



## Free Paper Abstracts

## COMPARISON OF VISUAL ACUITY EXAMINATION METHODS IN CHILDREN WITH DEVELOPMENTAL DISABILITIES

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### ABSTRACT

**PURPOSE:** To compare visual acuity examination methods using: Snellen chart, LVRC ETDRS chart, and LEA

chart in children with developmental disabilities (DD) in special needs elementary school in Malang.

**METHODS:** This analytical study uses cross sectional approach measuring the uncorrected and best corrected

visual acuity in 231 students in special needs elementary school with all three methods and then compares them

statistically. In addition, the success rate of each method of visual acuity examination in each group is compared.

**RESULTS:** Out of 231 students, 90 are able to be examined by all three methods. Significant differences are

founded on visual acuity results when using the LEA chart method ( $p \leq 0.05$ ),  $0.191 \pm 0.391$  compared with  $0.284$

$\pm 0.438$  Snellen and  $0.277 \pm 0.452$  LVRC ETDRS chart. The superiority of LEA chart than two other methods are

significant in all test groups except in the uncorrected visual acuity age group  $\geq 13$  years old.

Examination success

rate with LEA chart is highest in total respondents (67.81% compared to Snellen 46.35% and LVRC chart 45.92%),

< 13 years group, learning disability group and autism-ADHD groups compared to the other two methods.

**CONCLUSION:** Visual acuity results of LEA chart (number and symbol) methods are better in almost all test

groups with higher success rates due to less detection difficulties in children with DD and more familiar optotype

character.

**KEYWORDS:** visual acuity examination method, developmental disabilities, special needs school

There is no financial conflicts of interest to disclose

## The Potential Contribution Of Early Screening At Age 6-18 Months To Detecting Visual Impairments

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Purpose.

The later visual impairments are detected in infants and treatment initiated, the harder it is to achieve maximal results, both therapeutic and functional. This may increase the risk of amblyopia (lazy eye), which can be corrected following early detection. Possible consequent difficulties involve the acquisition of learning skills, excessive fatigue, and deficient physical and social functioning. The purpose of the study was to examine the rate of visual disorders among children aged 6 to 18 months, including refraction disorders, strabismus, and structural disorders.

Venue.

At the initiative of the Pediatric Ophthalmology Institute at the Barzilai Medical Center, a joint project was developed by the Barzilai Medical Center and the Ashkelon District Health Bureau at well baby clinics (Tipat Halav) in Sderot (town near Ashkelon), for early diagnosis of visual impairments among children aged 6-18 months.

Methods.

A retrospective study based on the results of examinations conducted from March to August 2022. The children aged 6-18 months were checked. The exam included dry retinoscopy by a certified pediatric optometrist followed, when necessary, by full medical examination with cycloplegic refraction test, by a pediatric ophthalmologist specializing in diagnosing visual impairments, where the ophthalmologist came with all her equipment and performed comprehensive examinations on site.

Results.

Of the 508 children summoned for an optometrist examination, 56.5% (n=287) complied. Of all those examined, impaired results were found for 16.4% (n=47). The two most frequent problems found were astigmatism (34.04%) and far-sightedness (25.53%). When all the impaired cases identified by the optometrist were subsequently examined by an ophthalmologist, 61.7% were found to be medically impaired as well. Namely, there was only a slight difference between the results of the optometrist's examination and detection and those of the ophthalmologist's examination, where the difference was mainly evident regarding astigmatism. 10% of the children were identified by the preventive examination as having a vision problem that required further treatment.

Conclusions.

Detecting and diagnosing children via screening tests at an early age can help identify about 10% of all cases of infants with compromised vision that can be treated promptly to prevent irreversible chronic deterioration. Retinoscopy by an optometrist remains trustworthy and accurate, does not involve considerable financial costs, and the physical presence of the optometrist at well baby clinics raises the compliance of parents with bringing their child to be tested, particularly in peripheral areas.

There is no financial disclosure.

