ADULT STRABISMUS

- Discuss the differences between pediatric and adult strabismus
- Describe several of the most common forms of adult strabismus
- Explain treatment options for adult patients with strabismus
ADULT STRABISMUS

• STRABISMUS: ANY MISALIGNMENT OF THE OCULAR AXES
  • ESOTROPIA-EYE TURNED IN
  • EXOTROPIA-EYE TURNED OUT
  • HYPERTROPIA-EYE TURNED UP
  • HYPOTROPIA-EYE TURNED DOWN (ALTHOUGH CLASSICALLY THE HIGHER EYE IS NAMED)
  • PHORIA-LATENT TENDENCY TO DRIFT (NOT MANIFEST)
ADULT STRABISMUS

• 2 TYPES OF ADULT STRABISMUS:
  • UNCORRECTED/RECURRENT PEDIATRIC STRABISMUS
  • NEW-ONSET STRABISMUS
ADULT STRABISMUS

• VISUAL RESPONSE TO STRABISMUS IS DIFFERENT IN ADULTS/CHILDREN

• THIS IS THE MOST IMPORTANT DISTINCTION BETWEEN THE TYPES OF STRABISMUS
CHILDREN’S VISUAL SYSTEMS ARE STILL DEVELOPING UNTIL AROUND AGE 9

CHILDREN LEARN TO SEE WELL BY SEEING WELL (FEEDBACK)

ANY INSULT BEFORE AGE 9 (STRABISMUS, UNEQUAL REFRACTIVE ERROR, CATARACT, ETC.) HAS THE POTENTIAL TO PERMANENTLY CHANGE THE VISUAL SYSTEM

LOSS OF VISION IN ONE EYE (AMBLYOPIA)

LOSS OF BINOCULAR VISION (DECREASED/ABSENT DEPTH PERCEPTION)
BINOCULAR VISION

• The brain takes the image from one eye and the image from the other eye to create a binocular picture of the world (3-D vision/stereopsis)

• If the images are dissimilar, the brain may then 'ignore' one eye, and simply use one eye for viewing (when both eyes are open)
  • This is done at the brain level and is noted during binocular viewing

• This is called suppression
SUPPRESSION

- SUPPRESSION IS A DIPLOPIA (DOUBLE VISION) AVOIDANCE MECHANISM
- CHILDREN UNDER 9 YEARS OLD CAN SUPPRESS ONE EYE
- VARIES BASED ON CONDITION
  - ESOTROPIA - FAIRLY SMALL AREA
  - EXOTROPIA - FAIRLY LARGE AREA (DUE TO VARIABILITY)
SUPPRESSION
DIPLOPIA

• Double vision due to the absence of suppression
• May be close together or far apart
  • Higher amounts of strabismus give less diplopia (images are further apart)
• Adults (over age 9) who develop strabismus are at-risk for developing diplopia
• Adults with childhood strabismus can also develop diplopia if it gets worse
  • Outside of the suppression scotoma
• Stereopsis/diplopia are 2 sides of the same coin
SUPPRESSION

Suppression Scotoma

Esotropia

Exotropia

Free Rotation & Strabismus

#msotolion

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CONVERGENCE INSUFFICIENCY

• CONVERGENCE-ABILITY TO CONVERGE THE EYES AND MAINTAIN BINOCULAR VISION WHILE FOCUSING ON A NEAR TARGET
• CAN OCCUR IN CHILDREN AS WELL
• COMMON IN ADULTS
  • DIFFICULTY READING (TRUE DIPLOPIA OR SIMPLY INABILITY TO READ FOR LONG PERIODS OF TIME)
• CONVERGENCE CENTER IN BRAIN
  • CAN BE SEEN IN CERTAIN NEUROLOGIC CONDITIONS (PARKINSON’S)
CONVERGENCE INSUFFICIENCY

