Optical instruments

Lecture 9

Synoptophore

M.Sc Ali Hadi Alhussaini

Synoptophore is comprehensive orthoptic unit which helps in complete evaluation of a case of strabismus. It can be used diagnostically to measure the total of deviation and to measure binocular status of the patient. Therapeutically it can be used to deliver fusional movements, treat unusual fixation and abnormal retinal correspondence.

Synoptophore is an instrument commonly used in orthoptics and strabismus and to measure the level of binocular interaction.

History

•The oldest model is developed by Claud worth.

• Mc. Maddox first develop slides used in early device

Principle

It is founded on the haploscopic principle which uses angled mirror to distance the two eyes so that right eye sees the right temporal field while left eye sees the left temporal field.

Consists

•Two tubes for viewing picture

•Lenses with in the eyes piece are +6.5 DS

•Pairs of slides

•Controls allow vertical separation of the target as well cyclotorsional adjustment

•Mirror in each tube to reflect the image of target through the eye piece into corresponding eye.

•Scales to measure the amount of deviation

• Illumination system to increase or decrease the stimus luminance

Uses of synaptophore

The uses of synaptophore divided into two

•Diagnostic uses

• Therapeutic uses

Diagnostic uses

•Assessment of grade of binocular single vision

•Measurement of objective and subjective angle of deviation

•Measurement of deviation in all cardinal direction of gaze

•Measurement of inter pupillary distance

•To examine the state of retinal correspondence

•Measurement of primary and secondary deviation

•To evaluation presence and type of suppression

•Measurement of fusional vergance

•measurement of angle kappa

Therapeutic uses

•It is used in treatment off

•Supression

•Abnormal Retinal correspondence

•Amblyopia with Eccentric fixation

•Accomodative esotropia Most read

• Heterophorias and intermittant heterophorias

Preliminary setting

Recomme

1.The patient's chair and the table should be adjusted so that he is able to look through the centre of the eye-pieces comfortably with his head erect.

2. The chin and forehead rest should be adjusted to suit the patient.

3. The patient's interpupillary distance (I.P.D.) must be measured and the instrument adjusted so that the distance between eye-pieces is equal to the interpupillary distance.

Diagnostic uses

Valuation of grade of binocular single vision

Simultanous perception

•First grade of bsv

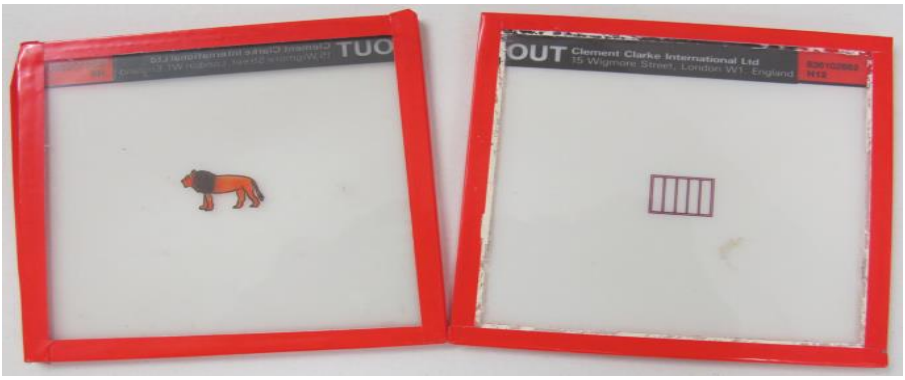
•Tested using two dissimilar picture such as an object and a surround E.g.: cage and lion

•Patient is asked to put the lion in cage by moving the arm of synaptophore

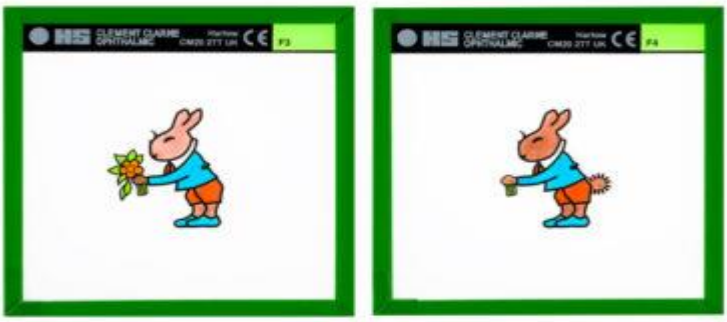
• Ideally the foveal picture must be used. But the target size should be appropriate to the patient visual acuity

