisms. Materials which may be sterilised by autoclave include: linen, instruments, rubber, liquids etc. The timing of autoclave depends upon the type of materials.

	Pressure	Temp	Time
Linen and instruments	15pounds	121 ^o c	30min
Rubber items	15pounds	121 ^o c	10min
Liquids	15pounds	121 ^o c	10min

Bowie dick test

To check whether the autoclave is functioning correctly, a special test run is done. 30 towels are arranged in a pile. Autoclave tape is placed on the top, middle and bottom towels. The towels are made into a tight pack and the test run performed. The autoclave tape should change colour on all three towels if it is functioning properly.

Packing of bins for autoclaving

Instruments should be thoroughly cleaned by washing in warm water. A tooth brush can be used to clean delicate instruments. An ultrasonic cleaner can also be used to clean delicate instruments; it is especially useful for unblocking cannulae. Care should be taken not to damage the tips. Rubber tubing should be used to protect the delicate tips of instruments.

Rubber items should not be folded and should be kept separately from metal instruments to prevent damage. Bottles are placed in a bin over a linen cloth.

All the detachable items are disassembled. Oil and lubricants are to be wiped off well because steam or gas will not penetrate. Each set must be separated and put in trays. The trays are placed inside the bin after spreading a towel. Place one towel with autoclave tape on the bottom, middle and top of the bin. The bin is closed and the holes are kept open so that steam can penetrate inside the bin. If the holes are closed, sterilisation will not occur. (Fig. 3.3)

- Hinged instruments must be kept open with box locks unlocked to permit steam contact on all surfaces
- Instrument must be placed in a perforated tray to allow steam penetration
- Sharp and delicate instruments are kept at the top of the tray
- Loose packing and space between items is very important for easy circulation and penetration of steam



Fig. 3.3 - Packing of bins

- Name of the item, date of sterilisation, date of expiry should be noted on each package
- Do not load liquids with instruments because the sterilisation time is different. Set the correct pressure and timing. Close the door of the autoclave and switch on
- **Linen:** Gowns are folded in such a way that the inside part faces outside so the surgeons and the OAs put on the gown without touching the outside portion. While folding the eye towels the holes must be visible. Avoid packing items too tightly to enable steam penetration to each layer of the liners.

Unloading the autoclave

Once the cycle is complete, switch off the autoclave and allow the pressure to come down. Open the door slowly (Fig 3.4).

- The holes of the bin are to be closed to prevent entry of micro-organisms and avoid contact with unsterile areas. Items are taken out using clean linen to prevent burning of the hands.
- The sterile items are to be stored in their designated place.



Fig.3.4 - Unloading the autoclave

Control measure

A biological test can be done for positive assurance that sterilisation conditions are achieved either by steam pressure, gas sterilisation or hot air oven. One

spore strip can be placed at the bottom of the bin and sterilise in a routine cycle. Once the cycle is completed the spore strip is removed and sent to the laboratory for analysis.

Flash autoclave

Prevacuum high-speed autoclave

The pre-vacuum high temperature autoclave requires the least time to sterilise a single load. The flash autoclave is an example. This is commonly used to sterilise instruments in between surgeries. All the air is evacuated using a vacuum pump before admitting steam. This causes rapid rise of temperature to 134°C. It permits instant steam penetration. The sterilisation time is reduced to fifteen minutes. The cycle is timed automatically.

Advantages of steam sterilisation

- The easiest, safest and surest method of sterilisation
- The fastest method
- Less expensive and easily supplied
- Automatically controlled
- Not left with harmful residue

Maintenance of sterility

Shelf life

Items are considered sterile only for a certain length of time. This is known as the shelf life of the item. The older stock must be used first. This can be achieved by placing the older stock in the front and the newer stock behind. The sterility of the item depends upon the type of package, use of dust covers, storing it in closed shelves, number of times it is handled and the condition of the storage area: cleanliness, humidity, temperature.

Indicators

Sterilisation tape must be used and checked to ensure that item has been exposed to the sterilisation process. Expiry dates or dates of autoclaving should be noted.

Contamination

The contamination of an item is due to it becoming wet, damaged, and broken or to the expiry of its shelf life. Contamination is more likely with increased handling. The sterile wrapping, i.e.: paper, material or plastic, acts as a barrier to the possible entry of micro organisms. If the package has been opened, purchased or damaged by water the contents are no longer sterile. Such items are considered non-sterile regardless of expiry date.

Handling

Sterile items should be handled only by scrubbed and gloved personnel. This applies to instruments, any intraocular lenses, prosthetic shells, cellulose swabs, etc.

An instrument should be passed to the surgeon in such a way that he/ she can take hold of it by its body. Only the tip of the instrument should come into contact with the patient's eye and should never be touched by the surgeon or scrub nurse.

Important points to remember

- All items must be labelled with the date of sterilisation.
- All items have an expiry date.
- All items must be inspected before use to ensure there are tears, punctures, open seams, moisture, soiling from being dropped on the floor, etc.
- Once a package has been opened, it is no longer considered sterile, whether or not its contents are used.
- Don't store non-sterile items with sterile items.
- If the sterility of an item cannot be assessed, it must be re-sterilised or discarded.
- In the processing and sterilisation areas, personnel can be burned when operating steam sterilisers or heat sealers and can be exposed to high levels of ETO. Be aware that many areas of a steam steriliser are hot.

Summary of sterilisation of certain items

Items	Type of sterilisation
Linen	Autoclaving
Glass	Autoclaving / Dry heat
Heat labile	ETO
Heat resistant	Autoclaving
Plastic	ETO
Sharp instruments	ETO / autoclaving / Chemical
Intra ocular lens	ETO
Sutures	ETO
Diathermy, Cautery	Autoclaving / chemical
Endoilluminators/probes	ETO
Silicon oil, buckles, sponges	Autoclaving

Control of airborne infection

Air in the operation room

The most effective way of preventing airborne infection is having air changes, laminar flow and use of filters in the air conditioners.

The air conditioning system must be designed to minimize air borne bacteria from entering the sterile field. The Air should flow out from Zone 1 to Zone 2 to Zone 3. In other words the Air pressure should be highest in Zone 1.

Air changes: It is recommended to have 20 air cycles per hour. Fresh air change every 3-4 cycles is recommended. The ventilation in the OT should not allow the outside air to enter the operating room.

Ventilatory systems: They help in maintaining the sterile atmosphere in the OT.

Laminar flow: The laminar flow can be either vertical or horizontal, though the vertical is more effective. It is usually restricted to an area in the centre of operating room (room within a room) and needs

100% coverage of High Efficiency Particulate Air (HEPA) filters. The air is passed through the HEPA filters from ceiling downwards. Horizontal flow is through the walls and is easier to install. It provides 400 air changes per hour. It is recommended for prosthetic surgeries.

Precautions to be taken in operation theatre

- Injuries due to slippery floors, cluttered corridors and improper precaution while cleaning instruments should be minimised.
- Height of all the furniture should be as high as the operation theatre table. This is known as the level of sterility.
- A separate breakout or unpacking area should be maintained to hold deliveries until the exterior shipping cartons can be opened and the contents removed in a safe and controlled manner.

Exterior shipping cartons have been exposed to many environments (in warehouses, on docks, in trucks), are usually made of corrugated porous material, and must be considered heavily contaminated and should not be brought into the CSSD.

Decontamination process

It is carried out prior to any kind of sterilisation. This reduces the contamination of the instruments.

Transport

The reusable items should be collected and taken to the decontamination area in such a way that avoids the contamination of the personnel or any area of the hospital. The equipment collected should be moved in trolleys or containers.

Attire

Soiled, reusable medical/surgical items are considered to be contaminated with bacteria and other micro organisms, which can cause illness to the staff. The

personnel handling these items should wear protective clothing which includes a scrub dress, mask, cap and gloves. In certain areas, goggles, shoe covers and moisture resistant barriers are desirable.

Sorting

Surgical instruments differ in configuration from plain surfaces to complicated instruments which include locks, hinges; blind holes etc. depending on the type of cleaning, items are to be sorted out. Contaminated instruments must be handles as little as possible. The sorting could be minimized to separating sharp instruments from blunt and discarding disposables or non-usable.

Soaking

Certain instruments maybe required to be soaked such as lumens or very bloody instruments. Rinsing alone would not suffice.

At all times, be alert for hazards such as sticks from needles, scalpels and other sharp instruments and glassware in the decontamination area. Never reach into liquid to retrieve items.

Washing

The detergent used should be used as specified by the manufacturer or a disinfectant like chlorhexidine can be used. The items can be washed in an ultrasonic cleaner and manually cleaned

Manual cleaning

All the items are to be cleaned with disinfectant like chlorhexidine or povidone iodine prior to sterilisation. Four bowls, one with disinfectant and the three with clean distilled water are used for cleaning purposes. The tray of used instruments is emptied out into a bowl of disinfectant. Using soft brush debris deposited is removed from the instruments. This the n followed by three rinses of distilled water thoroughly. For hinged instruments such as scissors etc. a lubricant is used after the final rinse. Care should be taken to remove the excess lubricant else steam would not penetrate.

Ultrasonic cleaner

It is used for cleaning instruments which are contaminated with lot of blood and cannulated instruments. The instruments must be completely immersed in cleaning solution. The tank should be filled to one inch above the top of the instruments tray. Suitable detergent, as specified by the manufacturer, is added. The temperature of the water further enhances the action of the detergent. The instruments should not overlap when immersed in the water. This is to be followed by manual cleaning.

2. Chemical agents

Chemical agents destroy micro-organism by protein coagulation and breaching the cell membrane.

A. Ethylene oxide gas sterilisation (E.T.O)

Ethylene Oxide is an effective gas for sterilising instruments and other materials which would otherwise be damaged by hot air, steam or other chemical disinfectants. Vitroprobe, cryoprobe, fibrotic light, lenses, sutures are the materials that require gas sterilisation.

After the sterilisation, the articles are kept outside for 24 hrs or 8 hrs in an aerator. This removes the residue of ethylene oxide.

Preparations for gas sterilisation

- Any lubricant should be removed from instruments as the gas cannot penetrate.
- All items should be cleaned and dried well.
- Detachable items should be disassembled.
- Make sure items are dried thoroughly before packing as water and ethylene oxide form a harmful gas.
- Dennison wrapper or polythene bag can be used for packing. Inspect the bags for damage before packing.
- Before sealing the bag makes sure there is no air inside to avoid rupture when vacuum forms in the steriliser.

- Do not use penetrating objects like pins, stapler, paper clips, etc. for sealing as this will damage the pack and contaminate the contents.
- Name of the item, sterilisation date, and expiry date should be written on each pack.
- Items should be loaded in steriliser carefully to allow free circulation and penetration of gas.
- Avoid overloading. There should be space between the chamber ceiling and the top of the packaged items. They should not touch the wall of the steriliser.

Advantages of E.T.O sterilisation

- a. It causes minimal damage to materials
- b. It can sterilise materials that cannot be sterilised by other methods
- c. Effective against all organisms
- d. Achieves good penetration

Disadvantages of E.T.O

- It is a slow and costly method
- It is flammable and toxic

B. Activated glutaraldehyde

This is a safe method of sterilisation for heat sensitive items. Complete immersion of instruments in activated glutaraldehyde for eight hours kills all micro-organisms including spores. Rinse and clean the instruments thoroughly in distilled water after sterilising.

Advantages

- It is non- corrosive and non- staining
- It is not absorbed by rubber articles or plastic
- It can be reused throughout its effective activation period
- Glutaraldehyde is effective at room temperature

C. Formaline sterilisation

Formaline (Fig 3.5) is used for fumigation of the operation theatre. It destroys all micro-organisms and it is available in liquid and tablet form. Apart from

fumigation, formaline is used to sterilise some heat sensitive items. The sterilisation time is 12 to 24 hours. The main disadvantage is that formaline irritates eyes and skin and is also carcinogenic.



Fig. 3.5 - Formaline

D. Alcohol (70% Isopropyl alcohol)

This destroys micro-organisms by protein denaturation but does not destroy spores. It is commonly used as a hand disinfectant and evaporates quickly.

E. Povidone Iodine

This is used for surface disinfection. 10% povidone iodine is used for hand scrubbing and skin preparation of the patient prior to surgery. 0.5% povidone iodine is used as eye drops prior to surgery.

F. Dettol (antiseptic)

Dettol destroys micro-organisms. It is used for floor cleaning in a dilution of 1:40 (1 part of dettol and 40 part of water).

Sterilisation of phacoemulsification Instruments

Failure to perform cleaning procedure after each surgery may result in patient injury.

The drip is removed from the drip chamber. The irrigation tubing is disconnected from it. The

irrigation aspiration tube is disconnected from the handpiece. The handpieces are unplugged from the console. The tubing are flushed with saline solution before switching off the machine and the saline collected in a bin.

Cleaning of the components

All cleaning procedures must be done immediately after each surgical procedure; otherwise, tissue debris and salts from the saline irrigating solution may collect and cause permanent damage.

Ultrasonic handpiece

The handpiece is wiped with a soft non abrasive cloth and distilled or sterile water to remove residual tissue

Both the irrigation and aspiration ports are flushed twice with a 20 cc syringe filled with warm distilled or sterile water. It is repeated with air.

Irrigation and aspiration handpiece

Clean the hand pieces, tips and sleeve with gauze piece dipped in isopropyl alcohol or any antiseptic. Thoroughly flush all the handpieces, components and tips with distilled or sterile water.

Disassemble irrigation and aspiration handpiece and remove tip from the handpiece.

Tips and sleeve are usually disposable ones. But they can be re used if properly sterilised. The tip should be connected to a syringe and flushed with water. Similarly, the sleeve is also flushed with water.

All are then packed into trays for steam sterilisation. Care should be taken to wrap the tubing and handpieces separately in a cloth i.e. the metal components should not come in contact with the wire.

Sterility of OT

The sterility of the theatre is checked microbiologically. Monthly cultures are taken by open plate technique to check for the growth of bacteria and fungus. In this method blood agar plates and saboraud dextrose agar plates are opened on the front

and back tables of the operation rooms for half an hour. The plates are then incubated for 24-48 hrs. If the colony count is the less than 20, then the theatre is considered sterile and satisfactory.

Sterilisation procedures and maintaining a sterile environment is a team effort and every member including the surgeon, theatre staff and housekeeping must contribute to the achievement of a sterile environment. One small lapse in the chain can lead to disastrous results. Sterilisation is an ongoing procedure with day-to-day monitoring.

