STRABISMUS

AN OCULAR DISEASE CHARACTERIZED BY THE INABILITY OF BOTH EYES OF AN INDIVIDUAL TO GAZE AT A TARGET SIMULTANEOUSLY AND THE OPTIC AXIS OF BOTH EYES IS SEPARATED

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CAUSES

- Dysfunction of the extraocular muscles (EOMs) - aberrant development, dystrophy and abnormal position
- Associated with Duane's retraction syndrome - mechanical abnormalities of the external rectus muscle, aberrant innervation and the absence of an abduction nucleus.

Effects

- Binocular vision impairment
- Often accompanied by amblyopia and loss of stereo vision.
- Affected appearance and self-esteem.

Treatment

- Mainly relies on surgical correction

Case Study

- Almost 1 out of 20 kids has strabismus
- Between 2 and 4 % of kids have esotropia, and 1 to 1.5 % have exotropia (horizontal misalignment of orthogonal axes).
- In some cases, esotropia isn't present from birth. A child's eyes might be normal up to age 3 or 4 years but then suddenly start to cross.

Catching that crossing early and straighten the eyes with surgery within three to six months, will help revamp the 3D vision. If a child lacks the potential for developing normal 3D vision, the eyes are prone to drifting again. Amblyopia or poor vision due to strabismus — esotropia or exotropia — that isn't corrected before age 9 will result in a permanent loss of 3D vision.

Neuroscience Behind Strabismus

The frontal eye field (FEF) participates in the control of eye movement and conjugate eye movement

A previous study reported that the gray matter volume of the FEF is increased in strabismus patients.

The occipital lobe is a key brain area for visual processing, which controls eye movements and pupil accommodation reflex activities associated with vision.

The lingual gyrus is part of the occipital lobe and important for the ventral visual stream, which participates in processing information such as shape, size, color, contour and object recognition. A crucial brain area for visual judgment and visual attention

Liang et al used the voxel-mirrored homotopic connectivity (VMHC) method to analyze interhemispheric functional connectivity changes in patients with strabismus. They observed alterations in the lingual gyrus regions of patients and the VMHC value of the lingual gyrus was found to be associated with stereoacuity.

- **Researchers observed that the thickness of the lingual gyrus, cuneus and occipital cortex, and the fractional anisotropy (FA) values in the medial lingual cortex were all reduced in strabismus patients.**
- **The cuneus is also located at the occipital lobe, which forms part of the visual center, and is involved in the processing of visual information in the retina-optic nerve-lateral geniculate pathway.**
- **Research by Schraa-Tam et al demonstrated that the cuneus is involved in eye movement reflex that functions to stabilize the image of the retina; therefore, dysfunction of the cuneus causes eye movement disorders.**

References:
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