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**Session: John Lee (Rapid Fire) Poster Session**

# Measurements of objective ocular torsion using a novel definition

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Introduction

To compare ocular torsion measurements using conventional fundus photography (CFP) and optical coherence tomography (OCT) with a novel definition of cyclotorsion.

Methods

We enrolled healthy children aged 3 to 12 years as participants. The disc-center-fovea angle (DFA) was employed to assess ocular torsion using OCT and CFP. The values obtained from both the right and left eyes were summed to derive a single value, compensating for the effect of head tilt during measurement.

Results

A total of 86 healthy children were enrolled. The DFA angles using OCT and CFP were -11.57 ± 5.27 and -12.07 ± 5.66 degrees, respectively. There was a strong correlation between OCT and CFP in all patients, with a Pearson correlation of 0.74 and an ICC of 0.74, respectively ($P < 0.001$).

Conclusions

Utilizing the new definition of torsion, the study revealed a significant correlation in DFA measurements obtained through OCT and CFP, emphasizing the comparability of torsion measurements. This underscores the feasibility of employing either modality in pediatric populations.

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**Session: Poster session A**

# Foveopapillary angle measured by fundus photography and optical coherence tomography. Are these methods interchangeable?

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Introduction

Although measurement of the foveopapillary angle (FPA) by fundus photography has been the traditional method for objective torsion measurement, optical coherence tomography has emerged as a popular alternative in the past few years. In some situations, as in high miopic patients, it is difficult to determine the exact localization of the fovea and thus the FPA. Concordance between fundus photography and OCT Spectralis has been previously evaluated finding that FPA with OCT Spectralis isn't affected by poor foveal definition. Marking the center of the fovea using B-scan of the Swept Source OCT (SS-OCT) could also be useful for this purpose. The aim of this study is to evaluate the concordance of the FPA measured by fundus photography and SS-OCT.

Methods:

FPA was measured in 15 patients by 2 different methods: 1) Fundus photography using a non-mydriatic Retinography (Topcon Corporation, Tokio, Japan) and 2) Color retinography from SS-OCT Triton (Topcon Corporation, Tokio, Japan) with B- scan fovea identification. For FPA calculation Cyclocheck.com (developed by Piotr Loba and Justyna Simiera) was used. FPA and B-Scan identification was made by 2 independent observers to determine interobserver reproducibility. Intraclass correlation coefficient (ICC) was assessed to evaluate concordance between these methods.

Results

29 eyes were included in the study, 73% were male, median age 60,5 years (26-78). Mean FPA in fundus photography was 7.12±4.46 degrees while 6.05± 4.56 degrees in SS-OCT. Concordance in FPA between the two methods was fair with an overall ICC of 0.529 ($p>0.01$). The concordance between observers when measuring FPA was high with ICC of 0.83 for fundus photography and 0.85 for SS-OCT.

Conclusions

Although both methods are very reproducible in measuring FPA, with high levels of agreement between observers, the results obtained by these methods are not interchangeable.

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**Session: Poster session A**

# Evaluation of sensitivity and specificity of slit light method in the diagnosis of cyclotorsion

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purpose:

To evaluate the amount of sensitivity and specificity of slit light method in the diagnosis of ocular cyclotorsion.

Methods:

120 eyes of 60 individuals (10 - 60 years old), with mean visual acuity of 0.08±0.14 Log MAR, were divided in two groups ( normal and torsion group). Indivisuals without ocular motility disorder selected as normal and pateints with extra ocular motility disorders and oblique muscle dysfunctions as torsion group.

The sensitivity and specificity of slit light (SL) in the diagnosis of ocular torsion were measured by masked investigators and compared to Fundus Photograghy(FP). Inter and intra-observer variability of theses techniques were also determined.

Results:

The amounts of sensitivity and specificity of SL, measured by the first examiner, were 60% and 92% for intorsion and 50% and 96% for extorsion assesment, respectively. These amounts were 53% and 95% for intorsion, and 54% and 97% for extorsion by the second examiner. The contingency coefficient between the two examiners was 68.6% for SL. This amount was 61% between FP and SL for the first examiner and 63% for the second.. The contingency coefficient for the repeatability of SL was 72.2% for the first examiner and 75.7% for the second. This amount was 71.2% between the two examiners.

Conclusion:

SL can be consider as useful method for diagnosis of cyclotorsion

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**Session: Poster session A**

# Comparative Analysis of Objective Cyclotorsion in Full-Term, Preterm, and Preterm Children with Retinopathy of Prematurity

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Background:

Retinopathy of Prematurity (ROP) is a prevalent retinal condition leading to macular dragging. However, exploration of potential associations between cyclodeviation levels and the onset and management of ROP remains limited. This study seeks to investigate the presence of ROP in premature newborns and its potential correlation with intravitreal injection (IVI) of anti-VEGF agents and ocular rotation.

Methods:

The study included children aged 3-12 years, encompassing full-term, preterm, and ROP children both with and without intravitreal injection treatment. Ocular torsion was evaluated using two imaging modalities: optical coherence tomography (OCT) and conventional fundus photography (CFP). The disc-center-fovea angle (DFA) was utilized for the assessment. Exclusion criteria comprised poor image quality, optic disc pathology, macular disorders, prior surgery, or limited eye mobility.

Results:

A total of 328 children were enrolled. No significant differences were observed in combined DFAs for both eyes when measured with OCT and CFP across all four groups. Bland-Altman plots confirmed a robust agreement between OCT and CFP, supported by intra-class correlation coefficients of 0.827, 0.678, 0.749, and 0.706 (all $P<0.001$).

Discussion:

A notable correlation was identified between ocular torsion measurements using OCT and traditional techniques involving CFP. Ocular rotation angles were found to be similar among children with no history of prematurity, preterm newborns without ROP, premature infants with ROP who did not undergo IVI therapy, and premature infants with ROP who received intravenous anti-VEGF agents.

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**Session: Poster session A**

# A new device to quantify abnormal head posture

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Introduction:

Abnormal head posture is a frequent problem in orthoptics and ophthalmology. Nevertheless, it is rarely measured in a direct way and the available devices are not child-friendly.

Reliable assessment of abnormal head posture is of great importance for evaluating the abnormal head posture itself and the underlying disease, for determining treatment and for evaluating the effectiveness of therapeutic intervention.

Methods:

We discuss the basic concept of a new, cheap, contact-free and user-friendly ‘torticollimeter’, make recommendations on its use and highlight its advantages and disadvantages in comparison to similar devices.

Results:

This new, low-cost and easy-to-use device, allows measuring separately the 3 components of abnormal head posture, even without cooperation of the patient. Its validity and reliability though, still have to be proven.

Conclusions:

As measuring the abnormal head posture may have a diagnostic, therapeutic, prognostic and evaluative value, an accurate measurement is essential. Our newly developed 'torticollimeter' is a cheap and easy-to-use tool to reach this aim, even in non-cooperative children.

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**Session: John Lee (Rapid Fire) Poster Session**

# Objective measurement of fusion control in intermittent exotropia

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**Purpose**: To develop an objective method for quantifying fusion control in patients with intermittent exotropia (IXT) using an eye-tracking device.

**Methods**: Fifty subjects fixated to visual targets on an LCD monitor at a distance of 45 cm, consisting of dots moving horizontally and vertically, and randomly appearing dots at fixed positions. The control group consisted of participants with less than 5 prism diopters (PD), and the IXT group consisted of IXT patients with 10 PD or more, excluding divergence excess types. Fixation disparity (FD) was measured with an eye-tracking device and the FD score was compared with the Newcastle control score (NCS) and the Mayo Clinic office-based scale (MCS). Subjects repeated the test twice, and test-retest reliability was determined.

**Results**: Fixation disparity scores of the IXT group during horizontal pursuit, vertical pursuit and random dot fixation showed positive correlations with the NCS (r=0.549, 0.583, 0.481, respectively) and MCS (r=0.551, 0.570, 0.505, respectively). The test-retest reliability of FD scores of the IXT group using an eye-tracking device was fair to good for each task (ICC =0.633, 0.656, 0.697, respectively).

**Conclusion**: The eye-tracking device developed for objective measurement of fusion control has the potential to be used as a new tool to assess the control of IXT.

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**Session: Poster session A**

# Depth perception and intraocular differences in older spectacle wearers

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Introduction: To explore the clinical relationship between age, interocular differences in the corrected distance and near logMAR visual acuities, refractive errors, eyeball lengths, pupil sizes and higher order ocular aberrations on clinical measures of stereoacuity and aniseikonia in asymptomatic presbyopic habitual spectacle wearers.

Methods: 91 subjects underwent clinical assessment of i) subjective refractive error, ii) stereoacuity at 6m and 40 cm (Randot Stereotests), iii) aniseikonia at 6m (Awaya test along vertical and horizontal meridia) iv) higher order aberrations (Hartman-Shack aberrometer) v) eyeball length and pupil size (IOL master 700). The Pythagorean theorem was applied to each pair of aniseikonia values to calculate the resultant aniseikonia (AR).

Results: Mean (±sd,95%CI) age of the subjects was 56.2 years (±8.10,54.6-57.9). Root mean square (RMS) interocular differences(±sd,95%CI) in spherical refractive errors, eyeball lengths and pupil sizes were 0.66D(±0.93,0.47-0.85), 0.24mm(±0.33,0.17-0.31), 0.15mm(±0.11,0.12-0.17). The median (mode, interquartile range) values for AR were 2.8(1.0,1.3-4.0).

Significant correlations ($p<.01$) were revealed between:

a) distance stereoacuity and age as well as difference in the corrected distance visual acuity.

b) near stereoacuity and difference in the corrected distance and near visual acuities.

Conclusions: Depth perception is age-related, influenced by interocular difference in the corrected visual acuities but not related to interocular difference in pupil sizes, higher order aberrations or aniseikonia in older habitual spectacle wearers. Assessment of stereoacuity, and aniseikonia, in older persons may be useful in relation to preventing accidental mis-location and falls.

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**Session: Poster session A**

# Postoperative Binocular Visual Field Assessment Using a Personalized Computerized Kinetic Perimetry

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- Surgical outcome of diplopia caused by paretic and restrictive strabismus is often accessed by a binocular visual field (BVF) using the Goldmann perimeter. However, Goldmann perimeters are being replaced by automated perimeters for assessment of patients with glaucoma and neuro-ophthalmic conditions. We propose to apply a postoperative evaluation method to BVF in patients diagnosed with fourth cranial nerve palsy (IVCNP) and thyroid eye disease (TED) using a computerized kinetic perimetry.
- Retrospective study. Patients with IVCNP and TED older than 18 years old and submitted to strabismus surgery were included. We excluded patients with previous strabismus surgery and absence of fusion. The BFV was performed after surgery through a personalized kinetic perimetry software on Octopus 900, Haag Streit® (vectors with a radiant direction, pointing from the center to the periphery, stimuli III4e; angular velocity of 5º/s). Thereafter, the Binocular Single Vision (BSV) Score was calculated as proposed by Sullivan et al (1992). We defined good surgical outcome: BSV Score > 50% and heterophoria in the primary position; moderate outcome: BSV Score 1-50% but with correctable diplopia with prisms or head tilt; poor outcome: BSV Score = 0% and/or intractable diplopia.
- 13 patients were included: 6 with IVCNP and 7 with TED. 10 patients achieved good outcome, 2 patients had moderate outcome and 1 patient had poor outcome. Mean BVS was 64.7 ± 25.6. IVCNP subgroup analysis revealed mean postoperative vertical deviation of 3.0 ± 3.5 DP, -1.0 ± 2.5 DP of horizontal deviation and mean BVS Score was 67.8 ± 24.9. TED subgroup presented mean postoperative vertical deviation of 2.7 ± 5.5 DP, +2.4 ± 2.6 DP of horizontal deviation and mean BVS Score was 62 ± 27.6.
- BVF evaluation allows us to quantify surgical outcome in patients with diplopia consequent to IVCNP and TED. This method may be applied to binocular diplopia from other causes and further studies are needed to validate this tool.

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**Session: Poster session A**

# Arkus Vision: a new method for the assessment and quantification of diplopia with virtual reality

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## INTRODUCTION:

Diplopia, or double vision, arises when eyes are misaligned, causing the perception of two images of a single object in the same visual space. This misalignment can be horizontal, vertical, or torsional, often involving multiple spatial planes. Surgical planning for diplopia necessitates the study and quantification of deviations. Classical methods include the use of red glass, Maddox rods, and Worth lights, coordimetry, synoptophore, and synoptometer. Drawbacks of these methods include image dissociation, the inability to measure deviation in diagnostic visual field positions, and limitations in evaluating deviation with fixation at different distances.

## METHODS:

Description and practical application of software using virtual reality GOOGLES to address the limitations of classical methods for quantifying deviations in patients with diplopia. The application is integrated into the storage unit of virtual reality glasses (Oculus Quest 2; 256 GB) and communicates remotely with a server that stores, analyzes, and builds a report of the generated information.

## RESULTS:

The software analyzes and quantifies deviation up to 30° in nine cardinal positions of the visual field, both horizontally and vertically, without eye image dissociation. It measures torsional deviation in all positions, being configurable for various fixation distances. Reports offer unlimited customizable graphs, reflecting "patient's view" and "observer's view" preferences. The system regulates head position and measures torticollis in sagittal and transverse planes, with presented paradigmatic cases highlighting method's importance.

## CONCLUSIONS:

The application (software) represents an innovative, facilitating, and optimizing technology for the evaluation and quantification of ocular deviations in patients with diplopia and normal retinal correspondence. The method has proven to be of utmost importance in the study and surgical planning of complex strabismus cases with diplopia.


**Session: Poster session A**

# Use of Strabiscan prototype device for preoperative strabismus angle measurements

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Introduction: Measuring the angle of strabismus using the alternating prismatic cover test (APCT) is the gold standard for planning surgery. A complementary test to visualize the maximum angle of deviation is the prismatic adaptation test (PAT). We analyzed the preoperative results of strabismic angle measurements using the Strabiscan prototype device and APCT and compared them with the PAT results.

Methods: 17 patients being prepared for strabismus surgery at the 2nd Department of Ophthalmology of PMU were included in the analysis. The average age of the patients was 18 years (range 5-65 years). The group included 5 patients with convergent strabismus and 12 with divergent strabismus. Each person was given a questionnaire on basic data and medical history. This was followed by an ophthalmologic examination including: evaluation of visual acuity, measurement of refractive error after accommodative paralysis, evaluation of the anterior segment and posterior segment of the eyeball. Subsequently, all patients were measured using the Strabiscan prototype device and APCT. In divergent strabismus, APCT was performed after a 3-hour monocular occlusion, while prism adaptation test time was 30 minutes.

Results: Statistical analysis showed no statistically significant differences in strabismus angle measurements between Strabiscan and APCT for distance or near ($p>0.05$). Comparison of PAT results to strabismus angle measurements did not highlight statistically significant differences between the methods in the evaluated group of patients ($p>0.05$).

Conclusions: Measurement of strabismus angle results with the Strabiscan prototype device are comparable to traditionally used methods in people with strabismus.

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**Session: Poster session A**

# A convenient method to estimate alignment of eyes under general anesthesia in strabismus subjects

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## Introduction

This study aims to describe a convenient and reliable method to estimate the alignment of eyes under general anesthesia (GA) in strabismus subjects. It is known that the strabismus angle under GA varies from the angle measured preoperatively. This variation may influence the surgical protocol and guide the operative procedure.

## Material and Methods

Through the operating miscroscope, pictures of the eye position of 99 subjects with horizontal strabismus were captured peroperatively under general anesthesia. We placed a curved caliper parallel to the horizontal meridian and measured the distance between the center of cornea and the corneal reflex spot of the axial light of the microscope. The eye position was estimated with a quantified Hirshberg method for each eye and the values were added for the overall angle. To validate this method, four strabismus surgeons blindly estimated the peroperative strabismus angle based on these pictures and the results were compared. Agreement between the four measurements was estimated using the ICC (Intraclass Correlation Coefficient) index.

## Results

ICC coefficients and their 95% confidence interval were 0.925 (0.877-0.953) for the overall angle, 0.918 (0.891-0.941) for the right eye and 0.859 (0.774-0.910) for the left eye, indicating good to excellent reliability of these measurements.

## Conclusion

The described technique is fast, easy and reliable and provides a tool to encourage surgeons to evaluate the angle under GA.


**Session: Poster session A**

# A free online tool for conversion between rectangular and polar representation of prism prescription

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## Introduction

Prismatic specifications of spectacles is paramount in evaluating the strabismus patient with built-in prisms, as the total strabismic deviation is the sum of any built-in prism effect in the two spectacle lenses and any residual deviation measured at the orthoptic evaluation. However, these components are typically reported in polar and rectangular representation, respectively, yielding summation complicated. The reverse calculation is needed when attaching Fresnel prisms to spectacles in patients requiring horizontal and vertical correction. Online calculators exist for converting prescription between polar and rectangular representation only for one lens, but to our knowledge, no tool exists evaluating two lenses in a spectacle specification, allowing unnecessary room for human error.

## Methods

Converting a prism from polar (with a given prism power and angle [v]) to rectangular (vertical and horizontal prism diopters) representation requires resolving the vertical and horizontal part using sin(v) and cos(v) of the angle respectively, factoring the power of the prism on each intermediate result. Converting from rectangular to polar representation uses the reverse calculation, respecting signs based on laterality. Intermediate results from the two lenses are added.

## Results

We propose a free online web-based calculator which allows conversion from an entire two-lens spectacle prescription to vertical and horizontal prism diopter values or conversion from vertical and horizontal prism diopters to polar representation in one lens or distributed over two lenses.

## Conclusions

A free online calculator will allow polar-to-rectangular conversion when evaluating spectacles with built-in prisms and the reverse conversion when attaching Fresnel prisms will minimize possible errors due to user calculations.

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**Session: Poster session A**

# Digital recording of ocular motility for modern practice

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Introduction

Monitoring and recording eye movements is essential to strabismus practice particularly when planning surgery. Digital methods of recording extra ocular movements are available that allow recording of uni ocular field of fixation [UFOF], fields of Binocular single vision [FBSV] and Lees plots. With the old technologies becoming more difficult to purchase and maintain it is essential to ensure that new methods can provide adequate and accurate information for those managing their strabismus

Methods

30 adults with normal binocular vision had their motility recorded on the Lees Screen and Aimark Perimeter . They also undertook examination on a digital Hess , field of BSV and UFOF using the Thomson Binocular Vision Analyser[BVA]. Qualitative and quantitative comparisons of the instrumentation were carried out and analysed using Graoh Pad Prism

Results

There was no statistical difference (Ttest $p>0.05$) (Blandaltman Analysis) found between mean deviation size between the digital Hess and Lees screen in any position of gaze but the participants could not see the target on dextro elevation and laevoelevation and had to move their heads more on the Lees screen . FBSV plots were qualitatively assessed and found to match between the Aimark Perimeter and Thomson FBSV test. The digital chart was able to record uniocular eye excursion but does not test as far out as the Aimark however can test motility up ti 55 degrees from the primary position and did detect limitations or weakness of movement . The digital technology was quicker to execute.

Conclusion

The Thomson BVA provides a compact and useful modern tool for assessing extra ocular motility. It can detect weakness of movement and was favoured by patients . The new technology was quicker and required less adjustments for the patient. The BVA records eye movement information that is useful albeit it cannot test extremes possible on the Aimark .

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**Session: Poster session A**

# Amplitude of accommodation measurements by otorefractometer in children with bilateral high hyperopia

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Purpose: To evaluate the amplitude of accommodation by otorefractometer in children with high hyperopia.

Materials-Method: The records of children with bilateral high hyperopia (6,00 diopter and above) were investigated. Age, amplitude of accommodation (AA) values and pupil size (PS) changes measured by otorefractometer (Tonoref III), spherical equivalent (SE), astigmatism, presence of amblyopia, strabismus, and stereopsis were noted. Age-matched emmetropic children were also evaluated as a control group. Comparisons between groups were statistically performed.

Results: The mean ages of high hyperopia (n:32) and control groups (n:12) were not statistically different (p:0,84). There were statistically significant differences in terms of mean AA, SE, and astigmatism values between groups (p:0,001, p<0,001, p<0,001). AA difference between the two eyes was not different between groups (p:0,30). Pupil size measurement was not different between groups (p:0,42). The presence of amblyopia and stereopsis were higher in the hyperopia group and stereo acuity was better in the control group.

Conclusion: Amplitude of accommodation, measured by a new otorefractometer (Tonoref III,) was found to be lower and asymmetrical accommodation was not remarkable in patients with high hyperopia.

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**Session: Poster session A**

# Retinal microvascular changes in unilateral functional amblyopia detected by OCT-angiography and follow-up during treatment

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Introduction: To evaluate the macular microvascular changes using optical coherence tomographic angiography (OCT-A) in children with unilateral amblyopia and their reversibility during treatment.

Methods: Patients with unilateral strabismic or anisometropic amblyopia or residual amblyopia from early congenital cataract surgery, examined between October 2019 and March 2021, were included. Vessel density and perfusion density in the superficial capillary plexus and area, perimeter and circularity of the foveal avascular zone (FAZ) were analysed using OCT-A in amblyopic eyes, contralateral eyes and control group healthy eyes. Correlation analyses between the microvascular parameters and the visual acuity were performed. In a pilot study on a few patients from the amblyopic cohort, longitudinal follow-up during treatment was also performed.

Results: A total of 128 eyes of 64 patients were included: 32 amblyopic eyes compared with 32 contralateral eyes and 64 control eyes. Vessel density and perfusion density in the superficial capillary plexus were significantly lower in amblyopic eyes compared to control eyes in 6 × 6 mm ($p < 0.02$) and 3 × 3 mm ($p < 0.01$) scans. Correlation analyses showed a linear decrease in vessel density and perfusion density with decreasing visual acuity. The microvascular changes observed were reversible with the occlusion treatment of amblyopia ($p < 0.001$).

Conclusions: The study found a decrease in vessel density and perfusion density in the macula of children with unilateral functional amblyopia. These microvascular changes were correlated with visual acuity and appeared to be reversible with treatment of amblyopia. On the whole, OCT-A appears to be a relevant complementary examination when it comes to diagnosing and monitoring functional amblyopia.

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**Session: Poster session A**

# Utility of the Red Reflex Test for Detecting Ophthalmic Pathology in the Pediatric Population

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**Introduction:** The red reflex screening test (RRT) is heavily relied upon to detect ocular pathologies in the pediatric population. Some studies report limitations in accurately detecting posterior segment pathologies (PSP). In this study we compared the efficacy of the RRT to identify anterior segment pathologies (ASP) compared to PSP and evaluated the role of ambient illumination and pharmacological dilation on the results of the RRT.

**Methods:** After IRB approval, ophthalmology residents and fellows at our tertiary care institution blinded to the patient diagnosis performed a standardized RRT both in standard illumination and in the dark and before and after pharmacologic pupil dilation. Following the RRT, a retina specialist blinded to the RRT results examined the patient to identify any ocular pathologies. The findings of this prospective trial were analyzed for efficacy of the RRT and to compare our variables of interest.

**Results:** A total of 84 patients (168 eyes) with a mean age of 9.0±5.5 years were included in the analysis. 90 eyes (53.6%) had evidence of a PSP, while 16 eyes had findings consistent with ASP (9.5%). Aligning with literature reports, the RRT showed higher sensitivity and negative predictive value (NPV) for ASP compared to PSP which had higher specificity and positive predictive value (PPV). Additionally, ambient lighting had no significant effect on the RRT results while dilation significantly increased the accuracy of the RRT results for both ASP and PSP.

**Conclusions:** Although the RRT is effective in detecting ASP, it has a very low sensitivity for detecting PSP in children. Pupil dilation increases the accuracy of the RRT but is impractical for use at a well child visit. Ambient lighting changes do not impact results. Our results indicate the RRT is useful for screening for ASP and it is useful if positive for PSP. A negative RRT screening for PSP is inconclusive and therefore should not be considered a reliable test to exclude PSP pathology.

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**Session: Poster session A**

# Baseline characteristics of children in the Early Glasses Study

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## Introduction

The Early Glasses Study determines the relationship between refractive error at age 1 and the risk of developing amblyopia or accommodative esotropia, and its protection by glasses. We finalized the baseline findings analysis.

## Methods

Healthy children, aged 12-18 mos., recruited at Children's Healthcare Centres, received orthoptic examination followed by retinoscopy in cycloplegia. Those exceeding AAPOS 2003 Criteria (spherical equivalent (SE) >+3.5D, >1.5D cyl, >1D cyl (10°-80°), >1.5D aniso) were randomized into glasses or not and are followed up biannually to age 4. Excluded were children with amblyopia, strabismus, ophthalmic disease, or exceeding the Criteria twofold. Visual acuity will be measured in all randomized and non-randomized with logarithmic Tumbling E's at age 4.

