Anesthesia for ophthalmic surgery

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Ophthalmic surgery

- Anesthesia for ophthalmic surgery dramatically changed recently, much cataract surgery is now performed under **topical anesthesia** only and much other surgeries under **local anesthetic nerve block**.
- When **general anesthesia** is used the **laryngeal mask airway** has generally replaced endotracheal tubes.

Intraocular pressure (IOP)

- **Normal intraocular pressure is 10-20 mmHg**.
- Increased IOP after some eye surgeries (particularly cataract) is typically due to retained ophthalmic viscosurgical device (the solution which used to maintaining the anterior chamber during surgical maneuvers) so, There are many factors that have to be taken into consideration that affect intraocular pressure.

Factors decrease IOP

- 1. Intravenous anesthetics (except ketamine).
- 2. Inhalational anesthetics.
- 3. Hypotension.
- 4. Hypocapnia.
- 5. Reduction in venous pressure, including head-up tilt.
- 6. Mannitol and acetazolamide.
- 7. Mechanical pressure on the eye to increase absorption of aqueous humor.

Factors increase IOP

- 1. **Hypertension.**
- **2. Hypercapnia.**
- **3. Raised venous pressure, including head-down tilt.**
- **4. Suxamethonium (transient effect).**
- **5. Local anesthetic block.**
- **6. Ketamine (has a little effect).**

The oculocardiac reflex :

- Traction on extraocular muscles, pressure on the eyeball, administration of a retrobulbar block, and trauma to the eye can elicit a wide variety of cardiac dysrhythmias ranging from bradycardia and ventricular ectopy to sinus arrest or ventricular fibrillation.
- This reflex consists of a trigeminal (V1) afferent and a vagal efferent pathway.
- The oculocardiac reflex is most commonly encountered in pediatric patients undergoing strabismus surgery, although it can be evoked in all age groups and during a variety of ocular procedures, including cataract extraction, enucleation, and retinal detachment repair.

oculocardiac reflex

- In awake patients, the oculocardiac reflex may be accompanied by nausea.
- Routine prophylaxis for the oculocardiac reflex is controversial.
- Anticholinergic medication is often helpful in preventing the reflex, and intravenous atropine or glycopyrrolate immediately prior to surgery is more effective than intramuscular premedication.

Management of the oculocardiac reflex

- (1) Immediate notification of the surgeon and temporary cessation of surgical stimulation until heart rate increases
- (2) Confirmation of adequate ventilation, oxygenation, and depth of anesthesia
- (3) Administration of intravenous atropine (10 mcg/kg) if bradycardia persists
- (4) In resistant episodes, infiltration of the rectus muscles with local anesthetic. The reflex eventually fatigues (self-extinguishes) with repeated traction on the extraocular muscles.

General anesthesia

Indications for general anesthesia:

- Potential failure of cooperation by the patient, especially those with learning difficulties.
- Patient phobias, especially severe claustrophobia.
- Children.
- Long duration operation.
- Various technical surgical problems.

Special Concerns in Ophthalmic Anesthesiology

Elderly patients with multiple systemic diseasesPediatric patients, often premature with congenital syndromes

Patients anxious because of loss of vision

Limited access to the airway

Oculocardiac reflex is common with general anesthesia and occasionally seen with blocks

Potential for eye injury with intraoperative movement

Intraocular pressure and anesthetic interactions

Systemic effects of ophthalmic medications

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- **Premedication is not used routinely now for eye surgery, but a short-acting benzodiazepine may be given orally as premedication to anxious patients.**
- **Anticholinergic agents cause a dry mouth and discomfort and do not need to be given with premedication. They are more likely to be needed in strabismus or retinal surgery, but may be given intravenously after induction if necessary.**
- **Propofol used widely because of its short duration of action, pleasant induction and reduced post-operative nausea.**