Key points to remember

1. Do not overload the autoclave as steam cannot penetrate a dense chamber
2. Ensure that holes of all bins are open
3. Set the correct pressure and timing
4. While unloading, close the holes of the bins immediately to prevent microorganisms from entering. Avoid any contact with unsterile areas
5. All areas and equipment in the operation theatre should be cleaned thoroughly on a regular basis

Students exercise

Answer the following

1. What is the definition of sterilisation?
2. Describe how to achieve asepsis in OT
3. What are the different methods of sterilisation?
4. Explain in detail about the autoclave method
5. What are the advantages and disadvantages of E.T.O. sterilisation?
6. Under supervision, practice scrubbing, gloving and post surgical instrument removal and cleaning
7. Explain how to pack the bins for autoclaving

Scrubbing, gowning, gloving procedure

Definition

Surgical scrubbing is the process of removing as many micro-organisms as possible from the hands and arms

by following a standard hand-wash technique before starting any surgical procedure. The aim of scrubbing is:

- To minimize cross infection
- To provide a sterile field

Materials needed for hand scrub

- Anti microbial agent like soap, chlorhexidine 4% or povidine Iodine 10%
- Sterile water in a sterile container
- Timer

Preparation prior to scrub

- Adjust the theatre attire
- Inspect hands for cuts and abrasions
- Remove jewelry like rings, wrist watch, etc.
- Remove fingernail polish
- Clip the nails whenever necessary

Procedure of surgical scrub

- Wet the hands and arms using sterile water.
- Apply soap and scrub each side for two minutes. This preliminary wash removes any hand cream or oil on the surface of the skin.
- Take a sterile nail brush. The brush is used only on the fingernails. Take care that the nails are thoroughly cleaned.
- Rinse the hands with sterile water by draining water from fingers to elbow
- Take 5ml of hibiscrub and scrub the same way as before, taking two minutes for each arm.
- Rinse the hands the same way as mentioned above
- Reapply another 5 ml of hibiscrub and repeat.
- Avoid touching any unsterile area with your hands (Fig. 3.6 & Fig. 3.6a).

Dry your hands as follows

- The palm is dried with a sterile towel and then each finger
- Next dry the arms from the wrist to elbow. The surface of the towel



Fig. 3.6 - Washing the hands



Fig. 3.6a - Drying the arm

- Which dries the arms should not contact the hands
- The towel is then dropped into the appropriate receptacle

Gowning procedure

1. Pick up sterile gown at the neckline / shoulders, lift straight up and hold away from the body
2. Allow gown to unfold completely. Do not shake.
3. Slip both hands into arm holes through sleeves by raising and spreading arms
4. Keep hands inside gown at the cuff, wait for circulating OA to tie gown before gloving. (Fig. 3.7)



Fig. 3.7 - Gowning

Gloving is done as open or closed procedure

Closed gloving procedure

1. Pick up sterile glove with cuff sleeve covered. Place sterile glove palm side down over the cuff of the gown.
2. Grasp the cuff of the glove and bring it over the gown cuff completely.
3. Slide the hand into the glove as the cuff is drawn over the wrist. Repeat step 1 through 3 for the opposite hand.

Open gloving procedure

1. Pick up the glove by its inside cuff with one hand. Avoid touching wrapper with bare hands.
2. Slide glove onto the opposite hand, with cuff down.
3. Using the partially gloved hand, slide fingers into the outer side of the opposite glove cuff.
4. Slide the hand into the glove and unroll the cuff. Avoid touching the bare arm.
5. With the gloved hand, slide the fingers under the outside edge of the opposite cuff and unroll it using the same technique (Fig. 3.8 & Fig. 3.8a)



Fig. 3.8 - Opening the glove



Fig. 3.8a - Sliding the hand inside the glove

Student exercise

1. *What is meant by surgical scrub?*
2. *Explain the procedure of surgical scrub. What are the materials needed for hand scrub?*
3. *Explain the gowning procedure.*
4. *Explain the open and closed gloving techniques.*

Demonstration

1. *Demonstrate the technique of hand – washing.*
2. *Prepare posters to illustrate hand washing.*
3. *Demonstrate the gowning and gloving procedure and have each student practice gowning and gloving.*

Cleaning of the operating room

Daily cleaning of the operating room

After completing the day's schedule, cleaning is done in all areas of the operating room. The purpose is:

- To destroy microorganisms as quickly as possible.
- To protect operating room personnel from coming in contact with known or unknown infectious materials.
- To prevent cross contamination.

Areas that require daily cleaning

- Walls
- Overhead lamp and fan
- Floors
- Doors
- Operation theatre tables
- Microscopes

Materials required for operating room cleaning

- Soft broom
- Dust pan
- Brush
- Detergent
- Antiseptic agent

- Mopping cloth
- Bucket

Procedure

- The floor is swept first
- Equipment such as electro surgical units should be checked and cleaned well.
- Ceiling and wall mounted fixtures are cleaned.
- Cabinets and doors are cleaned, especially around the handles or push plates.
- Walls of the scrub sink need special attention and cleaning.
- Transportation carts and wheels must be cleaned.
- Waste buckets are cleaned well and disinfected.
- Furniture is thoroughly scrubbed and cleaned with chemical disinfectant.
- Floor is always mopped last. A clean mop is used to mop the floor.
- Keep two buckets for mopping the floor, one with plain water and the other with chemical disinfectant (e.g. Dettol 1: 4 0 dilution in water)
- First dip the mop cloth in dettol, wring out water and mop the floor. Clean the mopping cloth in plain water, wring out and again, dip in dettol water, and mop the floor in same manner.

Weekly cleaning of operating room

- Remove all the furniture and equipment from the operating room suite.
- Clean and replace air conditioner filters. (Remove the A.C. filter, remove the dust and wash the filter, dip in antiseptic solution, dry it and replace).
- Regular cleaning of all sterilisers must be done as recommended by the manufactures.
- Floors through out the operating room suite should be machine - scrubbed periodically to remove accumulated deposits.
- Washing the walls and floors in the operating room suite once a week is very important.
- Clean and arrange all the equipment and furniture in their proper places after washing operating room.
- Mop the floor as mentioned above.

Operating room fumigation

Equal quantities of formaline and distilled water are added into the fumigator as required according to the size of the operating room. For a room of 7 X 6 cubic meters size, 50 ml formaline is used with equal amount of distilled water. The solution is poured into the machine and a fan placed above the machine rotates. That leads to the evaporation of formaline. (Fig 3.9)

This machine is electrically operated and the procedure takes half an hour. Formaline kills microorganisms by coagulation of protein cells. It is sporicidal within twelve hours. The operating room must be kept closed for at least twelve hours after fumigation.

Advantages of fumigation

- Significant reduction of bacteria in the environment
- Effective decontamination of exposed surfaces

Ultra violet lighting

U.V. Lamp (Ultraviolet light) is another method of sterilising the operating room. After completely cleaning the operating room as mentioned above, switch on the U.V. light for twelve hours. After this time switch off the light before entering in to the O.T. to protect the eyes of the operating room personnel.

Infection control practice for operating room

The five main categories of factors involved in surgical infection control have been classified in to five D'S"

Discipline

- Surgeons techniques
- Touch contamination
- Attire and preparation
- Support services
- Sterilisation techniques
- Maintenance and repair
- Standards and policies

- Infection control
- Infection report

Defense mechanism

- Type of patient and age
- Elderly patient
- Patient with high risk diseases
- Premature babies
- Drugs
- Antibiotics
- Irrigating solutions
- Skin preparation

Design

- Surgical suite
- Demarcation of aseptic area
- Ceiling design
- Ventilation material and traffic pattern

Devices

- Caps and mask
- Gloves
- Clothing
- Drapes
- Anaesthesia equipment
- Sterilisation devices
- Steam and gas

Summary

A good surgery can be spoiled by infection. Infection increases the cost both for the patients and the hospital. OAs must have cooperation with all other hospital staff involved in patient care. With all these efforts OAs can provide an infection free environment and quality care for surgical patients.

Student exercise

1. Why do we clean the operating room daily?
2. What is the procedure involved in cleaning the operating room?
3. Write in detail about operating room fumigation.

Sterilization protocol at a glance

Area	Procedures	Accepted Practice
No. of standard surgical sets	One surgeon with one OT table: 4 sets One surgeon with two OT tables : 7 sets One junior surgeon with one OT table: 2 sets	
Cleaning Procedures	Manual cleaning	Use four bowls. First wash is the disinfectant and cleaned with a soft toothbrush. Then followed by three washes with distilled water.
Blunt Instruments	Prior to surgery Between cases	Steam sterilisation Flash autoclave
Sharp instruments	Prior to Surgery Between Cases	Steam sterilisation, ethylene oxide sterilisation Flash autoclave
Heat labile instruments	Cryoprobe, Vitrectomy cutter & Cautery	Formalin chamber/ ethylene oxide
Linen	Surgeons dress, Aprons Drape sheets	Steam sterilisation Disposable
Hand washing	Prior to surgery Between cases	Hand scrubbing with povidone iodine scrub or chlorhexidine for 5 minutes. isopropyl alcohol
Surgical supplies	Irrigation Solution	Steam sterilisation before opening the seal.
Theater sterilisation/ Disinfections	Floor Fumigation of OT Air conditioners Walls	Chlorhexidine, lysol Formaldehyde Filters to be removed and washed with soap & water weekly Washed with water and disinfectant weekly.
Patient	Theatre trolleys Dress for OT	Disinfectant Sterile dress if provided by the hospital, shoe covers and cap
Sutures	Disinfection of the Conj. Sac Prior to surgery Between cases	Povidone iodine ETO (if the pack has been opened but only once) Cidex (this method is not recommended)

CHAPTER 4 INSTRUMENT AND EQUIPMENT MAINTENANCE

CONTENTS

Electrical connections
Microscopes
Phaco machine
Surgical instruments

GOALS

To enhance the OAs understanding of maintaining and handling the equipment safely and properly.

OBJECTIVES

The Ophthalmic Assistant (OA) will able to

- Demonstrate knowledge of the equipment, its names and usages
- Describe methods of cleaning and keeping the instruments in working condition
- Discuss ways to rectify minor problems in the instruments
- Perform trouble free service at all times.

CHAPTER 4

Instrument and Equipment Maintenance

In the Operation theatre the OA has to handle machines with electrical connections.

It is essential for the OA to have fundamental knowledge about the electrical equipment and how it is to be handled. The machines are very costly and can not be discarded if there is a problem which can be rectified. All the hospitals may not have an equipment maintenance department, so the OA should know the methods to handle the equipment and must be knowledgeable in correcting minor problems of the machines.

Electrical connections

Socket outlets should be mounted on the walls or ceiling, or if possible, sunk into floor. These need to be carefully planned because of the safety hazard with water.

All in socket should be double and the fuse box kept in the theatre, with the potential to increase electrical capacity if needed. The position of the operating tables needs to be decided before placing the electrical sockets. Wires lying around the floors are hazardous. Sockets should be close to the pieces of equipment they serve. All sockets must be properly earthed. Ophthalmic surgery is very delicate and can be dangerous if the operating room conditions are not favorable. The theatre must have a back up electrical supply (generator) in case the main electricity fails. If the electrical system is not reliable it is worthwhile putting all machinery onto voltage regulators. These stabilise the electrical input and protect the equipment from blowing fuses and bulbs.

- Always check that the primary voltage of the instrument matches that of the power source.
- Always switch off the main switch on the control panel before connecting or disconnecting electrical cords and /or cables

- Always ground the power cable, as specified by local electrical regulations.
- Frequent switching on and off of bulbs will shorten the life span.
- Always hold the plug or connection firmly when disconnecting cords and / cables and never pull directly on the cords or cables
- When storing equipment, take the following into consideration. The instrument should never be stored in a location where water will drip or splash on it.
- The instruments should be carefully covered with its vinyl dust cover
- Do not store where it the instrument can be exposed air pressure, temperature, humidity, strong ventilation or wind, direct sunshine, dust and salty or sulphuric air. In other words, it should be stored in an air conditioned room when available.
- If the instrument does not work please check the following points before calling for help:
 - Check whether all connector cords and cables are correctly and securely connected
 - Check fuse holders and replace blown fuses
 - Check both illuminator lamps and replace if necessary

Microscopes

Microscopes are essential instruments in the micro-surgery of the eye.

They require constant attention. Microscope bulbs have a finite life. They are replaced when they are fused out. Usually microscopes have one or more extra bulbs that can be pushed in as replacement bulb for the fused bulb so that the surgery may proceed without interruption. To achieve this, extra bulbs

should be checked before the commencement of the first surgery case using that microscope. The fused out bulb should be replaced immediately after the last surgery is over.

Caution

The bulb will remain hot for some time after it is fused out. Wait for sufficient time for the bulb to cool off before replacing it. Turn off the power while the bulb is being replaced.

Care of microscope includes

1. Cleaning the optics using distilled water or lens cleansing solution. Optics includes eye pieces, magnifier and objective lens.
2. The power cord, bulb, foot switch, illumination and the optics are to be checked.
3. Check the mechanical parts, and lubrication must be done after cleaning to keep the wheel movement smooth.

Trouble shooting

Problem	Solution
Microscope is not working	Check the power cord and plug
bulb is not glowing	Check the fuse and switch Check the bulb. If there is any problem with the bulb, change the bulb.
Fan is not working	Check the fan and voltage, check the wires leading to the fan and replace them if necessary
Up/down is not working	Same as above
Illumination is not good	Clean the optics. Check the fibre optic cable fitting and position of the bulb.

Whenever a new machine is installed, the specifications are to be read and followed.

Phacomachine

This equipment is used in the phacoemulsification technique of cataract extraction. In this method ultrasound energy is used to break the nucleus of the lens into smaller pieces within the capsular bag and then remove them, The machine has 3 parts:

- Console
- Hand piece
- Foot pedal

The hand piece has a main body to which 3 lines are attached:

1. The ultrasonic power line which conducts the ultrasonic power to the tip
2. Irrigation tube through which the irrigating fluid is carried to the eye
3. Aspiration tube through which lens matter and fluid is removed.

There is a tip at the end of the hand piece. The tip is made of a hollow titanium needle, which moves backward and forward. The opening of the tip acts as the aspiration port. There is a silicon sleeve which fits around the tip. There are 2 ports in this sleeve through which irrigating fluid enters the eye.

The console of the phacomachine displays the following parameters

1. Ultrasonic power
2. Vacuum
3. Bottle height
4. Flow rate
5. Irrigation
6. Aspiration

The foot pedal is used to control the different functions of the hand piece.

Trouble shooting

Problem	Possible cause	Correction
Low vacuum, insufficient aspiration.	Hand piece tubing improperly installed through peristaltic pump Irrigation pinch valve, aspiration port tubing is damaged, kinked or worn out Hand piece tip is clogged	Remove tubing and reinstall. Check tubing and/or replace Flush hand piece with sterile water, replace tip
Hand piece error	Hand piece tip is loose or power to the hand piece is disabled.	Tighten hand piece tip and retry. If the same problem recurs, change the hand piece
Ground fault error	Ground fault. Power to hand piece is disabled.	Replace the hand piece.

Phaco machine maintenance

- Remove drip chamber from irrigation bottle. Disconnect irrigation tubing from drip chamber.
- Disconnect irrigation and aspiration tubing from the hand piece. Do not connect irrigation and aspiration tubing together
- Remove all accessory pack components and tips from hand pieces.
- Unplug hand pieces from the console
- In irrigation free-flow mode, remove tubing from irrigation pinch valve.
- Turn system power off.
- Clamp a hemostat immediately below the blue aspiration T fitting

Surgical instruments

Handling of ophthalmic instruments

- All ophthalmic instruments need exceptionally careful handling.
- The tips of the scissors are extremely delicate and should not be touched.
- All scissors, needle holders and fine forceps need their tips protected. The protectors must cover the whole blade or jaws of the instruments.

- Scalpel blades and knives must be passed to the surgeon by the handle with the cutting edge pointing downwards. Artery forceps must be used to remove the blade.
- Never re-sterilise disposable needles.

Cleaning

Distilled water is preferred for cleaning purposes. If distilled water is not available, freshly boiled tap water may be used.

The following method should be used after each operation. Three containers are required.

Container-1 Hot soapy water

- The instruments must be supported carefully while cleaning
- A soft tooth brush can be used to clean each instrument individually.
- Needle holders, scissors and artery forceps must be fully opened and cleaned inside the jaws.
- Cannulae must be flushed thoroughly.
- Cotton wool should not be used to clean the instruments as it damages the tips.