## Results

Of the 888 recruited, 123 were excluded, 23 did not respond. Of 742 eligible for examination, 601 were examined at age 14.5±1.7 mos., 131 declined, 10 were lost to follow-up. 62 (10.3%) Exceeded the Criteria, 1 of whom was excluded with strabismic amblyopia, 1 esotropia, 1 intermittent exotropia, 1 exophoria, 5 exceeded Criteria twofold, 1 of whom with strabismic amblyopia, 1 declined further participation. Of the 539 below the Criteria, 2 were amblyopia suspect, 1 had microstrabismus, 1 exotropia, 9 myopia, 2 ptosis, 1 cong. oculomot. aprax., 1 Duane type 1. None of excluded prior examination was known to have amblyopia. Mean SE was +1.73±1.18D, mean cyl -0.72±0.46D, mean aniso 0.21±0.34D. Of those exceeding the Criteria, most had SE >+3.5D, followed by >1.5D cyl, >1D cyl (10°-80°), >1.5D aniso, respectively. Randomized were 52, 28 into glasses, 24 into no glasses. At first follow-up retinoscopy after 9.3±3.5 mos. (N=44), SE had changed between -2.375D and +2.75D.

## Conclusions

Of the 601 children (age 14.5 mos.) from general population, 62 (10.3%) exceeded AAPOS 2003 Criteria. 2 Had strabismic amblyopia, both exceeding the Criteria, 5 strabismus, 13 other ophthalmic disease.

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**Session: Poster session A**

# Refractive or deprivation amblyopia in Down's syndrome - is genotyping for inherited retinal dystrophy necessary?

**Ana CURIC**[1,2], Mirjana BJELOŠ[1,2,3], Mladen BUŠI?[1,2,3], Benedict RAK[1], Biljana KUZMANOVI? ELABJER[1,2,3]

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**Introduction**: This case of a 13-year-old girl with Down's syndrome (DS), bilateral amblyopia, and high myopia is aimed at linking the novel variant *IMPDH1* c.134A>G, p.(Tyr45Cys) to a clinical phenotype and emphasizing the importance of discerment between deprivation and refractive amblyopia.

**Methods:** A 13-year-old girl with DS, born with hearing loss, was diagnosed with high myopia and bilateral amblyopia at the age of 4. In 2022, a crosslinking of both eyes was performed due to keratoglobus. Phenotype including: high myopia, keratoglobus, and hearing loss prompted a consideration of possible inherited retinal dystrophy (IRD).

**Results:** On clinical examination her best-corrected visual acuity (BCVA) was 0.8 logMAR on the right eye (RE) and 0.7 logMAR on the left eye (LE). She manifested RE intermittent exotropia with local stereopsis of 100 s of arc. Retinoscopy demonstrated -11.50 Dsph RE and -12 Dsph/-0.75 Dcyl ax 70° LE. Optical biometry measured axial length values of 25.72 mm RE and 26.04 mm LE, and keratometry of K1 = 50.55 D ax 3° and K2 = 51.86 D ax 93° RE, and K1 = 50.25 D ax 27° and K2 = 51.32 ax 117° LE. On ultra-widefield imaging posterior staphyloma was evident. Sequence analysis using the retinal dystrophy panel identified a heterozygous missense variant *IMPDH1* c.134A>G, p.(Tyr45Cys) labeled as variant of uncertain significance.

**Conclusions:** Pathogenic variants in *IMPDH1* are associated with autosomal dominant retinitis pigmentosa 10, and Leber congenital amaurosis 11. It is important to distinguish between deprivation and refractive amblyopia due to different prognosis and follow-up, therefore the clinician should always aim to correlate phenotype and genotype in order to make the correct diagnosis. The patient, although suspect to have IRD, is heterozygous for *IMPDH1* variant and does not manifest any disease characteristics. Therefore, we do not expect further retinal disease progression, and crosslinking could be aimed at restoring BCVA.

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**Session: Poster session A**

# The effect of prolonged monocular occlusion on the nystagmus waveform in strabismic amblyopia with Manifest Latent Nystagmus

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PURPOSE:

Managing strabismic amblyopia in children with manifest latent nystagmus (MLN) can be difficult, as intensity of nystagmus increases with occlusion, which equates to a reduction in visual acuity (VA). As a result, many do not offer active intervention. In our study, we assessed VA and eye movement recordings in children with MLN and strabismic amblyopia to determine the effect of monocular occlusion.

METHODS:

A prospective case series of 10 children (5-8 years) with strabismic amblyopia and MLN was conducted. Detailed history, full ophthalmic examination and orthoptic assessment were performed. The non-amblyopic eye was occluded continuously for 6 hours. VA and eye movement recordings were assessed at baseline and at 2-hour intervals, using an EyeLink-1000 video-based eye tracker.

RESULTS:

100% of the children were compliant with continuous occlusion. 80% had previous amblyopia treatment (conventional occlusion therapy/atropine penalization). After 6 hours of continuous occlusion all demonstrated improvement in VA in the amblyopic eye (mean of 0.33 logMAR from baseline), and reduction in velocity and amplitude of nystagmus waveform (mean 9 degrees/second and 8 degrees respectively).

CONCLUSIONS:

Evidence reported in literature on the management of MLN is limited. The fear of worsening the nystagmus (and VA) with occlusion may deprive these children from receiving appropriate treatment to optimise vision during the amblyogenic period. Our study shows that continuous occlusion of the non-amblyopic eye is beneficial in improving the VA and nystagmus parameters in the amblyopic eye and should be considered as a treatment option.

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**Session: Poster session A**

# Can wandering fixation be treated by hours of occlusion ?

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Introduction : Parapapillary fixation is usually considered as the most challenging functional amblyopia to treat . Our approach demonstrates that it requires only hours of initial occlusion .

Methods : In our last prospective study including 72 strabismic patients with pathologic dominance , we selected 8 patients aged from 1 to 6 years ( mean : 4.6 y ) with wandering fixation . Initial occlusion was prescribed from 40 to 250 hours ( depending on the age ) , day and night relayed immediately by optical penalization of +2.50 D for distance in the dominant eye and a 3 weeks period of 1% atropine in this eye to prevent cheating .

Results : All patients centered their fixation immediately after this short period of treatment . All of them achieved a final 10/10 of vision at the age of 12y except one ( 8/10 ) . Two patients required 2 years of atropine and intermittent occlusion ( 2 hours / day ) due to persistence of fixation of the dominant eye at distance ( instinctive fixation ) . One needed a reverse penalization due to complete reverse amblyopia .

Conclusions : In the future the vast majority of successful treatment for functional amblyopia has no more to be based on long term periods of occlusion but on a relay of optical penalization for distance maintaining a useful dissociation between the two eyes until the end of sensitive period . Some cases of strong dominance need associate 2 hours occlusion for months to achieve alternate fixation .

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# A Patient Registry for the Binocular, Dual-Acting Digital Therapeutic for Amblyopia from Anisometropia and Mild Strabismus: Real World Outcomes following Prescription of Luminopia

**Derek SPRUNGER**[1], Eric GAIER[2]

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Title

A Patient Registry for the Binocular, Dual-Acting Digital Therapeutic for Amblyopia from Anisometropia and Mild Strabismus: Real World Outcomes following Prescription of Luminopia

Introduction

Real world data from a registry of patients prescribed the digital therapeutic Luminopia for amblyopia associated with anisometropia and/or mild strabismus was analyzed to characterize response to treatment.

Methods

Patients with amblyopia and ?12 weeks of Luminopia were enrolled in a multicentered, retrospective registry. Data collected included ocular history, amblyopia type, amblyopic eye (AE) best-corrected visual acuity (BCVA), and digitally measured treatment adherence.

Results

62 patients were evaluated. Median age was 8 (IQR: 6-10); 48 patients (77%) had a history of patching for a mean of 34±28 months. Mean BCVA was 0.43±0.26 logMAR at time of prescription and 24 (39%) had strabismic or mixed amblyopia.

By the first follow-up, an average of 84±39 days post prescription, mean AE BCVA improved by 0.85±1.4 lines ($p<0.01$); 25 patients (40%) improved by ?1 line.

From prescription to the most recent follow-up, 159±77 days post-prescription, mean AE BCVA improved by 1.1±1.4 lines. Mean, and 95% confidence interval of change in BCVA (logMAR) since prescription for each sub-group: for 4-7 years: -.09 [-.14, -.05], >7 years: -.12 [-.18, -.07], history of patching: -.1 [-0.14, -0.07], strabismic amblyopes: -.11 [-.17, -.05].

For the first 3 months of digital treatment, median adherence was 80% (IQR: 56-98%). Adherence was similar between subgroups for age ($p>.6$), prior treatment history ($p>.19$) and strabismic amblyopia ($p>.6$).


Therapy was well-tolerated and no safety events were reported.

Conclusions

Luminopia patients in this real-world analysis have clinically meaningful improvements in vision and strong adherence during the first three months of the digital treatment, even in difficult-to-treat patients with respect to age and prior therapy.

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**Session: Poster session A**

# Effectiveness of Dichoptic office Therapy combined with home monocular virtual reality gaming versus Dichoptic office therapy only, for management of anisometropic amblyopia.

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Introduction:

Management of amblyopia remains challenging. Contrast-rebalanced dichoptic therapy have been shown to be an effective treatment for childhood amblyopia. The aim of this work is to evaluate the effectiveness and reliability of combining office dichoptic therapy with home virtual reality gaming for management of anisometropic amblyopia.

Methods:

In this prospective, randomized, interventional study, 50 children aged 4-12 years with anisometropic amblyopia were randomized into two groups.

The first treatment group included 25 children who wore glasses full time and used the dichoptic digital device (Remmed VR) 1 hour per week at our office and 1 hour per day for the other 6 days at home using virtual reality gaming headset (oculus quest) after occluding one of its binocular lenses; facing the sound eye.

The second control group included 25 children who wore glasses and used the dichoptic digital device only 1 hour two days per week at our office.

The primary outcome was visual acuity (VA) change in the amblyopic eye from baseline at time of starting treatment to 12 weeks.

Results:

After 12 weeks of treatment, the amblyopic eye in the first combined treatment group showed a significant improvement in VA over the second monotherapy control group (4 lines vs. 2.5 lines).

Conclusion:


Due to a more engaging patient experience, combining dichoptic digital device with our modified sound eye patching, by using a virtual reality headset after covering one of its binocular lenses, showed more effectiveness and thus improved VA in amblyopic eyes compared with using the device only at the office.

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**Session: Poster session A**

# Effectiveness of prismatic combination treatment on children with amblyopia combined with esotropia

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Purpose

Prism has been used as a non-surgical treatment for certain types of strabismus; however, its role as the primary intervention for amblyopia combined with esotropia has been rarely studied. The objective of this study was to compare the effectiveness of prismatic correction with traditional occlusion therapy in treating amblyopia combined with esotropia.

Methods

This retrospective case-control study included children aged 3 to 16 years with amblyopia combined with esotropia. After refractive correction, the patients were divided into two groups. The control group received traditional occlusion therapy combined with binocular treatment, while the prism group received full correct prisms combined with binocular treatment. Clinical characteristics were assessed at each follow-up examination. The treatment outcomes after 12 months were evaluated to determine the more effective protocol.

Results

At baseline, there were no significant differences in clinical characteristics between the two groups (all $P > 0.05$). After treatment, both groups showed improvement in amblyopic eye visual acuity. The difference in visual acuity improvement between the two groups was not statistically significant at 6 months ($0.18\pm0.17$ vs $0.14\pm0.11$, $P > 0.05$), but it was statistically significant at 12 months ($0.35\pm0.20$ vs $0.25\pm0.18$, $P < 0.05$). The prism group demonstrated a significant improvement in binocular vision function, whereas there was no significant change in the control group at 6 months or 12 months after treatment.

Conclusion

Prismatic treatment combined with binocular treatment was more effective in improving amblyopic eye visual acuity and binocular vision compared to traditional occlusion therapy combined with binocular treatment in children with amblyopia combined with esotropia. Prismatic correction could be considered as the first-line treatment for amblyopia combined with esotropia.

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# Early Versus Late Surgery for Infantile Esotropia in Chilean Population

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## INTRODUCTION

Infantile esotropia begins approximately at 6 months of age. The management is mainly surgical. There are studies that concluded that early surgery would have a better result, however, pre surgical measurement is complex and can fluctuate. The objective of the study is to compare surgical success when operating before and after 18 months of age.

## METHODS

Retrospective study. We searched in the surgery database for all patients with strabismus, recording those with infantile esotropia. Pre and post operative characteristics, surgeries performed and whether the first one was before or after 18 months of age were recorded. Surgical success was compared between both groups, defined as an esotropia less than 10 diopters or an exotropia less than 5 diopters.

## RESULTS

30 patients with infantile esotropia were found. The mean age of diagnosis was 23.3 ± 35 months. At the first consultation, 7 had inferior oblique hyperfunction, 5 had dissociated vertical deviation and 1 had nystagmus. The average time from diagnosis to surgery was 4.4 ± 3.8 months. 17 patients were operated before 18 months and 13 after. Within the early surgery group, 7 were successful with 1 surgery, while 4 in the late group ($p = 0.4$). The early group had an average follow-up of 4.7 years, 1.6 operations, 10 had surgical success at the last consultation (58.8%) and of those evaluated for stereopsis, it was present in 1 patient, while the late group had an average follow-up of 3.2 years, 1.2 surgeries, 6 had success at the last consultation (45.2%), and of those evaluated for stereopsis, it was present in 1 patient.

## CONCLUSION

There was a trend that operating before 18 months of age would have a higher frequency of success compared to performing it after this age, however, this was not statistically significant. Of those evaluated for stereopsis, it was present in 1 patient in each group. The early surgery group had a slightly higher average number of surgeries compared to the late group.

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# Is botulinum toxin injection into the inferior oblique muscle an effective surgical simulation prior to inferior oblique myectomy? A retrospective review of 69 patients

**Christopher NORBURY**[1], Ian MARSH[1]

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Introduction:

A surgical simulation using botulinum toxin (BTX) injected into the inferior oblique is useful to assess for postoperative results as inferior oblique myectomy (IOM) is considered irreversible. This study aims to evaluate BTX as a surgical simulation and compare the effect of BTX injection to IOM. To the best of our knowledge this is the largest series of patients reported to have undergone both BTX and IOM.

Methods:

The medical records of 69 patients treated with BTX into the inferior oblique muscle as a surgical simulation were reviewed. Indications and deviations before and after treatment with BTX were recorded. For those patients that underwent IOM, deviations before and after surgery were recorded. All injections were delivered using electromyographic localisation.

Results:

49 out of 69 patients had a favourable outcome and had a significant reduction in their primary deviation. Of these 49 patients; 37 underwent IOM, 5 patients are awaiting IOM, 5 patients opted for repeat BTX despite IOM being offered and 2 patients resolved.

Of the 20 patients who were deemed unsuccessful following simulation with BTX; 10 had no improvement (despite repeat treatment with a higher dose), 5 patients were lost to follow up, 2 patients died and 3 patients developed intolerable diplopia which resolved.

Comparison was made between 31 patients who underwent both BTX and IOM. 6 patients were excluded due to missing data. A successful outcome was defined as a vertical angle of deviation less than half the preoperative angle or less than 5?. IOM showed a higher success rate than BTX (100% vs 93.5%). No patient treated with BTX reported diplopia following IOM. 84% of patients treated with IOM were discharged following resolution of symptoms. The remaining 16% showed improvement in vertical symptoms and have proceeded to have horizontal muscle surgery.

Conclusions:

BTX to the inferior oblique muscle is a useful predictor for surgical success prior to undergoing irreversible IOM.

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**Session: Poster session A**

# Cyclic esotropia - onset and course before and after treatment with botulinum toxin A injection - Case Report

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Introduction: Our aim is to describe a case in which intermittent esotropia (ET) became cyclic esotropia and how it responded to botulinum A toxin (BTX) treatment.

Methods: We describe the clinical findings (VA, stereoacuity, ocular alignment/movement, refraction and ocular finding) of 5-year-old boy who presented with left intermittent ET which converted to a 48-hour cyclic ET over a 15-month period and its response to BTX treatment over a follow up period of 14 months.

Results: At presentation, in May 2021 his VA was 6/6 with either eye, he had left small esotropia (not cooperative for measurements), stereoacuity 400", normal ocular findings and refraction <+1Ds in each eye. ET was noticed only when he was tired. Over the next 12 months the frequency and duration of manifest ET increased from minutes to 24 hours, and became cyclic ET with a 48-hour cycle. His Left/Alternating ET was between 16-50^, with 0-10^ difference between near (N) and distance (D). He underwent bilateral medial rectus muscle BTX injection in Nov 2022. He remained esophoric for 2 months (12-16^) and then manifest Left ET reoccurred. Over the next 14 months, the duration of manifest ET was variable (10min- 24 hours) and the cycles extended (3 to 30 days). His ET was recorded between 30-45^. In Dec 2023 his ET changed to 70^D and 90^N. In Jan 2024, on his 'straight' day, he had Left ET, 12^D, and 20^N, VA 6/6 right eye, 6/7.5 left eye and left eye suppression but still variable motor fusion.

Conclusion: Cyclic ET is a poorly understood condition and the literature regarding its management is scarce. Classical treatment is extraocular muscle surgery targeting the largest angle of deviation and BTX has been proposed as an alternative. We present a case where we observed the onset of cyclic ET and its course after BTX treatment (change in size of ET, change of duration of deviation as well as its cycle).

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# Management of Childhood Cyclic Esotropia with Botulinum Toxin Treatment

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Introduction: We aimed to describe three cases with childhood cyclic esotropia and report the outcome of botulinum toxin type A (BTA) treatment.

Methods: Three children with cyclic esotropia manifesting in a 48 hours cycle, were included in the study. BTA of 5 IU was injected into the medial rectus muscles.

Results: The first patient was a 9-year-old boy with esodeviation (55-50 PD at near and distance) beginning after phacoemulsification surgery for juvenile cataracts. Injection of BTA revealed breaking of the cycle and second BTA injection was performed for variable residual deviation. During the 6 years of follow-up, she remained orthophoric with a stereoacuity of 40 second of arc (arcsec). The second patient was a 9-year-old girl with latent nystagmus and anisometric amblyopia. She had diplopia and esotropia (65-45 PD at near and distance). After two injection of BTA with the 8 years of follow-up, she remained stable with a stereoacuity of 800 arcsec. The third patient was a 5-year-old boy with a history of falling and had right esotropia (40 PD at near and distance). After single BTA injection, he was found to be orthophoric with 4 years of follow-up.

Conclusions: Considering the results of our cases, BTA injection was found to be effective method to provide orthophoria in the long term. After breaking the cycle by the first BTA injection, it is useful to perform recurrent BTA injection for residual deviation. We think that BTA injection should be preferred as the first choice in the treatment of cyclic esotropia.

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**Session: Poster session A**

# Long-term efficacy of botulinum toxin for treatment of acquired nonaccommodative comitant esotropia

**Jeong-Min HWANG**[1], Nam Ju MOON[2], Jihae PARK[3], Hee Kyung YANG[1]

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**Purpose:** To investigate the long-term effectiveness of botulinum toxin (BTX) treatment in patients with acquired nonaccommodative comitant esotropia (ANAET) ? 25 prism diopters (?).

**Methods:** Patients with ANAET ? 25?, who received BTX injection in both medial rectus (MR) muscles without the use of electromyographic guidance and followed-up for at least 1 year were included. The distant and near deviation angles were measured at baseline, 1 year, and at the last follow-up examination after BTX injection. Treatment was considered successful if the final ocular alignment showed esophoria ? 6? at distance and near.

**Results:** Forty-two patients were included in this retrospective study. The mean age at treatment was 32.6±14.7 years and an average dose of BTX for the first injection was 6.7±1.3 units. An average of 2.0±1.0 injections were received for each patient and 16 patients (38%) received two or more injections. The mean esodeviation pre-injection was 13.2±5.6? at distance and 12.0±7.0? at near. The mean angle of esodeviation was 5.0±5.0? at distance and 4.0±5.0? at near at 1 year after the first injection and 4.8±5.9? at distance and 4.0±5.9? at near at final visit with an average follow-up of 2.7±1.3 years. The treatment success rate was 64.9% at 1 year and 73.8% at final visit. Ptosis and/or exodeviation ? 20? occurred in 3 patients (7.1%) at two weeks after injection, which all resolved within three months.

**Conclusion:** BTX injection in MR muscles is a safe and effective treatment of ANAET. These results suggest that BTX treatment can be a valuable alternative to strabismus surgery in ANAET ? 25?.

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**Session: John Lee (Rapid Fire) Poster Session**

# Clinical characteristics and surgical outcomes in Acute Acquired Commitant Esotropia (AACE)

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OBJECTIVE

To analyze the clinical characteristics and surgical outcomes of patients younger than 50 years-old diagnosed with an acute acquired commitant esotropia (AACE) and diplopia

METHODS

A retrospective review of all consecutive patients younger than 50 yo with AACE who underwent bilateral medial rectus recession (BMRR), or monocular medial rectus recession with lateral rectus resection (RR) with a minimum postoperative follow up 6 months. Exclusion criteria included history of strabismus surgery, trauma, or ocular patching. Data included age of onset, visual acuity, refractive error, angle of deviation, interval between onset and surgical correction and postoperative alignment and sensory binocular vision (BV)

RESULTS

Thirty-four patients were included. Twenty-two (64%) were female. The mean refractive error was -1D (-8,75 to +5,25); Sixteen (47%) patients had myopia with a mean of -3,75D (-0.5 to -8.75); 11 (32%) had hyperopia with a mean of +2D (+0,50 to +5,25). Age of onset of deviation was 21,5 (4 to 48) years old. The interval between the onset of diplopia and surgery was 8.7 years (1 to 26). All but 2 patients underwent BMRR. The postoperative follow up was 30.4 months (6 to 93). The mean near deviation improved from 27.1PD (14 to 40) to 4.8PD (0 to 8), and the mean distance deviation improved from 27.6PD (14 to 45) to 6PD (0 to 8) postoperatively. 30 (88%) of the patients had less than 5 PD of near-distance disparity. Postoperatively 32 (94%) of the patients recovered BV. Brain imaging was obtained in 5 patients. No patient had an associated neurological disease.

CONCLUSIONS

AACE in patients under the age of 50 years is more frequent in female and patients with myopia. However, age or degree of refractive error are not associated factors. Our results suggest that associated neurological conditions are uncommon. Our long-term results demonstrate good postoperative alignment, stability and binocularity vision using standard strabismus surgical nomograms.

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**Session: Poster session A**

# Stereopsis in patients with acute acquired comitant esotropia

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**Introduction** : Acute acquired comitant esotropia (AACE) is presenting with sudden onset large-angle comitant esotropia with diplopia. AACE generally expected good binocular potential after treatment, if it occurs without neurological disease. This study investigated factors affecting postoperative stereopsis in patients with AACE.

**Methods** : Retrospective medical records review of 40 patients (aged 4-59) who underwent surgery for AACE from January 2017 to August 2023 was performed. Age of onset, refractive error, angle of deviation, duration of esodeviation, presence of diplopia, stereo-acuity, and fusional state were analyzed. Patients were assigned into good stereopsis (40 to 100 arcsec) and lower stereopsis (>100 arcsec) groups. Motor success was defined as alignment within 4 prism diopter (PD) at both near and distance.

**Results** : 27(70%) patients achieved good stereopsis in near and 19(47.5%) in distance after surgery. Only eleven (27.5%) patients achieved normal 60 arcsec stereopsis in both near and distance. Mean initial esodeviation angle was 28.1±12.2PD at distance and 26.6±12.2PD at near. Mean postoperative follow-up time was 26.1±17.0 (6~64) months. Final mean postoperative angle of deviation was 0.9±2.3PD at distance and 1.7±3.5PD at near. Mean stereo-acuity was improved from 2.8 to 2.3 log arcsec at distant and 2.6 to 2.1 log arcsec at near. Amounts of preoperative near deviation significantly associated good stereopsis in near and distance (p= 0.034, 0.039, respectively).

**Conclusions** : Age of onset, fusional state, preoperative stereopsis, and duration of esodeviation did not affect to regain normal stereopsis in both near and distance, but amount of near angle of deviation only associated with good stereopsis.


**Session: Poster session A**

# Acute Acquired Concomitant Esotropia Recurrence

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Introduction: Acute acquired concomitant esotropia (AACE) is a rare type of esotropia. Type II AACE associated with physical stress or psychological stress (Franceschetti type) has been reported to respond well to surgical or botulinum toxin treatment. Regarding the recurrence of deviation in AACE on long term follow-up there is very few information available in the literature.

Methods: In this poster we review four cases of type II AACE with excellent initial results following treatment, where the deviation and symptoms recurred.

Results: Esotropia recurred in these patients after initial resolution with excellent ocular alignment and binocularity, in conditions of emotional and visual stress, in one case the deviation reappeared 5 years after initial surgery. The recurrent esodeviation was approached with surgery or prisms correction.

Conclusion: Recurrence of symptoms in AACE may appear even after long period of good alignment and high binocularity.

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# Preoperative Stereoacuity Assessment in Children with Constant Esotropia

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Introduction: Although some children with constant esotropia can develop normal stereopsis postoperatively, there is currently no known preoperative test to predict postoperative stereoacuity. The purpose of this pilot study was to preoperatively assess stereoacuity using the synoptophore on children with a constant esotropia.

Methods: The medical records of esotropic children undergoing synoptophore evaluation at our institution from October 1, 2021, through September 30, 2023, were retrospectively reviewed. Preoperative stereoacuity assessments were performed at distance (Frisby David and Randot Stereo Test), near (Preschool Randot, Frisby, and Titmus), and with the synoptophore using the Braddick Random Dot Slides (range, 90 to 720 seconds) after neutralizing their subjective angle.

