To study the Miosis, Mydriasis and local Anesthetic effects of drugs on Rabbit's Eye

Requirement:

Apparatus-

Droppers, measuring scale, torch, cotton wool

Subject-

Rabbit (2 - 5kgs)

Drugs-

Normal Saline
Pilocarpine (2 to 4% w/v),
Amphetamine (1 to 4% w/v),
Ephedrine (1 to 4% w/v),
Cocaine (1 to 4% w/v)
Physostigmine (1% w/v)
Xylocaine (0.5 to 1% w/v)
Atropine (1% w/v),
Ephinepherine (1% w/v)
Phenylephrine (20% w/v)

Procedure

1. Place the rabbit (No.1) on the table.
2. Hold the Rabbit from trunk and placed in the rabbit holder, the heads kept outside from rabbit holder
3. Measure the diameter of both the pupils with the help of a scale and Record the findings.
4. Observe the condition of the conjunctiva (congested or not) and elicit the corneal and light reflexes. Record the findings.
5. Put few (4 to 6 drops) drop in interval of two minutes of saline (as control) in the left eye and drug (as experimental) in the right eye by using eye dropper, respectively. After adding the drops, the medial canthus should be pressed for 10 seconds.
6. Record the following parameters after 10 min and tabulate the results after instilling the saline and drug respective eyes.

a. Diameter of the pupil:
The diameter of the pupillary size is measured by a scale

b. Light reflex:
The effect of light reflux were examined by holding the torch near to the eye and moving the light beam to and for .

c. Corneal reflex:

The corneal reflex was examined by touching a side of cornea with a cotton swab or tip, the rabbit immediately / progressively closes the eye lid.

7. Record your observations in a tabular form. Repeat the same procedure for other drugs on separate rabbits (Nos. 2 to 10).
8. The observation should be taken in dim light and entry of light rays directly into the eyes should be avoided

Observations

The observations like corneal reflex, light reflex, and pupillary diameter are studied before and after adding drug are recorded in observation table.

Sr. No.	Drug	Pupil Size (mm)	Light reflex	Corneal reflex	Observation	Result
1	Normal Saline	6	Present	Present	No change (No change in Pupil size)	No effect
2	Pilocarpine (4%w/v)	3	Present	Present	Reduce the size of pupil (Pupil Constriction)	Miosis Effect
3	Amphetamine (4% w/v)	8	Present	Present	Its increases the pupil size and increase in diameter of Iris (Pupil Dilation)	Mydriasis Effect
4	Ephedrine (4% w/v)	7	Present	Present	Its increases the pupil size and increase in diameter of Iris (Pupil Dilation)	Mydriasis Effect
5	Cocaine (4% w/v)	8	Present	Absent	Its increases the pupil size and increase in diameter of Iris (Pupil Dilation)	Mydriasis Effect
6	Physostigmine (1% w/v)	1	Present	Present	Reduce the size of pupil (Pupil Constriction)	Miosis Effect
7	Xylocaine (1% w/v)	6	Present	Absent	No change in the size of pupil but no sensetion to cotrten web (Pupil paralized)	Local anesthetic Effect
8	Atropine (1% w/v)	10	Absent	Present	Its increases the pupil size and increase in diameter of Iris (Pupil Dilation)	Mydriasis Effect
9	Epinephrine (1% w/v)	9	Present	Present	Its increases the pupil size and increase in diameter of Iris (Pupil Dilation)	Mydriasis Effect
10	Phenylephrine (20% w/v)	10	Present	Present	Its increases the pupil size and increase in diameter of Iris (Pupil Dilation)	Mydriasis Effect

Theory

Local action of large number of drugs in an eye can be achieved without systemic effect by application of drugs belonging to antimicrobial, autonomic or local anesthetic groups, the eye is supplied with both sympathetic and parasympathetic nerves. Ciliary muscles are supplied by parasympathetic nerves, when it contracts the ciliary body is mooned inwards and forwards because of the lens bulges forward and the eye is accommodated for near vision. The opposite effect is produced by the relaxation of ciliary muscles resulting in paralysis of accomidation. Topically applied drugs can effect the eye by changing conjuctival conjuction, papillary size, light reflux, corneal sensitivity, and intraocular pressure. The pupillary size can be measured by placing a transparent plastic scale in front of eyes as close as possible. Atropine an anti-muscarinic agents blocks the effects of endogenously released acetylcholine on the circular muscles of the iris and muscles ciliary produces mydriasis and spasm of accomidngation leading to cycloplegia but without producing loss of corneal reflux.

