CHAPTER - 10

GENERAL PRECAUTIONS TO SAFEGUARD AGAINST POST-OPERATIVE INFECTIONS FOLLOWING OPHTHALMIC SURGERY

The most important measure against the occurrence of endophthalmitis after intraocular surgery is taking meticulous precautions to ensure total asepsis and sterility at the time of surgery. Attention has to be paid to the four key sources of contamination:

The patient, personnel, instruments and environment.

The Patient:

1. **Prophylactic antibiotics** in the days preceding surgery and subconjuctival injection at the end of surgery should be given. For this, povidone iodine (Betadine) solution should be used on the table before commencing surgery.
   - Ciprofloxacin or Tobramycin eye drops with the frequency of administration as four times a day for about 3 days may be used.
   - The use of Povidone iodine 5% solution (not scrub), is now a strongly recommended practice for all intraocular surgeries.

2. There is a strong rationale for the use of subconjuctival injection at the end of the surgery.

3. Antibiotics may also be used in the infusion fluids.

4. Adequate facial wash should be given with an antiseptic soap on the night preceding surgery and periocular skin should be painted with betadine solution the preceding night and on the morning of surgery.

5. Apply Opsite or other similar adhesive taking particular attention to ensure its tight adherence at the medial canthus, nasal bridge and naso-labial fold. Keep the adhesive slightly redundant over the open eyelids while applying. However, prevent corneal touch. Lift the temporal edge of the adhesive at the lateral canthus and make a horizontal slit upto the medial canthus. At the medial canthus, extend the cut in a ‘V’ or ‘T’ shaped manner. Insert the eyelid
speculum through the slit opening in such a manner that the eyelid margin and eyelashes are wrapping with the edges of the adhesive.

6. All patients can be a major of contamination in the operating room. This should be minimized by preparing the surgical site (e.g. cutting eyelashes and cleaning with a bacteriostatic agents, ensuring evacuation of the bladder and large intestine, transporting the patient to the operating room in a clean gown and on a stretcher covered with clean linen.

**Personnel and Operation Room Aspects:**

(a) All personnel working with the OT must display co-operative and appropriate behaviour.

(b) General health and personnel hygiene of individuals working in the operation theatre needs close monitoring. Any one with **Upper Respiratory Infections, Draining skin lesions or Infections of the Eyes, Ears, or Mouth** should not be permitted to work in the OT.

(c) Dress code has to be strictly enforced. All personnel working in the OT must change into hospital laundered scrub attire and wear OT footwear, cap to cover all scalp hair adequately and properly fitting face mask before entering the operating room. Facemask should completely cover the nose and mouth and fit snugly against the face. Masks should not be left dangling under the chin; they should be changed if need be.

(d) Every one in the operating room should wear scrub apparel with long sleeves and tight cuffs at the wrist.

**Method of scrubbing:**

(a) Wash hands and arms to two inches above the elbow and clean finger nails under running water. Wet scrub, brush and apply antimicrobial soap solution. Begin scrubbing palm, outer and inner aspect of each finger, finger nails, the dorsum of the hand and circumferentially work up to the elbow. Rinse the hand and arm, keeping the arm above the elbow level.

(b) If one touches anything in the process of scrubbing, the procedure should be repeated.
Gowning and Gloving:
(a) In order to minimize the risk of contaminating the sterile operative set up during the process of growing and gloving a separate table should be used.
(b) Only the scrub nurse should gown and glove herself, the rest should avoid self gowning and gloving. This minimizes the risk of contamination from dripping water on the sterile table in the process of picking up the hand towel and self gowning.
(c) Members of the team should be gowned and gloved as soon as they enter the room. Once gowned and gloved, they should remain in the sterile end of the room until the patient is draped and the sterile setup is moved into place.
(d) During any waiting period, the sterile gowned and gloves members of the team must keep their hands as above waist level in front of them during this time. They should never sit, place their hands on lap or fold their hands.