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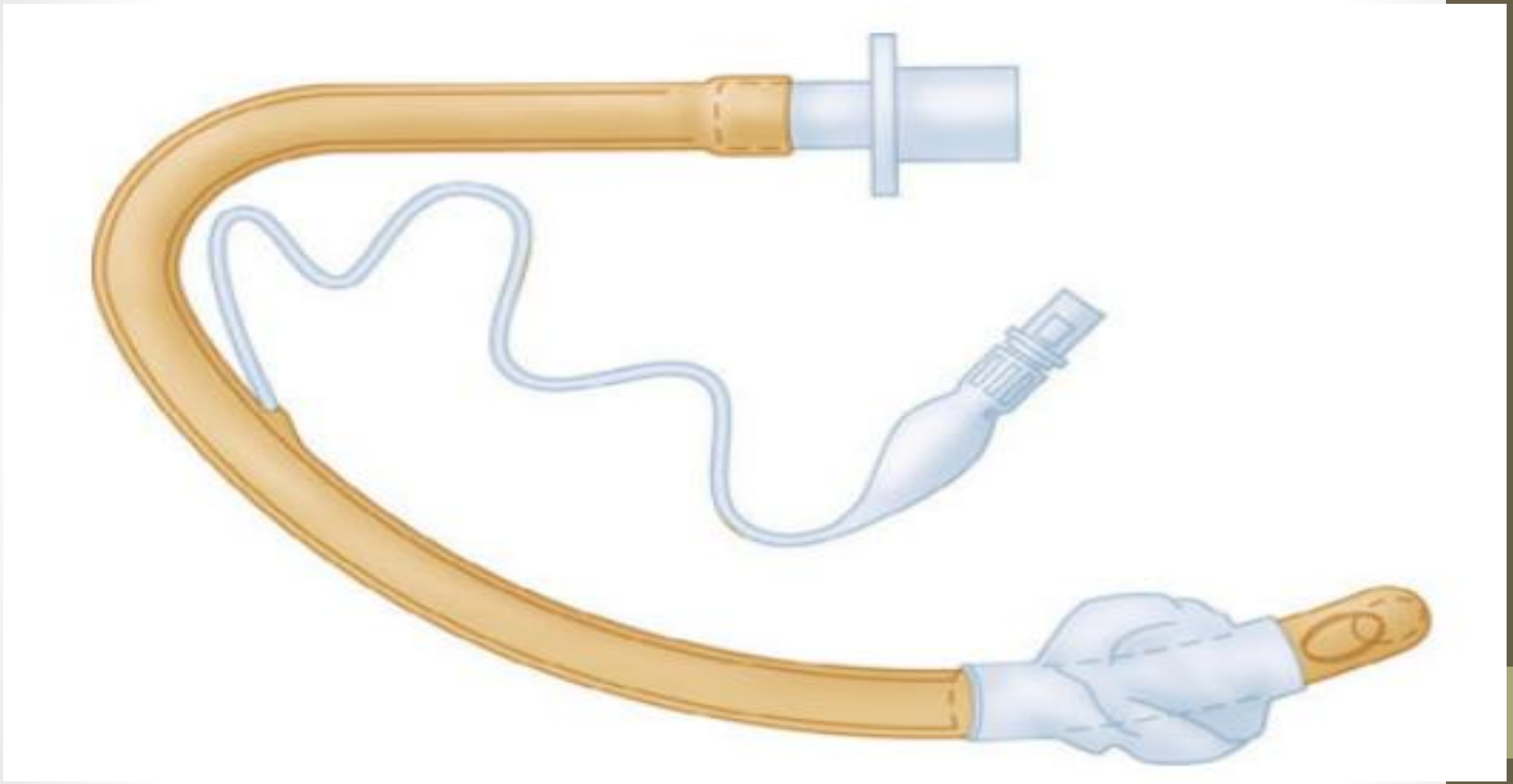
- **Etomidate** is useful in elderly or unhealthy patients because of its cardiac stability, reduction in IOP and rapid recovery.
- **Moderate hyperventilation reduces PaCO2** and provides excellent operating conditions.
- **Use of RAE** tube is preferred in eye surgery
- **Early on in the procedure**, the surgeon should be encouraged to infiltrate a long acting local anesthetic by the sub-Tenon's route. This should successfully eliminate various requirements in anesthetic from the surgical stimulus and provide a stable anesthetic with a reduction in the amounts of general anesthetic agent required.