Results: Five children (mean age 9 years; range, 6.4 to 13.5) with a mean constant angle of esotropia of 26 PD (range, 16 to 40) were included. Three of the children demonstrated 180 seconds or better of preoperative stereoacuity using the synoptophore but 400 seconds or worse using the Randot stereo testing without the synoptophore. All 3 demonstrated normal alignment and 40 seconds of stereopsis following surgery. The two remaining children demonstrated 400 seconds or worse preoperative stereoacuity with the synoptophore and no improvement following successful surgery.

Conclusions: Preoperative stereoacuity assessment using the synoptophore successfully predicted the stereoacuity outcomes in 5 patients with constant esotropia. The use of the synoptophore in the preoperative assessment may be predictive for clinicians and families alike regarding the postoperative potential for binocular function.

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# Effect of Distance-Near Incomitance at Esotropia Surgery

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Introduction: To evaluate the effect of distance-near incomitance on surgical success, stereopsis and development of consecutive exotropia in patients with esotropia (ET) surgery.

Methods: Records of patients who had ET surgery were evaluated. Patients with similar distance and near deviation were grouped as group 1, patients with more than 10 prism diopter (PD) difference between distance and near deviation were grouped as group 2. Preoperative and postoperative refractive errors, distance and near deviations, binocularity, postoperative surgical success and improvement of binocularity were evaluated. Surgery was planned according to the amount of near deviation.

Results: There were 43 patients in group 1 and 16 patients in group 2. There was a statistically significant difference between groups in terms of distance deviation (Group 1: 39.23 PD, group 2: 27.56 PD) but not for near deviation (42.78 PD / 44.38 PD respectively). Mean spherical equivalent was statistically significantly higher in group 2 (Group 1: 1.38 D, group 2: 2.52 D). There was no difference for binocularity with W4D and stereopsis levels preoperatively. In the postoperative period, the distance and near deviation amounts were found to decrease significantly in both groups in comparison to the preoperative period and the surgical success rate was 65.1% for group 1 and 62.5% for group 2. However development of consecutive XT was higher in group 2 (Group 1: 11.6%, group 2: 25%). Improvement of fusion and stereopsis were found to be better in group 1.

Conclusions: Surgical success rates were similar in both groups regardless of the distance-near incomitance. However consecutive exotropia was higher in patients with distance-near incomitance and fusion and stereopsis were better in group 1. The amount of near deviation is accepted as having more importance in surgical decision however in cases with distance-near incomitance AC/A ratio should be considered and surgical numbers must be revised.

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# Spasm of the near reflex in a patient with chronic intestinal pseudo-obstruction

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Introduction

The aim is to question about the association between spasm of the near reflex (SNR) and chronic intestinal pseudo-obstruction (CIPO).

Case report

A 17-year-old woman, suffering from CIPO, was referred to our ER because of the recent onset of diplopia and blurry vision.

Her visual acuity (VA) was 20/30. Dynamic retinoscopy showed a variable refraction from -5.00 to -1.25 in the and from -3.00 to -0.75 in the OS, while after cycloplegic eyedrop instillation the refraction was +0.25 -1,25/170° RE and +0.75 -1/175° (T) LE. ERG and VEP, laboratory tests, neurological exams, CT brain and MRI brain did not show anomalies and a subsequent visit confirmed the retinoscopy findings.

A therapy with atropine drops was set and lenses for far vision and for near vision were prescribed.

At subsequent monthly follow-up visits, VA and refraction were fluctuating and she reported symptoms relief with drops and worsening without. Therefore, the eye therapy was stopped and patient was referred to the psychiatrist.

Discussion

Primary SNR generally affects young women with uncorrected hypermetropia and is often psychogenic in origin.

Our patient was a young woman with an inconstant pseudomyopia and clear stressfull triggers, so she appeared to have a primary SNR. Despite this, her systemic pathology raised the doubt of an organic pathogenesis.

The etiology of CIPO is unknown, but altered levels of acetylcholine, secreted by the myenteric plexus and increasing the tone and amplitude of pendular movements of the gut, due to low acetylcholinesterase activity and a reduction of ganglion cells, have been found in neurodegenerative intestinal hypoganglionosis.

Moreover, acetylcholine is responsible for accommodation and pupil constriction.

Conclusions

Excessive neurostimulation mediated by acethilcoline could be one of the mechanisms underlying both SNR and CIPO.

However, it remains unclear why symptoms were discontinuous and why only the intestinal and intrinsic ocular muscles were involved.

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# Treatment of Accommodative Spasm in Adulthood and Childhood

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Objective: To show the results in patients treated for accommodative spasms in childhood and adulthood.

Method: An ophthalmologic examination using a 1% cyclopentolate solution was completed in a case series that included 2 children and 3 adults. Each of them was diagnosed and treated with cyclopentolate 1% due to accommodative spasm. One of the adults had strabismus and another adult, with high anisometropia and latent hyperopia, manifested spasm after Lasik refractive surgery. Examination, treatment, and outcome data were collected in each case.

Results: Measurement of visual acuity with correction under cyclopentolate helped to confirm the diagnosis. One month after treatment with cyclopentolate, three of the patients recovered their visual acuity to 100%. In the case of the patient with accommodative spasm and strabismus, and in the patient with spasm after refractive surgery, the improvement in visual acuity was partial after the first month of treatment and improved thereafter.

Conclusions: The measurement of subjective refraction with 1% cyclopentolate helps in the diagnosis of accommodative spasm. Total correction of refraction and treatment with cyclopentolate 1% can be considered an alternative in the resolution of accommodative spasms. It is confirmed that patients with latent hyperopia may present an accommodative spasm after Lasik surgery. It is necessary to use cyclopentolate 1% for the measurement of refraction before the Lasik intervention, even in several previous controls. Confirming the diagnosis of accommodative spasm after refractive surgery with 1% cyclopnetolate allows us to avoid re-surgery.

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# Case of congenital nystagmus and diplopia in young adult operated for esotropia

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Introduction: Patient aged 30 years with consecutive exotropia, congenital nystagmus, amblyopia complained on permanent diplopia despite wearing full spectacle correction with prisms. Since birth he presented alternating esotropia, high hypermetropia (+6.5 Dptr), congenital manifest nystagmus. At age of 4 years esotropia corrected by recession of inferior oblique muscle and Faden-sutures on medial recti in both eyes. Few years later developed consecutive exotropia.

Methods:. Exotropia alternating -40 dptr, dominant left eye, lack of convergence in right eye. BCVA 0.3 in each eye. Full correction (+6.0) with added 7 prisms base-OUT both eyes for correction of unpleasant diplopia. To mention, prisms base-in were worsening diplopia in exotropia. Patient presented hypoplasia of maculas on OCT.

Treatment provided: - removal of Faden-sutures on medial recti in each eye.

Results: A week after surgery and for 18 months so far - ortoforia, improvement of convergence with no diplopia and blockage of nystagmus at near. Binocular VA 0.4. No prisms needed. Full spectacle correction well tolerated.

Conclusions: recovery of convergence allows  to avoid dyplopia and decrease nystagmus due to it’s blockage in adults with consecutive exotropia after Faden-sutures on medial recti performent in childhood.

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# The effect of Fresnel prism in small angle esotropia (?20 prism diopters) patients

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Purpose: To investigate the effects of Fresnel prism in patients of small angles of esotropia with less than 20 prism diopters (PD).

Methods: This retrospective study included 32 patients with a residual esotropia of ? 20 PD measured by the simultaneous prism and cover test (SPCT) after full hypermetropic correction. Fresnel prism was applied to make the patients orthotropic with glasses. The treatment was discontinued if (1) orthotropia was sustained during two consecutive follow-ups at two-month intervals, (2) the angle continued to increase with prism adaptation. Patients were divided into two groups (treatment success and the treatment failure group). The criteria for treatment success was defined on both motor and sensory aspects, with remaining esotropia < 8PD and a visual acuity (VA) gained more than 0.2 logMAR, respectively. Our goal was to investigate the factors that influence the treatment outcomes.

Results: The initial angle of esodeviation was 6.92 ± 4.66 PD at distance, and 10.53 ± 5.58 at near. The logMAR VA was 0.10 ± 0.13 in the dominant eye, and 0.26 ± 0.19 in the non-dominant eye. Among 32 patients, 17 patients showed motor success. Among 26 patients, 15 patients showed sensory success. The factors influencing motor success were the maximum PD of prescribed Fresnel prism, maximum angle of esodeviation at distance and near, and the frequency of Fresnel prism adaptation. Sensory success was influenced by the presence of anisometropia and the maximum prescribed amount of Fresnel prism.

Conclusions: The factors influencing motor success suggest that a deep-seated monofixation status can hinder motor success following the removal of Fresnel prism. Considering the factors influencing sensory results, it can be inferred that challenges in visual improvement arise from a combination of abnormal binocular interaction due to strabismus and vision deprivation caused by anisometropia.

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**Session: Poster session A**

# Acquired distant esotropia in adult myopic patients

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Introduction: We present a series of adult myopic patients with acquired distant esotropia.

Patients and methods: All six patients experienced a gradually emerging distant double vision over a few years, without any neurological problems. Four are female and two male with a mean age of 43 years (31-62). Their mean myopic refraction is -3.5 D (-2.5 to -5.57 D) and four of them constantly wear contact lenses. The mean distant esotropic deviation is 28 prism dioptres (18 to 80 PD). The follow up period is between two and twelve years.

Results: Five patients used integrated in the glasses or Fresnel prisms to relieve diplopia. Four of them underwent an operation (left eye recess/resection procedure). One is still wearing prisms. Diplopia returned to one of the operated patient, eleven years after surgery, and was compensated with prisms.

Conclusions: A myopic patient accommodates and converges much more with contact lenses than with glasses. Combined with near work this might be a predisposing factor for slowly progressing distant esotropia.

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# Diagnosis of Fourth Nerve Palsy and Sagging Eye Syndrome in the Elderly

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Objective : Faced with vertical deviation (VD) in elderly individuals, Sagging Eye Syndrome (SES) and Fourth Nerve Palsy are the two most common diagnoses, sometimes challenging to differentiate. We aim to highlight elements of the clinical examination that help specify the diagnosis.

Patients and Methods : Two elderly patients with similar complaints of vertical diplopiawere examined using the Harms tangent screen. One was diagnosed with Fourth Nerve Palsy, and the other with SES.

Results : Examination of Fourth Nerve Palsy reveals a VD that increases in adduction ofthe hypertropic eye, with a positive Bielchowski test. The deviation pattern is typical, with incomitant VD, increased excyclotorsion in infraversion, and more significantdiplopia in lateral gaze. In SES, a nearly concomitant VD is observed with slightexcyclotorsion, but
a negative or reversed Bielchowski test. Motor analysis reveals limitedelevation and binocular single vision field with increased

Conclusion : Simple oculomotor examination is limited in differentiating between SES and Fourth Nerve Palsy in the elderly. Studying torsion and verticality in all gaze directions and binocular vision field helps identify differential signs. The Harms tangent screenenables these measurements to be conducted simultaneously.

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# Conservative treatment of Esotropia associated with eyelid and orbital hemangioma

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Background: Hemangiomas are the most common benign tumor of infancy. Most hemangiomas remain asymptomatic and can be managed by close observation. Large facial hemangiomas can have associated central nervous system malformations,abnormal arteries, especially those of the central nervous system, coarctation of the aorta, cardiac defects, and unusual ophthalmologic abnormalities can also occur.

Observations: We describe a child with large congenital hemangiomas of the face affecting the left eye, orbit and eyelid and structural arterial abnormalities of the left orbit. The child was properly monitored. Digital subtraction angiography was performed. After emergency excision of intracranial arteriovenous malformation, postoperative esotropia occurs. We approach the conservative method of treating esotropia with limited abduction of the left eye. In three months of treatment, we managed to bring the deviation angle of 30 prism diopters back into the ortho position.

Conclusion: A large congenital hemangioma required a multidisciplinary approach involving early vascular embolization of feeder vessels and subsequent surgical resection. Conservative treatment options for esotropia include observation, occlusion, optics, orthoptic exercises, and prisms. Their eye condition should be monitored when treatment is started, and therapy should be changed if necessary. The success of therapy is largely based on appropriate patient selection and compliance level.

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# What Affects The Deviation Change After Anesthesia Induction in Esotropia Patients?: Its Correlation with Age and The Surgical Success

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INTRODUCTION AND PURPOSE: To compare the esotropia (ET) deviation measurements before and after anesthesia induction with a smartphone application and to evaluate the results of strabismus surgery after six months.

METHOD: The files of the patients who were operated and documented with photographs at Marmara University, Pediatric Ophthalmology and Strabismus Unit between 2020 and 2023 were retrospectively scanned. Twenty-five patients with appropriate documentation were included. Refractions, best-corrected visual acuity (BCVA) and ophthalmological examinations were noted. The deviations were measured with prisms and also by photography-based smartphone application, preoperatively, after anesthesia induction and postoperatively.

RESULTS: The study included 25 patients (13 girls,12 boys) whose mean age was 5.14 years (range 0.5-17 years). Eight patients had infantile ET, 17 had partially refractive accommodative ET. BCVA measured in patients who could express themselves were 0.6 and 0.7 (snellen), in right and left eye, respectively. Bimedial rectus recession was performed in 24 patients; lateral rectus resection and medial rectus recession was performed in one patient. The mean preoperative deviation at near and far were 43.6±12.5PD and 42.8±13.5PD, respectively. After anesthesia induction, the mean deviation was 5.1±17.0PD. The mean deviation change after anesthesia induction was 38.5±21.7PD. The deviation change was inversely correlated with the patient age($p<0.004$; $r=0.6$). After six months, the mean deviation at near and distance were 7.2±9.9PD. The deviation change after anesthesia induction did not affect the surgical success rate.($p>0.05$)

CONCLUSION: In this study, the deviation change after anesthesia induction in ET patients was found to be inversely correlated with the patient age. Meanwhile, the surgical success rate was not related to this deviation change after anesthesia induction.

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# Strabismus surgery in high myopia: Is conventional horizontal surgery still a viable option?

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Introduction: Strabismus in high myopia is often associated with a displacement of the extraocular muscles (EOM) by the elongated eye. Recent reports on strabismus surgery in high myopia suggest realignment of the EOM into their path by loop myopexy or transposition surgery, connecting horizontal and vertical EOM in order to avoid a posterior scleral fixation suture which carries an increased risk of scleral perforation in these long eyes with a thin sclera. The dose effect of these surgeries however appear less predictable than those previously reported for conventional horizontal strabismus surgery. Here we report the outcome of recess and/or resection or plication surgery for horizontal strabismus in myopia with or without posterior myopexy.

Methods: Retrospective chart review of patients that underwent surgery of strabismus associated with high myopia.

Results: 12 patients (5m, 7F) with a mean spherical equivalent of – 8.1 dpt (range up to -16.75) were analyzed. Six patients had been corrected for esotropia and 6 for exotropia. To summarize results, exotropic angles were converted to positive angles and thus the mean angle of deviation, measured with the alternate prism cover test was 30.6 prism diopters (PD) (SD: 16.9) at distance and 34 PD (SD:19.1) at near. Postoperatively no patient had a manifest angle 3 months post operatively. The mean dose effect at that time point was 2.9 PD/mm surgery at distance and 3.3 PD/mm surgery at near. A deviation of the muscle path was seen in 2 patients, which resulted in an additional posterior scleral fixation suture. In these 2 patients the DE was 3 PD/mm surgery at distance and at near. There were no complications such as scleral perforations.

Conclusion: In agreement with previous reports, our data confirm that conventional horizontal EOM surgery with or without posterior fixation remains a valuable option to treat strabismus in high myopia with a low risk and excellent predictability.

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# Surgical treatment outcomes in heavy eye syndrome - a case series

**Alexandre REIS DA SILVA**[1], Ágata MOTA[1], José Alberto LEMOS[1], Isabel RIBEIRO[1], Renato CORREIA BARBOSA[1], Ana Rita VIANA[1], Catarina FRANCISCO[1], Isabel FERREIRA[1], Jorge BREDA[2]

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## Introduction

This study presents the effectiveness of a surgical intervention for heavy eye syndrome, an infrequent condition associated with high myopia. Heavy eye syndrome is characterized by a progressive, large-angle esotropia and hypotropia, leading to limited abduction and supraduction of the affected eye.

## Methods

Conducted at Unidade Local de Saúde de Matosinhos, Portugal, between 2017 and 2021, this retrospective study includes five patients diagnosed with heavy eye syndrome. The comprehensive dataset collected for each patient includes demographic information, clinical parameters, and detailed orthoptic evaluations, along with MRI imaging for visualizing orbital anatomy. The surgical procedure involved partial splitting and scleral fixation of the superior rectus (SR) and lateral rectus (LR) muscles, with retroequatorial myopexy of the medial rectus (MR) muscle in cases of abduction restriction.

## Results

The study cohort consisted of five patients with unilateral high axial myopia and classic heavy eye syndrome features, including large-angle esotropia, hypotropia, and restricted eye movement. MRI imaging revealed superotemporal globe prolapse, with a mean angle of dislocation of 135.7 degrees, contributing to limited eye movement. After surgery, all patients showed significant improvements in vertical and horizontal deviations, addressing primary clinical manifestations. Photographic documentation confirmed substantial improvements in ocular alignment.

## Conclusions

In managing heavy eye syndrome associated with high myopia, various surgical approaches have been explored with mixed results. This study's technique of partial muscle splitting, scleral fixation, and MR retroequatorial myopexy offers a promising approach to address this challenging condition effectively. These findings suggest that this surgical technique is a safe and effective option for managing heavy eye syndrome, providing cosmetic and functional improvements to affected individuals.

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# Lateral Rectus Superior Plication for Esotropia associated with high myopia in two children

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**Introduction:** Surgical treatment of esotropia (ET) associated with high myopia has been a challenge for many years, since conventional recession or resection procedures of the horizontal rectus muscles often have disappointing results. We describe two cases of children with ET associated with high myopia treated with a superior plication of the lateral rectus muscle (LRM) described by Yair Morad (World Society of Paediatric Ophthalmology and Strabismus subspeciality day 2023).

**Methods:** In this technique, using a 6-0 vicryl™ suture, the superior half of the LRM is secured 4 mm posterior to its insertion. The same suture is then passed through the sclera, 2 mm anterior and 2 mm superior to the insertion of the LRM. Patients were selected if high myopia was confirmed (cycloplegic refraction sphere < -6.00 diopters and axial length > 25 mm) and presented an ET > 14 prism diopter (PD) with no vertical deviation.

**Results:** The first case refers to a 11-year-old girl with myopia of -9.75 diopters (D) OD and -10.75 D OS and with an axial length of 26.53 mm OD and 26.36 mm OS. The patient was previously submitted to a medial rectus recess OU of 5.5 mm with no improvement of the deviation. Preoperative ET was of 25 PD for far and 18 PD for near. Three months after surgery, ET was 12 PD for far and near. The second patient is a 12-year-old girl with myopia of -8.50 D OD and -7.00 D OS and with an axial length of 26.51mm OD and 25.97 mm OS. The patient had no previous surgeries. Preoperative ET was of 40 PD for far and near. Along with the technique here described, the patient was also submitted to a hangback recess of the medial rectus OU of 5 mm. This patient is still in the early postoperative period and deviation has not yet been measured.

**Conclusion:** This novel surgical technique may be a new treatment option for ET associated with high myopia and no vertical deviation.

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# Effects of Bilateral Balanced Medial and Lateral Wall Decompression on the Development of Diplopia: Assessment of Sphenoid Trigon, Medial Wall Length, and Muscle Thickness

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Objective: This study aims to assess the relationship between exophthalmometry values, four rectus muscles thickness (TRT) in addition to the excised sphenoid trigone area (STA) and medial wall length during bilateral balanced orbital decompression surgery and the development of new-onset diplopia in the postoperative period.

Methods: Thirty-eight eyes of 19 patients who underwent bilateral medial and lateral wall decompression were included in this prospective study. Preoperative exophthalmometry, STA, and TRT values were measured. At the postoperative 3rd month, the length of the excised medial wall's longest part (EMD), changes in rectus muscle thickness, and exophthalmometry results were measured using orbital computed tomography. The impact of these parameters on the development of postoperative new-onset diplopia was investigated.

Results: The mean age of all patients was 44.03±12.23 years, with a female-to-male ratio of 11/8 (57.9%). A significant decrease in preoperative STA (63.58±45.65 mm2) to postoperative 3rd month (38.27±25.92 mm2) was observed ($p<0.001$). There was a significant decrease in Hertel values (24.13±2.02 mm and 19.98±2.09 mm, $p<0.001$). Horizontal diplopia was observed in 4 patients (21.1%) in the early period, and at the 3rd month, it persisted in 3 patients (15.8%) (25, 25, and 30 prism diopter). The total preoperative TRT significantly decreased at postoperative 3 months (24.11±6.12 mm and 23.01±5.59 mm, $p=0.001$, mean difference: 1.09±1.55 mm). Persistent diplopia development correlated with male gender ($r=0.344$, $p=0.34$) and postoperatively measured total TRT ($r=0.479$, $p=0.007$).

Discussion: In this study, a significant reduction in exophthalmometry and rectus muscle thickness values was observed with bilateral balanced medial and lateral wall decompression surgery, while persistent postoperative diplopia was shown to be associated with male gender and postoperative muscle thickness.

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**Session: Poster session A**

# A new approach to muscle lengthening surgery in vertical strabismus due to thyroid ophthalmopathy.

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**Introduction:** Our aim in this study is to introduce the new application technique developed by us for muscle lengthening operation with tutopatch, which is used for larger muscle weakening in thyroid-related vertical strabismus, and to evaluate the long-term results.

**Method:** The files of 9 patients with serious superior gaze limitation and very large vertical hypotropia due to thyroid ophthalmopathy, who were operated on by the same surgeon, were evaluated retrospectively. Vertical deviation amount was evaluated in the primary position. Full upward gaze was considered as 0 and failure to reach the midline was considered as -5, for vertical gaze limitation evaluation, Lid retraction was evaluated according to the amount of scleral show between the lower lid edge and the inferior margine of the limbus, counting every 0.5 mm as (+)..Post operative evaluations was taken from the patients' first year follow-up.

Operation technique: In the operation, the pericardium is placed between the distal part of the muscle tendon and the beginning of the muscle fibers, as much as the planned amount of recession.

**Results:** The patients were between 35-62 years old and 5 were men and 4 were women. Preoperatively,their deviation amount was between 14-30 prism diopter (pd) and except for two all had -4 and more upward gaze limitation Postoperatively, these values was found as 0-4 pd vertical deviation in primary position and 0-(-2) vertical gaze restriction. There were no noticeabe lower lid retraction in any of our cases.

**Conclusion:** Based on the results we obtained from this small series, we concluded that the new application is safe and effective method with permanent results in thyroid-related vertical deviations.

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**Session: Poster session A**

# Surgical outcomes and quality of life in patients with Thyroid Associated Orbitopathy after strabismus surgery

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INTRODUCTION

To report the long-term surgical outcomes and the impact on daily life activities of strabismus surgery in patients with Thyroid Associated Orbitopathy (TAO).

METHODS

Patients who underwent strabismus surgery for TAO were retrospectively reviewed. The primary outcome was to evaluate the influence of orbital decompression on the outcomes of TAO related strabismus surgery. Surgical success was defined by the resolution of diplopia and a post-operative deviation <10 prism diopters (PD). The secondary outcomes were the clinical features, surgical approaches, and impact on daily life activities.

RESULTS

A total of 45 patients were included in the study: 21 patients (46.7%) in the decompression surgery group (DS), and 24 (53.3%) in the non-decompression surgery group (NDS).

The mean follow-up time was 2,8 years (range 8 – 200 months).

Successful surgical outcome was achieved in 57,1% in the DS, and 75% in the NDS (p=0,226).

DS patients required almost twice the number of surgical interventions for strabismus compared to the NDS (1,95 vs 1,16; p=0,006), and a higher number of extraocular muscles recessed (2,67 vs 1,08;

Moreover, 21,8% of NDS patients used prism lenses in daily life activities, compared to 42.9% of patients that used prism lenses to reduce the impairment in their daily life activities (p=0.016).

CONCLUSIONS

DS patients required almost twice the number of strabismus surgical procedures, a higher number of extraocular muscles recessed, and an increased need for prism lenses to correct the residual deviation compared to the NDS, but with similar long-term surgical outcomes.

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**Session: Poster session A**

# Surgical correlation proposal adapted for patients with graves orbitopathy submitted to strabismus surgery

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Introduction: Graves' orbitopathy (GO) is a multifaceted disease, whose pathogenesis is not fully understood. Predicting results for strabismus surgery is challenging when conventional tables are used. The literature is scarce and there is no consensus on the techniques used.

Objectives: To verify a correlation between the deviation in prism diopters (PD) before and after surgery, on the first day and 6 months postoperatively and for each extraocular muscle (EOM).

Methods: This is an observational, retrospective study of patients diagnosed with GO submitted to strabismus surgery from 1990 to 2021 at a public university strabismus setting (P1) and in a strabismus sector from a private hospital (P2).