Supplies, Instruments and equipment:
(a) The furniture on which the sterile packs are to be placed should be placed in the sterile of the room. These should be clean and dry.
(b) Each pack must be examined for holes in the wrapper, watermarks (indicative of area of moisture), expiry date and integrity of closure.
(c) The tops of all furniture should be approximately the same height as the operating room table. This level is known as the level of sterility.
(d) Unsterile equipment, furniture and personnel should remain at least twelve inches from any sterile surface. Unsterile personnel should never walk between two sterile fields.

The environment: Asepsis of the Operating Room:
(a) Ideally, the floor in the OT should be sprayed and wet vacuum pick up used between surgical procedures and at the end of the day. Alternatively, mopping of the floor with a clean head every time using a two-bucket system should be employed, though this is a less effective method.
(b) Spot cleaning of walls and ceiling should be undertaken as needed everyday.
(c) Doors and switches should be cleaned with a germicidal detergent. Open shelves need to be cleaned daily with a detergent while closed cabins may be cleaned once a week.
(d) The sink area should be cleaned several times daily and keep as dry as possible. The spray heads on the faucets should be removed and cleaned daily.

(e) The outside of autoclaves should be cleaned daily while the inside surface is cleaned weekly. The inside cleaning needs use of trisodium phosphate to remove the chemical residue.

(f) Furniture used during a surgical procedure needs to be wiped with a detergent/germicide at the end of the day. The same applies to spotlights and other portable equipment, stretchers and kickbuckets. The latter, in addition, should be steam cleaned weekly.

(g) Before removing her gloves, the scrub nurse should place all soiled linen inside the laundry bin. No one should handle soiled linen inside with bare hands. Soiled linen should also never be left on the floor or transported on a trolley used for other purposes. The laundry bin should be removed immediately after it fills up.

(h) Liquid waste material such as the contents of the suction bottle should never be disposed off in a scrub sink or utility sink but only into a container meant for the purpose. Ideally however, disposable suction bottles should be used. Glass suction bottles when used should be cleaned with a disinfectant and autoclaved before reuse. If autoclaving is not feasible, they should be least be cleaned with disinfectant between cases.

**Operation Theatre Sterilization**

a) Operation theatre should be washed with copious amount of water. This is followed by fumigation with formalin vapor (30 ml of 40% formalin dissolved in 90 ml of clean water for fumigation of 1000 cubic feet by aerosol spray). The room should be kept closed for 6 hours. Carbolisation with 2% Carbolic acid is then undertaken. This method had the disadvantage that it takes about 24 hours for the pungent smell of formalin and carbolic acid to dissipate. If fumigator (Oticare) is not available, use 35 ml of 40% formaline with 10 gms of Potassium permanganate ($\text{K}_2\text{MnO}_4$) in a basin for a space of 1000 cu feet and seal for 24 hours.

b) A new method of fumigation has been evolved using 'Aldekol', a mixture containing 6% formaldehyde, 6% glutaraldehyde and 5% benzalkonium
chloride. To sterilize 4000 cu ft, 325 ml of Aldekol is dissolved in 150 ml of water and sprayed by aerosol for 30 minutes. The room should then be closed for 2 hours following which fumes are allowed to clear by putting on the exhaust or airconditioning. In effect, the operation theatre is sterile in just over 3 hours.

**Sterilization of instruments, equipment and Linen:**
The most appropriate method should depend on the type of material, the inventory size, the use and the facilities available.

Sterilization using moist and dry heat are physical methods of sterilization

Moist heat is used as stream under pressure while dry heat is used as circulating air.