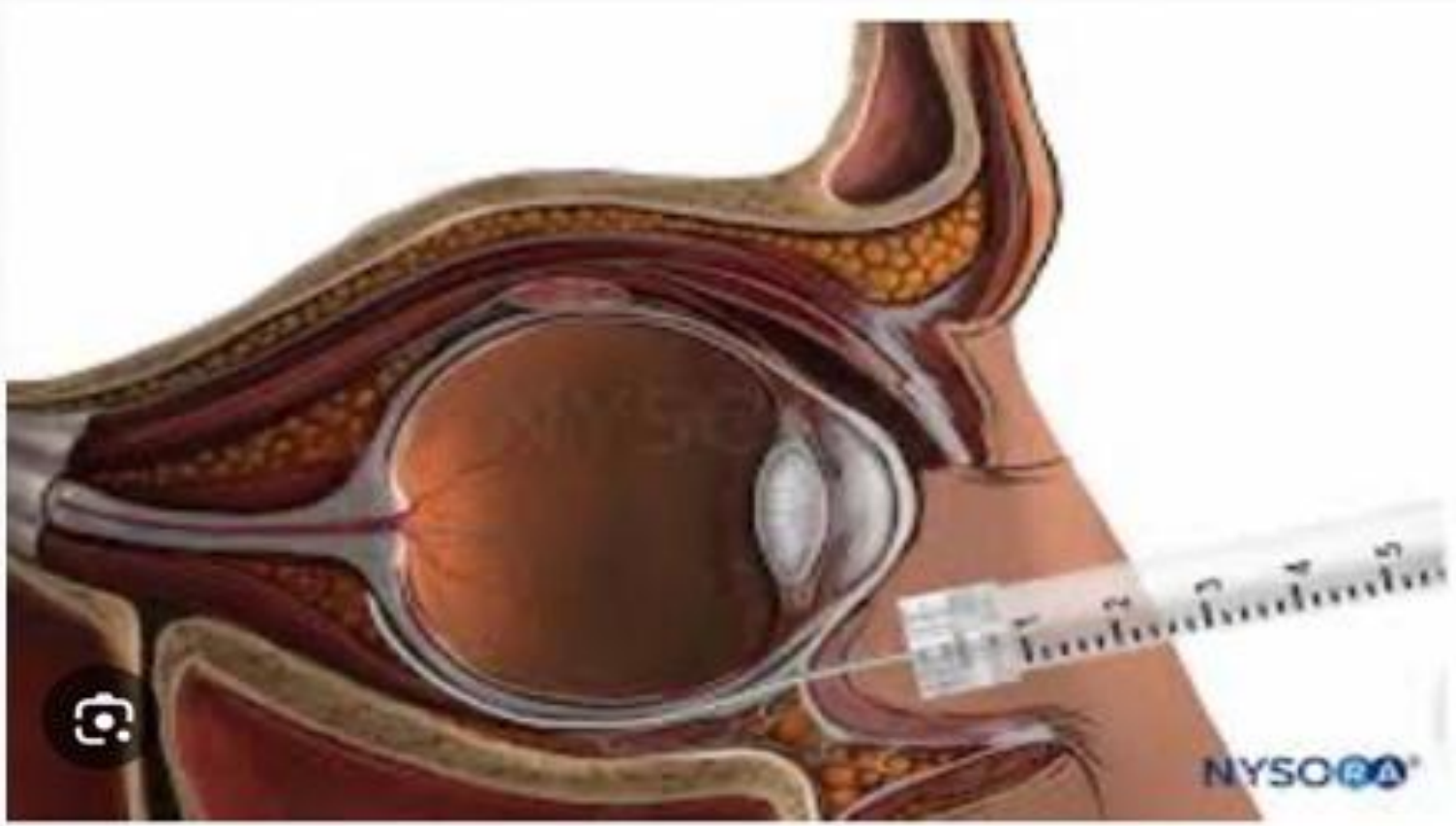


Local anesthetic techniques

- **1. Topical**: It is used for cataract surgery.
- **2. Sub-Tenon block**:

It is used for cataract surgery when immobile eye required. It is often **unsatisfactory for vitreoretinal surgey.**

