

Squint Examination

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Abstract

Strabismus is a common childhood disorder that causes deviation and squinting of eyes. It can have an irreversible effect on the personality and mindset of the child. Adult-onset strabismus is due to neurological causes or can be a consequence of childhood strabismus. This activity reviews the examination of strabismus and highlights the role of evaluation of patients with time.

Keywords: Strabismus, Squint, Examination.

INTRODUCTION

Strabismus is a common childhood disorder characterized by misalignment of the eyes.¹ It can cause diplopia, amblyopia, and loss of binocularity and have psychological effects on both the child and the parents,² which brings adverse effects on a person's life, including education, employment and social communication.³⁻⁸ It has been reported that the prevalence of strabismus in children varies between 2 and 6%, depending on ethnic populations in different parts of the world.^{9,10}

Strabismus is classified as esotropia (inward deviation), exotropia (outward deviation), vertical false hypertrophy (one eye turning up), hypotropia (one eye deviating downward), or incomplete rotation of one eye.¹¹ Strabismus can also be a manifestation of neurodevelopment disorders, craniofacial disorders, abnormalities of extraocular congenital muscles, and nerve paralysis innervating extraocular muscles.^{2,12}

The aim of strabismus examination is to rule out the cause, to make proper diagnosis and timely treatment to restore proper ocular alignment, which resolves amblyopia, preserves binocularity and eliminates diplopia.

Examination Techniques

The examination of squint is carried out under two aspects

- Examination of motor status
- Examination of sensory status

Examination of Motor status- Look for

- Head posture
- Ocular deviation
- Extent of versions

- Fusional vergence

Head posture – it has 3 components

Chin elevation or depression (vertical)

Face turn to right or left (horizontal)

Head tilt to right or left shoulder (Torsional)

Common causes of change in head posture are-

- Incomitant squint
- Comitant squint with A & V patterns
- Nystagmus with null
- Occasionally refractive errors
- Homonymous hemianopia

Ocular Deviation- look for

True strabismus

Pseudostrabismus

Pseudostrabismus- visual axes are aligned, but there is an appearance of squint.

e.g., telecanthus - broad nasal bridge

epicanthus- skin fold over the nasal bulbar conjunctiva.

Hypertelorism- greater inter-orbital separation
euryblepharon- horizontally large palpebral aperture, ptosis, or lid retraction may masquerade vertical squint.

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Angle Kappa is the angle between the visual and optical axis. This is normally +5

If it is more than +5, as in some hyperopes, it causes pseudoexotropia. If it is less than this, as in some myope, it causes pseudoesotropia.

Detection of squint at near (33 cm) and distance (6 mts)

- Cover test (Fig. 1)
- Cover uncover test (Fig. 2)

Prerequisites of cover – uncover test

- The ability of both eyes to fixate a target
- The ability of both eyes to have a central fixation
- The ability of both eyes to have no gross motility defect