**Sterilization methods of choice of article during eye surgery:**

| 1. Linen (Gowns, Caps, Masks, Drapes) | Autoclaving |
| 2. Glassware (Syringes) | Dry heat sterilization, or use disposables from reputed firms |
| 3. Metal instruments : Heat labile  
  Heat resistant | ETO sterilization  
  Autoclaving |
| 4. Plastic instruments/ Components | Ethylene oxide sterilization, formalin chamber |
| 5. Sharp edges instruments  
  (e.g. Vannas scissors, keratome) | ETO/ Hot air oven/ Chemical disinfection |
| 6. Sutures (including monofilament nylon) | Can be autoclaved |
| 7. Diathermy, Cautery electrodes | Autoclaving |
| 8. Endoilluminators / probes | Ethylene oxide sterilization |
| 9. Silicone oil/ buckles/ sponges | Autoclaving |
Sterilization monitoring system

Monitoring the results of sterilization is essential to ensure safe sterile products during surgery. The main objective is to minimize infection potential. The methods used, the frequency of monitoring and interpretation of results must be standardized.

Principles of sterile technique

- When bacteria cannot be eliminated from a field, they should be kept to an irreducible minimum.
- If there is any doubt about the sterility of anything, consider it to be unsterile.
- Persons who are sterile should touch only sterile articles while persons who are not sterile should touch only unsterile articles.
- Sterile persons should avoid leaning over an unsterile area, while nonsterile persons should avoid reaching over a sterile field.
- Table are sterile only at table level
- Gowns are considered sterile only from waist to shoulder level in front and upto the sleeves.
- The edge of anything that encloses sterile content is not considered sterile.
- Sterile persons should keep well within the sterile area; nonsterile persons should keep away from the sterile area.
- Moisture is a potential source of contamination; so avoid using moisture soaked linen packages.
- Keep nonsterile personnel or visitors to a minimum.

Important Considerations in Asepsis and Sterilization

Asepsis and sterilization (Surgeon Factors):

- Surgical scrubbing is not just hand washing.
- Do not operate with bare hands.
- Gowns are not sterile below the waist, on the back and in the region of armpits and neck.
- Cap and Mask are useless if they do not fully cover the scalp hair and nostrils.
• Do not let your mask hang losses around the neck and reuse the same.
• Do not wear same footwear from unrestricted to restricted area.
• Do not move around with hands folded (onto armpit) or in gown pocket.

Pathways to Sepsis and unsterility: General
1. Preparing all trolleys beforehand.
2. Relying on unconventional methods (Boiling).
3. Unsterile person completing a trolley using a Chittle forceps.
4. Throwing around soiled linen and covers etc.
5. Discarding swabs used for skin preparation onto the floor.
6. Sterile persons leaning over an unsterile area.
7. Nonsterile persons reaching over a sterile area.
8. Sterility is doubtful, but decide to use the same.
9. Linen is soaked with moisture, still using it.

Pathways to Sepsis and unsterility: Patient Preparation
1. Not specifically ruling out adnexal (eg. Dacryocystitis) and Ocular surface infections
2. Operation in presence of active septic foci.
3. Performing repeated contact procedures (eg. Applanation/Biometry)
4. Unclean patient attire and exposed scalp hair.
5. Improper surgical painting.
6. Uncovered nostrils and eyelashes (drape plus Opsite).
7. Not washing away Meibomian secretions.
8. Not washing conjunctival sac with povidone-iodine.

Pathways to Sepsis and unsterility: Surgeon Factors
1. Exposed scalp hair and nostrils
2. Operating inspite of an open wound.
3. Improperly scrubbed hands.
4. Ungloved hands.
5. Getting irrigation fluid all over: trolley surface, gown, draping.
6. Not checking indicator tapes (autoclave, ETO etc.)
7. Not checking irrigating fluid for particulate matter/presence and concentration of antibiotic.
8. Inadvertently touching an unsterile area but not changing gloves.
9. Same irrigation line used for several surgeries.
10. Reusing instruments from trolley of another patient directly.
11. Reusing dropped instruments without adequate resterilization.
12. Inserting dropped IOLs after wash!
13. Leaving the eye predisposed:
   • Improper valve
   • Wound gape
   • Exposed suture knots
   • Vitreous wick

Pathways to Sepsis and unsterility: Instruments Factors
Pay special attention to:
1. Tubular instruments (eg. Cannula)
2. Devices with anti-peristaltic pumps and reflux mechanisms. (eg. Phaco/vitrectomy machines): Ensure suction bottle is empty and sterile.