Container - 2 Lubricant

- A lubricant prevents the development of stiff joints and inhibits the development of corrosion.
- Lubricant is needed only for hinged instruments like scissors, needle holders and artery forceps.
- If a lubricant is not available, the instruments should be rinsed in clean water.

Container - 3 Clean hot water

- Excess lubricant or soap is rinsed off and the instruments left in the open dismantled position on a clean absorbent cloth.
- Cannulae must be flushed thoroughly again to remove any soap debris.

Drying

- Instruments must be dried thoroughly before being stored. If the instruments are put away in a wet or damp state they start rusting.
- A hair dryer is very effective for drying the joints and crevices of instruments. If a hair dryer is not available, dry gauze may be used cautiously.

Corrosion and rust

- Most instruments are made from stainless steel. Stainless steel usually does not rust, however it can corrode if washed in saline or left to soak for a long period of time in any liquid.
- Once the instrument has started to rust, it will become weak, and the rust will eventually destroy and break the instrument.

Oiling

With repeated sterilisation instruments will become stiff and difficult to open. A good quality sewing machine oil or silicon oil should be used each week on such instruments. This is especially relevant when working in a very hot, dry climate.

Repair

If forceps, lens-holding forceps, needle holders or scissors get bent they can be straightened with

stainless steel nose pliers and gently sharpened with a silicon carbide stone.

Retina surgery instruments are very costly, so special care must be taken in handling them.

Cleaning procedure for such instruments

Disconnect the handle from the forceps or scissors. Connect the small adapter to the forceps or scissors for cleaning. Three 20 cc syringes and two bowls are required. One bowl should contain distilled water and another contains spirit.

Step by step procedure

- Take 20ml distilled water in one syringe and flush the instrument twice
- Take another syringe with 10 ml spirit and flush it once
- Take third syringe with air and flush it three times
- Handle is to be cleaned by ultrasound cleaner
- Handles of forceps or scissors are dried with a hair dryer

Summary

Surgery instruments are very precious and costly. So they must be handled carefully. If there is any repair required the staff should know how to rectify and maintain the instrument. This helps to reduce costly maintenance. If maintained properly, the equipment should last for a long time.

Key points to remember

- *Clean the optics using distilled water or lens cleansing solution*
- *Whenever a new machine is installed, the instructions are to be read and followed*
- *The tips of all sharp instruments are to be covered appropriately*
- *When there is a break down the 'down time' should be at a minimum.*
- *Never re sterilise disposable needles*

Student exercise**Answer the following**

1. Write short notes on
 - a. Microscope and its care
 - b. Phacho machine and its parts
 - c. Handling of ophthalmic instruments.
2. Write in detail the cleaning procedure of surgical instruments.
3. Mention any three problems that occur in a microscope and how they could be rectified.
4. Give possible cause and corrections for the following troubles
 - a. Low vacuum, insufficient aspiration
 - b. Hand piece error
 - c. Ground fault error
5. Describe how to maintain the phacho machine?

CHAPTER 5 INTRODUCTION TO OCULAR ANAESTHESIA

CONTENTS

Ocular anaesthesia
General anaesthesia

GOALS

To enhance the OAs knowledge and ability to recognise emergencies and to assist in administering ocular and general anaesthesia.

OBJECTIVES

The Ophthalmic Assistant (OA) will be able to

- Demonstrate different methods of ocular anaesthesia
- List the types of blocks administered in the operation theatre
- Know the indications and contraindications for ocular anaesthesia
- Differentiate the drugs used for local and general anaesthesia
- Identify complications of anaesthetic block (ocular and systemic) and their management
- Demonstrate trolley set up for local anaesthesia
- Demonstrate the procedures in ocular anaesthesia
- Practice basic emergency management after administering anaesthesia

CHAPTER 5

Introduction to Ocular Anaesthesia

The person who gives local anaesthesia (ocular) must have the back ground knowledge of the relevant anatomy and physiology of the eye, medicines used for anaesthesia, knowledge of the effects and side effects of the drugs used and management of complications both ocular and systemic. Such a person should be trained by a qualified medical practitioner.

Local anaesthesia

- Local anaesthesia is very satisfactory and convenient for many ocular surgeries like cataract extraction, glaucoma, cornea and retinal detachment surgeries.
- It is safer than general anaesthesia and the patient remains conscious.
- It is quicker, creating less delays and allows better use of theatre time if managed well.
- Much cheaper.
- Appropriate for practice even in remote areas with basic hospital set up.

Contraindications

- Young children
- Mentally retarded persons.
- When verbal communication is difficult, or with uncooperative patients.
- Drug sensitivity (allergy).

Trolley set up for ocular anaesthesia

Drugs

- Xylocaine 2% with adrenaline
- Xylocaine 2% without adrenaline
- Hyalase 1500 I/U (Hyaluronidase)
- Bupivacaine 0.5%



Fig.5.1 - Trolley set up for ocular anaesthesia

Materials

- Sterile syringes –10ml, 5ml, 2ml, 1ml
- Sterile needles –22G X1 ½ inches for retro bulbar block
- Sterile needles 23GX 1 ½ inches for facial block
- Sterile cotton swabs in a sterile container
- Sterile eye pad in a sterile bin
- Bandages

Equipment

- Cheatle forceps with container
- Torch light
- I/V stand
- BP apparatus and stethoscope

Eye drops

- Antibiotics
- Steroids
- Mydriatics (Tropicamide/cyclopent, phenylephrine)
- Miotic (Pilocarpine 2%)

- Local anaesthesia drops like 4% xylocaine

Emergency set up to manage systemic complications (Fig. 5.1).

Test dose of anaesthesia

The purpose of giving a test dose is to check whether the patient is sensitive or allergic to the drug.

Method of giving test dose

1. Wash hands
2. Draw up 0.5ml of xylocaine in a sterile syringe
3. Ask the patient to lie down and explain the procedure to them
4. Clean the site on the fore arm with spirit swab.
5. Inject the drug (0.2 ml) intradermal, with a 26 G needle and put a mark around the injected area
6. Check if the patient develops rashes, redness, oedema at the injection site or nausea, vomiting, breathlessness, sweating, or giddiness, within half an hour
7. If the patient is free from the above mentioned signs and symptoms, the block can be given

Procedure for mixing hyalase and adrenaline in xylocaine vial

Wash and dry the hands

- Take the xylocaine bottle, remove the metallic cap and clean with a sterile swab
- Take the ampoule of Hyalase and break the top with a file
- Draw up 1ml xylocaine with a sterile syringe and add to the hyalase ampoule (make sure the powder is dissolved well)
- Draw up the dissolved hyalase with the syringe and add it to the xylocaine vial
- In the same way take 1 ampoule of adrenaline and break the top with a file
- Draw up 0.5 cc of adrenaline from the ampoule and add it to the xylocaine vial

Block

Before giving the block, talk to the patient in a soft and comforting voice, explaining the reason for giving the block. Explain to the patient that if the eye ball moves it is not possible to do the surgery. To prevent movements, a block injection is given.

There are two types of blocks; they are retro-bulbar block and peri-bulbar block.

Retro-bulbar or ciliary block

Purpose

1. Loss of sensation (anaesthesia) of ocular tissues.

Restricts the movements of the eyeball (Akinesia)
The amount of local anaesthetic used for a retro bulbar block is 2-3ml Xylocaine mixed with adrenaline and Hyaluronidase in a 5-ml syringe with a 22 gauge 1.5 needle.



Fig. 5.2 - Giving ciliary block



Fig.5.3 - Massage



Fig. 5.4 - Facial block



Fig 5.5 -Eye cleaning

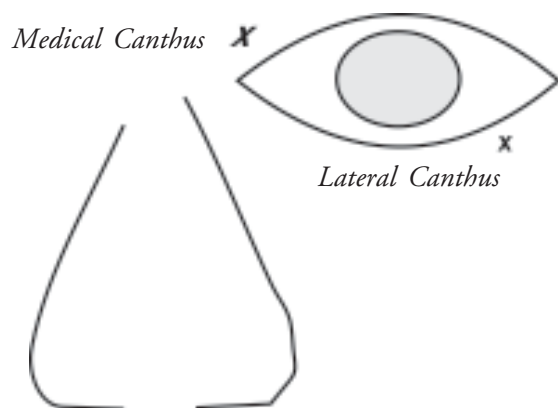


Fig.5.6 - Sites to give injection

Procedure for giving retro bulbar block

- Ask the patient to lie down in a comfortable face-up position
- Wash and dry the hands
- Draw 2 or 3 ml Xylocaine in a sterile 5 ml syringe and attach a 22 gauge 1.5inch. needle
- Clean the site of injection (periocular region) with a sterile swab
- Ask the patient to look straight ahead
- Prick below the lower lid (1/3 distance from the outer canthus and 2/3 distance from the inner canthus) into the muscle cone (Fig. 5.2).
- Withdraw the plunger of the syringe a little to check that the needle has not punctured any blood vessels. If this has occurred, blood will come through the needle into the syringe. Do not give the injection.
- If no blood comes into the syringe, give the injection, withdraw the needle slowly and apply pressure for 2-3 minutes after closing the eyelids.
- Massage the globe for 5 minutes with a sterile pad, making sure that the eyelid is closed, otherwise the cornea might get damaged (Fig. 5.3).
- The muscles of the eye become paralysed and anaesthetised.

Disadvantages

1. Retro- bulbar haemorrhage may occur.
2. Globe may be perforated.
3. The solution may enter the subdural space of the optic nerve.

Peribulbar block

Anaesthetic solution is injected into the orbit but not into the muscle cone.

- a. The purpose is the same as that of retro- bulbar block. However the risk of causing a retro- bulbar haemorrhage is less with this technique.
- b. 3 ml of xylocaine adrenaline and hyaluronidase is drawn up in a 5-cc syringe and it is attached to a 22-gauge needle (Fig. 5.4).

- c) Patient lies down comfortably and the lids are wiped clean (Fig. 5.5)
- d) Prick below the lower lid at the junction of lateral (outer) 1/3rd and medial (inner) 2/3rd into the orbital fat outside the muscle cone with the bevel of the needle facing up. 1.5ml of anaesthetic drug is injected (Fig. 5.6)
- e) The needle is withdrawn and then 1.5 ml is injected above the upper lid, below the superior orbital margin at the junction of medial 1/3rd and lateral 2/3rd in the same space with the bevel of the needle facing down. The needle is withdrawn and the eye is massaged.

Disadvantages

- Chances of globe perforation (common in peribulbar block)
- Conjunctival chemosis
- Late onset of anaesthesia

Purpose of giving massage

- To reduce the intraocular pressure
- To aid in the spread of the local anaesthetic

How to check the block

After giving a retro bulbar or peribulbar block and massage, ask the patient to look up, down, and to the left and right. If all these movements are restricted the block is fully effective.

Facial block

For intraocular surgery it is necessary to block the facial nerve (7th cranial nerve) which supplies the orbicularis oculi muscle, so that the patient cannot squeeze the eyelids.

The injection is given where the nerve winds around the neck of the mandible bone (lower jaw) – O'Brien's technique is the most commonly used for blocking the facial nerve. (Fig. 5.7)

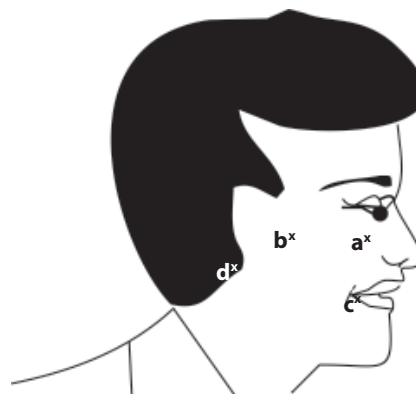


Fig.5.7 - Sites to give injection

Other methods are

- a) Van lint's
- b) Atkinson's
- c) Nadbath - Ellis

Procedure for giving a facial block

- Wash and dry the hands
- Draw up to 4 ml of xylocaine in a sterile 5ml syringe and attach a 23 gauge 1" needle
- Clean the area with a sterile swab
- Ask the patient to open their mouth and feel for the head of the mandible bone
- Ask them to close their mouth
- Inject the anaesthetic slowly just below the head of the mandible, at its neck where the nerve winds around.

Note

Do not use adrenaline if the patient is hypertensive or has cardiac problems. Adrenaline stimulates the heart and increases blood pressure.

1. Duration of action for xylocaine 2 percent is 1-2 hours
2. Duration of action for bupivacaine 0.5 percent is 3-5 hours
3. Xylocaine is fully effective within 10 minutes of administration
4. Bupivacaine is fully effective within ½ an hour of administration

Attitude

- Talk softly to the patient
- Tell them that an injection is given to restrict the movements of the eye ball and eye lids, and to avoid pain, which will enable the surgeon to do the surgery successfully.

Topical anaesthesia (Xylocaine 4%)

Anaesthetic drops like Xylocaine or proparacaine are instilled in the eye several times. This avoids all the complications of retro and peribulbar blocks. It works well for phacoemulsification cataract surgery performed by an experienced surgeon.

Patient's cooperation is very important; hence the procedure should be explained clearly to them. The anaesthetic drops are applied five times in the eye which is to be operated, at five minutes intervals. No injection is required

Inclusion criteria

- Immature cataract
- Nuclear sclerosis grade I and II
- Cooperative patient in the age group 45 to 60

Exclusion criteria

- Combined surgical procedure like trabeculectomy and cataract extraction with IOL implantation, corneal graft with IOL implantation, long surgeries like retinal detachment etc.
- Small pupil
- Pseudo exfoliation
- Corneal opacity
- Nuclear sclerosis group III and IV
- Psychiatric patients, mentally retarded patients, deaf patients, any un cooperative patient, and children.

Minor procedures which can be performed under topical anaesthesia are

- FB removal
- Suture removal
- Checking the duct patency (syringing)

- Tonometry
- A scan keratometry
- Pustule pricking, etc

General emergencies of block room

- Drug toxicity / Hypersensitivity (allergy)
- Central nervous system may be affected after retro bulbar anaesthesia (Fig. 5.8).



Fig. 5.8 - Emergency medicine trolley

Symptoms

- Dizziness
- Drowsiness
- Mental confusion
- Convulsions (fits)
- Respiratory distress
- Loss of consciousness

In cardiac patients the symptoms

- Sweating
- Loss of consciousness hypotension (fall in blood pressure)
- Bradycardia (fall in heart rate)
- Cardiac arrest
- Trauma to major blood vessels leads to epilepsy, respiratory and cardiac arrest.

Asthma patients may develop breathlessness and pulmonary edema.

- Treatment: deriphyline and Inj. Lasix.

Diabetic patients may develop hypoglycemia in the block room.

Symptoms

- Giddiness
- Loss of consciousness
- Sweating

Treatment

Check blood sugar immediately by Glucometer and give I.V.Dextrose 20%

An emergency trolley must be kept ready with the following:

Medications

- Inj.Adrenaline
- Inj. Deriphyllin
- Inj.Aminophyllin
- Inj.Decadron
- Inj.Avil
- Inj.Hydrocortisone
- Inj.Lasix
- I.V. fluids
- 25%Dextrose

Equipment

- Oxygen cylinder with flow meter
- IV set
- Venflon
- Disposable syringes & needles
- Ambu bag
- Boyle apparatus with laryngoscope & endotracheal tube
- Pulse oxymeter
- ECG monitor

The team members must be able to identify the situation and treat symptomatically. The physician and anaesthetist should be informed immediately.