What is eye miosis?

Miosis of the eye refers to having small or constricted pupils. The condition is also called pupillary miosis. Pupils are the black circles in the middle of eyes. With miosis, the muscles of iris (the colored part of eye) tighten around pupil. These muscles control whether pupils are large or small. Another name for miosis is pinpoint pupils.

Typically, pupils get bigger or smaller when light enters your eyes. When there's a bright light, pupils get smaller. When it's dark, pupils get larger. If have miosis, pupils stay small even if the light changes.

The size of pupils also changes when you look at an object that is close to you. Pupils get smaller when are focused on something that is closer rather than farther away.

Miosis of the pupils can be on one side (unilateral) or both sides (bilateral). These conditions can also be thought of as monocular (one eye) and binocular (two eyes).

Miosis (pupillary constriction)
– Parasympathetic stimulation: muscarinic agonists (e.g. carbachol, pilocarpine); cholinesterase inhibitors (e.g. neostigmine, physostigmine).

– Sympathetic blockade: α1-antagonists (e.g. phentolamine).

What are dilated pupils?

Dilated pupils (mydriasis) are when the black center of eyes are larger than normal. The condition may be caused by dilating eye drops from an eye exam, the side effects from a drug/medication or traumatic injury. Pupils naturally dilate due to changes in light and emotional events, but unusual pupil dilation could be the result of a medical condition.

If pupils are dilated, the black center of eyes (pupils) are larger than usual. Pupils are typically the same size in both eyes.

Pupils change in size to control how much light enters eye. The colorful part of eye (iris) controls the size of pupil with tiny muscles. In bright light, pupils will get smaller to prevent light from entering. In the dark, pupils get larger to allow more light in. These changes are called direct responses.

Pupils also shrink when focused on a close object. This is called an accommodative response. If a pupil does not get smaller in bright light or expand in the dark, the pupil is not functioning normally.

Mydriasis (pupillary dilatation) is often required for detailed examination of the retina. Two major groups of drugs are used to cause pupillary dilatation, namely muscarinic antagonists - anticholinergics (e.g. atropine, tropicamide) and sympathomimetics- α1-agonists (e.g. phenylephrine). Short-acting relatively weak mydriatics, such as tropicamide, facilitate retinal examination. Cyclopentolate and atropine are preferred for producing cycloplegia (paralysis of the ciliary muscle) for refraction in young children. Atropine is also used for the treatment of iridocyclitis mainly to prevent posterior synechiae, when it is often combined with phenylephrine.

Agents that dilate the pupil may abruptly increase the intra-ocular pressure in closed-angle glaucoma by causing obstruction to the outflow tract, and are contraindicated in this condition. Patients should be asked whether they are driving before having their pupils dilated and should be warned not to drive afterwards until their vision has returned to normal.

A local anesthetic (LA) is a medication that causes absence of all sensation (including pain) in a specific body part without loss of consciousness, as opposed to a general anesthetic, which eliminates all sensation in the entire body and causes unconsciousness. Local anesthetics are most commonly used to eliminate pain during or after surgery. When it is used on specific nerve pathways (local anesthetic nerve block), paralysis (loss of muscle function) also can be induced.

Oxybuprocaine and tetracaine are widely used in the eye as topical local anaesthetics. Proxymetacaine causes less initial stinging and is useful in paediatric patients. Tetracaine causes more profound anaesthesia and is suitable for minor surgical procedures. Oxybuprocaine or a combination of lidocaine and fluorescein is used for tonometry. Lidocaine with or without adrenaline is often injected into the eyelids for minor surgery. Lidocaine is also often injected for surgical procedures on the globe of the eye.