Results: 28 patients were included in the present study, 18 from P1 with ages between 24.0 - 86.0 yo (mean: 50.9 ± 13.0), and 10 from P2 aged 30.0 – 53.0 yo (mean: 43.8 ± 7.6). 66.7% were female and 33.3% male in P1, and 80% were female and 20% male in P2. The average of the medial rectus (RM) recess in the first surgery was 6.0 ± 6.8mm, of the lateral rectus (RL), was 0.5 ± 1.9mm, of the inferior rectus (RI) was 7.3 ± 3.6mm and of the superior rectus (RS) was 0.4 ± 1.5mm.

Statistically significant correlations ($p < 0.05$) were observed between mm of surgery for the medial rectus and the magnitude of the deviation in PD before and after the first surgical approach, on the first-day postop and 6 months postoperatively. In both situations, the correlation occurred directly ($r > 0$).

A measure that quantifies the accuracy and model quality of a linear regression is the Coefficient of Determination (R2). An R2 of 62.0% was observed. No statistically significant correlation (p ? 0.05) was observed in the study of the other EOM

Conclusions:

There was a correlation between the amount of strabismus surgery on the medial rectus in mm and the magnitude of the deviation in patients with GO. We could not find a correlation between the amount of surgery performed for other EOMs.

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**Session: Poster session A**

# Study on visual acuity and stereopsis, comparated between non surgical specialities residents vs surgical specialities residents. Analyzing outcomes

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Introduction: Visual acuity (VA) is the ability of the vision system to perceive, detect or identify special objects

Stereopsis (St) is the function of the visual system that allows the three-dimensionality of a visual scene to be distinguished with high precision from a disparity.

Methods: A non-experimental, descriptive, observational, cross-sectional study design.

80 residents were included and evaluated by the same person, under optimal conditions, in the same room examination, of which 39 are women and 41 are men, of the 80 residents there are 43 studying a surgical specialty and 37 studying a non-surgical specialty.

It was defined as normal VA: equal or less than 0 on logmar scale, good VA equal or less than .2 on logmar scale and regular VA equal or greater than .3 on logmar scale

Stereopsis: was defined as normal St equal or less than 40 seconds of arc (SoA), regular St a value between 60 to 80 SoA and gross St: a value equal or greater than 100 SoA.

Results:

We are still analyzing the information but here we have some preliminary results.

VA outcomes

Right eye: 71.25% of the persons included in this study has a normal VA result, 23.75% has a good VA and 5% has a regular VA.

Left eye: 71.25% of the persons included in this study has a normal VA result, 21.25% has a good VA and 7.5% has a regular VA.

St outcomes

63.75% of the persons included in this study have normal St,31.25% has a regular St and 5% has gross St.

Conclusions

We will finish analyzing the information in a time lapse less than 30 days, we have some preliminary conclusions regardless the outcomes.

We believe were going to find a statistic difference about VA and St being better in the surgical residents group.

The measurement of VA is necessary to assess the state of eye health, which is reflected in the general labor law in


article 514 (Mexican law).

Resident doctors and future specialists have a great dependence on their visual system to be able to train with solid theoretical and practical bases.

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**Session: Poster session B**

# Think of surgery in age-related distance esotropia patients

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## INTRODUCTION

Age-related distance esotropia (ARDE) is the commonest cause of diplopia in elderly patients, an acquired, small and disabling distance esotropia that occurs in people over 70 years old. The purpose of this study is to report the results of a series of patients with ARDE who underwent lateral rectus surgery.

## METHODS

We retrospectively reviewed the medical records of 44 patients diagnosed with ARDE between 2013 and 2023. Clinical characteristics and results of surgery during follow up were analyzed.

## RESULTS

A total of 44 patients met the inclusion criteria for ARDE. The median age at diagnosis was 80 years. The amount of distance deviation was 7,70 ± 3,07?. Strabismus surgery under local anesthesia was performed in 23 patients. Mean distance pre-operative esotropia in this group was 8,78 ± 1,97?. Lateral rectus resection in 21 and lateral rectus plication in 2 patients were performed. Mean post-operative distance deviation immediate and after 1,65 ± 0,98? years of follow up was 0,57 ± 1,5? with elimination of diplopia in all the patients. No overcorrections were found.

## CONCLUSIONS

The surgery in this group improves the quality of life by the elimination of diplopia  with a simple, safe and long-lasting strategy.

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# Clinical Characteristics of Intermittent Exotropia in 5,385 Koreans by Age at Presentation: The Korean Intermittent Exotropia Multicenter Study

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**Introduction:** The Korean Intermittent Exotropia Multicenter Study (KIEMS) is a nationwide cross-sectional multicenter study of intermittent exotropia (IXT) involving 65 ophthalmologists from 53 institutions in South Korea. We investigated the clinical characteristics of IXT patients in KIEMS by age.

**Methods:** Total 5385 patients with IXT ? 8 PD at distance or near fixation were included between Mar 2019 and Feb 2020. Participants were grouped by age at presentation: Group 1 (G1: 0?age<3 years), Group 2 (G2: 3?age<10 years), Group 3 (G3: 10?age<19 years), and Group 4 (G4: age?19 years). Gender, deviation angles, IXT type, oblique muscle function, binocular sensory outcome and cycloplegic refraction were compared among age groups.

**Results:** Proportions of females were higher in younger groups (G1: 62.6%, G2: 52.8%), while lower in older groups (G3: 41.5%, G4: 45.9%). Disease duration was significantly different among groups ($p<0.001$ by ANOVA), with the shortest in G1 (0.72 ± 0.75 year) and the longest in G4 (9.37 ± 11.67 years). Deviation angles decreased after age 1, started to increase during school age, and was largest in G4.

Basic type was the most common type in all age groups, with divergence excess type more frequent in G1 (8.1%) and convergence insufficiency type more common in G3 (19.8%) and G4 (14.8%). Cycloplegic refraction was in hyperopic side in G1, whereas in myopic side in G3 and G4. Oblique dysfunction was least frequent in G1 (17.4%) and most frequent in G4 (34.5%). While good stereopsis was less common in G1 (23.2%) and G4 (35.6%) than in G3 (47.9%) and G4 (51.1%), differences among age groups were not significant ($p=0.416$ by Chi-square test).

**Conclusions:** In this Korean IXT study, the oldest age group demonstrated the longest IXT duration and the largest deviation angles, and on the contrary to younger groups under 10 years of age, exhibited myopic refraction, a higher proportion of males, convergence insufficiency type, and oblique dysfunction.

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# Comparison of the surgical outcomes between Primary and Recurrent Intermittent Exotropia of 20 Prism Diopters

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Introduction:

To compare the characteristics and postoperative surgical outcomes for primary and recurrent 20 prism diopters (PD) intermittent exotropia

Method:

We retrospectively analyzed the medical records of 20PD intermittent exotropia patient who corrective surgery from Jan 2016 to Dec 2022. And divided into two groups, the primary 20PD group(Group A) maintained good alignment after primary surgery and the recurrent 20PD group(Group B) underwent secondary surgery for recurrence after an initial operation until at least postoperative 3 year in both groups. We evaluated VA, cycloplegic refraction, Titmus or Worth 4-dot test, and prism alternate cover testing were performed pre- and at POD 1 day, 1 wk, 1 mo, 3 mos, 6 mos, 1 yr, 2 yrs, and 3 yrs. Surgical success was defined as ocular deviation within 5PD of esotropia or up to 8PD of exotropia .

Results:

Total 103 patients were enrolled ( Group A: 80 , Group : 23). The success rates at 1, 2, and 3 yrs postoperatively were 72.5%, 78.8%, and 70.0% for Group A and 69.5%, 56.5%, and 52.7% for Group B, respectively. The immediate postop. correction effect per recession unit (PD/mm)was statistically higher in Group B than Group A (2.6 ± 0.7 PD, 2.2 ± 0.6 PD.$p<0.05$) at POD7day. The average overcorrection amount of the final successful group in each group at POD 1mo was -3.2 -2.6 PD, while in the failure group was +1.0,+0.9PD.

Conclusion:

Even with the same amount of exodeviation, the postoperatively outcome for primary and recurrent 20PD inermittent exotropia is different. in the recurrent 20PD intermittent exotropia group, the surgical success outcome was poorer and the immediate postop. correction effect PD/mm per recession was higher than primary. However, both groups showed a similar tendency for recurrence when rapid exodrift occurred 1mo after surgery.

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# Concurrent recessions of lateral and medial rectus for prevention of consecutive esotropia in intermittent exotropia

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## Introduction

If consecutive esotropia (CET) occurs after intermittent exotropia (IX(T)) surgery, it raises concerns among patients and their parents due to tenacious esodeviation and diplopia. We performed concurrent recessions of lateral rectus (LR) and medial rectus (MR) muscle in intermittent exotropia and aimed to observe the preventive effect against consecutive esotropia (CET).

## Methods

Total 30 patients were included in this study. Group A (n=13) underwent concurrent LR and MR recessions for IX(T) and group B (n=17) underwent secondary MR recession for CET that occurred after bilateral LR recessions or unilateral LR recession with MR resection for IX(T). In group A, 3 to 5 mm of MR recession was performed with LR recession after confirming strong tension of MR by forced duction test and spring-back balance test during IX(T) surgery. All patients were followed up more than a year (12-96 months) after surgery to analyze the development of CET and the recurrence of IX(T).

## Results

There were no significant differences in sex ratio, age at IX(T) surgery, and preoperative exotropia angle between two groups($P>0.05$). The deviation angles for groups A and B(after IX(T) surgery) were -2.15?, +4.83? at 1 month, -2.50?, +13.69? at 6 months, -3.45?, +19.31? at 1 year, -7.20?, +17.63? at 2 years, and -5.33?, +23.25? at 3 years, respectively, indicating a significant difference in the occurrence of esotropia($p<0.05$). CET was developed in only 1 patient of group A. After correction of CET in group B, there was no significant difference in tendency for IX(T) recurrence between two groups($p>0.05$).

## Conclusions

When CET development is expected due to strong tension of the MR, concurrent recessions of the LR and MR demonstrated to effectively prevent CET while reducing the number of surgeries.

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# Intermittent Exotropia following Accommodative Esotropia

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## Introduction

Uncorrected hyperopia may result in accommodative esotropia (AET) by increasing the accommodative effort coupled with accommodative convergence. Accommodative esotropia is frequently linked to an elevated accommodative convergence to accommodation (AC/A) ratio.

Intermittent exotropia (IXT) is characterized by a gradual and progressive outward deviation of either eye. Typically, the measured deviation tends to be more pronounced at a distance. Subsequent exotropia is observed in 5 to 20 percent of patients who initially present with fully AET. We report the clinical characteristics of AET convert to IXT after wearing spectacles.

## Methods

Patients diagnosed with AET were reviewed from January 1988 to December, 2023. Age at initial examination and final examination, gender, amount of ocular deviation in prism diopters, best corrected visual acuity, cycloplegic refraction, time to achieved orthophoria, time to convert to exotropia, and stereoacuity were collected.

## Results

Twenty children were enrolled in our study, with a mean age of 2.82 at the initial visit and 9.21 at the final visit. Refractive errors ranged from +2.5 to +11.0 diopters. Initially, all participants exhibited esodeviation, which resolved to orthophoria after wearing glasses for an average of 1.23 years. However, exodeviation manifested at a mean age of 5.72. Among them, 6 cases presented with exodeviation ranging from 15 to 25 prism diopters (PD). 7 cases exhibited exodeviation exceeding 30 PD, with four of them undergoing strabismus surgery, resulting in the restoration of proper alignment. Although most participants demonstrated good visual acuity, stereoacuity was poor except four cases.

## Conclusion

Early correction with spectacles in AET patients can restore ocular alignment and visual acuity. With spectacle correction, intermittent exotropia might reveal due to decrease of accommodative demand. Strabismus surgery for esotropia should not be performed without full correction of hypermetropia.


**Session: Poster session B**

# Spontaneous Consecutive Exotropia

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Introduction: Consecutive exotropia usually occurs following previous surgery for esotropia. Spontaneous drift from esotropia to exotropia (in the absence of surgery or botulinum toxin treatment) may develop.

Methods: This is an observational review of 32 patients, with different types of esotropia, who developed a spontaneous exotropic shift. They were identified by daily practice between 2019-2023. We looked at the cycloplegic refraction, type of esotropia, the presence of amblyopia at the time of the exoshift, history of occlusion, presence of dissociated vertical deviation and primary inferior oblique overaction, presence of binocular vision, age of the exoshift, medical history, and the amount of exodeviation.

Results: In spontaneous consecutive exotropia following accommodative esotropia patients were well managed by reducing the amount of optical correction. The presence of moderate or severe amblyopia at the time of the exotropia onset precipitates the angle of deviation and the need for surgery. The presence of dissociated vertical deviation and primary inferior oblique overaction was associated with a larger angle of deviation. Associated delay in neurological development may increase the risk for spontaneous consecutive exotropia. Spontaneous consecutive exotropia developed even in cases with good binocularity. Mean age of exotropia onset was around 7.

Conclusion: Spontaneous exotropia occurs in both accommodative and nonaccommodative esotropia. Long term close follow -up is required even in patients with good alignment and recovered amblyopia. The variability of this condition is high and possible predictive factors are difficult to point out.

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# Evaluation of accommodative amplitude in patients with consecutive exotropia

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Bacground: We aimed to investigate the amplitude of accommodation as as risk factor in patients with consecutive exotropia.

Methods: We retrospectively scanned the files of patients who underwent surgery due to esotropia, between January 2009 and December 2023. Patients with at least six months of postoperative follow-up were included in the study. All patients underwent detailed eye examinations, and accommodation amplitudes and pupil sizes were measured using an objective method, Tonoref III (NIDEK Co., Ltd.). Children under the age of six and those unable to cooperate were excluded.Thirteen cases who developed consecutive exotropia after esotropia surgery (XT Group) and 17 cases who did not (ET Group) were included in the study. The data obtained were compared between the two groups.

Results: The mean amplitude of accommodation was 3.58 ±2.45 D and 4.05±2.70 D in the XT Group, 3.88±2.70 D and 3.57± 2.19 D in the ET Group, in the right and the left eyes, respectively.The difference between the groups was not statistically different (p:0.79 and 0.59 right and the left eyes, respectively). No history of prematurity was detected in the control group, while prematurity was detected in 4 patients in the XT group (p:0.026). There was convergence insufficiency in 4 cases in the XT group but not in the control group (p<0.005). Strong fixation preference was more common in the XT Group (p:0.026).

Conclusion: The amplitude of accommodation measured by a new tool (Tonoref III) was not statistically different in patients who developed consecutive exotropia.

Key words: Accommodation amplitude, consecutive exotropia, esotropia surgery

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# Surgical Management of Consecutive Exotropia: A Retrospective Analysis of Patient Outcomes

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Objective: The aim of this study is to evaluate characteristics of consecutive exotropia(XT) patients in our clinics and to analyse our surgery outcomes.

Methods: Sixty-two eyes of 31 patients with consecutive XT who underwent previous strabismus surgeries were included in this retrospective study. Comprehensive ophthalmic examinations with refractive error after cycloplegia, convergence, and deviation angles were noted before and after surgery.

Results: The mean age of all patients was 19.71±12.40 years, with a female-to-male ratio of 21/10 (68%). Nineteen of these patients had operation for consecutive XT(61%). Mean preoperative deviation angles at near and far were 31.30±10.70 and 32.50±10.20 PD, respectively. Of the patients who had operation for XT, 84% had convergence weakness. Bilateral or unilateral lateral rectus (LR) recession was performed in 5(26%) patients. Meanwhile, 2(11%) patients had medial rectus(MR) advancement; 2(11%) had MR advancement with additional resection; 3(16%) had MR advancement with resection + LR botulinum toxin injection; 6(31%) had MR advancement with resection + LR recession and 2(11%) had LR recession with Y split procedure. Mean postoperative deviation was -2.92±5.57 PD after one year ($p<0.05$). Four patients had more that one procedures for XT. The surgical success rate was 84% (n=16)(postoperative deviation of <10PD).No serious complications were noted.

Conclusion: Consecutive XT might be addressed wih various surgical procedures. The surgical success rate after 1 year in our sample of patients was 84%.

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# Botulinum Toxin Treatment of Consecutive Exotropia

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Introduction: To assess the efficacy of botulinum toxin type A (BTA) injection as a re-treatment procedure in patients with consecutive exotropia.

Methods: The medical records of 34 patients who underwent BTA injection for consecutive exotropia were retrospectively reviewed. 5 units of BTA was applied to the unilateral lateral rectus muscle and the injection was administered under electromyography guidance. Successful motor alignment was defined as far deviation within 10 PD.

Results: A total of 34 patients were included in the study. Twenty six patients (76.5%) had acquired esotropia, 8 patients (23.5%) had infantile esotropia. The average age of the patients was 18.3±22.6 months. The mean time elapsed between the last surgery and botulinum toxin injection 67.8±78 months (range 0.3 to 252 months). The mean pre-BTA injection deviation was 20.03±8.42 PD at near and 21.41±8.87 PD at distance. The post-BTA injection deviation was 9.65±7.42 PD at near and 10.82±7.33 PD at distance. All the patients were followed up with 19.8±20 months (range 6 to 84 months). The average number of injections was 1.6±1.1. Of 34 patients, 22 (64.7%)had only one injection and 12 (35.3%) had multiple injections. In patients with single injection, successful alignment was achieved in 16 patients (72.7%). Final success rate was 70.6 %. Of 34 injections of botulinum toxin, in two patients transient mild ptosis and in one patient transient diplopia were observed.

Conclusion: The results of this study demonstrates that BTA injection can be an effective, safe treatment option in consecutive exotropia.

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# Surgical techniques and their outcomes in the treatment of congenital or acquired superior oblique muscle palsy

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Introduction:Paralysis of the superior oblique muscle is the most frequent cause of vertical strabismus and the most frequent form of oculomotor paralysis seen in children. The condition is most often congenital but can also be acquired. In certain severe cases, surgery should be proposed.

Objectives:Describe the characteristics of patients who have undergone surgery for superior oblique palsy. Describe the most commonly performed surgical interventions with their outcomes.Methods: Data from 45 patients who have undergone a first surgery for superior oblique palsy between 2010 and 2022 was collected. The procedures were performed at the University Hospital of Bordeaux or the University Hospital of Tours. Data was collected during the last preoperative consultation and six months post-surgery.

Results: Inferior oblique recession was the chosen procedure in 41% of cases. The average inferior oblique recession was 8,2mm. 27% of patients had inferior oblique recession and superior oblique tuck. The average vertical deviation in distance vision before surgery was 13,5 diopters. The average vertical deviation in distance vision after surgery was 4,75 diopters. Preoperatively, 88% of patients had torticollis, 70% of patients had notable excyclotorsion, 53% suffered from diplopia and 23% had prismation.These percentages were respectively reduced to 50%, 38%, 17% and 14% after the first surgery. 69% of patients reported being satisfied after a first surgery.

Conclusion: Recession of the inferior oblique muscle is the most commonly used surgical procedure. One-third of patients undergo a combined procedure involving both the inferior and superior oblique muscles. Following the initial surgery, vertical deviation is reduced by 70 percent from the first measurement. A significant improvement in symptoms (torticollis, diplopia, excyclotorsion) is observed postoperatively and results are predominantly satisfactory from the patient's perspective.

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# The results of anterior transposition of the inferior oblique: anterior fibres sutured to sclera versus anterior and posterior fibers separately sutured to sclera technique

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Purpose: To evaluate the results of two techniques of inferior oblique anterior transposition (IOAT) in patients with DVD.

Methods and results: 193 patients, age between 6 months and 30 years, follow-up 19-225 months.

Group 1: 122 patients, mean follow 63, 4 up months.

Only the anterior fibers of the inferior oblique (IO) were placed at the temporal corner of the inferior rectus (IR) insertion. The mean DVD reduction was 7, 36 PD. 15/122 patients (18, 3%) developed antielevation syndrome (AES) in 19-70 months after surgery.

Group 2: 61 patients, 36 with esotropia, 12 patients with exotropia, mean follow-up 23, 07 months. The anterior and posterior fibers were separately sutured to sclera, posterior fibers 3 mm posterior. 7/47 patients developed AES in 10-51 months after surgery.

Group 2 A: IO was sutured at the IR insertion: 24 patients, esotropia, DVD, inferior oblique overaction (IOOA), mean reduction 7, 4 PD, but 5 patients developed AHS in 18 - 51 months after surgery.

Group 2 B: 2 mm posterior the IR insertion: 25 patients, esotropia, DVD and IOOA, mean reduction 5,6 PD, only 2 patients developed AHS after 21 months.

Group 2 C: 8 patients, esotropia, DVD, no IOOA, mean reduction 2, 5 PD, one AES.

Group 2 D: 4 patients, exotropia, DVD, IOOA mean reduction 4, 75 PD

Group 3: 10 patients with esotropia, asymmetrical DVD or IOOA, mean follow up 8,50 months, treated by asymmetrical IOAT; mean DVD reduction was 7,60 PD, no AES.

DVD reduction in group 1 is close to group 2A, but more cases developed AES in group 1. AES developed especially in cases with difference in IOOA or difference ? 6 PD in DVD magnitude.

NO AES developed in group 3.

Conclusions: IOAT with anterior and posterior fibers of the IO separate sutured to sclera 2 mm posterior the IR insertion is a safe and effective procedure for DVD correction ? 15 PD, with low risk of AES. In patients with difference in IOOA or DVD magnitude, asymmetrical IOAT should be used in order to avoid AES.

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# The Effect of Graded Inferior Oblique Z-Lengthening Partial Width Myotomy for Small Hypertropias with Cyclotorsion

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Introduction: Treating small incomitant hypertropias can be challenging and can cause overcorrection. Z lengthening myotomy of the inferior oblique has been described previously. The study describes the surgical technique and examines the effect of graded inferior oblique Z lengthening partial width myotomy for incomitant hypertropias.

Methods: A retrospective chart review was performed to identify patients who underwent graded inferior oblique Z lengthening partial width myotomy for small incomitant hypertropias with cyclotorsion from January 2021 to August 2023. One to five alternating partial width myotomies 1 mm apart were performed on the inferior oblique of the hypertropic eye.

Results: 12 patients were identified. Mean hypertropia in primary gaze improved from 3.2±1.8 ? to 0.2 ± 0.6 ?. Ipsilateral horizontal gaze hypertropia improved from 1.9±1.7 ? to 0 ?. Contralateral gaze improved from 6.5±3.3 ? to 0.5 ± 1.0 ?. Up to five degrees of excyclotorsion were resolved in three patients. One patient had an overcorrection. Regression analysis showed that for each 1mm of partial width myotomy, the effect was 1.18? in primary gaze (P<.01) while .65 in contralateral gaze and .42 in ipsilateral gaze, which were not statistically significant

Conclusion: Graded Inferior oblique Z lengthening partial width myotomy for small hypertropias has a favorable result in collapsing hypertropias and improving primary deviation. It is a relatively straightforward, quick, sutureless procedure. In our small sample size, the risk of overcorrection was small. The number of partial width myotomies can be graded to accommodate the amount of hypertropia.

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# Comparison of the surgical treatment of superior oblique palsy: Inferior oblique myectomy versus combined inferior rectus recession

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Purpose: To compare inferior oblique (IO) myectomy and IO myectomy plus combined contralateral inferior rectus (IR) recession for the treatment of superior oblique (SO) palsy

Methods: A retrospective review of medical records of patients with SO palsy who underwent surgical treatment. Group 1 (n=21) underwent IO myectomy to correct hypertropia, while group 2 (n=22) uncerwent IO myectomy plus contralateral IR recession. Comparisons were made of preoperative and postoperative vertical deviation angles in primary position and contralateral gaze, the amount of corrected hypertropia and success rate (equal or less than 4 PD).

Results: Preoperatively, there was no statistically meaningful difference in mean deviation in primary position between the two groups (11.0 PD and 13.7 PD, respectively, $p>0.05$), however, there was significant difference in mean vertical deviation in contralateral gaze (13.7 PD and 17.9 PD, $p<0.000$). Mean vertical deviations at postoperative 3 months measurements were 1.3 PD and -1.5 PD ($p=0.02$) in primary position and 2.0 PD and 1.2 PD in contralateral gaze ($p=0.034$). Mean amount of corrected hypertropia in primary position was 9,3 PD and 15.2 PD in group 1 and 2 ($p=0.006$), and those of contralateral gaze was 11.8 PD and 16.7 PD in group 1 and 2 ($p<0.000$). Success rate of group 1 was 90.5% and that of group 2 was 72.7% ($p=0.058$).

Conclusions: Both IO myectomy and IO myectomy combined IR recession were effective in the treatment of SO palsy. Our findings support myectomy alone as slightly more effective than combined IR recession. However, IO myectomy combined IR recession seems to be effective when vertical deviation in contralateral gaze is significantly larger than vertical deviation in primary gaze.

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# Is inferior oblique weakening effective in contralateral downgaze?

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Introduction - Inferior oblique (IO) weakening procedures are utilised to correct hypertropia following primary or secondary IO overaction. Although effective in primary and contralateral upgaze, the effect of IO weakening on downgaze remains uncertain. This study aimed to look at the differential impact of IO weakening on version, elevation and depression in contralateral gaze.

Methods - We collected data from all patients who underwent isolated IO weakening procedures at a tertiary teaching hospital from 2012 - 2023. All patients had a pre-operative and post-operative 9 gaze deviation assessment. Data collection included the patient's age, type of procedure, the indication for surgery and the duration of follow-up.