Student exercise

Answer the following

1. *What are the uses of local anaesthesia?*
2. *List the contraindications of local anaesthesia.*

3. *Name the drugs to be kept in the trolley for ocular anaesthesia.*
4. *List the materials and the equipment needed to give ocular anaesthesia.*
5. *Describe the method of giving a test dose.*
6. *What is the procedure to mix hylas in xylocaine vial?*
7. *Write in detail about retro bulbar block.*
8. *Describe the procedure for giving a facial block.*
9. *Write a short note on topical anaesthesia.*
10. *List the medicines to be kept in an emergency trolley.*

General anaesthesia

General anaesthesia is a process of making the patient attain a reversible state of unconsciousness with the help of multiple pharmacological drugs thus removing pain during surgery (Fig. 5.9).

In ancient times attempts were made to relieve the pain of surgery by oral or rectal administration of herbal plant preparations. Dr. William Thomas Green Marton first introduced Ether for painless surgery on 16th October 1846 to this world. Hence it is declared as Ether Day or World Anaesthesia Day.



Fig.5.9 - General anaesthesia

Purpose of general anaesthesia

1. The patient should not feel pain during surgery.
2. The patient must be in an unconscious state, and not to know what is happening to them.

3. During anaesthesia the muscles are relaxed, so that the surgeon can do the surgery more easily.

Indication of general anaesthesia

1. Children
2. Mentally retarded patients, as such patients can not cooperate for surgery
3. Long duration surgery e.g. orbitotomy, retinal surgery
4. Un cooperative patients
5. Patients with allergies to local anesthetic drugs

Equipment used for general anaesthesia

Boyle's apparatus

It is the machine used to give general anaesthesia by using a mixture of the gases Oxygen, Nitrous oxide and Halothane geoflurane. It is also useful in emergency situations to give oxygen through a bag and mask or with the help of endotracheal tubes

Pulse oxymeter

In 1983 the Nellcor pulse oxymeter was introduced. The pulse oxymeter represents a very significant advance in patient safety. It gives the patients' pulse and oxygen saturation.

Suction apparatus

1. It is useful in any unconscious patient to clear the airway
2. To clear the oral cavity and throat of secretions at the end of the surgical procedures before extubation
3. If there is excessive bleeding during the surgery such as DCR, the oral cavity and field of surgery can be cleared with the suction apparatus.

Laryngoscope

It is used to view the larynx and adjacent structures for inserting an endotracheal tube. Two different sizes are available, adult and paediatric

Endotracheal tube

It is inserted into the trachea and delivers gases and vapours from the apparatus to the patient's lungs. Different types of tubes are available.

- Cuffed tube
- Un- cuffed tube
- RAE's tube
- Spiral embedded tracheal tube

Formula for calculating diameter of endotracheal tube is $(\text{age in years} + 16) / 4$. This formula is used only for children up to the age of 10. After calculating the size by this formula we can add or subtract 0.5mm accordingly. Endotracheal tubes are available in various sizes.

Airway (Oro Pharyngeal airway)

It is made of rubber or plastic. It extends from the lips to the pharynx. It fits between the lips and teeth in front and the tongue and posterior pharyngeal wall at the back. Different sizes of airways are available.

Purpose

1. To help to maintain an open airway.
2. To prevent patient from biting and obstructing a tracheal tube inserted through the mouth.
3. To protect against tongue biting during epilepsy (seizures)
4. To prevent the tongue falling back in to the posterior pharynx

Gases

Oxygen

It is a tasteless, colourless, odorless gas which forms 20.95 percent of the atmosphere. The oxygen is absorbed by the lungs and after metabolism in the body it is eliminated as carbon dioxide. Oxygen is stored in a black body and white shoulder cylinder. The gas is stored at high pressure in cylinders, 2000 pounds/square inch.

Nitrous oxide

It is stored as a liquid at low pressure in a special cylinder painted "French blue colour". During balanced anaesthesia the depth is maintained by 60% nitrous oxide and 33% oxygen. It is a weak anaesthetic agent.

Halothane

It is a non- inflammable, volatile liquid, with a sweet smell. It is a bronchodilator and does not irritate the airway. It has a moderate effect on skeletal muscle relaxation. It is favored for induction in children, especially for rapid induction and recovery.

Other drugs used for anaesthesia

Thiopentone

Is a short acting barbiturate commonly used for induction of anaesthesia (Fig. 5.10).

Propofol

It is a newer intravenous induction agent. It is a painful injection. The pain can be overcome by adding xylocard to the injection

Fentanyl is a synthetic opioid. It is a powerful analgesic with predictable results and minimal incidence of post operative nausea and vomiting, or respiratory depression

Suxa Methonium is a depolarizing muscle relaxant drug with short onset (1-1.5mins.) and a short duration of action (5-10mins.)

Vecuronium, atracurium

These are all non- depolarising muscle relaxants. Intubations can usually be performed about 2mins. after injecting the relaxant.

Duration of action

1. Atracurium 10-15 mins.
2. Vecuronium 30-40 mins.

Neostigmine

The action of a muscle relaxant is usually reversed by neostigmine. Bradycardia and hypotension are the

major side effects. These side effects can be prevented by giving atropine or glycopyrrolate along with the drug.



Fig. 5.10 - Anaesthesia tray

Anaesthesia tray contents

Name of the articles	Purpose
1. Venflon, scalp vein set	To start IV line
2. Syringes	To load medicines
3. IV set	To transfuse IV fluids
4. Xylocaine jelly	To anaesthetise and lubricate the endotracheal tube
5. Cylinder key	To open the O ₂ , N ₂ O cylinders
6. Airway	To maintain the airway
7. Laryngoscope with blade	To help with tracheal intubation
8. Endotracheal tube	To give artificial ventilation
9. Mask with circuit	To ventilate the patient
10. Head ring	To prevent shaking of the head
11. Boogies	To help in difficult intubation

12. Maggiles forceps	To pack the oral cavity and Pharynx with gauze
13. Plasters and scissors	To place the venflon and endotracheal tube
14. Spirit and cotton balls	To clean the injection site
15. Small pillow	To extend the neck
16. Laryngeal mask airway	To give O ₂ and anesthesia gases

Pre operative preparation for general anaesthesia

1. History

- Birth history - parents of infants should be asked whether child was born at term and about any other problems during and after birth
- History of recent upper respiratory tract infection (cough, cold)
- History of allergic reaction to drugs or food
- History of previous surgery and anaesthesia
- History of drugs being taken for any major illness
- History of systematic problems like IHD, DM, HT, epilepsy and asthma should be noted

2. Investigations

- Before surgery the patients should under go blood investigations
- Hemoglobin and urine sugar are a must for all patients
- Bleeding time, clotting time, blood grouping for surgeries with likelihood of excess blood loss from DCR, orbitotomy, enucleation, etc. should be noted
- Patients above 40 years of age require ECG, blood sugar and urea examination
- If the patient has any systemic problems, the physician must be consulted
- Aneasethelist should be informed about any systemic conditions like diabetes, hypertension, IHD etc.,

Preparation of the patient for general anesthesia

- Inform the patient and their parents (if the patient is a child) about the surgery and type of anesthesia to be given
- The investigation results should readily be available for the anesthetist
- Patient should fast for 4-6 hours before surgery. (liquid for 4 hours, solid for 6 hours)
- Male patients should shave before surgery
- All patients should have a bath before surgery
- Any prosthesis (i.e.) artificial eye, dentures (false teeth) should be removed and the anaesthetist should be told about them
- The patient must wear a clean loose cotton dress
- All jewels should be removed and hair tied up properly
- The consent form should be read and signed by the patient, parent, or guardian
- The weight and temperature of the patient recorded in the anaesthesia chart
- The OA who gives the injection must record the name of the drug, the dose, date and time given in the notes and sign their name

Before sending the patient to the operation theatre the OA should ask if the patient wants to pass urine. If so a bedpan is provided. The patient should not be allowed to walk as they may feel drowsy from the pre-medication.

Pre-medication depends on the weight of the patient and is given forty- five minutes before surgery according to the anaesthetist instruction. The purpose of pre-medication is to help the patient feel calm and relaxed.

Drugs used for pre-medication and their purposes

1. Atropine (or glycopyrrolate) – to reduce secretions and prevent bradycardia during
2. Surgery
3. Midazolam _ To produce sleep and avoid anxiety

Causes of bradycardia during anaesthesia

Bradycardia can occur during the following steps

- Laryngoscope introduction
- Tracheal intubation
- Tracheal suctioning
- Traction on eye muscles

Role of Anaesthetic OA

The senior OA should

- Know how to set up the anaesthetic machines and equipment
- Check that the machines and apparatus are in good working condition and check that the oxygen and nitrous oxide cylinders are full. The cylinder opening key must be in the Boyles apparatus
- Check the anaesthesia tray for the presence of all anaesthesia drugs including emergency drugs.
- One laryngoscope with all sizes of blades should be tested and placed on the tray
- Endotracheal tubes of various sizes and stylet (or boogy) for use in difficult intubations
- Mask of appropriate sizes and airways must be kept on the tray
- A functioning suction apparatus with catheter should be available
- A BP cuff must be applied and the patient's BP should be taken before starting the anaesthesia
- Pulse oxymeter (or cardiac monitor) should be in place prior to giving anaesthesia
- Anaesthetist's assistant must be familiar with the patient's history, physical status, and should anticipate problems during surgery and anaesthesia.
- Check the ECG monitor
- Make sure there are sufficient syringes and needles.
- Any defect found in the working of anaesthetic equipment must be reported to the anaesthetist immediately.

Assisting the anaesthetist

- The OA should help the patient lie down in a comfortable position on the operating table and give assurance if the patient is nervous
- All equipment needed should be readily available before the anaesthetist induces anaesthesia
- During induction the OA should help the anaesthetist by giving the laryngoscope and endotracheal tube. They should keep checking the patient's pulse and oxygen saturation

The OA should apply the BP cuff to the patient's arm and connect them to the ECG monitor (Fig. 5.11).



Fig. 5.11 - Assisting the anaesthetist

Note

At all times an endotracheal tube, atropine and Succinylcholine must be available along with a mask, airway laryngoscope and suction apparatus. During extubation (removal of tube) the anaesthetist may require suction apparatus, and should help in turning the patient's head down or turning to one side in case of vomiting. They may need drugs and to re-intubate the patient if there is any respiratory problem. The patient should be placed in the recovery position before being transferred to the recovery room.

Care of the patient in recovery room

On receiving the patient in the recovery room, the OA should observe the following:

- The patient should lie on one side (in the lateral position) with the head and neck extended and

knees should be flexed (bent). This is to prevent airway obstruction by the tongue.

- Breathing

This is monitored by observing

- Respiratory rate
- Pattern of breathing
- Noisy breathing

Observe the pulse oxymeter and see that SPO_2 is always above 95% in room air.

Circulation

- Colour of the patient's tongue, lips, fingers should be watched
- Feel the pulse
- Check the BP

Remember to listen carefully to the anaesthetist's instruction

- Take careful note of the instructions from the surgeon
- Keep noise level to a minimum.

The recovery OA should maintain an accurate record of the following

- Time of patient arrival in recovery room
- Observation of pulse, BP and respiration
- Any complication occurring during recovery. The anesthetic nurse should inform the anesthetist immediately and get their help to relieve the problem. If there is any special postoperative instruction, they must inform the ward OA about this clearly when the patient is handed over to the ward OA.

After full recovery the patient is shifted to the ward by stretcher accompanied by the OA who hands over the report of the patient to the ward OA. Oral fluids may be started after 2-3 hours if the patient is absolutely awake, and soft solid diet is given after 6 hours. The patient should be monitored by the ward OA throughout the day.

The recovery room must be equipped with an emergency trolley containing drugs and equipment

required in an emergency. This should be checked daily by the OA in charge. In addition, the following items must be ready;

- Pulse oximeter
- Oxygen cylinder with O_2 delivery system like Nasal O_2 catheter or Venturi mask. (or) Boyles apparatus
- Suction apparatus
- BP apparatus and stethoscope
- IV stand
- Kidney tray
- ECG machine

Problems and emergencies in recovery room

- Respiration may be depressed or absent
- Obstruction of airway with vomiting material
- Cyanosis (bluing of body, especially lips and fingertips)
- Laryngeal spasm (narrowing of upper air way)

Management

- Check the patient's airway; make sure it is clear. Extend the neck, pull the jaw forward and turn the head to one side
- Use suction if necessary
- Give O_2 by mask
- Inform the anesthetist if there is no improvement
- In case of laryngeal spasm, the patient may require re-intubation. The anaesthetist should be informed immediately

Vomiting

The patient should always be in the recovery position when they are unconscious. If they vomit in this position it is not aspirated and can be cleared by use of suction

Shock

This is due to heavy blood loss in some surgeries like orbitomy, enucleation

Signs / symptoms

- Weak and rapid pulse
- Low blood pressure
- Pale, cold and clammy skin
- Breathing shallow and fast

Management

Place the patient in a head down position or lift the feet to facilitate blood flow to the brain. Start the IV fluid immediately. Inform the anaesthetist immediately.

Pain

If the patient becomes restless and complains of pain, the anaesthetist will prescribe postoperative analgesic or sedation.

Fever

If the patient has high fever, sponging is done with cold water. If fever is persistent give antipyretic drugs according to the doctor's instructions.

Summary

Three types of anaesthesia are used: local, general and topical. The indications and contraindications that must be considered before surgery are explained. Equipment and medications were explained, as well as the necessity for administering these anaesthetics. The importance of giving a test dose is stressed to avoid allergic reactions. The OA should take all precautions for a safe outcome. The OA must be aware of a plan to handle any postoperative complications.

Key points to remember

- *Different types of anaesthesia are used for different surgical procedures.*
- *Trolley set up for local anaesthesia is essential*
- *Emergency trolley must be complete and present in the postoperative area*

- *Preoperative history of the patient must be complete to avoid complications*
- *The OA must be well-versed with postop medications and their uses*
- *The OA must be familiar with all instruments and equipment and their uses.*

Student exercise

I. Say "True or False" of the following statements

1. *Hemoglobin and urine sugar tests are not a must for all patients.*
2. *The patient must wear a clean loose cotton dress.*
3. *Atropine drug is used to produce sleep and to avoid anxiety.*
4. *Anaesthesia drugs include suxamethonium, Halothane, Fentanyl and Neostigmine.*
5. *Suction apparatus is useful in an unconscious patient to clear the airway.*

II. Fill in the blanks

1. _____ is the machine used to give general anaesthesia by using a mixture of the gases _____ and _____.
2. *Endotracheal tubes are available in _____ sizes.*
3. _____ protects against tongue biting during epilepsy
4. *Nitrous oxide is stored in special cylinder painted _____ colour.*
5. _____ is favoured for induction in children especially for rapid induction and recovery.