Information from cover uncover test

- Manifest/Latent squint
- Type of squint
- Visual dominance
- Visual acuity

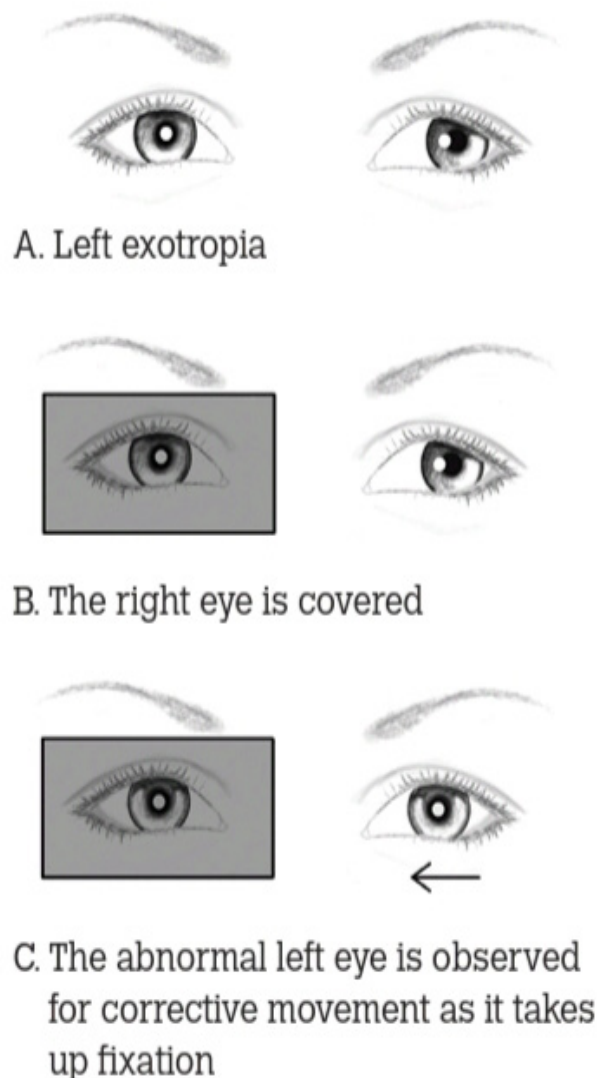


Fig 1: The cover test

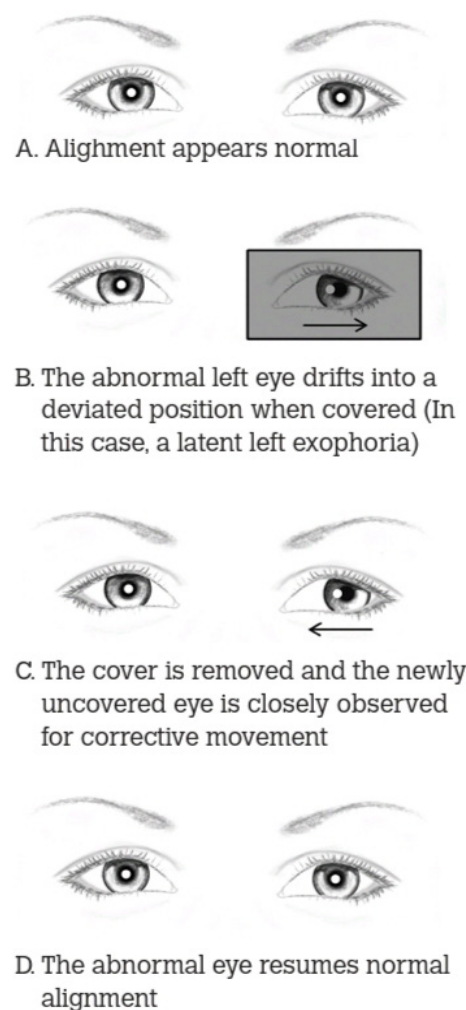


Fig 2: The uncover test

Measurement of deviation – can be measured by

- Objective
- Subjective – more precise and reveals the status of the sensory system.

Prism Bar cover test

To neutralize - the apex of the prism should point towards the deviation. As we measure the static deviation therefore dynamic factors like accommodation and fusion should be eliminated (Fig. 3).

Plus, lenses always measure less deviation both in eso and exo, and minus lenses always measure more deviation both in eso and exo.

When measuring the deviation, certain points should be remembered:

- Measure the deviation for near (33 cm) and distance (6 m)
- Measure with an accommodation target for near
- With glasses and without glasses-
- In 25 degrees in up and down gaze for A & V patterns
- In 9 cardinal position of the gaze

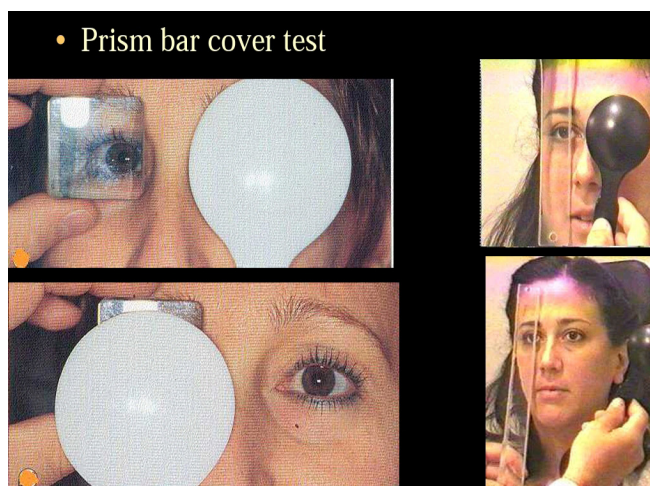


Fig 3: Prism bar cover test

- With either eye-fixing
- Deviation with subjective and objective methods
- After prolonged cover to differentiate between true and pseudo divergence cases type.