Results - We reviewed 35 patients who underwent IO weakening procedures. (24 left vs. 11 right). The procedures performed included recession (n=19), myectomy (n=8), anterior transposition (n=5), and tenotomy (n=3). We found that IO weakening procedures produced a mean correction of 7.4 ? in primary position and 13.5, 13.6, and 12.1 ? in contralateral version, elevation and depression respectively. All procedures reduced deviation in contralateral gaze. There was an average follow-up time of 4 months.

Conclusions - IO weakening procedures effectively reduced contralateral gaze deviation in all directions, but the impact was higher in upgaze compared to downgaze. This information is useful for deciding on the best surgical outcome in these cases and those with a larger deviation in downgaze may need a supplementary or alternative procedure to control their symptoms.

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# What to expect from primary inferior oblique overaction after esotropia surgery

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Introduction: Overelevation in adduction is common in patients with primary esotropia. This study evaluates the variation in ocular motility pattern in patients with primary inferior oblique (IO) muscle overaction after esotropia surgery.

Methods: The medical records of consecutive patients who underwent surgery for infantile, partially accommodative, and basic esotropia over eleven years and had at least one year of follow-up were reviewed. Patients with primary inferior oblique muscle overaction (IOOA) presented at baseline or during follow-up were selected and divided according to the first surgery performed concurrently with horizontal rectus surgery: without IO recession (NO-recess), with unilateral IO recession (UNIL-recess), and with bilateral IO recession (BIL-recess). The success (version normalisation or at least 2 points upgrade in severity scale [0–4] in the operated eye), recurrence rates, and the evolution of the non-operated IO muscles were evaluated.

Results: One hundred and ten patients were included – 53 NO-recess, 26 UNIL-recess, and 31 BIL-recess. Medial rectus muscle posterior fixation sutures surgery (PFS) was performed in 88.2% of patients for esotropia. A recession with graded anterior transposition was the weakening IO procedure. In the NO-recess group, 28 (52.8%) patients normalised their mild IOOA after PFS surgery alone. In the UNI-recess group, the success rate was 88.5%, with 16 (61.5%) patients showing worsened IO muscle of the fellow eye, which prompted additional surgery in 10 patients. In the BIL-recess group, all 31 patients improved the adduction pattern of the operated eye for an 80.6% success rate (6 improved marginally).

Conclusion: Graded anterior transposition of the inferior oblique muscle effectively normalises versions. However, it's frequent for a contralateral overaction to become manifest after unilateral IO surgery.

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# Don't trust a book by its cover: tips to diagnose and treat a traumatic fourth nerve palsy.

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***Introduction:*** Bilateral traumatic trochlear nerve palsy is common after car accident with whiplash syndrome. This condition is often misdiagnosed and patients' quality of life is severely impacted. We would like to present the case of a young man who had a head injury to illustrate the potential issues regarding the diagnosis and the surgical management.

***Methods:*** A 39-years-old man was referred to our squint department for vertical diplopia. He had a past history of a car accident in 2007 associated with loss of consciousness. Afterwards, he described double vision for more than 2 years associated with a head tilt. He finally had a plication of 4 mm of the left superior rectus muscle in 2009 for what was considered as a pure vertical deviation. Ten years later, the patient complained again with double vision and right hypertropia of 25 diopters without torsion was noted. A second surgery was underwent by his surgeon, consisting in the recession of the left inferior rectus muscle of 4 mm and a plication of the right inferior rectus muscle of 4 mm in 2019. Because of the persistence of diplopia in down-gaze, he was referred to our department. A marked restriction of down- gaze in the left eye was observed. Hess-Weiss testing and fundus photography demonstrated an undoubtful bilateral asymmetric excyclotorsion. The Bielschowsky head-tilt test was positive on left shoulder. We decided to relocate the previous muscles operated in their initial insertion and underwent a left inferior oblique (IO) recession of 10 mm and a right IO anterior nasal transposition.

***Results:*** Objective and subjective excyclotorsion normalized without any residual vertical.deviation.

***Conclusion :*** Traumatic fourth nerve palsy due to midbrain lesions should be suspected after brain injury and careful observation of torsional clues such as head tilt, V-pattern, fundus photography or Hess-Weiss test is warranted. The only logical and efficient approach has to be based on oblique muscles surgery.

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# Incomitance-base management of superior oblique palsy

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Introduction: The clinical findings of the superior oblique palsy, whether be congenital or acquired, are dominated by excyclotorsional diplopia, hypertropia and the compensatory head tilts to the opposite side. Depending on the time of evolution, the deviation can differ with the positions of the gaze. There are different surgical options depending on the incomitance. Knapp had proposed different surgical plannings according to the clinical presentations.

Methods: We present 5 clinical cases with congenital paralysis of the fourth nerve that differ from each other in the incomitance of their strabismus and we show the surgical results of each case through preoperative and postoperative photographs.

Results: Model 1: Hypertropia less than 10 Prism Diopters (PD), worse hypertropia on the opposite gaze position, excyclotorsión, inferior oblique weakening surgery. Model 2: Hypertropia of 20 PD, adduction and abduction hypertropia, and also in down gaze abduction positions, ipsilateral versions were more affected, mild incyclotorsion; recession of the ipsilateral superior rectus surgery was performed. Model 3: hypertropia of 10 PD that increase on the inferior gaze positions; recession of the contralateral inferior rectus. Model 4: Child patient, more than 20 PD hypertropia, also in adduction with severe head tilt; recession of the ipsilateral inferior oblique and plication of the superior oblique surgery. Model 5: Adult patient, more than 20 PD hypertropia in adult patient, worse hypertropia on the opposite gaze position, mild head tilt; recession of the ipsilateral inferior oblique and recession of the contralateral inferior rectus surgery were performed.

Conclusions: A correct and thorough examination of ocular motility in patients with fourth cranial nerve palsy, including ocular incomitance and torsion, is very important to decide the better surgical option in each particular case.

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# Heimann-Bielschowsky phenomenon and Hypotropic Dissociated Vertical Deviation: Case series

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Introduction: The Heimann-Bielschowsky phenomenon (HBP) describes unilateral vertical, slow, coarse, pendular variable amplitude movements in an eye with profound visual loss. Dissociated Vertical Deviation (DVD), wich almost always shows a hypertropia of the affected eye, ocasionally can manifest as hypotropia, also associated with an asimetric visual input. Three patients are presented who had this rare variant of DVD and/or HBP, describing the clinical features of this rare disorders and treatment.

Methods: A retrospective study of three cases of acquired Hypotropic DVD associated with visual deficit. Data regarding demographic characteristics, clinical features, image studies and surgical treatment were analyzed.

Results: Case 1: A 36-year-old woman with right frontal and optic foramen meningioma, best-corrected visual acuity (BCVA) in the right eye: light perception, left eye: 6/7,5; who presented an intermitent downward drift of his right eye. Case 2: A 29-year-old woman with left optic nerve Glioma, BCVA in the right eye: 6/6, left eye: amaurosis; who presented a variable hypotropia 0-25PD of the left eye and vertical pendular movements of the same eye. Case 3: A 59-year-old woman with supraselar meningoma and previous divergent strabismus surgery, BCVA in the right eye: amaurosis, left eye: 6/12; who presented vertical, slow, pendular right eye movement.

In case 2 we performed a combined recession-resection of the inferior rectus muscle of the left eye. The result at two months was an improvement with no vertical deviation in primary position at near and distance fixation, and without pendular movement.

Conclusions: The HBP and the Hypotropic DVD are both underrecognized conditions induced by asymmetric visual input. There are few references, especially in terms of the association of both entities and their surgical treatment.

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# Monocular elevation deficit with ptosis, exotropia and convergence deficit: is stereopsis suitable to plan a muscular bilateral surgery?

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Purpose: We describe the correct management of a Monocular Elevation Deficit (MED) misdiagnosed as a Brown Syndrome, and the importance of the stereoacuity, beyond the forced ductions test, to decide the surgical plan.

Methods: A 7 years old child was checked for a monocular ptosis, hypotropia, exotropia, convergence deficit, anomalous head position (AHP) with chin left rotated. In the past she was misdiagnosed as a Brown Syndrome. The patient underwent a full ophthalmological and orthoptic check that showed a suspected MED type 2. Stereopsis was 480”of arc at TNO test. The forced ductions test done before surgery confirmed the diagnosis. She underwent a modified Knapp procedure on the affected right eye. A recess/resect horizontal surgery on the second eye was done secondary, to improve the stereoacuity, that disappeared after the first operation. Furthermore, after the second surgical intervention, she underwent a series of orthoptic rehabilitation of the convergence deficit.

Results: After the first surgery on the affected eye we obtained a correction of hypotropia and an improvement of the AHP and of the convergence deficit, but stereopsis disappeared due to suppression. After the second surgery we obtained a good resolution of the exotropia and a restoration of the stereoacuity at 120”. The convergence deficit improved after the orthoptic rehabilitation ameliorating the AHP and enhancing stereocuity at 60”.

Conclusions: The good action of the inferior rectus checked by forced ductions test, points-out the central deficit and suggests the correct surgery. Also stereoacuity must be considered a sensitive data to decide for a second surgical approach. Orthoptic rehabilitation must be suggested after surgery to regain a correct fusion mechanism, that may restore the stereoscopic sensory state and guarantee a correct orthotropic position.

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# Recurring multiple eye muscle palsy as first sign of sarcoidosis

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**Introduction** I will discuss the case of a 57 years old woman, who presented first in April 2014 with diplopia due to complete right sixth nerve palsy, which resolved spontaneously after 6 months. January 2017 she was diagnosed again with a sixth nerve palsy, this time on the left eye. May 2017 she presented with a complete palsy of the left third cranial nerve. Apart from the eye motility disorder, the neurological and ocular exam was completely normal. Medical history consisted of migraine and hypercholesterolemia for which she was taking a statin. No other cardiovascular risk factors could be withheld.

**Methods/Results** Blood tests and lumbar puncture appeared normal. The first MRI showed a small incidental lesion in the right lateral ventricle for which follow-up was indicated and which remained unchanged. MRI, performed in May 2017, described a meningioma at the left cavernous sinus. This lesion could not explain the former cranial nerve palsies. CT thorax showed enlarged mediastinal and hilar lymph nodes and various nodules in the lung parenchyma as in the upper abdomen; an image suspicious of sarcoidosis. As a treatment of possible sarcoidosis, corticosteroids were started, with complete response within weeks. The assumed meningioma disappeared with this treatment, revealing it to be a sarcoid lesion.

**Conclusion** In patients presenting with recidivating cranial nerve deficits, main differential diagnosis consists of multiple sclerosis, neuroborreliosis, increased intracranial pressure and neurosarcoidosis. In case of suspicion, brain MRI and CT Thorax should be obtained. Neurosarcoidosis has imaging properties very similar to other known diseases such as a meningioma and misdiagnosis occurs easily. Repeated brain imaging might be necessary. Accurate diagnosis is of great importance, since neurosurgical procedures can be avoided.

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# Ophthalmoplegic migraine: a retrospective cohort study

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## INTRODUCTION

Recurrent painful ophthalmoplegic neuropathy (RPON) of the III cranial nerve, formerly known as“ophthalmoplegic migraine”, is a condition characterized by recurrent crises of headaches and III nerve palsy, which pathophysiology remains unclear.

## METHODS

Cases of typical ophthalmoplegic migraines examined in our department between 2011 and 2023 were retrospectively retrieved and studied. These included III nerve RPON fitting the International Classification of Headache Disorders definition, and cases of non-recurrent painful ophthalmoplegic neuropathy (NRPON) fitting all other characteristics of the definition.

## RESULTS

Twelve cases were retrieved – 11 males, 1 female, median age at first presentation: 2.9 years –, consisting in 6 cases of RPON and 6 of NRPON.

The left eye was involved in 7 patients and the right in 5. The median number of “crises” was 1.5 per patient [1-7]. Ophthalmoplegia and/or ptosis occurred in all patients and pupil was involved, in association with the previous ones, in 9 patients (75%). Six patients (50%) had a complete resolutive episode, whereas 6 (50%) had persistent sequelae of diverse degrees.

All patients had a brain MRI and ten of them (83%) (5 RPON and 5 NRPON) revealed an abnormality of the III cranial nerve on the side of the crisis, which always consisted in a round lesion at the anatomic emergence of the III in the interpeduncular cistern, enhancing with gadolinium. This enhancement vanished after the crisis in 1 case, while it persisted in 9 cases.

## CONCLUSIONS

Most of the patients who presented with ophthalmoplegic migraine were males. The presence of a characteristic lesion of the III at the time of the crisis was present in the vast majority of cases. The pathophysiological value of such lesions, often described as III nerve “schwannomas”, is debated. Its value as a diagnostic criterion of a specific pathological entity, however, should probably be considered, be it or not followed by a recurrence.


**Session: Poster session B**

# Evaluation of Sixth Nerve Palsy: Associations and Clinical Outcomes

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## Introduction

Abducens nerve palsy is the most common motor ocular nerve palsy in adults and may be congenital or acquired in aetiology with acquired causes being microvascular or other (trauma, space occupying lesions, demyelination etc). The clinical course is influenced by the underlying cause.

## Methods

We carried out a retrospective study of 52 patients seen at a tertiary hospital from May 21-October 23 with acquired abducens nerve palsy to investigate patient profile, aetiology and clinical factors affecting recovery and outcome. Patients were identified using an audit tool on mediSIGHT, an electronic patient record system. Data collected included age, sex, aetiology, and orthoptic assessment at presentation, 3 and 6 months. Palsy aetiology was delineated into microvascular (diabetes and hypertension) and non-microvascular causes (aneurysm, meningioma, medulloblastoma, road traffic accident, and inflammatory conditions).

## Results

Overall, 62% were female, 38% White British and the average age of onset was 59 years. Left eye was affected in 44%, right eye in 48% and both eyes in 8%. Microvascular causes contributed to 54% of cases, non-microvascular 25%, with the remaining 21% cases of unknown aetiology. 75% of cases with microvascular origin resolved fully, with an average duration of 4.1 months. Of those with a non-microvascular origin, only 31% fully resolved, over an average of 5.25 months. The mean initial angle of deviation in primary gaze (PD BO) was 20.2 PD for microvascular cases, and 27.8 PD for non-microvascular cases. With regards to treatment, 9% underwent strabismus surgery, 6% toxin and 2% therapeutic lumbar puncture.

## Conclusions

The majority of patients in our cohort presented with a microvascular acquired sixth nerve palsy. A microvascular palsy was more likely to resolve, and at a faster rate, compared to a non-microvascular sixth nerve palsy. Therefore, this study demonstrates the impact of aetiology on the duration and resolution of the palsy.


**Session: Poster session B**

# Evaluating Ocular Nerve Palsies: Impact of Eye Movement Recordings and Clinical Implications

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**Introduction:** Recent advancements in eye-tracking technology enable precise measurement of eye movements, enhancing diagnosis and intervention planning. However, their use in clinical practice is limited due to a lack of suitable testing paradigms and analysis techniques. This study investigated the impact of ocular nerve palsies on eye movements, specifically smooth pursuit and saccades, over a 4-month recovery period. The results provide evidence for the merit of using eye movement recordings in these patients.

**Methods:** Ten patients (mean age: 72.4 ± 10.5 years) with ocular nerve palsy associated with conditions such as diabetes mellitus, hypertension, and high cholesterol underwent five eye movement recording sessions using the EyeLink 1000 Plus eye tracker (SR research Ltd). Ethical approval was obtained from the Research Ethics Committee NHS.

**Results:** Patients with microvascular ocular nerve palsies exhibited impaired smooth pursuit and saccadic performance at baseline, with variable recovery rates. These findings were consistent with clinical observations on motility testing. Optimal testing frequencies and target amplitudes for specific parameters were identified, providing practical guidance for clinicians.

**Conclusion:** This study emphasises the potential of advanced eye-tracking technology to offer valuable insights into ocular nerve palsies' impact on eye movements. The identified impairments underscore the clinical significance of these assessments and the contribution to diagnosis and management. The identification of optimal testing frequencies and target amplitudes for specific testing parameters provides practical guidance for clinicians to implement the eye movement recording test. The findings stress the importance of further research and development in this promising field.

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**Session: Poster session B**

# Outcomes of modified Nishida procedure in sixth nerve palsy

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**INTROUDCTION:** To evaluate the motor outcomes and the changes in the palpebral fissure after modified Nishida procedure in unresolving sixth nerve palsy

**METHODS:** A retrospective chart review was conducted on patients who had modified Nishida procedure for unresolving sixth nerve palsy. The operative details including the exact position of sutures were recorded. Ductions, versions, angles of misalignment, and changes in palpebral fissure were tabulated.

**RESULTS:** A total of 35 patients were identified. Mean age was 25.3 ± 19.4 years. Trauma was the most common cause (25 patients, 71%). Mean preoperative angle of deviation in unilateral cases (n=33) was 44 ± 7 PD (range, 25 to 60 PD). Two cases had bilateral nerve palsy with a preoperative angle of 90 PD. Two cases had prior medial rectus recession. Medial rectus recession was performed in all other cases (mean recession, 4.6 ± 1.1 mm). Mean follow-up was 10.1 ± 9.0 months (range, 3 to 48 months). Initial overcorrection > 15 PD occurred in 8 cases (23%) and resolved completely over follow-up in 6 cases. Residual esotropia > 8 PD occurred in 4 cases (11%), all had a more proximal suture placement. There was no relationship between the amount of medial rectus recession and the risk of undercorrection. Final success rate was 83%. Mean postoperative angle at last follow-up was 1 ± 6 PD (range, XT 15 PD to ET 20 PD). Induced vertical deviation occurred in 3 patients but resolved completely in2 patients. Mean postoperative abduction deficit was -2.7 ± 0.8 (range, -1 to -4). Narrowing of palpebral fissure > 1 mm occurred in 8 cases (23%).

**CONCLUSIONS:** Modified Nishida procedure is an effective and self-adjusting procedure for the management of sixth nerve palsy. Care should be taken to properly place the sutures to reduce the risk of residual undercorrection.

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# New modification of vertical muscle transposition to enhance abducting force in sixth nerve palsy

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**Background:**

The purpose of the study is to determine where the transposed muscle should be reattached in order to increase the tangential force necessary to improve abduction.

**Methods:**

Retrospective case review of 12 consecutive patients with abducens paralysis who underwent transposition procedures between 2016 and 2019 was conducted.

Vertical rectus muscles are transposed to the insertion of lateral rectus muscle, the temporal parts are joined and sutured to the sclera on top of the lateral rectus muscle in the middle of the insertion. The nasal parts are sutured to the sclera following the spiral of Tillaux. The muscle junction suture is placed 8 mm from the insertion, with the temporal parts of the vertical muscles bellies joined and sutured to the lateral rectus muscle.

The minimum follow-up was 3 months.

**Results:**

The mean preoperative deviation was ET of 37° (range: ET 24° to ET 51°). The mean preoperative abduction limitation was 5 mm from midline (range: 7 to 1mm). The postoperative mean deviation was ET of 2° (range: 0° to ET 5°). The postoperative mean abduction improvement was 5mm past midline (range: 2 to 6mm). There were no complications, or signs of anterior segment ischemia.

**Conclusions:**

To achieve the maximal abductive force from the transposed muscles, we suggest that the vertical muscles be reattached as close as possible to the middle of the lateral rectus insertion.

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# Bilateral Vertical Rectus Transposition with Foster Modification in the Management of Abducens Nerve Palsy

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## Introduction

Abducens nerve palsy is the most prevalent isolated oculomotor palsy observed in adults. This condition results in esotropia primarily due to the unbalanced activity of the antagonising medial rectus muscle, manifesting most commonly as horizontal uncrossed diplopia. Within the spectrum of surgical techniques available, vertical rectus transposition enhanced by the Foster modification offers a targeted approach, particularly when there's a lack of functionality in the lateral rectus muscle.

## Methods

We present a case report detailing the surgical management of chronic traumatic bilateral abducens nerve palsy.

## Results

A 66-year-old patient visited the outpatient clinic, reporting a history of head trauma from a car accident six years prior. Since the incident, he has experienced horizontal diplopia. Ophthalmological assessment revealed a 26 prism diopter (PD) esotropia in the right eye (OD) and a 50 PD in the left eye (OS). Both eyes exhibited a limitation in abduction, marked at -4, with no movement beyond the midline and a pronounced horizontal left torticollis was evident. The patient underwent bilateral full tendon vertical rectus transposition complemented by a posterior augmentation suture, using the Foster Modification, coupled with a botulinum toxin injection into the medial rectus.

One month post-surgery, notable improvement was observed. The patient had significant correction in primary gaze with no deviation, the abduction limitation decreased to -3 in OD and -1 in OS.

## Conclusions

In this case report, we detailed the surgical intervention for a 66-year-old patient with chronic traumatic bilateral abducens nerve palsy. The patient underwent bilateral full tendon vertical rectus transposition with the Foster Modification and medial rectus botulinum toxin injection. One month post-surgery, significant improvements were evident: primary gaze corrected without deviation and abduction limitations decreased . No signs of torticollis were detected.

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# A case describing the surgical management of a complex sixth nerve palsy secondary to brainstem meningioma and stroke

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## Introduction

We describe surgical management of a 51 year old with constant diplopia secondary to a left abducens nerve palsy. Due to the patient's comorbidities, surgical and medical management plans were limited. Surgical management was challenging and required a multidisciplinary approach. We illustrate our case with pre and post-operative photos in nine positions of gaze.

## Methods

Our patient presented with multiple left sided cranial nerve palsies (5th, 6th & 7th) following surgery for brainstem meningioma and stroke. She presented with binocular horizontal diplopia and left exposure keratopathy with a neurotrophic cornea. Vision in the right eye was 0.0 and 1.2 Logmar in the left eye. Orthoptic assessment revealed a marked left esotropia of 50D BO at near and distance with -6 abduction deficit. She was trialled on left medial rectus botox with little effect. She subsequently underwent full tendon transposition of the left superior and inferior recti to the borders of the lateral rectus under local anaesthetic and sedation. Two weeks post-operatively, she had a 8D BI exotropia at near and no horizontal strabismus at distance. However, her esotropia gradually returned and at ten months post surgery, she measured 45-50D BO. Conservative management plans including an occlusive contact lens were contraindicated due to a poor ocular surface. Further surgical options were offered including contralateral surgery (declined), left medial rectus recession (with a risk of anterior segment ischaemia) and augmentation sutures to the left inferior and superior recti. We will carry out augmentation surgery in February 2024 and present our findings.

## Conclusion

We describe a cautious multidisciplinary approach to managing a complex case of sixth nerve palsy. Surgical management was challenged by the patient's compounding health factors. We describe and illustrate our case and the important lessons learnt.

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# Surgical management of 3rd and 6th nerves palsies

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Introduction

Paralytic strabismus is one of the most common oculomotor disorders in adults. The purpose of our study is to describe a population of patients operated for OMP and to detail the surgical procedures and their results.

Methods

We retrospectively studied the cases of patients operated for 3rd and 6th nerves palsies between 2014 and 2019 at a tertiary center. We analyzed the demographic features, the etiologies of the OMP, the surgical protocols and the postoperative results based on medical files.

Results

101 patients were included : 30 were operated for an oculomotor nerve palsy (=group1), 68 for an abducens palsy (group2) and 3 patients for complex palsy. Median age at surgery was 49.6 years (5-89 Y). Diplopia and torticollis were present in 88.3% and 57.5 % of cases respectively. The palsy was unilateral in 88.3% of patients.

The main etiologies were: vascular (26.6%) and tumor (16.6%) compression, stroke (16.6%), trauma (16.6%) and congenital palsy (13.3%) in group1, and trauma (25%), tumor (23.52%) and vascular (17.64%) compression and complicated neurosurgical procedures (16.17%) in group2. No identified etiology was noticed in 17.6% of group 2 patients.

Surgery was performed 48 months after the onset of the palsy. In group 1, a muscle recession/ plication surgery was performed in 66.6% of cases and a transposition procedure in 23,3%. In group 2, 66.2% patients had a muscle recession/ plication surgery, and a transposition procedure was the surgical choice in 33.8%.

Two months after surgery, torticollis resolved in 33% and 36% of patients in group 1 and group2 respectively. 32% and 68% of patients had no longer diplopia in group 1and group 2 respectively. Patients were satisfied in 35% in group 1 and 65% in group 2. At least 1 surgical re-intervention was indicated in 37 patients (36.6%).

Discussion and conclusion

Surgery is an important choice and treatment when managing a paralytic strabismus.

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# Transposition of the split lateral rectus muscle to 8 mm posterior of the medial rectus muscle insertion in complete oculomotor nerve palsy

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INTRODUCTION Surgical options in complete oculomotor nerve palsy are limited. Utilizing the remaining innervation in the lateral rectus muscle (LR), transposition of the LR redirects eye movement to better alignment of the eyes. The aim of this study is to present the surgical experience with six cases of complete oculomotor nerve palsy.

METHODS Retrospective case series evaluating six consecutive operations on patients with complete oculomotor nerve palsy between May 2018 and October 2023 in which the split LR was transposed nasally. Primary outcome is horizontal and vertical ocular alignment in primary position. Secondary outcomes are abduction and adduction deficits and complications.