• TREATMENT
  • CONVERGENCE EXERCISES (VISION THERAPY) - NOT IN ADULTS
  • BASE-IN PRISMS AT NEAR (FULL GLASSES V. FRESNEL V. SINGLE-VISION READERS)
  • SURGERY (USUALLY NOT INDICATED)
  • OCCLUSION AT NEAR (WORST-CASE SCENARIO)
  • CAN BE VERY CHALLENGING TO TREAT
DIVERGENCE INSUFFICIENCY

- SMALL-ANGLE ACQUIRED COMITANT ESOTROPIA THAT IS LARGER AT DISTANCE THAN NEAR (>10PD)
  - OPPOSITE TYPICAL ESOTROPIA
- DIVERGENCE IS THE OPPOSITE OF CONVERGENCE
  - NO SPECIFIC DIVERGENCE CENTER IN THE BRAIN
- CAN MIMIC BILATERAL 6TH NERVE PALSIES
- SYMPTOMS MAINLY OCCUR WHEN DRIVING (READING IS NOT USUALLY AFFECTED)
DIVERGENCE INSUFFICIENCY

- TREATMENT IS USUALLY WITH BASE-OUT PRISMS
  - FULL-LENS V. DISTANCE ONLY (DRIVING GLASSES)
- SURGICAL INTERVENTION IS POSSIBLE
  - MEDIAL RECTUS RECESSION (WEAKENING) VS. LATERAL RECTUS RESECTION (TIGHTENING)
  - CLASSICALLY LATERALS WERE FELT TO WORK MORE AT DISTANCE, BUT NOT RECENTLY
CRANIAL NERVE PALSIES

• MOST COMMON CAUSE OF ADULT STRABISMUS

• USUALLY VASCULAR IN ORIGIN
  • MORE COMMON IN DIABETICS, CARDIOVASCULAR DISEASE

• OFTEN THEY WILL RESOLVE WITH TIME

• TEMPORARY SUPPORT
SIXTH NERVE PALSY

• MOST COMMON CRANIAL NERVE PALSY

• USUALLY ACUTE-ONSET HORIZONTAL DIPLOPIA WORSE AT DISTANCE
  • ALSO WORSE LOOKING TO THE SIDE OF THE LESION

• READING IS OFTEN COMPLETELY NORMAL

• MAY HAVE A FACE-TURN TO AVOID DIPLOPIA
SIXTH NERVE PALSY
SIXTH NERVE PALSY

• MOST WILL RESOLVE WITHIN 6 MONTHS
• SURGICAL CORRECTION IF NOT RESOLVED AT 6 MONTHS
• SUPPORTIVE TREATMENT
  • FRESNEL PRISMS
  • OCCLUSION (TAPE/PIRATE PATCH)
  • INCOMITANCY
FOURTH NERVE PALSY

• SECOND MOST COMMON CRANIAL NERVE PALSY
• CAN BE ISCHEMIC, BUT IS MOST COMMON TRAUMATIC NERVE PALSY
  • LONGEST COURSE, EXITS THE BRAINSTEM POSTERIORLY
• CAN BE BILATERAL
• CAN PRESENT WITH VERTICAL OR TORSIONAL DIPLOPIA
FOURTH NERVE PALSY
FOURTH NERVE PALSY

- ALSO CAN BE CONGENITAL
  - SEE AS ADULTS AS THEY GET WORSE
- CONGENITAL PATIENTS OFTEN HAVE LARGE-ANGLES
- CAN HAVE COMPENSATORY HEAD TILT
- IF STILL SYMPTOMATIC AFTER 6 MONTHS, SURGERY IS AN OPTION
  - ONLY OPTION FOR SIGNIFICANT TORSION
THIRD NERVE PALSY

