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***Diract Ophthalmoscope***



***DEFINATION***

It’s a hand-held instrument used to examine the fundus. the process of examination by ophthalmoscope is called fundusscopy.

➢ It is used monocularly.

➢ It can be used to examine central 7 to 10 degree of retina.

➢ It gives a magnification of 15x which makes the 1.5mm disc appear much larger.



***Parts of direct ophthalmoscope:***

1. The body which is hollow and houses the battery, on-off switch and rheostat.

The rheostat is used to control the amount of illumination.

***2.*** The head forms the main part of the device. It contains ***an illuminating system and a viewing system.***



***illuminating system:***

▪ Low voltage light bulb ▪ Condensing lenses which focus the light into the mirror

▪ A reflector or prism placed in the path of light rays above the bulb. The light rays are deviated at 90° to reach the pupil

▪ Aperture wheel and filters between the light bulb and the reflecting mirror.

***Viewing system:***

• Sight hole (peephole) behind and a little above the mirror for observation to see the illuminated area

• Wheel that can be rotated around a central axis that contains a series of plus and minus lenses of different powers to compensate for the refractive states of the examiner and patient's eyes.

• The range is usually between +30 and -30 in gradually increasing and decreasing strength. These only correct spherical refractive errors but not astigmatism. Therefore, in regular with the rule astigmatism the optic disc looks oval in shape.

***Filters***

• Red free (the light becomes green) makes retinal hemorrhages and blood vessels stand out more clearly and it is helpful to estimate C/D ratio (cup to disc ratio)

• Cobalt blue filter to be used with fluorescein dye to examine the cornea for corneal abrasions or ulcer

• Polarized filter to reduce reflections from the cornea and retina.



***Apertures***

➢ large, medium, small circles

➢ Half circle

➢ Streak (slit)

➢ Graticule or grid

✓ Large aperture is used to examine the fundus through dilated pupil.

✓ Small aperture is used to examine the fundus with small pupil.

✓ Half circle is used to avoid reflection while examining the fundus.

✓ The slit or streak is used to give an optical section of the cornea and lens and to examine for macular edema.

✓ The grid or graticule is used to measure the size of the lesion in the fundus, the size of the optic disc and cup-disc ratio



***Optics of Direct Ophthalmoscope***

➢ A source of light is reflected by a plane or mildly concave mirror into the observed eye or traced to observer's eye from the handheld instrument.

➢ This illuminates an area of the fundus.

➢ The light from the illuminated area is again reflected back along the optical axis to reach the eye of the observer.

➢ The illuminated area is the object for the optical device.

➢ To see the illuminated area, the observer's eye should be in the line of the rays reflected from the illuminated fundus.

➢ The eye of the observer should be very near the observed eye.

➢ The emerging rays from the observed eye behave differently depending upon

***refractive status of the observed eye:***

a) Emmetropia: The rays emerging from the observed eye are parallel and are brought to focus on the retina of the observer.

b) Hypermteropia: The emerging rays are divergent and do not reach the retina of the observer. They meet behind the eye of the observer unless the observer's eye either accommodates or a plus lens is kept in front of the eye.

c) Myopia: The emerging rays are converging and come to focus in front of the retina and can be focused only if a minus lens is placed in front of the observer's eye***.***

***Method of Direct Ophthalmoscopy***

* The best results are obtained by fully dilated pupil. However, fundus can be seen with undilated pupil, if the patient looks at a distant object.
* To see with un dilated pupil, a smaller aperture in the ophthalmoscope may be used. The small aperture reduces the field of vision. It is good only for examination of the disc.
* To operate the ophthalmoscope, the examiner holds the instruments on the right hand, stands on the right side of the patient facing the patient and examines the right eye. The reverse is done to examine the left eye.

***Distant Direct Ophthalmoscope***

* It gives an idea about presence of opacity in ocular media (cornea, lens or vitreous).
* You should look through viewing hole of the direct ophthalmoscope and throw the light into the patient's eye in a semidark room from a distance of 25 cm. This will result in red-orange glow of the pupil called the red reflex.
* Red reflex is an orange- red glow of the pupil by reflection of light from the highly vascular choroid from the back of the eye.

***Optic disc (OD)***

* The OD is oval / round & measure about 1.5mm.
* Healthy OD appears pinkish orange in color.
* Yellowish appearance of the OD is suggestive of optic atrophy. The small spot of light in direct ophthalmoscope intended to be approximately one disc diameter in size. Place the spot on the disc & observe how much of the disc is filled up. If the disc is fully filling the spot of light & matches its size this would indicate a normal disc size.
  1. Examine the disc for its:
  2. ✓ Shape
  3. ✓ Color
  4. ✓ Clarity of margins
  5. ✓ Cup-Disc (C/D) ratio
  6. ✓ Venous pulsation
  7. it is absent in approximately 20% of normal individual



***Macula and foveal reflex***

➢ The fovea is located approximately 3mm temperol

➢ The fovea acts like a concave mirror & gather s the light from the ophthalmoscope & presents as a sharp reflex called foveal reflex.

- It should always record as FR present or absent.

- **If is dull, it is recorded as Dull FR.**

➢ Macula is dark pigmented area around the foveal reflex.

➢ Macula should be examined.

➢ presence of drusen.

➢ pigmentary changes.

➢ elevation(edema).

***Vessels***

• Examine the vessels & branches as they come out of disc. Examine atery to vein (A/V)ratio, branching of vessels to all four quadrants crossing etc. Normal A/V ration is 2/3.



***The other uses of direct ophthalmoscope Pupil***

➢ pupil can be evaluated by comparing the size & shape.

➢ Media Opacities

-anything that interferes with the reflecting light from the retina like cataract, floaters, corneal scars etc can be seen as black spots.

➢ Anterior Segment

-with + 13 to + 15D lens in the ophthalmoscope cornea, lids, sclera, lashes, & iris can be grossly examined.

➢ Vitreous

-with +6or+7D lens in the ophthalmoscope vitreous floaters, &vit opacities can be seen.

***Procedure***

1. First you have to explain the patient about the procedure. It should be performed in a semidark room.

2. The patient's right eye should be examined with the examiner right eye & right hand.

3. Give the pt a fixation target.

4. Start from a one arm length & move as close as possible to the pt's.

5. First trace the optic disc & follow the vescular arcades & finally move to the macula & other as you wish to examine.

6. Do not put your hand on pts head or shoulder which pt uncomfortable.

***Advantages:***

✓ Hand-held

✓ Easy to use

✓ The image formed is not inverted

✓ Magnification around 15X

✓ It is possible to examine anterior segment structures by using + 10 dial-up lens

***Disadvantages:***

✓ Small field of view (about 6 degree)

✓ It is affected by patient's refractive errors

✓ It is difficult to see in presence of media opacity like dense cataract or vitreous hemorrhage

✓ Examination needs to be very close to the patient

✓ It is monocular i.e. no binocularity or stereopsis (3D perception)

✓ There is no teaching facility.

Thank you