A blunt cannula is passed into the plane between Tenon's capsule and the sclera to inject the local anesthetic. It is often administrated by the surgeon without the help of the anesthetist.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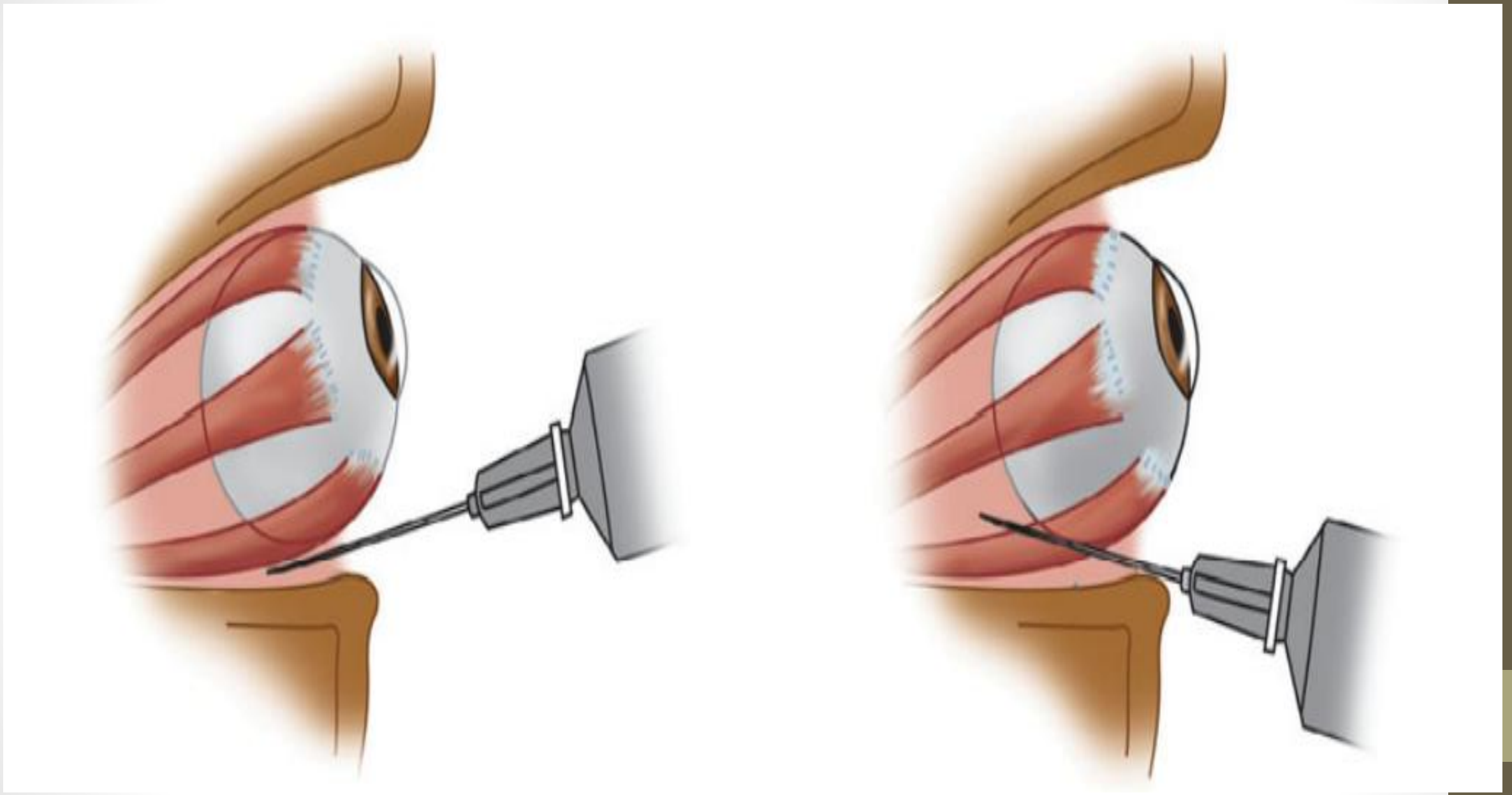
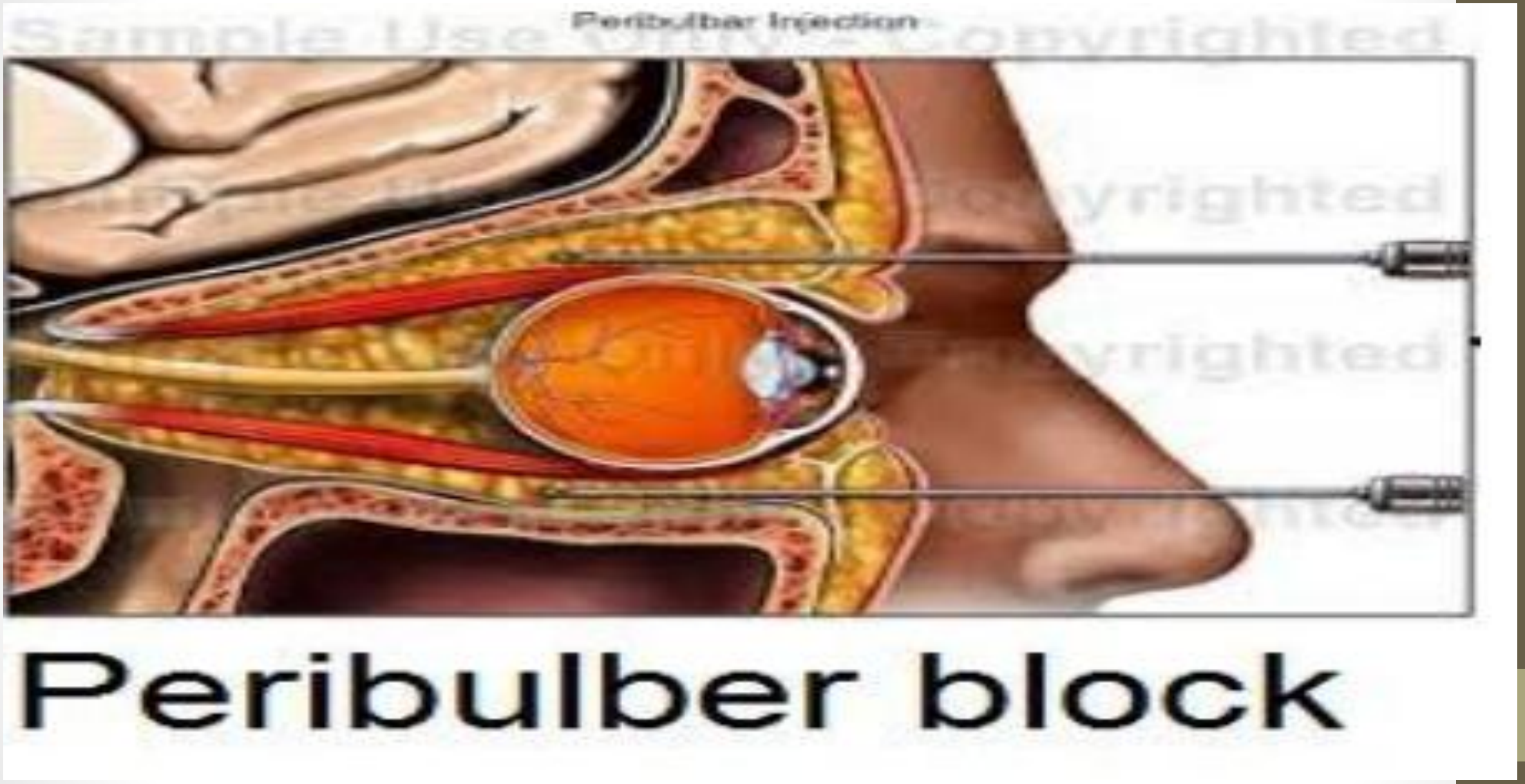
Retrobulber block:

