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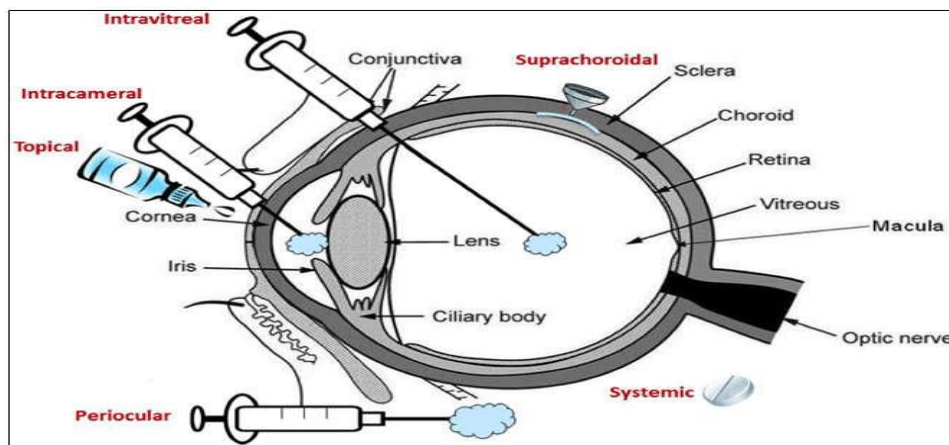
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**Subject: Minor OT Procedures**

**Assignment : Routes of Drugs Administration**

## Routes of Drug Administration

- A drug produces its effect when an appropriate concentration reaches the site of action, because the eye has a variety of anatomical barriers.
- The chemical properties of a drug must be taken in consideration when one is choosing a drug delivery route for the treatment of ophthalmic disorder.
- Therapeutic agents can be introduced into the eye, mainly by four methods :
  1. Topical instillation
  2. Periocular injections
  3. Intraocular injections
  4. Systemic administration



### **1. Instillation of the Drug into the Conjunctival Sac**

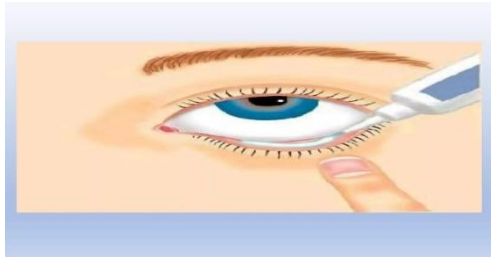
This is done in the form of eyedrops, ointment, gels, soft contact lens or membrane delivery. The Passage of drug through the corneal epithelium is determined by its fat solubility and the degree of dissociation of the electrolytes.

- **Eyedrops** : It achieves a high concentration and is quickly washed away. More than 80% of the drug enters the lacrimal drainage system after 5 minutes. It is convenient for daytime use as it causes minimum blurring of vision



- **Ointment** :

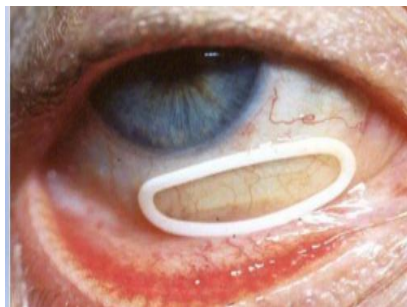
It has longer contact time but there is lower drug concentration in tears. It causes blurring of vision therefore it is applied at bedtime.



- **Gels** :It also has prolong contact time and may cause less blurring of vision than ointment.
- **Soft contact lens** : It absorbs small molecules of drugs when soaked in the drug. It delivers high concentrations for over about 4 hours.



- **Membrane delivery** : By 'ocusersts' there is relatively constant rate of drug delivery thus reducing the side effects. Pilocarpine ocusersts cause less fluctuation in intraocular pressure as it delivers drug over a longer duration.



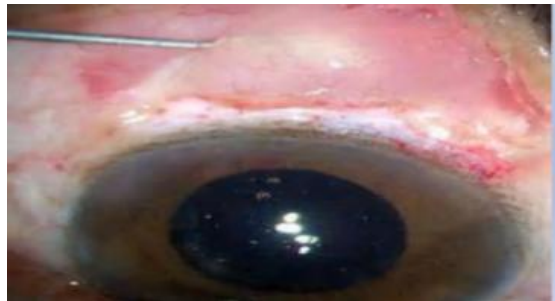
- **Iontophoresis** : An electrolyte is given into the eye with the passage of a galvanic current which increases the permeability of the cornea. It is rarely used nowadays.

## 2. **Periocular Injection**

These include subconjunctival, sub-Tenon, retrobulbar and peribulbar routes.

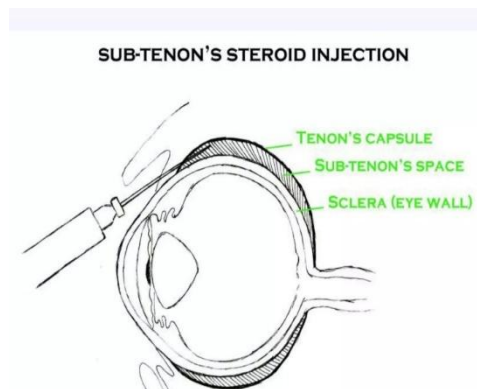
- **Subconjunctival injections:**

They achieve high concentration of drugs and are useful in acute anterior segment infections and inflammations. The drugs which cannot penetrate the cornea owing to large-sized molecules can easily pass through the sclera. Hence a wider range of substances can be introduced into the eye. These are used in treatment of Corneal ulcer, cataract surgery, conjunctivitis, Iridocyclitis.



