Direct Ophthalmoscopes - a comparison

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The direct ophthalmoscopes most commonly used by ophthalmologists in India these days are either Keeler Vista 20, Heine Beta 200 or Welch Allyn 11720 or 11730. "Are there any differences in these instruments?" is a question that one may ask while making a choice. Yes, there are some. In the K and H instruments the reflecting mirror that reflects the light on to the eye of the patient is front silvered and fully reflecting. The ophthalmologist while examining the fundus looks just above the mirror. The result is as indicated in figure1(a)(b) the area illuminated and the areas seen are different though there is good overlap. By tilting the instrument while looking at the fundus one can see the missing area. In the WA instrument the reflecting mirror is partially silvered and while examining the fundus the ophthalmologist looks through the mirror with the result the area illuminated and the area observed are the same. It is referred to as the coaxial optical system. The disadvantage here is that since the mirror reflects only part of the light from the bulb there is a loss of illumination. This is compensated using a brighter lamp. While the battery operated K and H instruments use 2.8 volt bulbs the WA instrument uses 3.5 volt bulb which is designed to give more light. The consequence is that while K and H instruments can work on a pair of readily available 1.5 volt dry cells the WA requires 3.5 volt rechargeable cells. Those cells require greater care. A well cared for rechargeable cell may last for two to three years however replacement cells are not readily available in Indian market and are expensive.

In all the three ophthalmoscopes models that work using a power unit connected to the 220 volt mains instead of the cells are also available. Such electrically operated scopes may be useful in clinics but are not convenient for ward rounds. The electrically operated models of K and H instruments are designed to use the 3.5 volt bulb that gives more light.

Another important difference is in the different apertures provided in them. K and WA instrument have three circular apertures of different sizes while the H instrument has two circular aperture of different sizes and one semicircular aperture. While the slit and fixation star apertures are provided in all the three the K instrument provides a graticule used as an aid in the detection of Glaucoma.

A third difference is in the number and nature of the filters provided in them. The K instrument has the red free, cobalt and safety filters. The WA instrument has the red free and cobalt filters only and the H instrument has only the red free filter.

A fourth difference is in the lenses available in the lens disc and the range of power that could be covered using each of them. K offers a range of +29 to -30D in 1D step, In H instrument it is from -35 to +20D however the 1D step is confined to the range -10 to +10D only. In the WA instrument it is -25 to +40D with 1D step available for the range -10 to +10D as in the H instrument.

One more difference is the dust cover provided for the optics. K instrument has a built in dust cover while the other two do not have it.

For aesthetically inclined people the head of the WA instrument is available in different colours while the other two are available only in black colour. The WA instrument is relatively smaller in size compared to the other two.

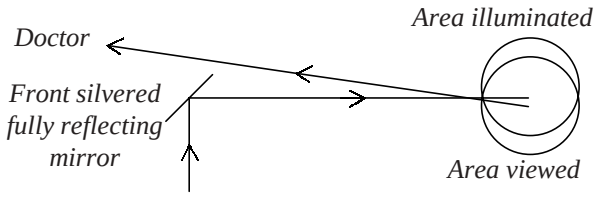

Figure 1(a) K&H Instrument

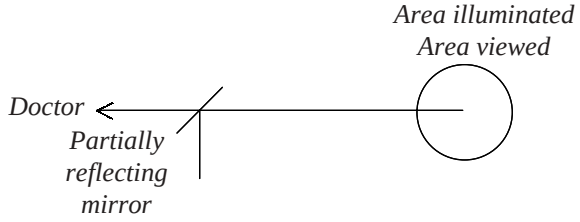

Figure 1(b) W Instrument

In terms of the present cost at Madurai the H instrument is less expensive than the K instrument which is less than the WA instrument. When an instrument is purchased it is very important to get a spare bulb as spare bulbs are not readily available in many cities in India.

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(The author and the section editor have no commercial interest in any one of the three instruments, their manufacturers or their suppliers. The above comparison is made to provide to the potential buyer information on what he/she should look for.)

Problem of Dust

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Dust is unavoidable in tropical climate. It is mostly fine particles of sand with some organic matter. Both are harmful to instruments. The least of the damage is dust spoils the appearance of instruments. The other damages are dust reduces the transparency of optical elements in instruments. Dust particles also causes scattering of light thereby reducing the visibility through the optics. Dust particles, which have good abrasive nature cause wear and tare of moving parts of instruments. The organic matter in dust may carry microbes, pollen grains and other material that spread infection or cause the growth of fungi on optics under suitable conditions. Fungus cause permanent damage to the optical components.

While dust on metallic or non-metallic parts may be removed by wiping the surfaces with a damp cloth, the dust on optics will have to be handled carefully. Dust particles can cause permanent scratches on the surfaces of optical components if they are removed improperly. It is safer to use an instrument with a certain amount of dust than attempting to remove it improperly and producing permanent scratches. Scratches scatter light and reduce visibility.

The best way to remove dust on optics will be to blow it off or to use soft paint (letter) brush usually referred to as camel hair brush. Dust particles that are not easily removed by the above procedure may be removed using a cotton swab dipped in distilled water.

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