- Injection of the local anesthetic into the muscle cone behind the eye.
- It is increasingly regarded as out of date and unsafe because the significant incidence of perforation of the globe, hemorrhage, and intradural injection.

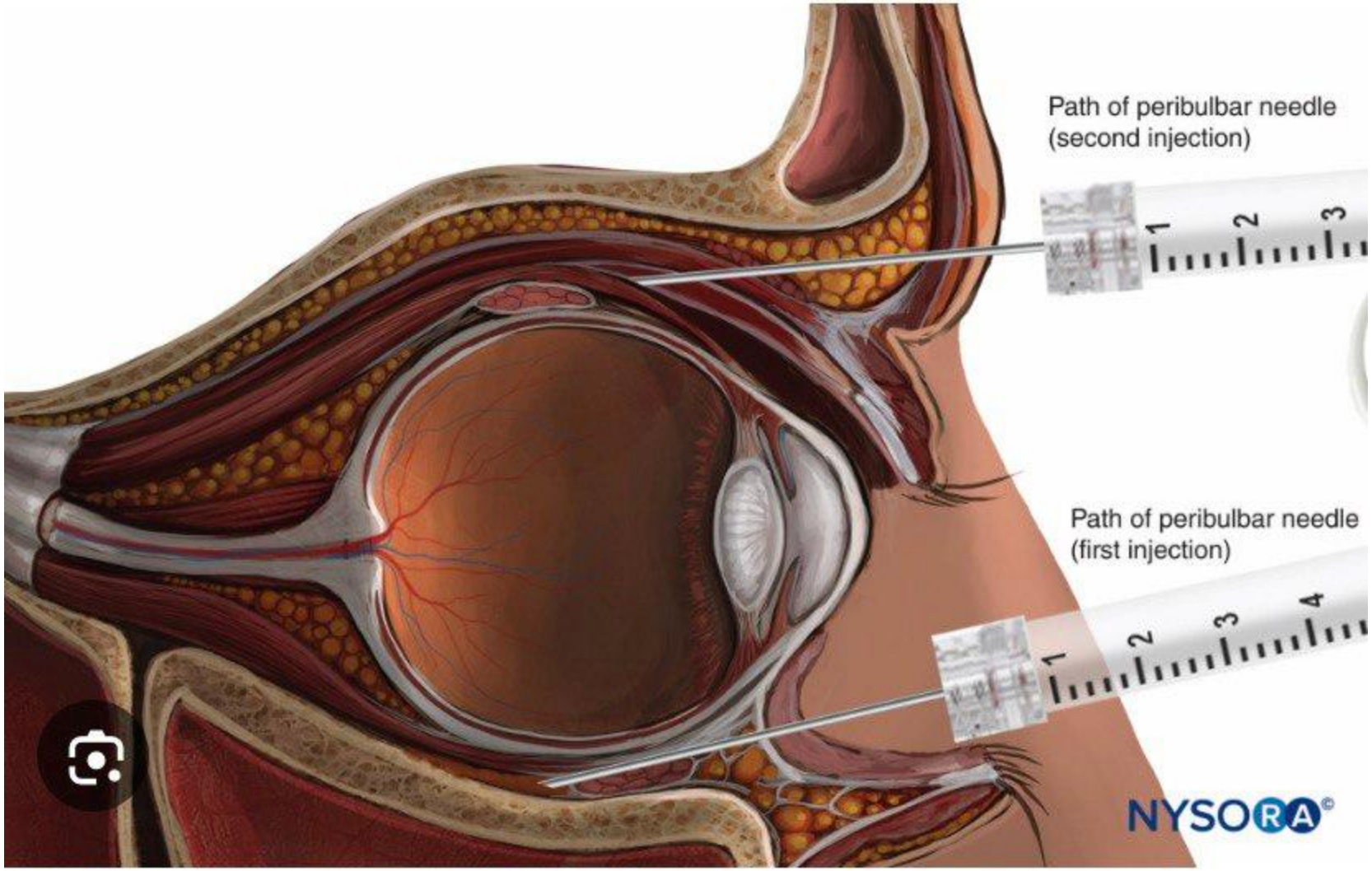


Peribulber block

- It can be a true extradural injection, allowing the local anesthetic to diffuse into the muscle cone, or into the intraconal space.
- It is increasingly used vitreoretinal surgery and other forms where a greater level of akinesia and analgesia is needed.



Peribulber block


Path of peribulbar needle
(second injection)
Path of peribulbar needle
(first injection)
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Thank you