- **Sub-Tenon injections:**

Anterior sub-Tenon injections are used mainly to administer steroids in the treatment of severe or resistant anterior uveitis. Posterior sub-Tenon injections are indicated in patients with intermediate and posterior uveitis. Depots of crystalline suspensions of corticosteroids lead to high intraocular levels of steroids without systemic side-effects.



- **Retrobulbar injections:**

These are used to deliver drugs for optic neuritis, papillitis and posterior Uveitis. They are also used for administering retrobulbar block anaesthesia.

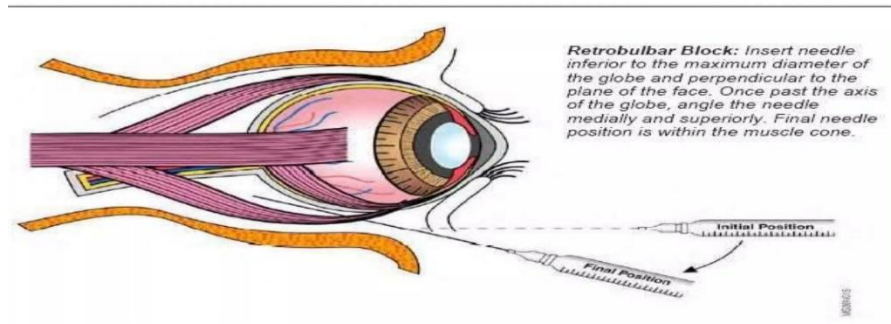


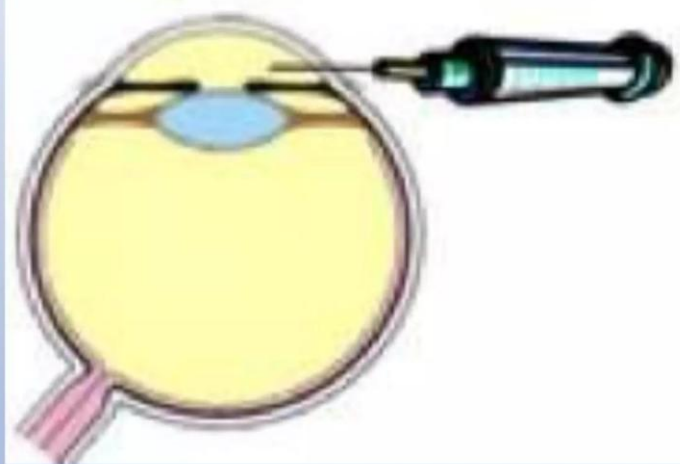
Figure 1. How the Retrobulbar Block is Performed

### 3. **Intraocular injection (Injection into the Eyeball):**

These include Intra cameral injection and Intra vitreal injection. It can be given in the anterior chamber or in the vitreous. It is reserved for desperate cases such as Panophthalmitis to flood the ocular tissues.

- **Intracameral injection**

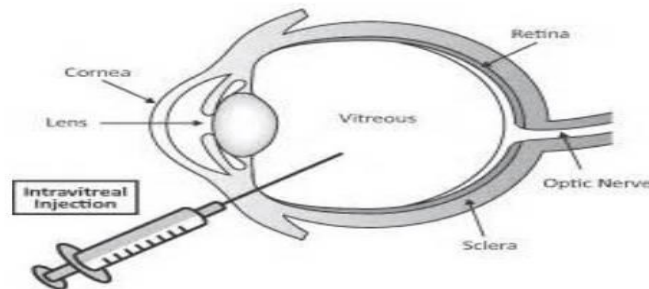
Administration of drugs into anterior chamber called intracameral injection. These are mainly used in treatment of anterior chamber neovascularization, in a painful blind eye.



- **Intravitreal injection**

Drug administration in the posterior chamber of eye called intravitreal injection.

These are used in the treatment of Retinal disease, diabetic retinopathy, retinal vein occlusion, uveitis.



#### **4. Systemic Administration**

Therapeutic substances can be given by mouth or parenterally by intramuscular and intravenous injections.

- **Oral Route**

This is oldest and most common route. The drug passes through the large G.I.T area and different PH of different parts.

- **Intravenous Route**

The drugs which are directly administered into the venous supply are called intravenous injections. So these directly reach into systemic circulation and produce effect.

- **Intramuscular Route**

The intramuscular route is a method of administering drugs into the muscle.

The main factor influencing the intraocular penetration of the drug is the blood-aqueous barrier. It depends mainly on two characteristics of the drug namely:

- **Molecular weight:** Low molecular weight substances penetrate easily. However, most antibiotics such as penicillin are large-sized molecules and are impermeable.
- **Lipid solubility:** A lipid soluble substance such as sulphonamide is 16 times more permeable than sucrose having almost the same molecular weight. Similarly chloramphenicol, a lipid soluble antibiotic enters the eye freely.