RESULTS A total of six operations were included. The preoperative horizontal deviation ranged from 40?XT to more than 90?XT and adduction ranged from -30 to +2. In five out of six operations the LR was split in equal parts and reattached 8 mm posterior of the medial rectus (MR) insertion. Three of those five had an added tenotomy of superior and inferior oblique. In one out of six operations the LR was split in a 1/3 superior part and a 2/3 inferior part, both also reattached 8 mm posterior of the MR insertion. Postoperative ocular alignment was enhanced in all cases and ranged from 6?ET to more than 45?XT. Adduction of the operated eye improved in all cases postoperatively and ranged from +1 to +20. However, a marginal decline in abduction was evident in three cases from no limitation preoperatively to -27, -24 and -16 postoperatively. No evident complications were observed after five out of six operations. One patient experienced vision-threatening complications, attributed to an immediate postoperative increase in intraocular pressure.

CONCLUSIONS Transposition of the split LR to 8 mm posterior of the MR insertion in complete oculomotor nerve palsy improved strabismus and adduction movement. Caution should be exercised for complications as choroidal effusion or secondary glaucoma.

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# Long term results of lateral rectus disinsertion and reattachment to the orbital wall in complete third nerve paralysis

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INTRODUCTION complete third nerve paralysis is a complex surgical challenge mainly due to the unbalanced force of the lateral rectus which inevitably causes drift towards exotropia over the long run. Detaching the muscle from the globe and re-attaching it to the orbital wall aims to solve this problem

METHODS Five patients with complete third nerve palsy were operated during the years 2003 – 2018. All patients underwent lateral rectus disinsertion and re-attachment to the orbital wall, together with superior oblique tenectomy. Medial rectus resection with/without superior rectus resection was done in order to achieve orthophoria on the operating table.

RESULTS All patients achieved near orthophoria alignment that was cosmetically acceptable. In four patients some residual abduction and adduction movements were noted. These surgical results were stable during a follow-up period of 7-20 years.

DISCUSSION Lateral rectus disinsertion and reattachment to the orbital wall, together with superior oblique tenectomy abolish any abducting or depressing force on the globe. If ortho alignment is achieved on the operating table, it usually remains stable thereafter. Some abducting and adducting force is still generated by the lateral rectus extra-muscular attachments and by the weak medial rectus that has no counterbalance force.

CONCLUSION – Lateral rectus detachment and re-attachment to the orbital wall is an excellent surgical choice in patients with complete third nerve palsy. The surgical results are remarkably stable over a long follow-up period.

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# Evaluating Botulinum Toxin Injection to Treat VI Nerve Palsies : A Retrospective Study

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INTRODUCTION

Sixth nerve palsy (VI CNP) is a prevalent form of oculomotor paralysis associated with the risk of chronic diplopia. Botulinum toxin injections into the medial rectus muscle have been proposed to prevent complications, but their efficacy in acute VI CNP remains unclear.

METHODS

This retrospective observational study, conducted between January 2018 and September 2022, aimed to compare the recovery rates of patients with acute VI CNP who received early medial rectus botulinum toxin injections to those who did not. Propensity score matching addressed inherent biases, considering factors such as age, gender, etiology, and initial deviation angle. Statistical analysis employed the Chi-square test.

RESULTS

Of the initially eligible 117 patients, 59 were excluded based on predefined criteria. Propensity score matching yielded two groups of 14 patients each. The recovery rate in the treated group was 75%, compared to 50% in the untreated group, although the difference was not statistically significant ($p = 0.11$). Transient side effects were observed in six patients, aligning with existing literature.

CONCLUSIONS

This study found no difference in long-term recovery between patients who received botulinum toxin injections and those who did not. However, the retrospective nature of the study does not allow us to conclude that there was no real lack of efficacy. In addition, further studies would be interesting to assess the effect on medial rectus contracture and the improvement in patients' quality of life after botulinum toxin injection. Finally, a randomised trial with a large number of patients is needed to determine the effectiveness of botulinum toxin in recovery and to better select the patients who would benefit most from it.

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**Session: Poster session B**

# Paraocular steroids as farmacology managment on a patient with ocular myasthenia gravis. a case report.

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Introduction: Myasthenia gravis is a post-synaptic autoimmune disease of the neuromuscular junction with a classic bimodal presentation related to sex, most often affecting young women under 40.

The objective of this case report is to describe the clinical presentation, and therapeutic approach in this particular case and the outcomes, as well as the prognosis.

Isolated ocular myasthenia is rare. While ptosis and diplopia are common presenting symptoms including in patients who will eventually evolve into generalized myasthenia, only 20% of patients will turn out to have pure ocular MG. The diagnostic difficulty with this entity is that only 50% have detectable antibodies to the AChR. Single fiber EMG studies support the diagnosis of neuromuscular transmission failure in patients without detectable antibodies, including ocular myasthenia.

The latter group of patients may also have some minor abnormalities on single fiber EMG studies with borderline increased jitter values making the diagnosis even more challenging. Other diagnostic cues are therefore crucial, and ultimately a muscle biopsy may be necessary to clinch the diagnosis.

Methods: This is a case report about the outcomes using paraocular steroid as treatment of ocular MG.

Results:

The patient was followed closely, once per week for the first month then once every two weeks for a total of 3 months.

The patient didn’t notice changes the first week after the first steroid dose.

The patient received a second dose, but this dose was applied on the contralateral eye.

After two weeks of the first dose, the patient reported that she wasn’t seeing double any longer, and her eyelids were more open.

Conclusions

It seems that using local deposit steroids could be a way of treatment for ocular myasthenia gravis.


Using a local treatment is an advantage because we reduce the risk of getting some systemic secondary effect.

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**Session: Poster session C**

# Changing age spectrum in strabismus surgery

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**Introduction:** The proportion of children undergoing strabismus surgery appeared decreasing. To verify that, we analyzed the age of patients who received extraocular muscle (EOM) surgery.

**Methods:** Data of patients were reviewed who underwent EOM surgery at the University Eye Hospital Giessen between 1991 and 2019 and compared numbers of operations in decadal age groups to the German population in the respective period. In addition, we evaluated indications of surgery. The data pool comprised > 25,000 surgeries including > 60,000 muscles operated.

**Results:** In comparison to 1991, in 2019 the proportion of children aged ? 10 years had decreased from 50.2% to 31.8%, corresponding to a relative decrease of more than one third. The proportion of patients aged > 50 years had increased from 6.5% to 22.5%, i.e., by factor > 3, while the population ? 10 years in 2019 was only 13% smaller than in 1991 and the population aged > 50 years had increased by not more than 37%. The major reason of the decreasing proportion of children was a 53% reduction in surgeries for esotropia. We found no apparent changes in the 2nd to 5th decades.

**Conclusion:** The lower proportion of children receiving EOM surgery appears to indicate improvement in vision screening during the past 4 decades. The increasing proportion of elder patients may result from better information on potential therapy and increased incidence of acquired strabismus with corresponding complaints. The demographic shift played a secondary role. Due to demography, further increase in demand of EOM surgery is likely.


**Session: Poster session C**

# Prevalence of strabismus after 12 years of treatment of type 1 prethreshold retinopathy of prematurity (ROP) in Southeast Bulgaria

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INTRODUCTION: To present the prevalence of strabismus in prematures, treated for type 1 prethreshold ROP after 12 years of follow up in Southeast Bulgaria.

METHODS: Since year 2010, 164 prematurely born children (319 eyes) were treated for type 1 prethreshold ROP and were prospectively followed up. Mean (range) gestational age was 28.6 (23 – 33) wg, and mean (range) birth weight – 1143 (570 – 1990) grams. Cryotherapy was applied on 76 eyes (23.2%), laser – in 215 eyes (65.5%), anti-VEGF – in 10 eyes (3%) and surgery – in 18 eyes (5.5%). Ten children (20 eyes - 6.1%) were lost to follow up. Presence of strabismus was checked in all 164 children aged from 1 to 12 years using Hirschberg test. Confidence intervals (95%) were calculated using the binominal distribution.

RESULTS: Among the 164 examined children 36 showed strabismus (22.0%, 95% confidence interval: 15.9% - 29.1%). Twenty-six of them (72.2%, 95% confidence interval: 54.8% - 85.8%) had strabismus and favorable structural retinal outcome. Ten children had unfavorable structural outcome (7 children with one eye total retinal detachment; 1 child with both eyes total retinal detachment and 2 children with partial retinal detachment).

CONCLUSION: The results of our study confirm the increased prevalence of strabismus in prematurely born children, treated for ROP even with favorable structural outcome. This means that these patients should be carefully followed up at shorter intervals, compared to full term born children.

KEY WORDS: ROP, treatment, strabismus

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# Refractive surgery and strabismus

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Objective: To propose refractive surgery as a complementary treatment to improve the degree of strabismus deviation, sensory status and functional capacity related to vision. At the same time, review what factors must be taken into account before being operated on refractive surgery to avoid subsequent complications related to binocular vision.

Method: The medical records of strabismic patients over 18 years of age before and after refractive surgery (Lasik or intraocular lens placement (IOL) with or without cataract extraction were reviewed. Data related to age, sex, type of surgery, degree and type of strabismus, stereopsis, videoculography for the study of ocular motility and results of the VF14 questionnaire for the evaluation of visual function were collected.

Results: Improvement was found in deviation, stereopsis and visual functional capacity.

Conclusion: Refractive surgery can be considered as one of the treatment options in strabismic patients. We do not recommend monovision or multifocal intraocular lenses in patients with strabismus due to their dissociative condition.

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# Review of clinic types introduced during lockdowns for the COVID19 pandemic

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Introduction

Ophthalmology predominately requires face to face examination. However the 2020 COVID19 pandemic lockdowns forced us to consider other ways of working. Many of these could not be maintained following the initial crisis due to the need to physically examine the patient. Four years on we review what is still in place in our subspeciality of orthoptics, paediatric ophthalmology and adult strabismus, motility and neuro motility.

Method

A review of adaptations made during the pandemic including supply of cycloplegic drops for home instillation, video and telephone clinics, virtual clinics, patient initiated follow up and modifications to follow periods. Feedback has been considered from patients and staff.

Results

Many parents welcome the opportunity to instil drops at home and reduced waiting time in clinic even if it means attending 2 clinics rather than a joint clinic e.g. joint orthoptic optometric clinic. We now give a choice.

Video clinics continue. Patient satisfaction, particularly for parent/carers of paediatric patients, is less due to a number of factors not least no longer being confined to home.

Telephone clinics continue though timings have been modified to late afternoon / early evening.

Virtual clinics continue where appropriate. Consultants prefer a physical examination of disc concerns in children in addition to imaging particularly for those not ‘barn door’ normal or abnormal.

Patient initiated follow up is increasing; patients welcome the opportunity of a safety net particularly where they don’t agree with discharge. Early evidence suggests many don’t make an appointment inside the required 12 months.

Amblyopia review period has been extended to 3 months for most. Careful consideration is expected of every case to extend follow up to the maximum period.

Conclusions

Clinics other than traditional face to face continue and can add value and save time. Modifications have been made due to changing home/school/work situations and clinical effectiveness.

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# Utilising Virtual Clinics and Orthoptists to Aid COVID-19 Service Recovery in Adult Strabismus

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Introduction: The Sheffield Virtual Adult Strabismus service was already well established and put to real-time trial during the COVID-19 pandemic. We describe a multi-disciplinary adaptation to offer safe and effective service delivery. We evaluate the efficacy of a virtual strabismus service to meet clinical demand, streamline patient care and optimise medical input.

Methods: Prospective data analysis from the virtual clinics dated from January 2015 to November 2021. All information was captured at first consultation with comprehensive Orthoptic assessment and imaging. The strabismus consultant reviewed this for clinical outcome and discussed management virtually with patients.

Results: Pre-COVID (January 2015–March 2020), 1,068 appointments were offered. During COVID (July 2020–November 2021), 442 appointments were offered. Clinical capacity increased to meet demand. Within two months of service re-opening, first appointment mean waiting time reduced below 18 weeks. During COVID, 24.6% of patients were listed for procedures after first visit. Face-to-face medical follow-up for non-surgical cases reduced from 47.7% to 16.3%.

Conclusions: Virtual strabismus services offer flexible, safe and effective ways to maximise limited time and resources. Orthoptists are uniquely essential and highly valued keyworkers to conservatively manage non-surgical strabismus, utilising their skillsets is crucial to sustain ongoing clinical demand and patient care.

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# Perception of childhood strabismus among preschool teachers

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Introduction: Strabismus in children creates an abnormality in facial appearance and may cause negative influence on teacher-student interaction. In this study, we aimed to determine whether preschool teachers have a negative perception towards students who have strabismus.

Methods: Portrait photograph of a healthy boy representing a preschool student was created using artificial intelligence. The photograph was then digitally altered to create photographs of the same child in esotropic and exotropic states. Participants recruited from preschool teachers were asked to view and evaluate the photographs using survey methodology. Each participant viewed only one photograph representing one of the three states (normal/ esotropic /exotropic). An equal number of participants viewed each photograph. Participants were then asked to fill the teacher attitude scale towards inclusive education and to evaluate the photograph with reference to individual characteristics and classroom behavior. Descriptive analysis was conducted to compare the three groups of participants.

Results: Regarding inclusive education scale, results were similar among three groups. For classroom behavior; esotropic child was rated lower for responsibility compared to normal and exotropic child. For individual characteristics; scores for hesitancy, cuteness, happiness, activeness and cleverness were lower for esotopic and exotropic child compared to normal child. Esotropic child was rated more negatively than exotropic child on most of the parameters for classroom behavior and individual characteristics.

Conclusions: Strabismus in children may cause a negative perception among teachers in terms of classroom behavior and individual characteristics. This may affect the child's education and socialization. Correction of strabismus may reverse these negative psychosocial effects.


**Session: Poster session C**

# Responsiveness and interpretability of the Dutch Adult Strabismus-20 Questionnaire (Dutch-AS-20)

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**Introduction**: During recent years there has been a growing awareness of the importance of using patient-reported outcome measures, such as quality of life (QoL) questionnaires, as an outcome measure in ophthalmic research and clinical practice. The development of the Dutch version of the Adult Strabismus-20 questionnaire (Dutch-AS-20) allows assessment of the strabismus-specific QoL among adult patients with strabismus in the Netherlands. Our recent analyses established the reliability and validity of the Dutch-AS-20. However, the responsiveness and interpretability of the questionnaire have not been assessed. Therefore, the aim of this study was to determine the responsiveness and interpretability of the Dutch-AS-20 in a sample of Dutch adult patients with strabismus undergoing strabismus surgery. **Methods:** A construct approach was used for testing responsiveness of the Dutch-AS-20. Eight hypotheses were formulated a priori. Two types of hypotheses were tested: (1) comparison with other outcome measurement instruments and (2) comparison between subgroups. The minimal important change (MIC) for each subscale was determined in relation to the smallest detectable change (SDC) to interpret change scores on the Dutch-AS-20. **Results:** all predefined hypotheses were met, confirming the responsiveness of the Dutch-AS-20. The MIC for the psychosocial subscale was estimated to be 3.1 T-score points 2-3 months postoperative (SDC 2.7 T-score points). The MIC of the function subscale could not be determined due to lack of validity of the anchor question (correlation change score function subscale Dutch-AS-20 and anchor question <0.30). **Conclusion:** Our recent analyses established the responsiveness of both subscales of the Dutch-AS-20 to changes in strabismus-specific QoL 2-3 months following strabismus surgery. This confirmed the usefulness of the instrument in longitudinal studies. Care must be taken when interpreting change scores on the function subscale due to an unknown MIC.

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# Preliminary Report: Comparative Performance of Large Language Models for American Academy Self-Assessment Questions in Pediatric Ophthalmology

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Introduction:

This preliminary report presents a comparative assessment of six large language models (LLMs) in their ability to answer 100 self-assessment multiple-choice questions (MCQs) from the American Academy of Ophthalmology (AAO) on the topic of pediatric ophthalmology.

Methods:

We evaluated the performance of the following LLMs: mixtral-8x7b-instruct-v0.1, wizardlm-70b, Gemini-pro-dev-api, pplx-70b-online, claude2.1, and gpt-4-turbo. Our assessment focused on two key aspects. First, we measured the rate of successful answers provided by each LLM. Second, we analyzed the consistency of incorrect answers across the LLMs to determine whether certain incorrect responses were consistently chosen by all models.

Results:

Our findings indicate that Chat GPT-4 outperformed the other LLMs in answering the pediatric ophthalmology MCQs, achieving a success rate of 79%. Claude 2.1 followed closely with a success rate of 74%, while mixtral scored 63%, pplx 59%, Gemini 57%, and wizardlm 53%.

Furthermore, our analysis revealed that there is a variation in the incorrect answers provided by the LLMs. Some incorrect responses were consistent across the models, suggesting potential areas of improvement in their training data or reasoning capabilities.

Conclusions:

In conclusion, this preliminary report highlights the varying performance of different large language models in answering AAO self-assessment MCQs on pediatric ophthalmology. Chat GPT-4 demonstrated the highest success rate, reinforcing its effectiveness in providing accurate answers to these questions, consistent with previous reports. Our study suggests that there is a diversity of LLMs available that can offer comparable answers, which could be beneficial for educational purposes, particularly for students studying pediatric ophthalmology.

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# The impact of post-stroke ocular motility defects using the Brain Injury associated Visual Impairment - Impact Questionnaire (BIVI-IQ)

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Introduction

Ocular motility defects post-stroke have a reported prevalence of 44%, which include a wide variety of abnormalities. These are known to impact on quality of life including independence, activities of daily living and hobbies. Quality of life for this population has previously been measured using tools not developed for this population or with addition of a supplementary measure. The aim of this study was to assess the impact of post-stroke ocular motility defects.

Methods

18 NHS hospitals, coupled with advertisements, recruited stroke survivors with visual impairment (VI) at any time post-stroke. Participants were asked to complete the Brain Injury-related Visual Impairment Impact Questionnaire (BIVI-IQ). The BIVI-IQ was specifically developed and validated to assess the impact of post-stroke VI (scoring ranges 0-37), a low score indicating a better quality of life. Demographics, social history, stroke and vision assessment data were collected.

Results

316 participants completed the BIVI-IQ, 123 of which had ocular motility defects (39%). For this analysis 20 stroke survivors with only pre-existent ocular motility defect were excluded. 73 completed a repeat BIVI-IQ at visit 3. The mean age was 68 years, 70% were male and median time post-stroke was 37 days (range 1-7576). Types of ocular motility defect were saccadic dysmetria (52%), reduced convergence (48%), manifest strabismus (horizontal (34%) and vertical (28%)), cranial nerve palsies (28%), nystagmus (26%), gaze palsies (18%), saccadic palsy (16%), internuclear ophthalmoplegia (12%) and skew deviations (5%). The median score for this group with ocular motility defects was 13.9 (range 0-25.6) at baseline improving to 11.1 (range 0-24.8) at visit 3.

Conclusions

This is the first study to specifically report on the impact of post-stroke ocular motility defects. Post-stroke ocular motility defects have an impact on quality of life. This impact is comparable to other post-stroke VIs such as hemianopia.

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# Torsion and Quality of Life study in patients with Sagging Eye Syndrome

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Objective: To evaluate the concordance and repeatability of objective and subjective methods to measure ocular torsion in patients with sagging eye syndrome, as well as to to analyze the impact of diplopia on quality of life.

Methods: cross-sectional descriptive study in a sample of 62 patients. Binocular vision, ocular motility and different eyelid measurements were examined. Subjective ocular torsion was measured using Maddox's double rod method, and objective torsion was measured using the Fovea Disc Angle method (Eidon retinograph) and the FoDi method (SD-OCT Spectralis tomograph). The presence of diplopia in the different gaze positions was evaluated with the diplopia questionnaire and the impact of diplopia on quality of life with the AS-20 questionnaire. A descriptive analysis of all variables was performed and the repeatability and concordance of each method was studied.

Results: The mean age of the sample was 82.63±5.77 years and 68.8% were women. Repeatability was better with the FDA method (ICC OD=0.92; ICC OI=0.87) than with the FoDi method (ICC OD=0.90; ICC OI=0.77). Much higher excyclotorsion values were obtained in the LE in both methods (p-value<0.001). A good concordance between methods was obtained in the case of the RE (ICC=0.85) and acceptable in the case of the LE (ICC=0.75), with a mean difference between methods of 0.38±2.19º in the RE and 2.34±2.11º in the LE. The impact on quality of life was minimal in the psychosocial part (97.98/100) and important in the functional part (70/100), and the presence of diplopia was moderate in the different gaze positions (40.09/100).

Conclusions: the objective methods used show good repeatability (better with the FDA method) and good agreement between them (better with the RE). The FoDi method underestimates the excycloposition values obtained compared to the FDA method. A significant impact of diplopia has been found in the functional part of the quality of life of patients with SES.

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# Clinical features of oculomotor disorders in children with primary congenital glaucoma.

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INTRODUCTION

Oculomotor disorders are reported in congenital glaucoma (CG), but there are few data concerning this topic. This study aims to describe the clinical features of oculomotor disorders associated with congenital glaucoma.

METHODS

A retrospective study was conducted using registries of children operated on for primary congenital glaucoma (PCG) between 2015 and 2022. We recorded the oculomotor disorders, its characteristics, refractive data and associated amblyopia.

RESULTS

48 children were included, 25 boys and 23 girls. Mean follow-up was 64.5 months for strabismic children versus 73.2 months for non-strabismic. Only 2 children had unilateral GC. 25% of those included (13 children) had strabismus. Of these, 4 had convergent strabismus (30%) and 9 divergent strabismus (68%). All these children had lower best corrected visual acuity (BCVA ) (profound or moderate amblyopia with BCVA below 0.6 LogMAR). We found a greater myopic mean spherical equivalent (SE) in the strabismic population (mean SE-1.75 D) than in the non-strabismic population (mean SE -0.35 D).

CONCLUSIONS

This study shows a higher proportion of divergent strabismus in this population, in contrast to the general population. Most children managed for PCG with strabismus had reduced visual acuity. Nystagmus appears to occur at a BCVA of less than 0.6 LogMAR in our series. This amblyopia seems to have both an organic origin (lack of corneal transparency due to Haab's striae and optic nerve lesions) and a refractive origin (with axial myopia linked to the increase in axial length associated with high intraocular pressure).

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# Evaluation of conjonctival incisions used in strabismus surgery in eyes that have undergone glaucoma surgery.

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Introduction: To evaluate the effects of conjonctival incisions used in strabismus surgery in patients who have undergone glaucoma surgery.

Method: The files of the operated patients who were followed up in the strabismus unit of our hospital between 2012 and 2023 were retrospectively examined. The files of patients who had glaucoma surgery before strabismus surgery were included in the study. The types of conjonctival incisions used and peroperative and postoperative complications were recorded.

Results: Four patients were operated for congenital glaucoma and 1 patient was operated for post-traumatic glaucoma and 1 patient was operated for open angle glaucoma. Ahmed glaucoma valve was applied to 3 patients. During the strabismus operation, Cul de sac incision was used in 4 patients, Swan incision was used in 2 patients, and limbal L incision was used in 3 patients. No peroperative complications were observed. Although the bleb was avoided with a cul de sac incision, postoperative hypotony was observed in one patient. No bleb leakage that could cause postoperative hypotony was observed in any of the other patients. Increased intraocular pressure occurred in a patient who underwent transposition surgery and L incision. In this patient, the increase in intraocular pressure was controlled within a week with medical treatment.

Conclusion: As a result of our study, it was observed that the types of conjonctival incisions used in strabismus surgery in patients who had undergone glaucoma surgery did not make a difference in terms of bleb leakage when closed well. It was concluded that it is important to prepare the incision away from the bleb and close it well.


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# Early and late complications after strabismus surgery in children.

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Introduction: Strabismus surgery mostly is safe and effective, but both early and late complications may occur and must be diagnosed and treated to obtain the best possible surgical outcome. The aim of our study was to assess the occurrence of early and late complications after strabismus surgery in children operated on in our center in years 2020-2023.

Material and methods: In the years 2020-2023, 555 patients with strabismus aged 2 to 12 years old were operated on in our clinic. Operated patients suffered from the following types of strabismus: strabismus convergent, strabismus divergent, vertical strabismus and an strabismus with additional oblique component. The strabismus angle before surgery ranged from 17 to 52 PD. The first check-up was performed 2 weeks after the surgical procedure and the next ophthalmologic examination was performed 3 months after the surgery.

Results: After strabismus surgery, children experienced early complications in the form of: postoperative infection (3 patients), allergic reaction (7 patients), dellen (4 patients), changes in the position of eyelids (5 patients), transient changes in refraction (4 patients). Late complications were noted in 18 patients in the form of: unsatisfactory alignment of the strabismus angle (10 patients), diplopia (2 patients), conjunctival scarring (4 patients), granuloma (2 patients).

Conclusion: Strabismus surgery in children is associated with a low number of early and late complications. Systematic postoperative follow-up is important to achieve the best possible outcome.

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# Management of suture granuloma after strabismus surgery

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**Introduction:**

Suture granuloma is a common complication of strabismus surgery, with an estimated occurrence of up to 2.1%. Despite this, there is no standardised protocol for prevention or management. We describe a case report of a 9-year-old female who developed large suture granulomas after undergoing strabismus surgery using 6/0 VICRYL (a synthetic braided absorbable suture made from polyglactin 910).