III. Answer the following

1. *Why do we give anaesthesia to patients?*
2. *What are the points to be noted in the history of patients?*
3. *Write in detail about preparation of the patient for general anaesthesia.*

4. *What is the role of the anaesthetic nurse?*
5. *Mention the names of the instruments used for anaesthesia.*
6. *What are the drugs used for anaesthesia?*
7. *What is the role of the OA in the recovery room?*
8. *What are the symptoms of shock and how are they managed?*
9. *What are the gases used for anesthesia (GA)?*

CHAPTER 6 MANAGEMENT OF SYSTEMIC EMERGENCIES IN OPERATION THEATRE (INTENSIVE CARE UNIT)

CONTENTS

- Staffing and structure of ICU
- OT emergencies
 - Acute myocardial infarction
 - Cardiac arrest
 - Hypoglycemia
 - Seizures
 - Acute pulmonary edema
 - Shock

GOALS

To equip the ophthalmic assistants with skills to manage emergencies in the operation theatre

OBJECTIVES

- The OA will know
 - The importance of concentrating on the critically ill and postoperative patients for close observation
 - To provide monitor- assisted supervision
 - To provide care for acute cardiac conditions

CHAPTER 6

Management of systemic emergencies in Operation Theatre (Intensive Care Unit)

ICU has become a symbol of modern medical care. It is a highly sophisticated unit engaged in delivering critical care to the patients. It is professionally managed by experts in order to deliver effective and efficient quality care.

Definition

It is a nursing unit staffed and equipped to look after critically ill patients who are often unable to communicate their needs. These patients require constant nursing care and observation.

Nature of service

It depends upon the unit

1. Single discipline unit
 - Cardiac care unit
 - Paediatric intensive care unit
2. Multidisciplinary ICU
 - Medical ICU
 - Surgical ICU

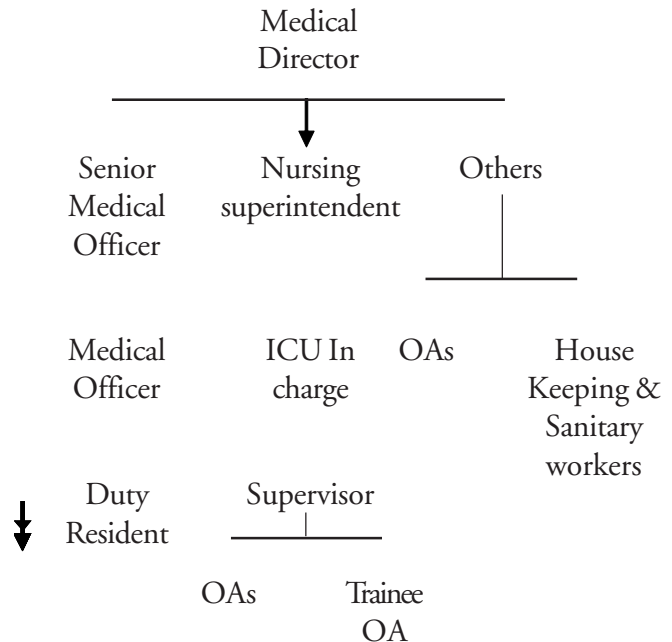
Location

It should be located near the operation theatre and in a readily accessible location.

Staffing

1. Medical staff: ICU should be staffed with two or three trained doctors and one senior medical officer.
2. Nursing staff: It is according to the type of treatment given to the patient. Nurse: Patient Ratio should be 1:1. ICU should be managed by qualified and well trained R.N.s

Structure of ICU



Staff

Equipment

- Dressing tray
- Emergency medicines trolley
- Oxygen cylinder
- Nebulizer
- Glucometer
- Pulse oxymeter
- ECG machine
- Cardiac monitor

- CPR equipment – ambu bag, facemask
- Ventilator and defibrillator

Drugs

The emergency trolley must contain the following drugs: Injection Atropine, injection aminophylline, injection lasix, injection adrenaline, injection calmpose, injection deriphylline, injection dextrose, dopamine, dobutamine. etc. Also Venflon, IV fluids.

Physical facilities

It must be in an isolated area with adequate ventilation. Centralised A/C, adequate lighting, temperature and should be maintained at 60 to 70° F. Humidity should be 50 to 60 % .Noise should not exceed 60 decibels.

Registers

- Emergency drugs
- Medication register
- Equipment register
- Narcotic - drugs record
- Day and night report

Records

- Patient monitoring record
- Temperature chart
- Intake / output chart

OT Emergencies

Acute myocardial infarction

Definition

It is defined as sudden blockage of one or more branches of a coronary artery. It may interfere with cardiac function and can cause immediate death.

Causes

- Coronary spasm
- Thrombosis

Symptoms

- Chest pain radiating to shoulders, left hand, jaw and neck
- Difficulty in breathing
- Anxiety
- Sweating

Signs

- Tachycardia or bradycardia, low B.P, ECG changes like ST depression and T wave inversion

Management

- Patient is shifted to ICU on a stretcher
- Oxygen should be started at 2.3 liters/minute
- IV fluids – 5% dextrose, or ringer lactate
- Sedate the patient with an injection of morphine, pethidine and an injection of phenergan
- Sublingual sonbitrate 5mg if BP is normal. Injection perthidine
- Dopamine drip should be started if BP is low
- Monitoring of vital signs. Should be done constantly

Cardiac arrest

Definition

Abrupt cessation of the cardiac pump function. Cardiac arrest may be reversible with prompt intervention but if timely intervention is not done, it leads to death.

Signs

- BP is not recordable
- Absent pulse, respiration
- Absent heart sounds
- Pupils fixed, not reacting to light. (This may not be a useful sign in ophthalmology due to the use of dilating drops).

Management

Basic CPR is ABC

- Airway
- Breathing
- Circulation

Airway is maintained by artificial ventilation, either mouth- to- mouth or mouth- to-nose.

Mouth -to-mouth

- Remove any obstructing substances like dentures or food particles from the mouth by handkerchief
- Place one hand under the nape of the neck and hyperextend it
- Place the opposite hand on patient's forehead, press down; compress the nostrils with the fingers
- Take a deep breath, breath directly over the patient's lips
- Watch for chest movements. Allow the air to be exhaled
- Repeat 4-5 times for an adult patient
- Look for chest movements, listen for airflow

Mouth- to- nose

Mouth is closed with fingers. Air is blown into the nostrils.

CPR compression site

is found by measuring two fingers widths above the midline of the sternum.

Immediate action steps

- Shake and shout at the patient to see if there is any response
- Open the airway by placing the patient in a supine position. Use head -tilt and chin - lift method
- Use jaw thrust if any neck injury is suspected
- Place the hand above the xyphoid process; arms must be straight, shoulders directly over the compression site
- Compressions are delivered straight down with enough force to depress the sternum
- Fully release the pressure on patient's sternum
- Compressions rate is 80 – 100 compressions per min. 15 compression, then give 2 ventilations

If two persons are performing CPR, 5 compressions then 1 ventilation. After 1 minute, stop

CPR and recheck carotid pulse, breathing. If absent, resume CPR

Hypoglycemia

Definition

Low blood sugar. Signs and symptoms of hypoglycemia generally occur when the blood sugar level is below 60 mgs.

Causes

- Drugs- Insulin or oral hypoglycemic agents.
- Diseases -like hepatic dysfunction, glycogen storage disorders.

Symptoms

Headache
Hunger
Giddiness
Irritability
Sweating
Blurring of vision

Signs

Tachycardia
Cold and clammy skin
Coma or unconscious stage

Management

- If the patient is conscious encourage them to take oral fluids
- 25% dextrose - 2 ampoules (50ml) given intravenously
- Maintenance IV drip - 10% dextrose for 12 - 24 hours
- Administer glucagon 1 mg SC. If not improving with dextrose

Seizures

Definition

Seizures are a manifestation of a massive discharge of a group or groups of neurons in the brain.

Causes

- Head injury
- Drugs
- Meningitis

Types

Seizures

- Generalised
- Focal seizures

Management

- Place the patient on the bed or floor, away from furniture and sharp objects
- Clear and maintain the airway by suctioning.
- Insert a mouth gag or airway into the mouth to prevent the patient from biting the tongue.
- Head should be extended
- If the patient is on a bed, keep the side- rails up for safety
- Sedate the patient by injection of calmpose / midazolam Iv 50 mg, slow Iv / IM injection of phentyoin

Acute pulmonary edema**Definition**

An increase in pulmonary venous pressure which results initially in engorgement of the pulmonary vasculature.

Causes

- Congestive heart failure
- Aspiration of gastric contents
- Shock to the lungs.

Symptom

Difficulty in breathing
Chest discomfort
Cough with sputum

Signs

Tachycardia
BP is increased
Cyanosis (bluish discoloration of skin, lips, nails)

Management

- Positioning the patient with a back rest
- Start high oxygen by mask: 6-8 litres
- Injection Lasix IVs (40 -160 mg) can be given

- If BP is high, an injection of Nitroglycerine should be given through IV
- Sedate the patient by injection of morphine and phenergan

Shock**Definition**

Shock is the failure of the cardiovascular system to provide sufficient blood circulation to all parts of body

Types

- Haemorrhagic shock, caused by blood loss or plasma loss, as seen in burns and crush injuries. It is also called hypovolemic shock.
- Cardiogenic shock caused by the heart failing to pump blood adequately to all parts of the body.
- Anaphylactic shock is a life- threatening reaction of the body to an allergen. E.g. drugs (penicillin), food stuffs (fish, mushrooms, peanuts)

Symptoms

Weakness

Nausea

Thirst

Dizziness

Breathlessness

Signs

Urticaria

Swollen lips, tongue

Rapid pulse, shallow breathing

Cool & clammy skin

Low BP, cyanosis of lips and earlobes

Loss of consciousness

Management

- Airway to be maintained by oxygen supply
- Keep the patient in a lying position
- Elevate the lower extremities
- Injection Adrenaline 1000 mg/ sc can be given
- Fluid replacement by normal saline
- Haemoaccel or blood transfusion should be started if there is severe blood loss.

- Injection of Hydrocortisone 100 mg IV can be given every 8 hours
- Basic monitoring of vital signs. Antihistamines- Injection Avil 50mg Im to be given.

Summary

In this unit the OA learns the importance of the Intensive Care Unit, its location near the theatre, and how to manage emergency cases efficiently. In the ICU the equipment should always be in perfect condition and all the drugs should be available at all times. The OA is to be alert and maintain the room appropriately.

Key points to remember

- *Intensive care units patients require constant nursing care and observation.*
- *Intensive care units must be in an isolated area and adequate ventilation is needed. Centralised A/C, adequate lighting, temperature at 60-70°C should be maintained. Humidity should be 50 to 60 %. Noise should not exceed 60 decibels.*

Student exercise

Answer the following

1. *What is the equipment to be kept ready in the Intensive care unit?*
2. *Name the drugs stocked in an emergency trolley.*
3. *What are the registers and records to be maintained in the ICU?*
4. *What are the symptoms of acute myocardial infarction?*
5. *List the steps in managing cardiac arrest.*
6. *What are the causes and symptoms of acute pulmonary edema?*
7. *List the steps in managing hypoglycemia.*
8. *Write a short note on shock.*

CHAPTER 7 BASIC KNOWLEDGE OF SUTURES, NEEDLES AND LENSES

CONTENTS

Sutures and needles
Intraocular lenses

GOALS

To enhance the ophthalmic assistants knowledge about sutures, needles and the different types of lenses implanted in the eye

OBJECTIVES

The OA will be able to

- List the different types of sutures, needles and lenses
- Recognise the differences between the types of materials

CHAPTER 7

Basic Knowledge of Sutures, Needles and Lenses

Different types of sutures, needles and lenses are used in eye surgery. The OA should have knowledge about the different types of sutures, needles and lenses, so that they can assist the surgeon during the surgery effectively.

Suture and needles

A suture is a length of thread with a needle attached to one (single-armed) or both ends (double-armed). In ophthalmic surgery it is common for double-armed sutures to be used. (Example: cataract and cornea surgery) A length of double-armed suture material is cut in half. The unused suture lengths can be re-sterilized by soaking in spirit or by E.T.O sterilisation. (Fig 7.1)



Fig.7.1 - Suture and needle

Sutures are used in extra capsular cataract surgeries, conjunctival suturing, corneal tear, repair corneal transplants, filtering procedures, squint surgeries, scleral buckling, retinal surgeries etc..

Suture

Suture materials have been developed enormously over the past 20 years. Surgeons and manufacturers work closely together in making different types of suture materials suitable for various parts of the body.

Types of suture

- Non-absorbable
- Absorbable

Non absorbable sutures

- Nylon
- Braided silk
- Virgin silk
- Polyester
- Poly propylene

Absorbable sutures

- Ethicon (polyglycolic acid suture)
- Chromic catgut
- Collagen
- D and G (Dexon)

Non – absorbable sutures

Non-absorbable sutures such as (5-0) or (6-0) mersilene or dacron are used in muscle procedures involving the obliques or rectus muscles. For e.g., they are used for joining the muscle bellies in muscle transposition procedures. Non-absorbable sutures may also be used for anchoring supramid sheets, sleeves or caps.

The 4-0 or 5-0 black silk suture passed through the limbus is useful for stabilising and retracting the eye during surgery. This suture is also useful as a traction suture to fix the globe in a given position for several days postoperatively in cases where surgery is performed to correct mechanical restrictions.

Non- absorbable sutures remain in the tissues. They don't get absorbed and must be removed once the wound has healed. After several years even non-absorbable sutures may degrade. These can be monofilament, twisted or braided.

a. Monofilament

A single strand (Example: Nylon). It can become untied easily, so requires firm knotting. It runs smoothly through tissues.

b. Twisted

Two or more strands twisted around each other (Example: Virgin silk), knots easily but does not run smoothly through the tissues.

c. Braided

Two or more strands plaited together, knots easily but does not run smoothly through the tissues. They are not advisable when there is infection. (Example: Silk)

Absorbable suture

Absorbable sutures – (catgut or collagen, plain or chromic) have replaced silk sutures for extra ocular muscle surgery. The sutures vary in size from 4-0 to 6-0. Catgut differs from collagen that it is made from a single sheep intestine, which is composed of 95%collagen and 5%noncollagenous –associated tissue. Collagen sutures are formed by an extrusion of homogenized, pooled beef fascia and are 100% collagen.

Needles

Ophthalmic needles are made of stainless steel and are swaged to the suture material for smooth passage through tissue.

The safest needles for extra ocular muscle surgery are the fine spatula type. The spatula needles cut tissue at its tip and sides only and actually displace tissue above and below. This displacement results in less chance of inadvertent scleral perforation, provided the flat of the spatula is parallel to the sclera.

Curved cutting and reverse cutting needles should be used with caution and should be of very fine caliber. A reverse cutting needle is available on the (4-0) black silk, which is frequently used for placement of traction sutures. Extra care should be taken when using the large needle.

Needles for special application are available. These include short, heavy needles for posterior fixation suture. Some prefer a long fine needle that is supplied by Ethicon for the crossed swords technique; others prefer a moderate length fine wire. (0.203mm diameter) spatula needle for muscle reattachment and a smaller half circle needle for conjunctival closure. The heavier needle (0.330 mm wire diameter) on 5-0 vicryl is used for ptosis surgery.

Types of needles

- Spatula
- Taper point
- Reverse cutting
- Conventional

Spatula

A rhomboid-shape in cross section with two- sided cutting edges used in the cornea and the sclera where the plane of penetration must be precise.

Taper point

A cone-shaped, single point needle with a round shaft used for delicate tissues

Reverse cutting

Triangular in cross section with two- side cutting edges and a lower cutting edge used passing through for resistant tissue.

Conventional cutting

Triangular in cross section with two - side cutting edges and an upper cutting edge. (Largely replaced by the reverse-cutting needle.)

Needles also come in different diameters, usually to match the diameter of the suture material to which they are attached.