B. Synaptophore – Eyepieces are of +6.00 or +6.50D, so that the targets are at optical infinity. The targets are placed at a fixed distance, but proximal convergence does come into play (Fig. 4).

C. Corneal reflection tests

- Hirschberg's test (Fig. 5)
- Krimsky test

Subjective tests for deviation – based on diplopia principle.

- Maddox Wing for near
- Maddox tangent scale for distance

Diplopia testing- uncrossed diplopia in esodeviation and crossed diplopia in exodeviation.

Hess/ Less screen- dissociation is by red and green glasses in Hess screen and mirror septum in Less screen.

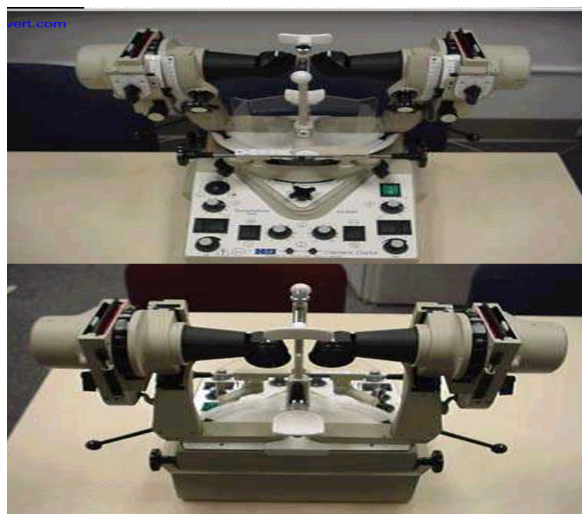


Fig 4: Synaptophore

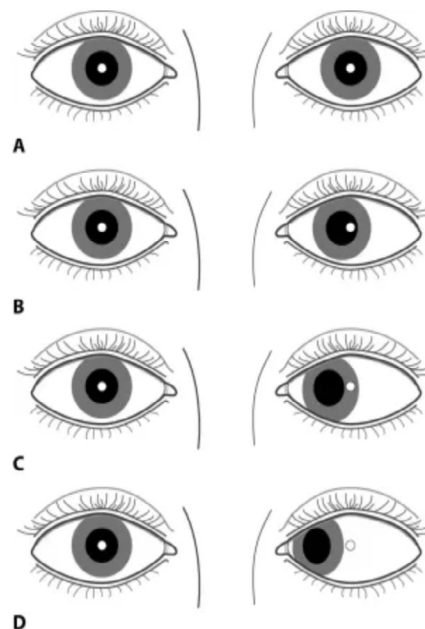


Fig 5: Hirschberg test

The haploscopic tests are good for documentation in paralytic and restrictive strabismus.

Interpretation

- The small chart is of the paralytic eye
- The larger one of the sound eye shows secondary overaction.

Measurement of cyclodeviation

- By double Maddox rod
- Synaptophore
- Objective evaluation by indirect ophthalmoscope. Below the disc excyclotorsion, above the disc encyclotorsion.

Ocular movement limitations and overactions should be noted.

Normal adduction nasal 1/3 of the cornea crosses the lower punctum. Abduction temporal limbus should touch the lateral canthus.

Grading Oblique Overaction

Measure the angle the adducting eye makes with the horizontal line as it elevates and abducts

Grade I : +15° with the horizontal line

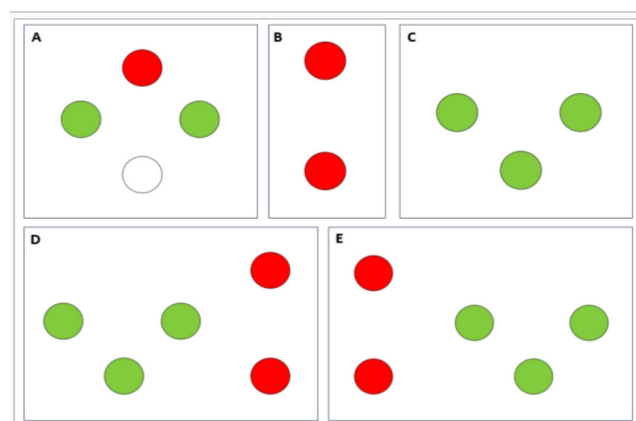
Grade II : +30°

Grade III : + 60°

Grade IV : + 90°

Fusional range in practice, heterophoria becomes tropia if it is not overcome by fusional vergence. If the vergence amplitudes are good, even a large angle squint remains latent and asymptomatic.