**Methods:**

Case report with literature review.

**Results:**

The patient underwent uncomplicated right eyed lateral rectus recession and medial rectus resection but developed suture granulomas over the new insertion sites of both muscles within 3 weeks, despite sterile intraoperative techniques and good post-operative drop compliance. The patient was afebrile, had minimal pain and did not respond to initial treatment with hourly dexamethasone 0.1% drops and oral ibuprofen for two weeks. The patient was taken back to theatre for revision surgery. She was found to have extensive granulation tissue overlying the retained suture fragments. The granulation tissue was completely excised, and the conjunctiva sutured with 8/0 VICRYL. There was subsequently good healing with no recurrence at 2 month follow up. The sutures grew Gram negative bacilli (Psychrobacter) on culture.

**Conclusions:**

Suture granuloma is caused by a foreign body reaction, which may be to suture antigen or bacteria. The main differential diagnosis is infection, which requires very different management. While non-surgical treatments such as topical or oral steroids and beta blockers are known to be helpful, treatment courses are often prolonged over many months, and may still require subsequent surgery. We suggest that early recognition and surgical intervention for suture granuloma can produce safe and effective results without the need for prolonged medical therapy. The suture material used is also likely to be important in determining treatment response, with possible cost implications for theatre procurement.

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# Randomised controlled trial of 5% vs. 1.25% povidone-iodine preoperative conjunctival rinsing: no difference but many contaminated reattached eye muscles

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Introduction: Our previous study of 26 patients with endophthalmitis after strabismus surgery doi:10.1111/aos.14446 showed that most cases occur in children aged 6 or less, exclusively after medial rectus recession. One issue discussed was the optimal concentration of Povidone-Iodine (PI) for antisepsis.

Methods: In four academic clinics in Amsterdam, Leiden and Rotterdam the onjunctiva was irrigated with 1.25% or 5% PI prior surgery. PI 10% was diluted 2x or 8x by the anesthiologist prior surgery according to a blinded randomisation table. Smears were obtained for aerobic and anaerobic bacteria with moistened dissolving Ca-alginate swabs from nose and conjunctiva before PI irrigation, from conjunctiva 5 minutes after PI irrigation, from reattached medial rectus muscles (RMR), and from conjunctiva after its closure (CC). Specimens were inoculated and cultivated onto blood/chocolate agars and in thioglycolate broth for 3-5 days.

Results: 70 Children were included. Case #20-70 had nose cultures. Case #53-70 had lacrimal sack compression added to PI irrigation. No statistically significant difference was found between 1.25% and 5% PI.Bacteria were found on RMR in 7, on CC in another 2, of 19 cases without nose cultures. Bacteria were found on RMR in 9, on CC in another 5, of 33 cases with nose cultures; in 9 of these 9+5=14 cases, the bacteriae in the nose and on RMR or CC were the same. In some cases where nose and RMR bacteria were the same, the conjunctiva had contained other bacteria before surgery. Bacteria were found on RMR in 3, on CC in 0, of 18 cases with lacrimal sack compression added tot PI irrigation.

Conclusions: RCT

In 44.2% of the first 52 cases, bacteriae were found on RMR or CC. Of the 33 cases of these that had nose cultures, 64.3% of 14 cases with bacteria on RMR or CC carried the same bacteria in the nose. Of the 18 cases with lacrimal sack compression added to PI irrigation only 16.7% had bacteriae on RMR and none on CC.

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# The incidence of incorrect eye muscle operations in the Netherlands

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Abstract:

Title: The incidence of incorrect eye muscle operations in the Netherlands

Introduction: Even with the help of a time out procedure, the risk of making a mistake with the scheduled operation in strabismus surgery is probably higher than in other ophthalmic operations due to the possibility of not only operating on the wrong eye, but also the possibility of operating on the wrong muscle or doing the wrong procedure on that muscle.

Methods: We sent a survey to all ophthalmologists who perform strabismus operations in the Netherlands. The survey included questions about the amount of strabismus surgery they perform yearly, how many years they perform strabismus surgery and whether the surgeon had ever performed incorrect eye muscle surgery, if so, we asked them if they operated on the wrong eye or wrong muscle and how many times they performed incorrect eye surgery. we also asked them what procedure they use to avoid wrong eye surgery and whether they have changed their procedure to prevent mistakes since.

Results: we were able to identify 86 strabismus surgeons in the Netherlands, of which 66 completed the survey, 20 had performed an incorrect eye muscle operation, most cases involved an incorrect muscle.

Conclusion: Incorrect eye muscle operations for strabismus occur in about 1 in 3 surgeons in the Netherlands, most surgeons adapted their procedure to avoid another wrong eye surgery.

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# Efficacy of pre-operative multidisciplinary meetings for surgical management of strabismus.

**Bhavini GOHIL**[1], Naomi TAN[1], Rohit JOLLY[1], Neha YADAV[1], Saurabh JAIN[1]

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**Title:** Efficacy of pre-operative multidisciplinary meetings for surgical management of strabismus.

**Authors:** B Gohil (O), N Tan (C), R Jolly (C), N Yadav (CF), S Jain(C)

## Introduction:

Informal discussion regarding surgical management plans between strabismus surgeons is common. The informal nature of this limits potentially valuable multi-disciplinary input and learning opportunities. Weekly virtual multidisciplinary team (MDT) meetings were set up to provide a platform for discussion of pre-operative strabismus surgical cases.

## Methods:

Weekly virtual Microsoft Teams meetings are held on Monday mornings for 1hour, attended by three consultants, paediatric fellow, all trainees on the paediatric firm and orthoptists. The meetings are recorded and available for play-back, allowing reference to the content.

Anonymised case presentations for upcoming surgery cases are prepared and presented, with discussion from the participants regarding the examination findings and surgical management. Cases are anonymised to allow multicentre collaboration. The collectively agreed management plan is documented in the patient medical notes.

## Results:

The management plan is formalised, where possible, during the MDT meeting. Where required, additional tests are arranged. There are opportunities for all participants to constructively challenge decisions. Trainees of all levels are actively engaged by presenting cases and listening to the rationale behind surgical plans, with the opportunity to ask and respond to questions.

## Conclusions:

Patients are informed that their case has been taken to the MDT meeting, to obtain multiple opinions from the team which gives them additional confidence.

Orthoptists can see the impact of the measurements they provide, and how omitting or including tests can change the agreed plan.

This MDT has been a positive change to our surgical strabismus patient pathway. Knowledge and teamwork have been strengthened using this innovative virtual discussion method.

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# Fluorescent surgical needles for teaching strabismus surgery

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## Introduction

There are many reports of globe perforations while suturing the muscle to the sclera.

Losing the sight of the needle during the scleral pass can result in globe perforation.

There have been many published ideas on how to address this issue.

We present needle fluorescence as a way of not losing sight of the needle during the scleral pass.

## Methods

Our first attempt was to use fluorescent paint on a 6-0 Spatulated needle.

Using blue light we could see the fluorescence while doing simulated scleral passes on different materials and pig eyes.

We thought about 3D printing the needles with fluorescent PLA filament. We used Onshape software and Bambu Lab printers, the filament was Ziro 3D PLA-PRO.

The needles could be designed and printed at a larger size.

They were tested on different materials but not on pigs eyes because the size of the needle was too large.

## Results

Fluorescence proved to be a tool to asses the depth of the needle on different materials, but couldn't be tested yet on pig eyes due to the large size of the needle.

## Conclusions

Our trial plastic needles were created with a basic 3D printer and they are too large to perform a scleral pass in pig eyes.

We are working on reducing the size and increase the strenght and sharpness of the fluorescent needle, but the main point is that plastic fluorescent needles showed to be very helpful in keeping track of the needle in other materials.

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# The prevalence of different types of strabismus among strabismic patients in Kazakhstan

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**Introduction:** Strabismus is a very common pediatric ocular problem found in Kazakhstan and there is a lack of population-based data on its prevalence and types. This study presents the relative prevalence of various types of strabismus and other pathologic findings that might be associated with it.

**Methods:** This single-center, retrospective cohort study was performed using data from the archives of «Kazakh « Badge of Honour» research institute of eye diseases» LLP, Almaty, Kazakhstan, from 2018 to 2022. The study consisted of using records of strabismic patients. From these, strabismus types and associated abnormalities, types of amblyopia were recorded.

**Results:** In this study, 425 strabismic patients were studied who underwent strabismus surgery at the First Surgical Department of the Kazakh National Institute of Ophthalmology in Almaty, Kazakhstan. Nonaccommodative esotropia (ET) was the most prevalent type of strabismus accounting for 43.3% of all strabismic patients while intermittent exotropia (XT), nonaccommodative ET and hypertropia (HT), with 21.3%, 20.1% and 15.3%, respectively, were relatively common. The most common association with those types of strabismus was inferior oblique overaction accounting for 10% of all cases. Significantly 30% of patients had no amblyopia and 70% of patients had a combined type of amblyopia which was the most common type of amblyopia found in strabismic patients.

**Conclusion:** The study found that nonaccommodative esotropia (ET) was the most prevalent type of strabismus, accounting for 43.3% of all cases. The findings emphasize the importance of tailored treatment approaches that take into account the specific type of strabismus and the presence of amblyopia in order to provide the best possible care for these patients. Further research may be warranted to explore treatment strategies and outcomes in greater depth.

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# Comparison of Functional and Vascular Structures in Dominant and Non Dominant Eyes

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PURPOSE:

Although the mechanism of ocular dominance is not fully understood, there are studies suggesting that it is caused by retinal anatomy, visual pathways or cortical asymmetry . In this study; we aimed to evaluate the retina and optic disc functions and the vascular structure in dominant eyes (DE) and non-dominant eyes (NDE) in healthy adults using pattern electroretinogram (pERG) and optical coherence tomography angiography (OCTA) tests.

METHOD:

68 eyes of 34 healthy subjects with bilateral visual acuity of 1.0 were included in the study. Intraocular pressure (IOP), cycloplegic spherical equivalent value, axial length, pERG and OCTA measurements were performed. Patients with SE +2.5/-2.5 D were included in the study. DE was detected by the hole-in the card test. The first group was taken as DE and the second group was taken as NDE.

RESULTS: 24 (71%) of the cases were female and 10 (29%) were male, and the mean age was 31.4±7.9 (18-35) years. Right eye dominance was observed in 24 cases (71%), and left eye dominance was observed in 10 cases (29%). No significant difference was detected between the groups in terms of pERG wave amplitudes and latencies ($p>0.05$). With regard to OCTA, no significant difference was detected between dominant and nondominant eyes in terms of vascular densities in the superficial and deep capillary layers ($p>0.05$).

DISCUSSION: Given that there was no significant difference in pERG, p50 and N95 wave amplitudes and latencies between DE and NDE in our study, it can be concluded that the two eyes are functionally similar. The similar results between the two eyes with OCTA indicate that there is no difference in terms of vascularity.

CONCLUSION: It can be concluded that there is no difference between the optic nerve and retina functions and vascular structures. It is thought that cortical structuring is more effective than ocular function in DE preference in healthy individuals.

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# Diagnosis and Management Practice Patterns among Pediatric Ophthalmology Personnel in Israel

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Introduction:Pediatric ophthalmology is characterized by diverse attitudes regarding diagnosis and treatment of various

conditions. Our aim was to investigate the diagnosis and management practice patterns of different aspects of pediatric ophthalmology among pediatric ophthalmologists and orthoptists in Israel.

Methods: A 21-question survey was delivered to all registered pediatric ophthalmologists and orthoptists in Israel.

Results: The response rate was 58.3%. Most pediatric ophthalmology personnel in Israel do not document intermittent exotropia (IXT) with a control scale, do not use modalities other than patching for amblyopia, and do not use distance stereoacuity tests. There was no consensus regarding patching and over minus treatments in IXT. In contrast to frequent use of prism adaptation test (PAT) for evaluating strabismus, most Israeli pediatric ophthalmology personnel do not use postoperation diplopia test (PODT). While most orthoptists use a questionnaire when diagnosing convergence insufficiency (CI), most pediatric ophthalmologists do not.

Conclusions: This study highlights the current areas of consensus and disagreement regarding pediatric ophthalmology diagnosis and management practices in Israel. Adopting a uniform approach regarding diagnosing CI, including using a questionnaire by pediatric ophthalmologists and orthoptic exercises in the management of IXT, is warranted to enable unified treatment by pediatric ophthalmologists and orthoptists in Israel.


**Session: Poster session C**

# Online Visibility and Scientific Relevance of Strabismus Research: Bibliometric Analysis

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**Introduction:** Quality and accuracy of online scientific data are crucial given the internet and social media serve as primary sources of medical knowledge nowadays. Our study aims to assess the relationship between online visibility and the scientific relevance of strabismus research.

**Methods:** The Altmetric Attention Score (AAS) served as a proxy for online visibility, whilst citations and the journal's impact factor as a metric for scientific robustness. A list of 100 articles with the highest AAS and 100 papers with the highest citations including the keyword "strabismus" was generated. Data for citations, time since publication, and the journal's impact factor were collected. Correlation between all variables was tested with Spearman's rank correlation coefficient.

**Results:** For the 100 articles with the highest AAS, we demonstrated a significant, but weak correlation between online visibility and citations ($p = 0.04$, $r = 0.22$). We found no correlation between Altmetric Attention Score and the journal's impact factor ($p = 0.15$) or time ($p = 0.37$). For the 100 articles with the highest number of citations, we found no correlation between the citations and the AAS ($p = 0.73$) or the journal's impact factor ($p = 0.55$).

**Conclusions:** Although highly publicised papers tend to be cited more frequently, the most highly cited papers are not always the ones being most shared on social media. Therefore, researchers should make a greater effort to share potentially high-impact studies on social media to improve the dissemination of their data, increase citations in related papers and enhance the quality of evidence-based knowledge for patients.

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# Development of a Comic to address Fear and Anxiety Factors affecting Patients and their Families undergoing Strabismus Surgery

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Introduction:

The aim of this study was to develop a leaflet in comic form to address perioperative fear and anxiety factors affecting paediatric strabismus surgery patients.

Methods:

We reviewed relevant literature to determine precipitants of fears and anxieties experienced by paediatric patients. and used this to develop a two-part questionnaire for a cohort of paediatric patients undergoing strabismus surgery. We analysed their answers for content themes and reviewed pre-existing paediatric comics and similar materials. We used this information to develop a strabismus surgery leaflet in comic form for strabismus patients and assessed readability of our comic using the Baker Able Leaflet Design (BALD) assessment tool.

Results:

The two-part questionnaire identified positive and negative aspects of the patient journey, corroborated fears reported in the literature, and anxiety inducing factors specific to strabismus patients. Common anxiety factors for children during their patient journeys included engaging with medical professionals and use of medical equipment, as well as the inpatient and outpatient environments. We used this information to develop a paediatric comic for widespread use validating the readability and design with the BALD assessment tool.

Conclusions:

There is a lack of evidence regarding fear and anxiety specific to paediatric strabismus surgeries. Strabismus surgery, especially in the paediatric age group carries unique fear inducing factors, therefore interventions which alleviate this would greatly benefit patient experience. Addressing anxiety inducing factors in paediatric strabismus surgery is needed to mitigate negative short- and long-term negative effects on patients and support patients peri-operatively. Comics are a reproducible and cost-effective means by which to educate patients and their families.

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# Surgical management of a complete traumatic superior oblique rupture

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Introduction

We describe the surgical management of a 26-year-old patient with complete avulsion of the left superior oblique muscle secondary to childhood trauma.The patient suffered from a left penetrating orbital injury from a hook at the age of 13. He presented with a large angle incomitant vertical deviation controlled by a large compensatory head posture.

Methods

This patient was referred for a second opinion regarding troublesome vertical diplopia which he controlled with a significant head posture. He had undergone previous lid surgery as a child but no strabismus surgery. On clinical examination, he had excellent visual acuities in either eye: Right 0.06 and Left 0.14. Orthoptic assessment revealed a left hypertropia measuring 25^L/R in primary position, increasing to 45^L/R in right gaze. There was no significant measurable torsion (1° right incyclortosion and 1° left excyclotorsion in primary position, similar in right gaze and depression). Ocular motility showed a -2 underaction of his left superior oblique and a +3 overaction of the ipsilateral inferior oblique. He adopted a large compensatory head posture (right head tilt with chin depression), with which he was able to maintain single vision and demonstrate motor fusion and stereopsis. Anterior and posterior examination of his eyes was normal. MRI imaging showed a largely absent superior oblique, bar the tendon and trochlear. This patient was managed through a multidisciplinary approach and will undergo staged strabismus surgery to address his vertical diplopia and head posture.

Conclusion

Surgical management of traumatic strabismus can be complex.This patient is due to have staged strabismus surgery to his left eye, commencing with left inferior oblique recession and potentially right inferior rectus recession +/- nasal transposition depending on initial post operative results. We will present our pre and post operative results with photographs in 9 positions of gaze, MRI images and patient videos.

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# Surgical repair of complete inferior rectus muscle transection following non-penetrating trauma: a case report

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## Introduction

Transection of any extraocular muscle (EOM) without globe, eyelid, or orbital bone involvement is rare. We report an unusual case of isolated inferior rectus (IR) muscle transection and demonstrate good post-operative outcomes with early intervention.

## Case report

A 47-year-old male with childhood surgical correction of congenital esotropia presented following left eye injury with pliers, complaining of pain and diplopia. On examination, his vision was 6/15 (6/7.5 with pinhole). There was visible soft tissue protruding through an inferior conjunctival laceration, and marked left hypertropia, with -3 infraduction deficit. No other abnormalities were found. CT orbits showed no fractures or globe rupture.

Inferior peritomy performed during emergency surgical exploration confirmed a horizontally transected IR. The anterior aspect of the IR retained its insertion 6.5 mm from limbus, the posterior slipped part of the IR was identified inferiorly attached to Tenon's and both parts joined using 6/0 vicryl sutures. Exploration revealed intact sclera and globe. At 3-months post-operatively, there was no overt diplopia, good VA (6/4), but residual -2 underactivity of infraduction, correctable with 2D base-down Fresnel prism.

## Discussion

Traumatic IR injuries frequently occur associated with orbital floor fractures or globe injury; only 3 other cases of isolated traumatic IR transection were identified in the literature. Most of these patients ultimately achieved orthotropia or microtropia. Some authors suggest delaying surgical repair for up to 6 months to observe for spontaneous resolution, whilst other cases of delayed repair had poor outcomes due to fibrosis.

## Conclusion

Isolated EOM transection without globe or orbit injury is rare, however should be considered in all trauma cases presenting with diplopia. This case of isolated IR transection expands the limited evidence base and demonstrates that good functional outcome can be achieved with prompt surgical repair.

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# And her smile came back

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## Introduction

A three-year-old female patient presented to our ophthalmic emergency unit with a post-traumatic severe left eye retrobulbar hematoma, and marked proptosis. Her orbital imaging revealed optic nerve avulsion.

One month later, she was referred to the strabismus unit due to marked left hypotropia with limitation in elevation. Her visual acuity in the affected eye was no perception of light (NPL) due to optic nerve avulsion.

Throughout the examinations, she consistently displayed a depressed mood with a noticeable absence of her usual smile attributed to concerns related to poor cosmesis.

## Purpose

To demonstrate our approach to planning and reconstructing extraocular muscles following severe ocular trauma resulting in optic nerve avulsion and a torn superior rectus muscle. Additionally, our aim is to illustrate the emotional impact on the patient, who consistently exhibited sadness during all examinations. Subsequent to the transposition surgery of extraocular muscles, despite her ongoing visual acuity NPL, the patient experienced a positive change, regaining her smile.

## Patients and methods

The procedure involved dissection and excision of the upper symblepharon, along with exploration of the superior rectus muscle. During the exploration, we identified a complete tear in the superior rectus muscle. Subsequently, we performed transposition of the superior oblique tendon to the site of the torn superior rectus, after shortening of the tendon. Additionally, a large recession of the inferior rectus muscle was done.

## Results

The patient's postoperative cosmetic appearance was satisfactory, although her visual acuity was still NPL her innocent childhood smile returned.

## Conclusion

Following strabismus surgery, we achieved success in improving the patient's emotional well-being, as evidenced by removal of symblepharon, and restoration of her smile after correction of hypotropia.

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# PULLED IN 2 SYNDROME - a case report.

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TITLE

PULLED IN 2 SYNDROME – case report.

INTRODUCTION

Pulled in 2 syndrome (PITS) is an uncommon, but serious, complication of squint surgery, when an extraocular muscle ruptures peroperatively, potentially resulting in permanent loss of the muscle and its function

METHODS

We present a 58-year-old hyperopic man who presented with a consecutive right divergent squint, 40 years after surgery for a partially accommodative esotropia.

Surgery was undertaken under general anaesthetic. The horizontal recti of the divergent eye were explored, and the lateral rectus recessed. There was scarring and fat around the previously recessed medial rectus, which was cleared with a plan to pull the muscle up to the original insertion. After suturing the tendon and disinserting from the globe, the muscle split at the junction of the muscle belly and the tendon as it was pulled forwards. The muscle belly was grasped as it retracted in the orbit and sutured with a non-absorbable 5.0 suture, using a half circle needle and secured to the globe. An intraoperative forced duction test was performed which showed a minus one restriction of the eye into abduction.

At post operative assessment he had excellent cosmesis with a small esotropia for near, with a slightly increased angle for distance and on right gaze.

CONCLUSION

PITS is a potentially devastating complication of squint surgery, occurring more commonly in older patients, particularly affecting the medial or inferior rectus. There is also an increased incidence in muscles affected by cranial nerve palsies, eg 3rd, 4th 6th weaknesses, which were not present in this case. Although reattachment of the muscle stump is achieved in the majority of reported cases, transposition surgery may be needed to achieve satisfactory alignment in cases where this is not possible.

This case is a typical example of this rare complication. It has been predicted that this problem will be encountered by most squint surgeons approximately once every 10 years.

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# Esotropia as a first manifestation of Neurofibromatosis type 2 - a case report

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Introduction: A 13-month-old girl presented with esotropia of the left eye. According to the parents, this had been the case for 10 months. There was no personal or family history of general or ophthalmogical disorders.

Methods: An orthoptic and ophthalmologic examination was performed for further clarification. Ophtalmoscopy revealed an abnormal optic disc on the left eye. Therefore, a neuropaediatric examination with cerebral magnetic resonance imaging and molecular genetic testing was initiated.

Results: The visual acuity on a preferential looking test was reduced on the left eye. Dilated cycloplegic refraction measured around +2 diopters. Cover testing revealed a left esotropia of + 3 to +10°. The limitation of abduction was 40-45° on both eyes. In the indirect ophthalmoscopy there was an affection of the optic disc anatomy. The cerebral magnetic resonance imaging confirmed an optic disc hamartoma. Finally, genetic testing confirmed a Neurofibromatosis type 2.

Conclusion: Any appearance of esotropia and reduced visual acuity in infants need proper ophthalmoscopy. The diagnosis of unilateral optic disc hamartoma must lead to multidisciplinary follow-up. This ensures that rare disease as Neurofibromatosis type 2 can be detected in an early stage.

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# Outcome of strabismus surgery in patients of type 3 Gaucher's disease

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## Introduction

Gaucher's disease (GD) is an autosomal recessive

lysosomal storage disorder. Three phenotypes are recognized: type 1

(GD1),Type 2 (GD2), and type 3 (GD3), the neuronopathic or

chronic type which represents 5% of all cases. The

earliest neurological defect in GD3 is horizontal

saccadic movement initiation failure (SIF),

Other ocular motor abnormalities include strabismus, nystagmus,

and an abnormal vestibulo-ocular reflex. Strabismus

(mostly esotropia) is present in 22%.

## Purpose

Surgical correction of esotropia in patients of neuronopathic Gaucher's disease (GD) type 3 aiming to improve the cosmetic appearance with the evaluation of the success rate, presence of residual angle, or recurrence during the follow-up period.

Patients and methods

Ten patients with type 3 neuronopathic GD were referred from the Pediatric Gastroenterology and Neurology Units of Mansoura Children's Hospital. All patients suffered from systemic, neurological, and ophthalmological manifestations such as hepatosplenomegaly, horizontal gaze palsy and esotropia, respectively. They received enzyme replacement therapy, and showed a stationary course for at least 1 year before strabismus surgery.

Patients were admitted and operated for correction of esotropia. They were followed up regularly every month for 1 year. Postoperative data were recorded at the end of 1, 3, 6, and 12 months.

## Results

In all, 80% of cases showed improvement of the angle. Orthotropia (within 10 pd) was obtained at the end of 6 months and maintained till the end of 1 year postoperatively; 20% of the cases showed residual esotropia.

## Conclusion

Surgical correction of strabismus in type 3 GD can achieve good cosmetic results with low risk of residual angle or recurrence.

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# Extraocular muscle enlargement in acromegaly patients.

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Introduction:

Acromegaly is a rare disease, its annual incidence is 3-4/1 000 000 people. In more than 95% of patients the cause is a growth hormone (GH)-secreting pituitary adenoma. Increased levels of GH and insulin-like growth factor (IGF-1) stimulate the growth of various epithelial and connective tissues. Our objective is to evaluate the extraocular muscles(EOM) through imaging studies in patients diagnosed with acromegaly.

