SIGTH FOR ALL BASIC SCIENCES COURSE

OCULAR MOTILITY AND PUPILAR FUNCTION TEST

Learning outcomes:

When residents have worked through this module should know how to perform and interpret the following test or procedures:

- Hirschberg test
- Ocular motility test
- Cover-uncover test
- Pupil examination and pupils reactions (including the swinging flashlight test)

**Ocular Motility Test**
The ocular motility test is used to assess the quality of eye movements, and how the two eyes move together as they follow a target. This test allows us to diagnose strabismus, extraocular muscle dysfunction of the cranial nerves which innervate the extraocular muscles. Ocular motility should always be assessed, especially when people complain of double vision.

**Method:**
- The person should not wear their spectacles for this test
- Turn a penlight on, and hold it directly in front of the person’s face, at about 50 cm
- Ask the person to hold their head still, and to follow light only with their eyes
- Ask them to tell you if hurts when they move their eyes or if they have any double vision
- Using smooth and regular movements, move the penlight in a large double H shaped pattern in front of the person’s face
- If the eyes move smoothly, together, and unrestricted in all positions of gaze, record this as: _ocular motility:  full and unrestricted_
- If the eyes do no move together, you need to record: - which eye is not moving –the direction(s)

**Cover test**
The cover test is a simple test in which we use an occluder to assess the presence and direction of an eye turn or tropia. If one eye turns in, out, up or down, we say that the person has a tropia or a squint. The cover test is performed at both distance and near in the same manner, and with the person wearing their appropriate spectacle correction (distance and near spectacles).

- To perform the test at distance, ask the patient to look at the biggest letter on the acuity chart while wearing their distance spectacles (if they have any)
- To perform the test at near, ask the patient to look at a target at 40 cm (such as a pen or near acuity chart) while wearing their near spectacles (if they have any)
- Use an occlude (or a PD rule or your hand) to cover the left eye, while carefully watching the right eye for any movement
- The right eye should stay still as the left eye is covered- it should not move inwards, outwards, up or down
- If the right eye moves when the left eye is covered, it means there is a tropia (eye turn) present
- Uncover the left eye after about 2 seconds
- Allow about another 2 seconds for the eyes to realign, and then cover the right while carefully watching the left eye for movement
- The left eye should stay still as the left eye is covered- it should not move inwards, outwards, up or down
• If the left eye moves when the left eye is covered, it means there is a tropia (eye turn) present
• Uncover the right eye after about 2 seconds
• If there is no movement when you cover each eye, you record this as:
  Cover test (distance): No movement detected
  Cover test (near): No movement detected
• If there is eye movement on the cover test, you need to record: Which eye moved – The direction of the eye movement
• If there is movement on the cover test, there are four ways to record this:
  – Exotropia – means that the eye moved in when you covered the other eye
  – Esotropia – means that the eye moved out when you covered the other eye
  – Hypotropia – means that the eye moved up when you covered the other eye
  – Hypertropia – means that the eye moved down when you covered the other eye
  – For example, if the left eye moves outwards when the right eye is covered, this means the left eye is usually turned inwards and not looking straight at the target. We record this as: Left Esotropia.

**Hirschberg Test**
The Hirschberg test is a screening test to determine whether a person’s eye are in alignment, or whether they have an eye turn (also called a tropia or strabismus). It is especially useful for examining babies or young children, when it may be difficult to do the cover test. In the Hirschberg test, we shine a light into the person’s eyes and look at where the light reflex is located on the cornea in reference to the pupil. In a person with no squint, light will be reflected from the centre of both corneas. In a person with a misalignment of the eyes, the location of the corneal reflex will help us to determine the direction of the strabismus.
• Shine a light in the person’s face from a distance of about 40 cm, holding the light just below your own eye
• Ask the person to keep both eyes open and to look at the light
• Look at the location of the light reflections in the person’s eyes
• If there is no squint, the light reflections will be equal for the two eyes, typically close to the centre of the pupil, or displaced about 0.5 mm nasally
• If the person has a squint, the reflection from the light will not be in the same position in each eye
• The type of displacement of the corneal reflex tells us the type of tropia that is present
  – If the reflex is nasally displaced, the person’s eye is turned outwards (exotropia)
  – If the reflex is temporally displaced, the person’s eye is turned inwards (esotropia)
  – If the reflex is displaced upwards, the person’s eye is turned downwards (hypotropia)
  – If the reflex is displaced downwards, the person’s eye is turned upwards (hypertropia).
  – If the corneal reflexes are close to the centre of each pupil, or displaced about 0.5 mm nasally in each pupil, you record this as:
    – Hirschberg test: No Squint. If a corneal reflex is not in the centre of the pupil, you need to record:
      – In which eye the reflex is not central – The direction of the reflex (nasal, up, down, lateral).

**PUPIL EXAMINATION**
The pupil controls the amount of light entering the eye. Examining the pupils of a person’s eyes can provide important information about the health of the eyes and the functioning of
the visual system. Pupil examination typically includes an assessment of pupil size and shape in each eye, as well as pupil reactions to light and accommodation.

**Pupil size and shape:**
- Examine both pupils in dim room illumination
- The pupils of a person's eye should equal in size, or no more than 1 mm different

**Direct and consensual pupil reflexes:**
- Ask the person to look into the distance, or at a large letter on the distance visual acuity chart
- Shine a pen torch into the person's right eye while looking at the right pupil
- The right pupil should constrict (get smaller) when light is shone in it
- Now take the light away from the right eye, while looking at the right pupil
- The right pupil should dilate (get bigger) when the penlight is moved away
- Normally, the pupil will get smaller when a light is shone into either eye and get bigger when the light is taken away — this is called the *direct reflex*
- Next, you should shine the light into the person's right eye again, but this time look at the pupil of the person's left eye
- The left pupil should constrict (get smaller) when light is shone into the right eye
- Now take the light away from the right eye, while still looking at the left pupil
- The left pupil should dilate (get bigger) when the light is taken away from the right eye
- This reaction of the left pupil to light shone into or taken away from the right eye is called the *consensual reflex*
- Repeat the entire procedure for direct and consensual reflex by shining light into the person's left eye
- If the pupils do not react normally to light, this could mean that the person has a serious eye disease or neurological condition.

**Swinging flashlight test:**
- In dim room illumination, note the size of the pupils
- Ask the person to look far away
- Now swing the light of the pen torch back and forth from one pupil to the other, while carefully looking at the pupil size and reaction of each
- When you shine the light into the person's right eye, both pupils should constrict. When you swing the light over to the left eye, the left pupil should stay small — it should NOT get bigger!
- Now swing the light back over to the right eye again — the right pupil should stay small
- If either pupil gets larger when we swing the light to point at it, we call this a relative afferent pupil defect (RAPD), or sometimes it is also called a Marcus Gunn Pupil
- An RAPD usually indicates a problem with the optic nerve, or some kind of retinal disease