• LEAST COMMON CRANIAL NERVE PALSY
• 3RD NERVE INNERVATES 4/6 EOMs (SR/IR/IO/MR)
  • ALSO INNERVATES LEVATOR MUSCLE (PTOSIS) AND PUPIL (LARGER UNREACTIVE PUPIL)
• COMPLICATED DIPLOPIA IS POSSIBLE
  • SURGICAL CORRECTION CAN BE DIFFICULT DUE TO NONFUNCTIONING MUSCLES
• IMAGING DUE TO RISK OF ANEURYSM
THIRD NERVE PALSY
INTERNUCLEAR OPHTHALMOPLEGIA (INO)

• SIMILAR TO A NERVE PALSY BUT A PATHWAY IS AFFECTED AND NOT THE NERVE ITSELF

• NORMALLY WHEN LOOKING HORIZONTALLY, YOUR 6TH NERVE ACTIVATES AND TELLS YOUR 3RD NERVE ON THE OTHER SIDE TO LOOK
INTERNUCLEAR OPHTHALMOPLEGIA (INO)
INTERNUCLEAR OPTHALMOPLEGIA (INO)
MYASTHENIA GRAVIS

- MYASTHENIA GRAVIS IS NEUROMUSCULAR JUNCTION DISORDER WHICH CAN CAUSE VARIABLE OCULAR SYMPTOMS
  - MOST COMMON ARE DIPLOPIA AND PTOSIS
  - CAN MIMIC ANY STRABISMUS PATTERN OR LOOK TOTALLY BIZARRE
  - CAN CHANGE FROM DAY-TO-DAY
MYASTHENIA GRAVIS
MYASTHENIA GRAVIS

• CAN BE OCULAR ALONE OR OCULAR FIRST

• TESTING:
  • ANTIBODIES: ONLY POSITIVE 50% IN OCULAR-ONLY MYASTHENIA
  • TENSILON TEST
  • ELECTROMYOGRAM (EMG)

• TREATMENT
  • ACETYLCHOLINESTERASE INHIBITORS
  • SURGERY IN VERY RARE SITUATIONS (AFTER MONTHS OF STABILITY)
GRAVES' DISEASE

- THYROID EYE DISEASE/THYROID OPHTHALMOPATHY
- ASSOCIATED WITH OTHER OCULAR ABNORMALITIES (EYELID RETRACTION, PROPTOSIS, INJECTION, TEARING)
- RESTRICTIVE DISORDER
  - INFERIOR RECTUS IS MOST COMMON MUSCLE, FOLLOWED BY MEDIAL RECTUS
- SURGERY CAN BE CHALLENGING DUE TO THE TIGHT MUSCLES
GRAVES' DISEASE
SMALL-ANGLE HYPERTROPIA

• VERY COMMON IN ADULTS
• NO EVIDENCE OF REDUCED MOTILITY/NERVE PALSY
• USUALLY INTERMITTENT
• USUALLY SLOW-ONSET
• OFTEN TREATED WELL WITH PRISMS
  • MAY WORSEN OVER TIME
PRISMS

• PRISM IS AN OPTICAL SURFACE WHICH BENDS LIGHT TOWARD ITS BASE

• VERY USEFUL IN DIPLOPIA MANAGEMENT
  • BENDS TO IMAGE TO REACH THE Fovea ON THE DEVIATING EYE

• CAN BE GROUND INTO LENSES OR TEMPORARY WITH FRESNEL PRISM
PRISMS
PRISMS
PRISMS

- Ground-in prisms are optically superior
  - Fresnel will cause visual degradation and rainbow effect with lights
  - Small amounts in one lens; larger amounts need to be split
- Much adult strabismus will resolve
- Don’t give it unless symptomatic
  - It doesn’t move the eye to make it look straighter
OCCLUSIVE TAPE

• CAN BE USED FOR TEMPORARY TREATMENT OR PERMANENT
• ABLE TO SEEN BY OTHERS
• CAN BE REMOVED
• CAN BE PLACED AT SPECIFIC AREA OF NEED
OCCLUSIVE TAPE
PIRATE PATCH
PIRATE PATCH

• GOOD FOR TEMPORARY CONDITIONS (EMERGENCY?)
• NOT GOOD WITH GLASSES