Vergence is tested in 3 planes –
Horizontal convergence and divergence,
Vertical surcumergence and deorsumvergence



Worth 4 Dot test outcomes. A. Normal result. A normal result indicates anomalous retinal correspondence in patients with manifest strabismus at the time of testing B. Left eye suppression C. Right eye suppression D. Uncrossed diplopia E. Crossed diplopia

Fig 6: Worth Four Dot Test

Torsional in cyclovergence and exocyclovergence.

In principle, to measure the vergence, the visual axis is misaligned artificially either by prisms or on the synaptophore.

The most simple way to determine this is by holding a pen or pencil at arm's length and gradually bringing it closer to the patient with the patient fixing on the target. When the patient states that he sees double, that is near the point of convergence, and the blur determines the near point of accommodation. The NPA is tested with each eye separately (monocular) and then the two eyes together (binocular). Normally, it is 8 to 10 cm, and values above 10 cm are considered abnormal. Royal Air Force (RAF) Binocular gauge can quantify the measurements.

Convergence sustenance: it is the ability to hold the eyes at a near point of convergence. Normally, one should be able to hold for 45 seconds to 1 minute. Less than 30 seconds is definitely poor. This helps in assessing the strength of fusional convergence.

Measurement of vergence - with prisms, convergence and divergence should be measured both for near and distance with a prism bar. The prism bar is moved with the prism strength increasing when the patient is fixing on a fixation target. The endpoint is noted when the patient complains of diplopia or one eye moves out. The prism strength is gradually reduced till the patient again sees single. The break point is always more than the recovery point but within five diopters. A larger difference indicates poor recovery, as in intermittent exotropia. Convergence amplitudes are measured with base-out prisms and divergence amplitudes are measured with base-in prisms.

Examination of sensory status: it comprises of

- Examination or assessment of the binocular status
- Nature of correspondence between them

This helps us to determine the prognosis in case of squint and whether there would be a functional improvement or just cosmetic alignment.

The sensory status is examined within the following aspect

- Is binocularity present?
- Is there any diplopia present and if yes, then what type?
- What is the type of correspondence
- If suppression is present, then its extent and depth
- Presence of amblyopia
- Presence or absence of stereopsis

First, determine whether the diplopia is uniocular or binocular. Uniocular diplopia can be due to astigmatism, subluxated lens, large peripheral iridectomy, corneal edema, etc.

Binocular diplopia indicates the presence of muscle imbalance and disappears when one eye is closed. This can be determined by Red & green Maddox rod and Bagolini lenses. If there is squint but no diplopia the dissociation tests help in identifying whether Binocular perception is present or not.

Types of correspondence – A bifoveal correspondence is called normal retinal correspondence (NRC) and correspondence between the fovea of one eye and the extrafoveal point of the deviation eye is called anomalous retinal correspondence (ARC).

Suppression - it is a sensory adaptation to squint in which only one eye functions. It may be unilateral or alternating. It may be facultative (only during binocular conditions) or obligatory (only during monocular conditions). Its extent (area of suppression) and depth (severity) should be noted with Bagolini Striated glass.

Worth Four Dot Test

The test is done at a 6 m distance and WFDT subtends an angle of 1.2° . In the case of a central scotoma larger than this size, dots will not be visualized. In that case the dots can be brought closure to the patient to increase the angle subtended. Synaptophore – 3 sets of slides (Fig. 6).

- SMP – foveal, macular and paramacular
- Fusion
- Stereopses

After image testing – not physiological; therefore should not be practiced

The extent of suppression scotoma – can be charted by

- Prisms
- Synaptophore
- Less or Hess screen
- Perimeter Goldmann's

Depth by neutral density filters of Bagolini can be assessed when increasing strength of filters is placed over the second eye. The scotoma diminishes in size and, at one stage, may disappear.

CONCLUSION

Strabismus, or the misalignment of the eyes can be seen in children and in adults also, but it can be cured with a thorough examination by performing several tests, regular follow-up, and treatment. Squint examination is also a key factor in planning squint surgery because an exact measurement of the degree of deviation is also needed to get the best result.

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