Needle / diameter sizes

110mm, 150mm, 200mm, 230mm, 250mm, 280mm, 330mm, 430mm.

Needle manufacturing process

- Wire cutting
- Pressing
- Channeling
- Grinding
- Deburring
- Attaching
- Curving

Type of curving angles

- 1/2 circle
- 3/8 circle
- 1/4 circle

Suture needle models

(Example: 6402N)

- 6-wire size
- 4-140 angle curvature
- 0- (10-0) suture
- 2-Double arm
- N-Nylon

Interpreting suture needle details

8482S

- 8-wire size
- 4-140 Angle curvature
- 8-8-0 Suture
- 2-Double arm
- S-Silk

Intraocular lenses

Surgical removal of cataract and the implantation of an intraocular lens is one of the most successful microsurgical procedures today.

History

Sir Harold Ridley was the first person to successfully implant an IOL in the eye. He did this on November 29, 1949 at St. Thomas hospital, London. While working with RAF casualties during World War II,

Ridley noticed that when splinters of Perspex from aircraft cockpit canopies became lodged in the eyes of wounded pilots, they did not trigger infection or reaction. These observations led him to propose the use of artificial lenses in the eye to treat cataracts.

He went on to develop comprehensive programmes for cataract surgery with intraocular implants and pioneered this treatment in the face of prolonged strong opposition from the medical community. He worked hard to overcome complications, and had refined the technique by the late 1960s. With his pupil Peter Choyce he eventually achieved worldwide support for the technique, and the intraocular lens was finally approved for use in the USA by the Food and Drug Administration in 1981. It is now the most common type of eye surgery. There are a number of ways a cataract can be removed. These are:

- Intracapsular cataract extraction
- Extra capsular cataract extraction
- Phacoemulsification

Intra-capsular cataract extraction

Commonly used 30 years ago, intra-capsular cataract extraction, or ICCE, involved removing the entire lens and its attachments from the ciliary body. Patients were kept in the hospital for bed rest for approximately one week after the surgery.

Because this technique was used before IOLs became available, the lens that was removed was not replaced. To see clearly after surgery, very thick glasses with a large magnifying effect (commonly known as “coke bottle” glasses) were used.

These glasses were difficult to adjust to and many people had problems moving about, especially on uneven surfaces and or in new areas. Following surgery, patients had to lie still in bed while the eye healed, often with sandbags around their head to keep them from moving. With the development of better sutures (stitches), patients were released after a few days and their activities were less restricted.

Several advancements have dramatically improved cataract surgery from the days of ICCE. These include the development of replacement lenses and agents known as viscoelastics.

Extra-capsular cataract extraction

Extra-capsular cataract extraction (ECCE) refers to surgery in which the entire cataract is removed through an opening made in the anterior lens capsule. The rest of the lens capsule and all its attachments are left intact.

Most cataracts have a diameter of at least 10mm. Therefore, an incision (cut) of at least this length is to be made to remove the cataract. The new lens, usually a PC IOL, is then placed in the lens capsule. At the end of the procedure, many tiny sutures (stitches) are needed to close the wound.

This procedure became very successful because patients could have surgery and go home the same day. However, because of the large incision, this procedure caused several problems. Many patients took longer to heal and to regain the ability to carry out daily activities. Eventually a new procedure that reduced the size of the incision was developed.

These two techniques are not used much anymore except in special cases.

Phacoemulsification

It is a procedure in which the nucleus is broken down into smaller pieces within the bag and removed. Ultrasonic energy is used to emulsify the lens material. It requires a very small incision; hence the healing is much faster with less postoperative astigmatism. A foldable lens can be inserted through the small incision. The technique is also much safer than other methods.

Silicones

They are odorless, colourless, water resistant, chemical resistant, and oxidation resistant, stable at high temperature, and do not conduct.

The cataract has the shape of a small magnifying lens and is about the size of the nail on your little

finger (approximately 13mm). The lens of the eye is covered by a very fine, thin, clear membranous lens capsule. The lens capsule is attached to the inside of the eye, just behind the iris by very fine attachments known as zonules. These zonules hold the lens in place and control its ability to focus.

Inside the capsule, the lens material is made of two components: soft material called the cortex and harder central material called the nucleus. In many ways, the lens of the eye is like a peach or cherry; the outside skin is the capsule, the pulp is the cortex and the pit is the nucleus.

Intraocular lens

This is an artificial lens which is placed in the eye after surgical removal of the cataract (Opacified natural lens of the eye). Over the years there has been a marked improvement in the manufacture and design of IOLs. The basic design of an IOL consists of a central optic with haptics.

Optic

It is the central portion which refracts the light entering the eye. It can be plano convex or biconvex.

Haptics

These are the appendages attached to the optic to keep it in place. They may have various designs, like J loop, C loops, plate etc. An IOL can be placed in different positions in the eye:

- Posterior chamber – The IOL is placed within the capsular bag, or in the sulcus
- Anterior chamber – The IOL is placed in the anterior chamber over the iris
- Iris fixated – These IOLs are placed in the pupillary space and attached to the iris
- Scleral fixated – These IOLs are placed behind the iris and the haptics are sutured to the sclera

Depending on the design the IOL can be classified as:

- I
 - a. Rigid (Requires a large incision)
 - b. Foldable (Requires a smaller incision for insertion as these lenses are flexible)

- II a. Single piece: Haptic and optic are made of the same material and are an integral part of the IOL (Fig. 7.2)
- b. Three pieces - Haptics and optics are made of different material. (Fig. 7.3)

The haptics are then attached to the optic. Thus the IOL has 3 pieces - 1 Optic and 2 Haptics. Haptics are attached to the optic by fusion.

IOLs are made of different materials:

- PMMA - Rigid IOLs are made of PMMA
- Silicon - used to make foldable IOLs. They are chemically inert, thermally stable and resistant to oxidation.
- Hydrogel - resistant to degradation and oxidation and can withstand sterilisation used to make foldable IOLs. They are very flexible, cause less damage to corneal endothelium and are autoclavable.
- Flexible acrylics are also used in foldable IOLs. They have a higher refractive index and require a controlled unfolding. They are less likely to be damaged by the YAG laser

Haptic – haptics are made of

- Polyamide
- Dacron
- Mersilens
- Polypropylene
- PMMA



Single piece IOL
Fig.7.2



Three piece IOL
Fig 7.3

Negative power IOL

If the power of the lens is less than zero that is -1, -2, -3 etc. it is called a negative power lens.

Visco elastics

These are jelly like substances used during ocular surgery.

- Maintain the anterior chamber
- Protect structures like corneal endothelium and iris from surgical trauma
- Give the surgeon a better view

Two commonly used visco elastics are viscoat and healon.

Summary

In this unit the OA learns the different types of sutures, needles, lenses and their uses. It helps them to identify the appropriate type and hand over the required lens to the surgeon.

Key points to remember

- *There are several types of IOLs used in cataract surgery*
- *Price of the lenses may vary but the outcome will be similar*
- *Sutures are made of different materials*
- *Sutures are available with a variety of needles already attached*

Student exercises

I. Answer the following

1. *Write a short note on:*
 - a. *Sutures and needles*
 - b. *Non-absorbable sutures*
 - c. *Needles*
2. *IOLs are made of different materials. What are the materials used?*

CHAPTER 8 ROLE OF OPHTHALMIC ASSISTANT IN CATARACT SURGERY

CONTENTS

Cataract
Pre-operative evaluation
Types of surgery
Steps of surgery
Instruments required
Cataract surgery complications
Role of operation theatre OAs

GOALS

To enable the ophtalmic assistant (OA) to learn about the different types of cataract, cataract surgery and assist the surgeon in the surgery

OBJECTIVES

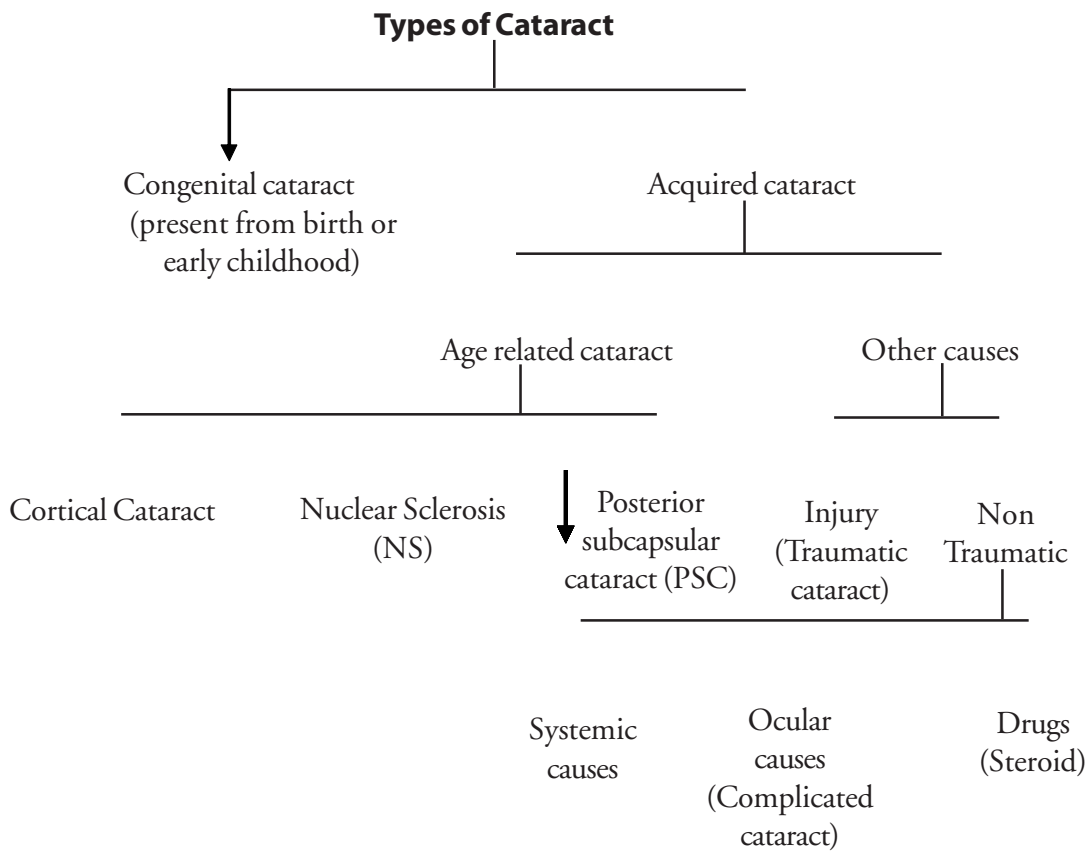
- The OA will learn about
- The different types of cataract
 - Different types of surgery
 - Steps involved in the surgery
 - The setting up of the trolley
 - Prepare the patient for surgery
 - Hand over the instruments in order

CHAPTER 8

Role of Ophthalmic Assistant in Cataract Surgery

Cataract

Cataract is defined as opacity of the crystalline lens or its capsule which prevents the passage of the rays of light and causes significant visual loss.



Cortical cataract

1. Some opacities remain unchanged for prolonged periods, while others progress rapidly.
2. Their effect on visual function varies greatly depending on the location of the opacification. Common symptom is glare from intense light.

Nuclear cataract

1. Progress slowly. Usually bilateral, though they may be asymmetrical
2. Greater impairment of distant vision than of near vision. As cataract advances colour of lens changes to yellow, brown or black.

Features of posterior subcapsular cataract

- Young age group
- May be due to injury, drugs or inflammation
- Patient complains more of glare

Patient's symptoms /clinical history

- Decreased vision
- Glare
- Contrast sensitivity

Preoperative evaluation

Once the patient has been admitted to the ward for surgery or treatment, as per the instructions in the case sheet, the OA is to do the necessary tests and record them in the case sheet. The following tests are conducted prior to the intra ocular/ cataract surgery.

A.Ocular examination

i. Visual acuity

Vision should be tested with and without glasses and with pinhole. In advanced and mature cataract, perception and projection of light should be tested in the entire four quadrants to rule out retinal problems.

ii. Refraction

Both the eyes should be refracted. If the extent of cataract does not correspond to the visual loss, posterior segment pathology should be ruled out by special tests. In such cases the possibility of poor prognosis is explained to the patient before the surgery.

iii. Intraocular pressure (IOP)

The tension must be normal. If the tension is raised due to glaucoma the tension has to be lowered either by operation or by medication. The IOP has to be normal before cataract surgery. Usually IOP is tested by Schiottz tonometer/non contact tonometer in both eyes. In borderline and raised IOP, differential tonometry and applanation tonometry are done.

iv. Syringing

Patency of nasolacrimal duct should be tested. If the duct is partially free with clear fluid, hourly antibiotic drops are started and conjunctival swab is taken for culture and sensitivity. The operation is performed only after the culture shows no growth. If duct is not free, with mucus or purulent discharge, Dacryocystorhinostomy / Dacryocystectomy is to be done and cataract surgery can be done after one month.

v. A-scan, K-reading prior to cataract surgery

It is essential in case of IOL surgery. It gives the power of planoconvex IOL and +2 is added to this for biconvex IOL. In case of scarred cornea and irregular surface of cornea, the K reading will not be possible. In this case the other eye should be taken into consideration.

vi. Random blood sugar (RBS)

Random blood sugar test is compulsory for all cataract patients to ensure that they are not diabetic. Normal random blood sugar value is below 160mgs. If the patient's blood sugar is raised, additional test (fasting blood sugar and post prandial blood sugar) is done.

B. General examination

Common systemic problems like diabetes, hypertension, and ischemic heart disease should be under control before surgery. Physician fitness is required in such cases prior to surgery.

i. Blood sugar evaluation

In diabetic patients, fasting and post prandial blood sugar evaluation is done. Diabetes should be well under control, and if not controlled, physician's opinion must be taken and treatment added according to the doctor's advice. On the day of operation, anti-diabetic treatment should be avoided to prevent hypoglycemia. (In uncontrolled diabetes, there is a chance of post-operative infection and delayed wound healing and the pupil is difficult to dilate).

ii. Blood pressure recording

In the presence of hypertension, blood pressure must be reduced to systolic 170mm of Hg and diastolic 100 mm of Hg. If surgery is done in uncontrolled hypertension, there is a grave risk of expulsive hemorrhage immediately after the section is made for cataract surgery.

If B.P is not controlled, physician's opinion is taken, important investigations like blood urea, serum creatinine and serum cholesterol may be done and treatment started according to the physician's advice. Cataract surgery can be safely done with diastolic blood pressure under 100 mm Hg. In these patients, phenylephrine and adrenaline should be avoided and pupil dilatation is achieved with cyclopentolate and tropicamide.

iii. Cardiac evaluation

Every cardiac patient should have fresh ECG . Surgery should be performed only after six months of the previous attack of IHD or MI. Here again adrenaline and phenylephrine should be avoided and surgery has to be done with cardiac monitoring.

iv. Asthma

In asthmatic patients, chest auscultation should be done for the presence of rhonchi. Patients should continue the anti asthmatic treatment. An injection of Broncho dilator before surgery can be given to make the patient comfortable on the operation table.

v. Renal failure and renal transplantation

Blood urea and serum creatine tests results are obtained.

vi. Allergic conditions

If the patient has any history of medicinal allergy, a xylocaine test dose has to be given before giving local anaesthesia. Hence it is mandatory to get the information from the patient and record it in the case sheet.

vii. For paediatric patients

Hemoglobin and urine sugar should be tested. The anesthetist's opinion is also needed. If the child has cough or cold the surgery should be postponed.