Slides

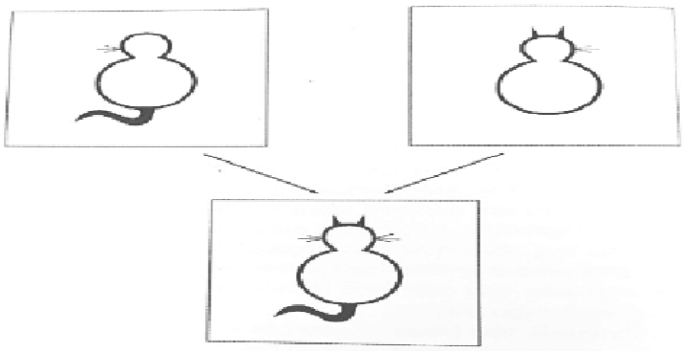
- Simultaneous macular perception (SMP) slides These slides consist of two different objects, subtending an scale angle of 5 degrees at the macula. One solid and one deep object, like lion and cage is projected in also eye. If both the images cover and patient sees lion in cage indicates simultaneous perception. Absence of either target suggests suppression of that eye. Sometimes a small central scotoma can be missed in the eye with the cage in front of that eye so it is advisable to show the slides alternately in both the eyes.



- Fusion: the targets used are same in all respect but for some part either missing in one slide or addition in the other one. The patient should be able to fuse the two targets sees both the target as one complete figure. Like in the figure the cat has a tail in one slide and a butterfly in the other. If fusion is present the patient will report one cat with a tail and a butterfly. Suppression in any eye can be easily accepted by the examiner as the patient will not see either the tail or the butterfly depending on the eye blocked.



- Stereopsis: these slides consist of two similar slides with part of the slide having horizontal disparity which gives depth view when seen as one. In the figure the gate overlaps in both the slides but the train, bird and the signal are horizontally displaced relative to each other and so give rise to a feeling of relative depth.



- After image slides this is the most dissociating test in which battery- powered camera flash is used to produce a vertical after image in right eye and a horizontal after image in the left eye. In the treatment of abnormal retinal correspondence it is necessary to maintain the after images for a period of time by an alternating light and dark background. This is provided by an alternating flashing device incorporated in the synoptophore that alternately illuminates each of the optical tube.

Technique of examination:

- Patient is asked to seat with his chin resting on the chin rest. The chin rest is correct to bring his at the level of the eye part.
- Before proceeding for the further examination is important to correct the IPD of the patient. The IPD is measured by aligning the fixing eye with the mark present on the eye part. The measurement is done for each eye independently.

Measurement of deviation:

For measurement of angle of deviation SMP slides are used. For determination of subjective angle of deviation the patient is asked to superimpose the two images by moving the optical tube. For objective assessment the examiner uses flash. Either eye is allowed to take fixation by illuminating one slide at a time and the movement of fixing eye is noticed. The optical tubes are adjusted horizontally and vertically depending upon the type of deviation till the re-fixation movement is neutralized.

Measurement of fusional range:

The fusion slides are placed in the slide holder after the neutralization of deviation is done. For determining convergence fusion the two slides are moved out till the patient complains of diplopia or deviation of the eye is observed and for divergence fusion the slides are moved in.

Each eye is stimulated separately and patient is asked draw the

relative position of the lines.

Determination of Abnormal Retinal correspondence

Simultaneous macular perception slides are used and any deviation if present should be corrected so that both the images fall on fovea. If patient can see both the images in presence of manifest squint it is suggestive of Abnormal Retinal correspondence .

- If Subjective Angle = Objective Angle bnormal Retinal correspondence
- If Subjective Angle < Objective Angle Abnormal Retinal correspondence
- If Angle of Anomaly (objective angle – subjective angle(
- =Objective Angle Harmonious ARC (full sensory adaptation(

If Angle of Anomaly < Objective Angle Unharmonious ARC

Hering Bielschowsky After Image test:

It is a highly dissociating test in which fovea of the two eyes is stimulated separately with a bright light. A horizontal image is projected in front of right eye while a vertical image is projected in front of the left eye, and the patient is asked to appreciate the after images.

- A cross response at center indicates normal retinal correspondence.
- An asymmetrical cross response is suggestive of ARC.
- Absence of vertical line and horizontal line indicates suppression of right and left eye respectively.

Haidinger's brush

is an entoptic phenomenon esteemed by macula, first described by Austrian physicist Wilhelm Karl von Haidinger in 1844. This property of macula can be used for treatment of eccentric fixation. A rotating polarized plate backlit with a bright white light is projected in front of the eccentric eye while the normal eye is occluded. The patient appreciates the Haidinger's brush with his macula and then looks at the test object in such a way that the Haidinger's brush overlaps the test object.