Methods:

We carried out a retrospective study of patients diagnosed with pituitary adenoma and acromegaly, between 2014 and 2022 at the Ribera POVISA Hospital. We reviewed the imaging tests performed to study the pituitary gland.

For the analysis of EOM thickening, the diameter of the medial and inferior rectus was measured. The measurements were obtained by computed tomography (CT) in one case, and by magnetic resonance imaging (MRI) in the other 3 patients. We compared the measurements obtained with control values ??from healthy patients described in the literature.

Results:

A total of 4 patients were included, 2 of whom were men. The average age of the subjects was 52.25±8.18 years. We found thickening of the EOM in 3 of the 4 cases analyzed. There was asymmetry for the medial rectus, with greater thickening in the right compared to the left, although we did not obtain significant differences.

Conclusions:

Thickening of EOM associated with acromegaly has been described, although literature is limited to case series.

Knowing this association will avoid performing unnecessary diagnostic tests in search of other pathologies that cause EOM thickening. The limitations of this study are mainly its retrospective nature with brain and pituitary imaging studies, which lack the resolution of orbital studies. On the other hand, the sample is very small, although this is related to the low prevalence of the pathology. We had this finding in 3 of 4 patients.

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# Intermittent strabismus secondary to orbital varicose vein.

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Introduction

Orbital varicose veins are congenital or secondary venous anomalies, characterized by dilatation and proliferation of the orbital venous vessels. The most frequent clinical sign is intermittent exophthalmos.

Methods

We present the case and images of a 34-year-old female patient with left orbital varicose vein with clinical symptoms of intermittent enophthalmos and strabismus that appears depending on head position and Valsalva maneuvers.

Results

The patient presented with a left ET esotropia of 30 prism diopters (PD) without vertical strabismus with inferior and left lateral gaze limitation in the left eye since childhood. During Valsalva's maneuver or head tilt, a left upper hypertropia of 50 PD appeared with enophthalmos.

Macroscopic examination showed a soft bluish lesion in the palpebral region of the left inferior orbital septum and also in the inferior conjunctival sac fundus. Magnetic resonance imaging described a palpebral and orbital finding compatible with venous dilatation.

According to the literature, strabismus and enophthalmus are rare manifestations of orbital veins. One case of intermittent enophthalmos without strabismus caused by Valsalva maneuver has been reported.

In our patient, the possible relationship between orbital vascular pathology and extrinsic ocular musculature could be the cause of strabismus and enophthalmos.

Conclusions.

Although exophthalmos is the most likely clinical symptom of orbital veins, strabismus and enophthalmos may also occur.

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# Intraorbital haematoma during labor

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**Introduction:** A 31 year old woman complained about double vision during labor. Due to the rarity of this condition the diagnosis was not made immediately. Our aim is to raise awareness that an intraorbital haematoma can arise from venous hyperpression during labor. Early recognition and explanation to the patient will reduce the uncertainty and help the mother in this turbulent period of young motherhood.

**Methods:** Consult by the ophthalmologist and orthoptist was performed the same day at the maternity department. Full orthoptic examination took place 3 days postpartum.

**Results:** She wore an eyepatch on her left eye because of intractable diplopia in primary position and almost all directions of gaze. Only down/rightgaze was spared. One day postpartum there was a small haematoma from the left upper eyelid (nasally). The pupils were isocor, no RAPD. Funduscopy: normal. Slight exophthalmus OS (Hertel: 17-110-19). Orthoptic examination reveiled a small exotropia and small hypotropia of the left eye. Motility showed a small painfull restriction of elevation of the left eye. Visual acuity was good with her refractive correction.

MRI revealed an haematoma above the superior rectus muscle of the left eye. After 8 days she noticed a significant improvement of the diplopia and complete recovery occured after approximately 6 weeks.

**Conclusions:** Orthoptists and ophthalmologists need to be aware of this rare condition. Subperiostal orbital haemorrhage during labor has been described in literature and usually occurs

above the superior rectus muscle and can result in exophthalmos, restriction of elevation, painfull eyemovements, diplopia and vision loss due to optic nerve neuropathy. Recovery mostly occurs in the first 4 weeks, however also longer periods have been described up to 6 months. Our case had a relatively mild course. After two weeks there was no diplopia anymore in primary position. Vision was not affected. Nevertheless it had a great impact on her wellbeing.

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# Binocular diplopia in cocaine related nasal septum destruction

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## Introduction

Chronic cocaine use carries a high risk of nasal septum damage. Orbital involvement has been reported in several cases and a few cases present with intermittent binocular diplopia. With the ever- increasing numbers of cocaine use worldwide, the case presented here today will become increasingly common in our clinic.

## Methods

This is a case presentation of a 38 year old male with a two weeks history of headache and binocular vertical diplopia for distance and near. He had a 4 year history of cocaine use and stopped using cocaine 1 year ago.

## Results

Orthoptic examination showed a slight proptosis and marked mechanical restriction on downgaze of the right eye. CT and MRI demonstrated bilateral destruction of the nasal septum and bone erosion of orbital ?oor (inferomedial) of the right eye and bilateral orbital in?ammation around inferior and medial rectus muscles of the right eye.

A biopsy of the nasal mucosa showed necrotizing, non-granulomatous in?ammation without evidence of granulomatous vasculitis. Blood examination showed positive C-ANCA/PR3-ANCA and ANA negative. Multiple diagnosis were considered, but positive C-ANCA/PR3-ANCA made cocaine use the most likely cause for the nasal abnormalities.

Various treatment methods were started, including antibiotics, corticosteroids, nonsteroidal anti- in?ammatory drugs (NSAIDs), without significant improvement in orbital in?ammation. Only the mechanical restriction and diplopia have reduced since the start of treatment.

Metabolites of cocaine were found in urine that indicate active cocaine use, even though he said he wasn't. This might be the reason why he is not responding well to treatment.

## Conclusion

Cocaine use can cause serious damage to the nasal septum and should be considered in de di?erential diagnosis of binocular diplopia, especially when it extends to destruction of the orbital walls and orbital in?ammation.

For optimal treatment, psychosocial help should be advised in these types of patients.

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# Morphometric, ophthalmological and strabological assessment of children operated on due coronary craniosynostosis at the Children's Hospital in Olsztyn, Poland- preliminary report

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## Introduction

Children with craniosynostosis have abnormal structure of the orbits and often the eyeballs. Approximately 1:2000-1:2500 children are born with this defect every year in the world. This may lead to visual system dysfunction and vision impairment in the future. Most abnormalities occur in children with coronary craniosynostosis.

## Methods

We examined the morfometric features of the orbits, the structure and position of the eyeballs on the basis of preoperative CT scans. We also examined the refractive error and the position of the eyeballs, mobility and strabismus angle in children before and after surgery. We also wanted to measured how the procedure affects the reduction of the strabismus angle.

## Results

Based on these test, we obtained the following results- strabismus, differences in the size of the eyeballs, anisometropia and amblyopia. In order to present these irregularities, we present several cases.

Our research is at a preliminary stage. In the future, we plan to analyze the correlation between the observed morphological and ophthalmological disorders.

## Conclusion

Currently, approximately 150 children with craniosynostosis are operated on in our hospital every year. In this group, coronary craniosynostosis accounts for approximately 6-10 cases per year. They are usually operated on within 1 year of life. We want to provide them with ophthalmological care for years to come.

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# Absorbable Sutures in Inferior Rectus Muscle Recession Surgery

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## Introduction

Inferior rectus (IR) recession surgery can be associated with a significant risk of overcorrection due to the impact of the lower lid retractors, rapid dissolution of absorbable sutures and tight muscles in thyroid eye disease (TED). Non-absorbable sutures have been used to minimise risk of late overcorrection but suffer from their own disadvantages. This study aims to evaluate the efficacy of absorbable sutures in inferior rectus (IR) recession.

## Methods

A retrospective study (December 2020 to January 2023) was conducted at a single tertiary referral centre on patients who underwent IR recession for hypotropia. The data collected included preoperative and postoperative orthoptic measurements, presence of TED, surgeon training level (fellow/consultant) and number of muscles operated on.

## Results

Of the 20 IR procedures identified, all used absorbable 6/0 vicryl sutures. 4 procedures involved TED patients. Success was defined as ?5 prism diopters (PD) deviation in primary position, 2-12 weeks post-surgery. 9 (45%) were successful using near measurements and 13 (65%) in the distance. Postoperatively, 14 patients (70%) were orthophoric or undercorrected, whilst 6 (30%) were overcorrected. Average undercorrection was 4.57 PD and 6.46 PD for distance and near respectively; overcorrection was 7.33 PD (distance) and 11.83 PD (near). Overcorrection occurred in 50% of TED patients. Logistic regression showed that TED ($p=0.35$), surgeon training level ($p=0.06$) and number of muscles recessed ($p=0.26$) did not have a significant impact ($p>0.05$) on the procedure success.

## Conclusion

This study shows comparable success rates to literature values for IR recession. Notably, the majority of the cases in this cohort were undercorrected or orthophoric demonstrating the safety of the use of absorbable sutures in inferior rectus recession.

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# Rectus Muscle Fenestration as an Alternative Procedure for Horizontal Strabismus Management

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## INTRODUCTION

An emerging alternative procedure known as fenestration is gaining attention for revolutionize horizontal strabismus management.The main advantage from this procedure is the reduction in recovery time for the patient since sutures are not required. This intricate procedure represents a pivotal step in the pursuit of optimal correction for strabismus.

## METHODS

This is a retrospective and descriptive study, the study which involved 27 patients (median age: 8.5 years, range: 2.5 to 50 years.

The table of Kenneth Wright was used for reference with the addition of 2mm as is standard in the literature. Success was defined as postoperative alignment within 8DP of orthotropia in the primary position at the last follow-up. A history of previous strabismus surgery, orbital surgery, nystagmus, or neurological disorders were excluded from this study.

## RESULTS

A total of 27 children were included. The mean preoperative angle of deviation at distance improved from the preoperative angle of deviation at a distance ranged from 25DP to 70DP mean: 38.3 DP, SD: 10.53, after the procedure it showed improvement ranging from 8 to 10DP, the definition of a success postoperative result angle: 8DP to 10DP, range: 10DP, $P < 0.001$ postoperatively $P<0.001$.

At one-month follow-up, both groups in total demonstrated an 85.1% frequency of orthotropia alignment, with significant reductions in esotropia (3.3D/mm) and exotropia (4.09D/mm)

Success outcome was achieved in 81.4%-85,1% of the cases at the 1 day and 1 month follow-up . There were no reported postoperative complications.

No discernible differences were noted between bilateral and unilateral cases OR 0.71, IQR 0.09-6.42; $p < 0.711$.

## CONCLUSIONS

The efficacy and safety of muscle fenestration for correcting horizontal strabismus were found to be comparable between bilateral fenestration and resection, it is important to note that this study had a limited follow-up period. In Costa RIca conventional surgery a 71%, success rate was obtained.

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# The Comparison Of Three Muscle Strenghthening Surgery Methods

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INTRODUCTION: Resection, plication and reinforsed plication operations are used for strenghtening procedure in strabismus surgery. our aim for this study to compare the results of these surgeries.

METHOD: The files of 10 patients who had one eye operated on by the same surgeon due to horizontal deviation and who used resection as a muscle strengthening technique, 10 patients who used the plication, and 10 patients who used reinforced plication were evaluated retrospectively. Before the operation, patients underwent anterior and posterior segment examinations as well as a detailed strabismus examination. Strabismus examinations performed postop1st day and It was repeated at first month and 6th. months.

SPSS for windows 20 program was used for statistical evaluation of the results.

RESULTS: The preoperative deviation amount of the patients, who underwent resection and plication, were between 35-45 pd, with an average of 38.4± 9.6 pd, and this post-operative value was found to be 2.7±6.1 pd. Except for two patients who underwent the reinforced plication as a second operation, all was applied as the first operation. In this group, the deviation amount were recorded as 30-60 pd preoperatively, an average of 42.2± 14.0 pd, and 3.2±7.4 postoperatively.

CONCLUSION: As a result of our study, all techniques were found to be effective, and reinforced plication was also effective in larger deviations. Working with larger series will help determine the real effects.

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# Effect and duration of diagnostic injection of lidocaine into extraocular muscles

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Introduction: Lidocaine injection into extraocular muscles induces a temporary paralysis which may be useful in clinical practice. It may be used as an alternative to the use of botulin toxin injection, which has a longer lasting effect and more side effects, as a diagnostic procedure to evaluate complicated diplopias.

Methods: Description of 3 cases of perimuscular lidocaine 2% injection into extraocular muscles focusing on obtaining a time-effect curve and diagnosis of diplopias with uncertain prognosis after surgery.

Results: Description of 3 cases of diplopia which was not entirely compensated by prisms. Two out of three cases had a great symptomatic improvement which was followed by a good surgical result as well as a correction of the asthenopia which was the main symptomatic complain. The time-curve effect showed a possible maximum effect between 4-6 hours after injection and a complete effect cessation 24 hours after injection.

Conclusion: In conclusion, lidocaine is considered as a promising diagnostic procedure useful for complex cases. In our clinical practice a good correlation between lidocaine effect and an adequate surgical result was found. It has a fast and reversible effect in less than 24 hours with a probable maximum effect between 4 and 6 hours. Further investigation is required to improve our understanding of lidocaine effect and establish the best moment to examine the patient to acquire the best clinical information.

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# Near and distance Stereoacuity Improvements Following Successful Surgical Alignment in Exotropic and Esotropic cases

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Introduction: Surgical treatment for strabismus is to encourage binocular vision, and the study is to evaluate the effect of surgical realignment on near and distance stereopsis in exotropic and esotropic cases.

Methods: The records of patients who underwent strabismus surgery for esotropia and exotropia were retrospectively reviewed. Patients were included in the study if they achieved postoperative satisfactory alignment (< 10 PD). Visual acuity, ocular deviations, ocular motility, strabismus subtype and duration, surgery procedures, and stereopsis at before and at 1, 6, 12, 24, 48, 60 and 72 months after surgery were collected. Wilcoxon signed ranks test was performed to analyze stereopsis improvement by surgery. A logistic regression analysis was used to investigate the factors for stereopsis improvement.

Results: 22 exotropic and 46 esotropic patients were enrolled. After surgery, near stereopsis was improved in 56 patients (82.3%) including 45 (97.8%) esotropic patients and 11 (50%) exotropic patients. Distance stereopsis was improved in 53 patients (77.9%) including 40 (87.0 %) esotropic patients and 13 (59.1%) exotropic patients. The near and distance stereopsis after surgery was significantly improved in patients with esotropia ($p < 0.001$, $p < 0.001$), but not in exotropic patients ($p = 0.248$, $p = 0.753$). Spherical refraction and anisometropia were related factors for distance stereopsis improvement in esotropia patients (OR 1.802, $p = 0.028$) (OR 4.670, $p = 0.029$).

Conclusions: The loss of stereopsis was significantly restored by appropriate surgery in esotropia patients and the extent of distance stereopsis recovery by surgery depends on spherical refraction and anisometropia.

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# A comparison of surgical outcomes between manifest exotropia and esotropia cases

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Introduction:The improvement of ocular alignment and binocular sensory function is the goal of surgical correction in patients with strabismus. The aim of this study was to compare the surgical outcomes of concomitant manifest esotropia (ET) and exotropia (XT) cases.

Methods:In present retrospective study, 30 XT and 74 ET patients who had undergone strabismus surgery were involved. Data on type and duration of strabismus, age at onset of deviation and surgery, pre- and postoperative strabismus deviation angles, and near and distance stereoacuity was recorded. Statistical analysis were used Wilcoxon signed ranks test, chi-square test.

Results:In esotropia group, 68 cases (92%) had successful near and distance ocular alignment(<10 prism diopters) after surgery. 58 cases had ability to cooperate with stereopsis examination. After surgery, 53 cases (91%) had near stereopsis (52%, good stereopsis), and 45 cases (78%) had distance stereopsis (31%,good stereopsis). In exotropia group, 26 cases (87%) had successful near and distance ocular alignment (<10 prism diopters) after surgery. 23 cases had ability to cooperate with stereopsis examination. After surgery, 16 cases (78%) had near stereopsis (70%,good stereopsis), and 16 cases (78%) had distance stereopsis (70%,good stereopsis). Though XT patients showed better pre-operative near and distance stereopsis than ET patients, the near and distance stereopsis after surgery was significantly improved in patients with esotropia($p < 0.001$,$p<0.001$). On the contrary, the near and distance stereopsis after surgery was not significantly improved in patients with exotropia($p = 0.368$,$p=0,154$).

Conclusions:Surgical correction of strabismus could improve ocular alignment and binocular sensory functions in patients with manifest strabismus, regardless of onset age, strabismus duration, or type. Compared with XT patients, ET patients could recover more binocular sensory functions if postoperative successful ocular alignment is achieved,

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# Monocular infantile blindness with nystagmus : oculomotor features and surgical outcome

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Introduction : Oculomotor status in monocular infantile blindness (MIB) may be considered as a subtype of infantile esotropia. Patients frequently present with nystagmus increasing in abduction and usually adopt anomalous head posture (AHP) with fixation in adduction in order to decrease the amplitude of nystagmus.

Methods: We studied a series of 27 cases of MIB with nystagmus resulting from strictly unilateral organic ocular damage. Their clinical history with, medical and surgical treatments were recorded.

Results: 27 patients (13 women) aged 4 to 46 years were included (median 8.9 years). The etiology found was papillary atrophy or hypoplasia in 12 cases, colobomatous damage in 4 cases, congenital cataract in 8 cases, consequences of forceps trauma in 2 cases and retinal hamartoma in one case. The visual acuity of the healthy eye was on average 0.06 log Mar. 92% of patients presented AHP, the sound eye fixating in adduction. A torsional component was also observed in half of the cases. 75% of patients presented esotropia. 20 patients received strabismus surgery in order to treat esotropia and improve a disabling torticollis. In 15 cases, surgery was indicated to treat torticollis and thus performed on the healthy eye. In 12 cases, a faden-operation of medial rectus associated or not with recession was performed to treat fixation in adduction, and 2 cases were treated for torsional torticollis. AHP improved in all cases. In 5 cases, esotropia was the main reason for surgery and it was performed on the amblyopic eye, with good results.

Conclusion: MIB with nystagmus is a rare situation that can lead to disabling head posture requiring appropriate oculomotor care. In this case, surgery of the sound eye is mandatory, and fadenoperation seems convenient to treat fixation in adduction.

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# The oculomotor imbalance in the absence of visual input in case of persistent concomitant strabismus

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The oculomotor imbalance in the absence of visual input in case of persistent concomitant strabismus.

Introduction: The components of the muscular imbalance often appear more complex after one or several muscle surgeries for a concomitant strabismus than they initially do. Thus, the MRI of the orbits could provide useful data if a new surgery is indicated. This procedure is now systematically applied to optimize the surgical strategy.

Methods: The MRI of the orbits was performed according to an appropriate protocol with axial, coronal, standard and oblique, and sagittal oblique sections in SEpT1 and SEpT2 sequences (without Gadolinium). It was carried out with closed eyes, i.e. without visual input, thus revealing the imbalance of the global passive and active muscles forces.

Patients: Sixty-two patients with a persistent concomitant strabismus (either residual, repeated, consecutive or complex) were examined according to usual strabismological procedures, completed with the realization of an MRI.

Results: The persistent strabismus that appeared after a surgery for an esotropia was a persistent or repeated esotropia or a consecutive exotropia. If it originated after a surgery for an exotropia, the strabismus was a persistent or repeated exotropia or a consecutive esotropia. In both cases a residual or additional incomitant deviation may be associated. The deviation was confirmed by the MRI. It showed the imbalance of the global muscle forces. Nonetheless, the deviation appeared either of the same type as the manifest deviation, or of the opposite type or side, or differently on both eyes. Therefore, the surgical strategy in order to treat the persistent strabismus was to correct the imbalance of this forces. The postoperative results are analyzed in detail.

Conclusion: The imbalance of the global muscle forces on which the visual input acts is to be assessed. It is to be corrected by a new surgery and the forces shared optimally between the muscles involved.

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# Choroidal effusion induced by Lateral Rectus Split Nasal Transposition (LRSNT) for 3rd nerve palsy due to vortex vein compression solved by relaxing adjustable sutures.

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## Introduction

Lateral Rectus Split with Nasal Transposition (LRSNT) for a complete 3rd nerve palsy may offer a permanent correction of the ocular misalignment, but studies have shown up to 10% risk of choroidal effusion and serous retinal detachment in the immediate postoperative phase. We present a case with Indocyanine Green (ICG) verified vortex vein pulsation after LRSNT and how this can be managed.

## Methods

Evaluation of patients treated with LRSNT for a complete 3rd the last five years to report any cases of choroidal effusion.

## Results

Among 35 patients with 3rd nerve palsy, four patients had LRSNT performed in one eye. Of these, one had choroidal effusion:

A 61y-old-woman operated for a large pituitary adenoma suffered from a complete left 3rd nerve palsy with ptosis, exotropia and hypotropia. The ptosis resolved, but the ocular deviation in the left eye (LE) remained, thus a left LRSNT was performed. On the day after the surgery, the patient complained of pain in LE, and of visual loss in LE from BCVA 0,7 to 0,1. Optical coherence tomography showed choroidal effusion with severe choroidal folds, and ICG showed venous pulsation of the lower nasal vortex vein, and the intraocular pressure (IOP) was 35 mmHg. At day 8, still without resolution, a 5 mm relaxation of the adjustable sutures on both the superior and inferior part of the LRSNT in LE were performed, and during the following week, IOP normalized, choroidal folding and effusion reduced, and BCVA improved from 0.1 to 0.8 Snellen. *ICG angiogram film shows venous pulse in vortex veins* at first day after left LRSNT for a complete 3rd palsy.

## Discussion

LRSNT for complete 3rd nerve palsy may produce choroidal effusion and serous retinal detachment in the immediate postoperative phase due to compression of the vortex veins. In this case, ICG showed vortex vein pulsation, and relaxation of the adjustable sutures eight days after surgery resolved the problem.

**Word-count: 316**

**Characters: 1939**

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# Secondary glaucoma after nasal transposition of the split lateral rectus muscle.

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Introduction: Nasal transposition of the split lateral rectus muscle (NTSLR) has been recognized as an effective procedure to improve primary position alignment in patients with third nerve palsy. Although NTSLR has been generally recognized as a satisfactory procedure, there have also been reports on vision-threatening complications including choroidal effusion, elevated intraocular pressure, anterior segment ischemia and one case of optic nerve edema.

Method: We present a case involving a 64-year-old male who underwent a NTSLR on his left eye for complete bilateral third nerve palsy. The patient had undergone a recession of both lateral muscles five months earlier. He presented with a large exotropia of more than 90PD and a left hypertropia of 20 PD. He was amblyopic on his right eye and had adapted a head turn to the right to make optimal use of his left eye.

Results: The patient complained of pain and nausea only hours after the procedure. Upon examination, a shallowed anterior chamber and an intraocular pressure of 50 mm Hg were noted; efforts to reduce the pressure, including release of the transposed muscles, administration of intraocular pressure-lowering medications and performing a peripheral laser iridectomy, proved unsuccessful. Normalization of intraocular pressure was achieved only after a vitrectomy was performed.

We argue that taut muscles or an incomplete split of the lateral muscle may have compressed the vortex veins, leading to choroidal effusion and causing a mechanical anterior shift of the iris-lens diaphragm resulting in an aqueous misdirection syndrome.

In the end, the left eye achieved nearly a primary position, while the right eye persisted with an exotropia of 35PD and a right hypertropia of 18 PD.

Conclusion: Nasal transposition of the split lateral rectus muscle (NTSLR) is an effective procedure to improve alignment in patients with third nerve palsy. Caution should be exercised due to the potential of vision-threatening complications.

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# Evaluation of aberrometry changes following strabismus surgery in patients with horizontal strabismus

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BACKGROUND: The aim is to investigate the change in aberrations following strabismus surgery in patients with horizontal strabismus. MATERIALS AND METHODS: This prospective study included patients who underwent surgery for horizontal strabismus. The patients were assessed preoperatively and 1 month and 3 months after the surgery, in terms of logMAR best?corrected visual acuity, eye deviation, spherical equivalent refractive error, tomographic and aberrometric corneal changes. Corneal tomography was performed using Orbscan II device. Wavefront analyses were performed using Bausch and Lomb Zywave II. RESULTS: A total of 25 patients (48 eyes) with exotropia or esotropia were entered in this study. Mean values of exotropia in the distance and near deviations were reported as 31.42 ± 7.13 and 28.82 ± 6.96 prism diopters (PD), respectively. Mean scores of esotropia in the distance and near deviations were 25.22 ± 5.41 and 30.45 ± 9.4 PD, respectively. Evaluation of irregularity in 5 mm zone, horizontal coma, spherical aberration changes, and root mean square of higher?order aberrations (HOAs) in 6 mm, and HOA w/o Z 400 changes showed that there was a significant difference before the intervention and 1 month after the surgery ($P < 0.05$). However, no difference was observed in the aforementioned variables before and 3 months after the intervention ($P > 0.05$). CONCLUSIONS: Results of the present study indicated a transient increase in HOAs and corneal irregularity following strabismus surgery on horizontal eye muscles that returned to the baseline after 3 months.