Hemoglobin, bleeding time, clotting time, blood group should be investigated for the patients with DCR, enucleation and evisceration.

The above mentioned tests are performed and recorded in the case sheet of the patient. The OA in the ward has to meticulously check whether all the necessary tests have been conducted and give instructions to the patient.

Types of surgery

a. Intra capsular cataract extraction

This method involves removal of the whole lens with its capsule. It is rarely done now, except in cases where the zonular attachments are so weak that it is safer to remove the whole nucleus.

b. Extra capsular cataract extraction

This method involves making an incision along the superior limbus, cutting open the anterior lens capsule, removing the cataractous lens and closing the wound usually with 4-5 interrupted sutures of 9-0 or 10-0 nylon. PCIOL may or may not be placed. A can opener capsulotomy is made and the nucleus delivered using the pressure and counter pressure method. Loose cortex is aspirated using the simcoe cannula.

c. Manual SICS

A three step, valved tunnel is created which starts from the scleral surface about 2-3 mm from the limbus, passes through the sclera and the limbus into the cornea, and ends at the inner surface of the cornea just below the limbus. This tunnel is a watertight self sealing wound which does not require sutures. A large capsulo rheis is the preferred method of capsulotomy here, though a can-opener can also be used. Rhexis is followed by hydro dissection, in which

saline is injected just under the rhexis margin to lift up the cataractous nucleus. The nucleus is then prolapsed into the anterior chamber and delivered using the irrigating vectis. Loose cortex is aspirated with simcoe cannula and PCIOL is placed. The wound is closed by filling the anterior chamber with saline and hydrating the side port (an opening made in the cornea near the limbus about and clock hours away from the edge of the tunnel, on the side of the surgeons dominant hand – i.e on the right in a right handed surgeon and vice versa). In SICS, viscoelastics should be liberally used to protect the corneal endothelium especially during nuclear delivery.

d. Phacoemulsification

This method involves an even smaller incision than SICS. The incision may be scleral or limbal or clear corneal, and bevelled tunnel or stab entry may be used. Liberal use of visco elastics is advisable in Phaco. Capsulorhexis is a must, as is hydro dissection. Hydrodelineation to separate the central nucleus from the epinucleus is also done. The side port entry is made on the side of the surgeon's non-dominant hand; that is on the left side for a right handed surgeon and vice versa. The nucleus is broken up into smaller pieces using ultrasonic energy and aspirated. The Phaco machine hand - piece delivers the ultrasonic energy and aspirates the broken pieces. Cortex is removed using the I/A cannula or the Simcoe cannula and PCIOL is placed inside the bag. Rigid IOL or foldable IOL may be placed. The wound is closed by filling the anterior chamber with saline and hydrating the side port (Fig. 8.1 & Fig. 8.2).

Special considerations

- Viscoelastic is very important in SICS and should be liberally used.
- Trypan blue may be used to stain the anterior lens capsule in mature cataracts in any type of surgery (ECCE, SICS, Phaco)
- Sutures may be placed in case there is a wound leak or a pre-mature entry or flap tear. Several types of sutures may be used for e.g.: vertical

sutures, horizontal mattress suture, infinity sutures, x- shaped suture etc.

- CTR is used in cases where there is zonular weakness. It is inserted under the rhexis margin to stretch the capsular ring.
- Cionni's ring is used in case of sectoral weakness of zonules.



Fig. 8.1 - Phaco machine



Fig. 8.2 - Instrument trolley

ICCE**Advantages**

Simple procedure
No microscope

Disadvantages

PCIOL is impossible
Good best corrected vision but poor in quality

ECCE**Advantages**

Better visual function

Disadvantages

Suture related complication
Delayed wound healing
Suture expenses
Glass correction given after 3 months

SICS**Advantages**

No suture
Quick rehabilitation
Only one follow up
Low cost, Minimum discomfort

Disadvantages

Longer learning curve for surgeons
Residual astigmatism is present

Phacoemulsification**Advantages**

Better quality of vision
Fast rehabilitation
Less tissue handling
Less or no astigmatism

Disadvantages

Expensive
Difficult in advanced cases
Difficult technique

Advances in IOL

- Foldable IOL
- Multifocal IOL

Foldable IOL

- Small size section is needed.
- It can be done through clear corneal tunnel.
- Can be done under topical anaesthesia
- Better quality of vision.

Multifocal IOL**Advantages**

Can be used for near vision and distant vision. So no reading glasses are needed.

Disadvantages

Should be properly placed or else there will be discomfort

Steps of surgery**A. Extra capsular cataract extraction****1. Cleaning**

The surgical area is cleaned using a swab or gauze dipped in 10% Povidone iodine. The lids and lashes are cleaned first followed by the adjoining areas in concentric circles of increasing diameter, the centre of which is the cornea. The entire area should be cleaned twice using two separate swabs (Fig. 8.3).



Fig. 8.3 - Cleaning the surgical area

2. Draping

A sterile towel or drape is placed such that only the cleaned surgical area is exposed. The patient's hair should be properly tucked into the sterile cap and should not come into surgical field.

3. Speculum

It is used to separate the lids as generally as possible without causing distress to the patient or pressure on the globe. The lid margin should be lifted clean off the globe (Fig. 8.4).

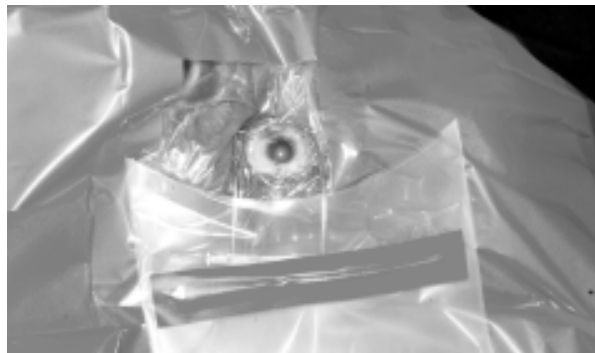


Fig. 8.4 - Eyelids are separated with speculum

4. Bridle suture

A bridle suture is placed over the superior rectus using cotton thread. The conjunctiva at the inferior limbus is grasped and the globe is rotated downwards. The superior rectus is located and the suture passed under it and anchored to the drape with artery clamp.

5. Conjunctival section
6. Cautery
7. Limbal incision (groove)
8. Corneal entry
9. Anterior chamber reformation with visco elastic
10. Can opener capsulotomy
11. Cutting open the incision
12. Nucleus delivery
13. Cortex aspiration
14. Placing the PC IOL
15. Dialling the IOL
16. Suturing the wound
17. Washing and reforming the anterior chamber
18. Conjunctival cautery

B. Small incision cataract surgery (SICS)

1. Cleaning
2. Draping
3. Placing speculum
4. Bridle suture
(In case of temporal SICS. Bridle suture is placed over the LR.)
5. Conjunctival section

6. Cautery
7. Scleral incision (vernier callipers may be used to measure site and size of the incision)
8. Tunnel is dissected
9. Side port entry/ paracentesis (if Adrenaline or Trypan blue is to be used it is injected through the side part at this stage).
10. Ac Formation with Visco.
11. AC entry
12. Capsulorhexis
13. Hydrodissection
14. Nucleus prolapse
15. The nucleus is dialled into Anterior chamber
16. Nucleus delivery
17. Cortex wash
18. PC IOL insertion and dialling
19. AC wash
20. Hydrating side port
21. Conjunctival cautery

C. Phacoemulsification

1. Cleaning
2. Draping in phaco, special plastic drapes are used. The part which is to cover the surgical site is transparent adhesive plastic. It is stuck over the eye lids and carefully slit open to allow access to the surgical area (Fig. 8.5).
3. Speculum
4. Bridle suture : may or may not be required.
5. Conjunctival section is done only in case a scleral tunnel is made
6. Incision -may be scleral or limbal or clear corneal
7. Tunnel - as in SICS but much smaller. The size depends on the type of IOL (rigid / foldable / rollable) and the size of phaco sleeve. Some surgeons prefer a direct stab entry.
8. Paracentesis (follow by injection of adrenaline / lignocaine/trypan blue/ visco)
9. AC entry
10. Capsulorhexis

11. Hydro dissection and hydrodelineation
12. Phaco emulsification: Nuclear cracking and aspiration of emulsified pieces. This is aided by an additional instrument passed through the side port without may be sinskey hook, cyclodialysis spatula or chopper (blunt or sharp).
13. Cortex aspiration – usually done with I/A port though simcoe cannula may also be used.
14. PCIOL insertion and dialling.
15. AC wash.
16. Stromal hydration.
17. Conjunctival – cautery (if scleral tunnel used)



Fig 8.5 OA assisting in Phaco surgery

5. Instrumentation

1. For cleaning and draping
 - Sponge holding forceps
2. Lid speculum
3. For bridle suture
 - Toothed forceps
 - Silcock's locking needle holder
 - Elschmig's forceps
 - Artery forceps
 - Spatulated needle
4. For suturing the wound
 - Toothed forceps
 - Micro needle holder
 - Plain tying forceps
 - Suture with needle (9-0 or 10-0 nylon)
 - Small spring scissors
5. For peripheral iridectomy
 - Iris forceps
 - Iris scissors or vannas scissors
6. For IOL insertion
 - Shepard's lens holding forceps
 - Sinskey hook
7. Syringes
 - 5cc syringe (saline/simcoe)
 - 2cc syringe (visco/air)
 - 1cc syringe (Adrenaline, Typan-blue, Deca/Gara)
8. Extra capsular cataract extraction
 - Forceps
 - Dressing forceps with serrated edges at tip (for conjunctiva)
 - Colibri forceps (for cornea)
 - MC Phersons forceps (anterior capsule)
 - Westcott spring handled scissors
 - Blade breaker, razor blade
 - Cystotome: Fashioned from 26 G or 30 G needle using needle holder.
 - Corneal scissors
 - Lens expressor / nucleus hook and wire rectis.
 - Simcoe cannula
9. For SICS
 - Cleaning instruments
 - Draping instruments
 - Speculum
 - Instruments for bridle suture
 - Crescent blade on knife handle
 - Paracentesis knife
 - Angled keratome
 - Cystotome
 - Sinskey hook
 - Irrigating vectis
 - Simcoe cannula
10. For phaco
 - Cleaning instruments
 - Draping instruments
 - Speculum

- No 15 blade on BP handle
- Paracentesis knife
- Angled keratome
- Cystotome
- Sinsky hook / chopper with phaco probe
- Cyclodialysis spatula with I/A probe
- Phaco unit consisting of
 - Handpiece with phaco tip – 30° & 45°
 - Phaco sleeve
 - I & A hand piece with tube

Cataract surgery complications and role of Ophthalmic assistant (Scrub nurse)

1. Premature entry during tunnel construction.
 - If crescent blade is blunt, a sharper blade should be used and tunnelling started from another area
 - If bleeding is obscuring the surgery field, cautery may be used
 - If the pre mature entry is extensive, the section may be converted to ECCE
2. PCR
 - The assistant should loosen the speculum and if he/she is pulling on the bridle suture, it should be released. The pressure on the eyeball should be minimal.
 - At the end of the surgery, there should be no vitreous visible at the section/near the side port.
 - Flow of saline in simcoe cannula is usually reduced – even dry tap may be used.
 - Liberal amount of visco-elastic should be available.
 - If the nucleus has not been delivered, instruments like irrigating and wire vectis, sinskey hook and cyclodialysis spatula should be ready.

Role of operation theatre OAs

Role of OA in the preoperative preparation room

The theatre OA should arrive one hour prior to the start of surgery, wash the hands and prepare the ocular anaesthesia trolley.

- Check case sheet
- Check which is the eye to be operated
- Reassure the patient
- Explain to the patient what is going to be done (eg –RBB, facial block, topical anaesthesia, drops to be instilled, duration of surgery)
- If patient needs something like a drink of water or a visit to the rest room, it should be arranged.
- Check pupillary dilatation
- Check whether block has taken up fully
- Check that patients' hair/dress/jewels etc are not going to come in the surgery field
- Escort the patient to operation theatre
- Arrange for stretcher if required
- Show the case sheet to the assisting scrub nurse or surgeon

Patient counselling

Receive the patient in a friendly manner and have them lie down in a comfortable position. Patient counselling involves creating awareness about patient's condition and keeping them well informed about the local anaesthesia and the surgical procedure.

Preoperative case sheet checking

1. Patient's name and the eye to be operated.
2. Check that the consent letter is signed by the patient
3. Check the patient's eye for congestion, discharge, pustule etc
4. Special attention and monitoring of the patient with high risk like cardiac, renal failure, asthmatic etc
5. Patient with one eye, myopic or other ocular problem should be reported to the doctor
6. Verification of A - scan and keratometry

Assisting doctors in giving local anaesthesia

1. Explain to the patient the procedure and where exactly the retro bulbar and facial injection will be given

2. Reassure the patient and allay the anxiety
3. Clear any doubts regarding the procedure
4. After giving injection, massage the eye ball with a sterile pad (making sure the eye lid is closed) for three minutes by giving intermittent pressure and check the on set of action. While giving the massage, talk to the patient softly so that the patient will have no fear. Clean the eye and the periorbital area with sterile cotton soaked with 10% Betadine
5. Patient to be dressed with cap, bandage and leggings before being shifted to operation theatre

Role of circulating ophthalmic assistant

1. Before entering the theatre the Ophthalmic Surgical Assistant has to wash her feet thoroughly. Remove chappels outside theatre.
2. Change to proper theatre attire (Foot wear, cap, mask, gown)
3. Check operating room schedule for operating surgeon.
4. Wash hands thoroughly and enter the operating room. Connect electronic equipment to the switch board and place them in proper position. (E.g. The foot pedal in easy reach of surgeon's foot). Check whether it is in working condition.
5. Check that all the equipment is in good condition. If maintenance is needed inform the operating room supervisor.
6. Place the waste bucket in a convenient place to receive the waste.
7. Check that all the supplies are adequately stocked.
8. Help the scrub nurse in scrubbing.
9. Open the sterile gown and gloves for the scrub nurse and the surgeon.
10. Tie the gowns for scrub nurse and surgeon.
11. Pour sterile water over gloves to remove powder.
12. Open the sterile pack required for surgery.

Set up prep tray

1. Sterile wiper in a sterile jar
2. Small cup of 10% Betadine
3. Artery clamp or sponge holding forceps
4. Assist the patient to the operating room table
5. Check the name and eye to be operated.
6. Prep the operative eye according to the surgical eye prep procedure.
7. Assist the scrub OA in draping the patient.
8. Keep the correct IOL ready, open and give to scrub nurse when instructed.
9. When surgical procedure is completed, apply drops (as ordered by surgeon). Scrub OA will close the patient's operated eye and place a sterile dressing and shield. Tie the bandage securely over the eye.
10. Patient will be shifted from the operating table back to the ward.
11. Complete operating room records must be attached to the case sheet, recording date of surgery, operative eye, name of surgeon, scrub OA, surgical procedure, and any intra operative complications. If an IOL is implanted attach the IOL sticker and sign the name.

