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Hirschberg Test

The Hirschberg Test involves shining a light into the patient's eyes and observing the reflection on the cornea [1][2]. The corneal light reflex is not actually a reflection from the outside of the cornea. It is a reflection of Purkinje's image, which is a virtual image behind the pupil. The Hirschberg test is limited in that it can only detect aesthetic strabismus. There can be an apparent yaw (pseudostabismus), where the pupillary axes are angled to each other but the visual axes are correctly positioned [1]. Conversely, there can also be strabismus that is masked by a Kappa angle of the opposite sign, giving the appearance of proper binocular position despite a yaw [3].

Krimsky Test

The Krimsky Test is a modification of the Hirschberg test. Prisms are placed in front of the fixing eye with the apex pointing in the direction of the deviation. This shifts the corneal reflex towards the centre of the pupil. The prism that centres the corneal reflex in both pupils indicates the angle of deviation.[4,5] The Krimsky test is typically used on children or adults who cannot cooperate, those with sensory strabismus, or those with vision worse than 20/400 [6,7].

Cover Test

The Cover Test involves covering one eye and observing the movement of the uncovered eye. If the uncovered eye moves to fixate on a target, it indicates that the covered eye was not previously fixating on the target, signifying strabismus.[8] The cover test is the reference standard for detecting strabismus.[8]

Variations of the Cover Test

- **Cover-Uncover Test:** Diagnoses manifest strabismus.[8]
- **Alternate Cover Test:** Diagnoses latent strabismus.
- **Simultaneous Prism Cover Test:** Measures the magnitude of manifest and latent strabismus.
- **Prism Alternate Cover Test:** Measures the magnitude of both manifest and latent strabismus [8].

Maddox Rod Test

The Maddox Rod Test uses lenses that refract a point of light into a line image in front of each eye. The patient is asked to describe the orientation of the lines.[9]

Double Maddox Rod (DMR) Test

The Double Maddox Rod (DMR) Test is the most common in-office test for the measurement of cyclodeviation.³ It is a subjective test.[9]

Synoptophore

The Synoptophore projects two separate and dissimilar images into the same position in space to measure strabismus.² Synoptophores are difficult to use for non-specialists. They are not compact or easily transported and can only be used on cooperative patients.²⁰

Lancaster Red-Green Test

The Lancaster Red-Green Test is a subjective test for strabismus.³

Bruckner Test

The Bruckner test is not mentioned as being commonly used to test for strabismus in any of the sources. However, it is mentioned as being commonly used to detect amblyopia.^[11,12] The Bruckner test involves illuminating both eyes simultaneously from a distance of about one metre and noting any difference in the brightness of the fundus reflex.^[10] In the presence of strabismus, the reflex is darker in the fixing eye than in the deviated eye.^[11,12]

References

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Limitation

Hirschberg and Krimsky tests

These tests rely on corneal reflections and can be affected by asymmetric foveas, which can lead to a misdiagnosis of strabismus [13]. The angle kappa can also influence the results of these tests, potentially leading to a misdiagnosis of exotropia or esotropia. Additionally, these tests are generally used for near fixation and their accuracy for distance deviation is not well-defined. There is a risk of errors in measuring strabismic angles when using near point fixation because this can induce accommodation and convergence of the eyes, even in sensory strabismus [14].

Cover Test Cover tests: While the cover test is the gold standard for detecting strabismus, it is still subject to examiner bias. The cover test may not be sufficient as a

standalone test for amblyopia screening because it does not detect refractive errors [8].
Prism cover test: This test can be unreliable because it requires the examiner to simultaneously cover the patient's eye, hold the prism bar, observe eye movements and correct the patient's posture [15]. The accuracy of the test is also affected by factors such as the examiner's experience, the patient's cooperation, and the presence of reflections in glasses or prism bars. The accuracy of the test is reduced for large deviation values because of the variable resolution of the prism bars [15,16].

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This is achieved by placing two different slides (e.g. lion and cage) in the slots of the instrument and adjust the tubes in parallel (mark should be 0 degrees on the horizontal scale) then the patient focuses through the tubes while the operator illuminates alternately. every transparency[18].

When the visual axes of both eyes remain parallel, there is no distortion, the eyes remain motionless as the focus is transferred from one eye to another by alternating the illumination of the images. In the event of a deviation (in or out), the eye that deviates will make an outward or inward movement respectively, in order to focus whenever the projection transparency is illuminated [18],[19],[20].

Though synoptophore provides accurate measurements for strabismus but it has major limitation which is that Synoptophores are difficult to use for non-specialists. They are not

compact or easily transported and can only be used on cooperative patients[21].

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