Opening sterile packages

1. The packages are opened without touching the inside of the package. Pull the layers apart and gently let the sterilised item slide out of the package onto a sterile field
2. The sterile storage room should be a limited - access area, well ventilated with controlled temperature and humidity. It must be clean and dust free
3. Ensure that the sterile supplies are used before their expiry dates
4. Any sterile item that comes in contact with an unsterile surfaces is considered contaminated

5. The edge of the sterile container is not considered sterile once the package has been opened
6. All the sterile packaged items expiry dates have to be checked once a week
7. Before opening the package for use check the following. Each package is marked with
 - a. Name of the item
 - b. Date of sterilisation
 - c. Date of expiry
 - d. Load number
 - e. Autoclave number
 - f. Name of the personnel packing the item

Surgical eye prep procedure

Purpose – prevention of infection

Before starting the procedure explain the procedure to the patient and position the patient on the operating room table and cover them with a body cover.

Instill one drop of 5% Betadine into the operative eye. Before applying it, in a soft voice inform the patient. It is applied to clean the surface of the eye for surgery. Ask them to keep the eyes closed until they are informed to open them

Set up tray as mentioned before

1. With sponge- holding forceps take Betadine soaked cotton ball and gently clean both eye lids and lashes starting from outer canthus to inner canthus. Then clean the eyebrow and peri- orbital area about five centimeters diameter around the operative eye. Dry the prepped area with sterile cotton if necessary.
2. Keep the prep tray ready for the next case, so unnecessary delay can be avoided.
3. Management of an infected patient: Each member of the theatre staff must be aware of their responsibility within the operating theatre, especially in managing an infected case. When operating a known infected patient the following procedures should be followed

- Explain to the patient that additional precautions are being taken to reduce the risk of cross- infection.
- Always schedule such patients as the last cases for the day.
- Limit the number of staff in the OR and allow only those who are experienced.
- Remove all unnecessary items from the trolley and equipment from the theatre.
- Those who are involved in the procedure should wear double gloves.
- Discard all the disposable items from the trolley in a double wrapped bag and incinerate immediately.
- When discarding contaminated sharps, place them in containers that are closable, puncture resistant, appropriately labeled or colour coded and leak proof on the sides and bottom. Incinerate immediately.
- After surgery soak the instruments in 2% gluteraldehyde or any other strong disinfectant for ½ an hour.
- If the instruments are boiled, ensure that the water is discarded after use and the sterilizer properly cleaned.
- After soaking in antiseptic or boiling, the instruments are again washed with hot soapy water, rinsed in clean water and dried.
- The linen is soaked in antiseptic agent (E.g. Dettol 1:40 ratio) for 30 minutes and then washed as usual.
- If specimens are taken for lab investigation they should be clearly marked “CONTAMINATED” according to the hospital policy, wrapped in a plastic bag and sent immediately to the laboratory.
- Inform the anaesthetist when there is a risk of infection so necessary precautions will be taken for personnel and equipment. Once the operation is over the theatre must be washed with detergent, mopped with disinfectant and fumigated.

Role of ophthalmic assistant as a scrub OA

- a. In any surgery, the role of the assistant is to help the surgeon so that the surgery proceeds smoothly. The assistant should be careful in handling the instruments and should take care that his/her efforts at assistance do not block the surgeon's view or hamper the surgeon's movements.
- b. The ophthalmic assistant should check that all the tests have been done.
- c. If any of the test results are abnormal, or if the patient has some systemic risk factor, a physician's opinion should be taken.
- d. The ophthalmic assistant should check that proper consent has been taken for the surgery.
- e. The ophthalmic assistant should also check which is the side to be operated on.
- f. Before starting the case, the ophthalmic assistant should check that the supplies are adequate.
- g. If the patient on table is apprehensive/unco-operative, sedation should be arranged for or the surgery post-poned, counselling done and if required GA planned for the patient.
- h. Before cleaning and draping the patient, the ophthalmic assistant should note the presence of signs of recent infection, or inflammation if any. For e.g a patient posted for cataract surgery may overnight develop congestion and swelling due to drug allergy, or redness with watering and discharge due to conjunctivitis. Any mild discharge in the fornix should be investigated. A patient posted for DCR may develop some skin rashes or eruptions, or acute dacryocystitis with pain, redness and swelling in the sac area. Such conditions should be brought to the notice of the doctor / operation theatre supervisor.
- i. In ocular surgery, the cornea has to be kept lubricated by ophthalmic assistant using saline from an angled cannula.
- j. The drapes should not be allowed to get wet by overflow of saline over them. If they do, a dry folded towel should be placed over the wet area.
- k. If there is an intra-operative complication, the tension among the surgeon and the assistants

should never be audible to the patient. If the patient does get stressed, he/she should be reassured both during and after the surgery.

1. During intra-op complications, the ophthalmic assistant should assist the surgeon calmly and efficiently. If in doubt, a more experienced senior should be called to help.

Summary

In this chapter we have covered the different types of cataract surgery and the role of OA in the preparation stage as well as during the surgery. The OA is to prepare the patient for the surgery and neatly arrange the sterilised instruments in the trolley for the surgeon to use for the surgery.

Key points to remember

- *The ophthalmic assistant should check that all the tests have been done.*
- *The surgical area is to be cleaned using a swab or gauze dipped in 10% Povidone using Povidone iodine.*
- *The lids and lashes are to be cleaned first followed by the adjoining areas*
- *A sterile towel or drape is to be placed such that only the cleaned surgical area is exposed.*
- *Speculum is to be used to separate the lids as gently as possible without causing distress to the patient or pressure on the globe*
- *The assistant should be careful in handling the instruments and should take care that his/her efforts at assistance do not block the surgeon's view or hamper the surgeon's movements.*

Student exercise

Answer the following

1. *What are the different types of cataract surgery?*
2. *Write short notes on:*
 - a. *Phacoemulsification*
 - b. *Bridle suture*
 - c. *Instruments needed for suturing the wound*
3. *List the instruments used for SICS.*
4. *Explain in detail the steps involved in cataract surgery.*
5. *What is the role of OA in the block room?*

CHAPTER 9 ROLE OF OA IN ASSISTING SPECIALITY SURGERIES

CONTENTS

Orbit sac surgeries

- DCR
- Dacryocystectomy (DCT)

Glaucoma surgeries

- Trabeculotomy
- Trabeculectomy with ECCE

Cornea surgeries

- PKP
- Pterygium excision with autograft

Role of operation theatre OAs

GOALS

To enable the ophthalmic assistant (OA) to understand about assisting in speciality surgeries

OBJECTIVES

The (OA) will learn to

- Prepare the patient for the surgery
- Arrange the instruments for the surgery
- Assist the surgeon in the surgery

CHAPTER 9

Role of OA in assisting speciality surgeries

Orbit - sac surgeries

DCR

Pre op work up

- Syringing / Probing
- BP
- RBSL
- Blood tests like : Hb, BT,CT, Blood group and type, ESR
- HIV
- Counselling / consent

Steps involved in the surgery

1. Cleaning : The eye and the nose and most of the cheek and forehead are cleaned
2. Draping : Two sterile towels are used for draping, one partially wrapped around the head and covering the other eye, and the other covering the nose and mouth up to the chest. Towel clips/ artery forceps are used for anchoring the drapes
3. Nasal cavity is packed with adrenaline soaked guaze after putting xylocaine jelly
4. Skin incision given
5. Blunt dissection is done
6. The Medical canthal xendon is divided
7. Periosteum is reflected off the nasal bone
8. Osteotomy is made and enlarged
9. Probe is passed to locate the lacrimal sac
10. The anterior sac mucosa is cut to form a rectangular flap. The posterior part of the sac is excised
11. The nasal mucosal flap is made
12. The two flaps are anastomosed using three interrupted sutures of 6-0 vicryl



Fig. 9.1 - OA assisting in orbit surgery

13. Duct patency is checked
14. Muscle layer is closed with 6-0 vicryl and skin with 4-0 silk

Instruments

- A. For nasal packing
 - Thudicums nasal speculum
 - Nose packing forceps
 - Nose pack (Thin length of gauze soaked in Adrenaline 1:100,000)]
- B. For local infiltration
 - A 5 cc syringe with disposable needle (with 3-5 cc of 2% xylocaine)
- C. For surgery
 - No 15 blade with BP handle
 - Artery forceps
 - Cat's paw retractors
 - Freer periosteal elevator
 - Forceps – toothed, plain
 - Kerrison Bone punch
 - Punctum dilator
 - Probe

- No 11 blade on BP handle
- Westcott spring handled scissors
- Needle holder
- 6-0 vicryl and 4-0 silk sutures on needle
- 2cc syringe with cannula for syringing

Dacryocystectomy (DCT)

Steps

1. Painting and draping is done
2. Local anaesthetic is injected
3. Skin incision is put in medial canthal area with no.15 blade
4. Wound retracted with cat's paw retractors
5. Blunt dissection is done with mosquito and artery forceps and lacrimal sac is identified after probing
6. The sac is separated from surrounding tissue with sharp and blunt dissection and removed.
7. Betadine wash is given
8. The wound is sutured with 4-0 silk

Instruments

1. No.15 blade
2. Two cat's paw retractors
3. Mosquito forceps
4. Sac dissector
5. Toothed forceps
6. Bowman's probe
7. Scissors
8. Artery forceps
9. 4-0 silk suture

Special considerations

A. Pre operative

1. As DCR (like most orbital and lacrimal surgeries) may involve significant blood loss, pre-op testing (like BP, Hb, BT, CT, HIV, Blood grouping and typing) is very important.

2. Conditions like bleeding disorders, uncontrolled diabetes and hypertension, cardiac disease, asthma etc should be properly treated before the patient is taken up for surgery. If such conditions are present a physician's opinion should be taken and fitness for surgery confirmed.
3. The surgery may be done under general anaesthesia or local anaesthesia. For children, mentally unfit or deaf patients, general anaesthesia is given. For apprehensive patients or people with low pain tolerance, counselling should be done. If reasonably co-operative, local anaesthesia or IV sedation are used, otherwise general anaesthesia is planned.

B. Intra operative

1. The surgical field has to be kept as clear as possible. Oozing blood has to be continuously mopped. Suction or cautery may have to be used and should be kept ready.
2. The patient should be monitored throughout the surgery. If available, pulse oximeter should be attached before local anaesthesia is given.
3. In case of severe Intra operative bleed, the patients' BP should be checked and controlled. BP apparatus and O2 cylinder should be available in Operation theatre.
4. Intubation should be available as it may be required in case of intra-operative complications like loss of flaps etc.

C. Post operative

1. Some patients may develop bleeding through nose/mouth in the post-op period. If the blood is mostly clotted, the patient should be reassured and instructed to lie supine for a while. BP should be checked and controlled.

More active bleeding may require nasal repacking and application of an ice pack. The patient is instructed to lie down supine with neck extended with two

pillows. Severe bleeding may require by injection Botropase, IV fluids and suction and repacking.

Glaucoma surgeries

1.Trabeculectomy

Surgical procedure

1. Conjunctival flap is made, fornix/ limbal based
2. Cautery applied
3. Triangular flap 4mm 3mm made
4. Antimetabolites MMC_0.20% 5FU/5. ML. if indicated, are applied and washed with ringer Lactate
5. Scleral flap is dissected out carefully up to the base
6. Paracentesis done
7. A/C (Anterior chamber) entered
8. The trabecular meshwork is punched with Kelly's punch
9. Peripheral Iridectomy (PI) done
10. A/C formed
11. Flap sutured with 10 'o' nylon suture
12. Conjunctival flap sutured with 8 'o' vicryl
13. S/C inj. Garamycin ½ cc+ inj, Decadron ½ cc given

Trabeculectomy surgery

Instruments

1. Speculum: Lid speculum is used to separate the lids as gently as possible without causing distress to the patient, pressure on the globe or interference with the surgery
2. Superior rectus needle holder: It is used to take superior rectus bridle suture during surgery
3. Toothed forceps
4. Superior rectus forceps
5. Plain on tying forceps

6. Artery clamp: To secure the superior rectus bridle suture to the drape
7. Conjunctival scissor: Used for making conjunctival flap either fornix based/ limbal based during surgery
8. Corneal forceps: For holding delicate tissue like cornea during suturing
9. No.15 blade on BP handle
10. Blade breaker with razor blade
11. Kelly's punch
12. Iris holding forceps
13. Vannas scissors
14. Cautery: Used to cauterize bleeding vessels after making conjunctival flap under Saline (wet cautery)
15. Swab stick: Used to clean the after surgery
16. Mitomycin: 2mg/vial 0.2%. Taken on small sponge.

Trabeculectomy with ECCE

Surgical procedure

1. Conjunctival flap is made
2. Cautery applied
3. Triangular flap 4mm 3mm made
4. Antimetabolites MMC_0.20% 5FU/5. ML. if indicated, are applied and washed with ringer Lactate
5. Scleral flap is dissected out carefully up to the base
6. The groove is extended on both sides along the limbus
7. The AC is entered just beneath the flap
8. Visco is injected
9. Capsulotomy is made
10. The section is extended (6 to 6.5 mm)
11. The nucleus is delivered by pressure – counter pressure technique
12. The cortex is washed

13. The IOL is inserted
14. PI is done
15. Wound closed with 10-0 nylon
16. Conjunctiva closed with 8-0 vicryl

Instruments

Same as for trab and including the instruments for ECCE

Cornea surgeries

Penetrating keratoplasty

1. The donor eye is collected from the eye bank by the OA.
2. The OA checks the case sheet and the eye to be operated on.
3. Retro bulbar block (or GA) is administered. The eye should not be massaged.
4. Cleaning and draping of the part is done.
5. Lid speculum is placed.
6. Superior rectus bridle suture is put.
7. The part to be excised is marked on the recipient cornea using a trephine (usually 7 to 7.5mm).
8. The donor corneal button is excised using a larger trephine. The donor corneal button should be 0.5mm larger than the corneal button removed from the recipient eye.
9. The damaged cornea (previously marked on the recipient eye) is removed using corneal scissors and fine toothed forceps.
10. The anterior chamber is formed by visco.
11. The donor corneal button is sutured to the recipient eye using 10-0 nylon .
12. The anterior chamber is washed and reformed with saline.
13. The eye is patched after putting appropriate drops.

Instruments

1. Lid speculum
2. Superior rectus forceps with needle and thread

3. Toothed forceps
4. Plain forceps
5. Trephine (2 are required, 1 is 0.5 mm larger)
6. Corneal scissors
7. 10-0 nylon suture



Fig.9.2 - Patching the eye after surgery

Pterygium excision with autograft

Steps of surgery

1. Cleaning and draping
2. Lid speculum
3. Stay suture (4-0 or 6-0 silk)
4. Head and neck of pterygium is excised using a no.15 blade
5. The appropriate size of the graft is marked on the conjunctiva in the supero temporal quadrant
6. Saline is injected under the conjunctiva in the marked area
7. The conjunctiva is lifted up and excised in the marked area.
8. The graft is placed over the bare sclera and sutured with 6-0 vicryl
9. The stay suture is removed
10. Appropriate drops are applied and the eye is patched (Fig. 9.2).

Instruments

1. Lid speculum
2. Plain forceps

3. Toothed forceps
4. No.15 blade
5. BP handle
6. Marker pen
7. Conjunctival scissors
8. 6-0 vicryl suture

Summary

The OA learned about the instruments to be used in the different speciality surgeries and the steps involved in each type of surgery.

Student exercise**Answer the following**

1. *What are the steps involved in the DCR surgery?*
2. *List the instruments needed for nasal packing.*
3. *List the instruments needed for trabeculotomy surgery.*
4. *Write a short note on penetrating keratoplasty.*
5. *What are the steps involved in the Pterygium excision with autograft?*

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A R A V I N D E Y E C A R E S Y S T E M