## Refractive Errors and Amblyopia Among Greenlandic Preschool Children

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### Purpose

Visual acuity and refraction of children have not previously been studied in Greenland. We aim to estimate the prevalence of refractive errors and amblyopia in preschool children in Greenland.

### Setting

The 57.000 inhabitants of Greenland live along the 44.000 kilometre coastline in 17 cities without connection by road. There are no permanent ophthalmologists in Greenland. Vision screening is recommended at the age of four, but the participation rate is low due to the lack of healthcare professionals.

### Methods

Children born in 2017 in six different cities in Greenland were invited to participate in a vision screening and a complete eye examination. The vision screening was conducted by a trained optometrist at the kindergarten with measurements of the visual acuity (VA) for distance and for near using logMAR-based picture charts, stereoacuity with Lang-II-Test, and refraction using the PlusoptiX A12R. The eye examination consisted of the same measurements as the screening and further included slit lamp examination, ophthalmoscopy, and cycloplegic refraction. Significant refractive errors were defined as myopia  $\leq -0,5$  Diopters (D), hyperopia  $\geq +2,0$ D and amblyopia was defined as VA  $\leq 6/12$

### Results

320 children participated in the study. Mean age was 59 months (49-73 months). Five percent had a binocular VA for distance of 6/9,5 or less. Eight percent had a stereoacuity of 600'' or more. Seven percent were myopic less than -0,5D, sixteen percent were hyperopic more than +2D. Estimated prevalence of amblyopia was 9,4%. Twenty-three children were prescribed glasses of which four were prescribed patching regimen for amblyopia. Five were referred to a new examination within a year.

### Conclusions

Refractive errors and amblyopia exist in Greenlandic children. A simple screening method customized to Greenland should be developed to ensure that children receive the necessary treatment before school age potentially preventing lifelong reduced visual function.

### Financial Disclosure

This study is funded by Synoptik Foundation

## Efficacy of Orthoptek Magnocellular Stimulator (OMS) as a new modality for amblyopia therapy

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**Purpose:** To evaluate the efficacy of Orthoptek Magnocellular Stimulator (OMS) as a new modality for amblyopia therapy

**Setting/ venue:** The study was conducted in Prasad Nethralaya, a tertiary eye care center in South India over a period of eighteen months between August 2021 to March 2023

**Methods:** Seventy-five subjects with confirmed diagnoses of amblyopia were included. Detailed history regarding the cause of amblyopia, refractive correction and previously instituted amblyopia therapy was recorded. Participants underwent anterior and posterior segment examination in detail, followed by cycloplegic refraction to determine refractive status, and auxiliary tests like corneal topography or electrophysiological tests where indicated. Following this, they underwent approximately 30 sessions of amblyopia therapy with appropriate refractive correction. Vision in both eyes was recorded before and after therapy in log MAR values. Binocular fusion status was recorded by Worth Four Dot Test and stereopsis using TNO chart, before and after therapy.

**Results:** A total of 75 patients were subjected to amblyopia therapy using OMS. Twenty-five patients were male and fifty were female, mean age of study population was  $12 \pm 6$  years (range 7 to 32 years). Visual acuity in logMAR units prior to therapy was  $0.57 \pm 0.28$  and post therapy was  $0.16 \pm 0.18$  ( $P= 0.0001$  by paired T test). Prior to therapy only seven patients had binocular fusion, following therapy all seventy-five patients had fusion. Stereoacuity improved from average pre-therapy value of 480 seconds of arc to average post therapy value of 60 sec.

**Conclusion:** OMS is an effective tool in management of amblyopia as a primary treatment modality, producing significant improvement even in cases where occlusion therapy has failed. It can be used in adults, as opposed to conventional modalities of amblyopia therapy. Binocular fusion and stereoacuity were also seen to have improved, in addition to visual acuity.

**Financial disclosure:** The study's author and co-authors do not have any financial stake or affiliation with the companies involved in the production of Orthoptek Magnocellular Stimulator machine.

## Assessing stereo acuity in amblyopic children and adolescents and its comparison in subtypes of amblyopia

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**PURPOSE:** To examine and present the level of stereoacuity in different types of amblyopes and correlate their binocular dysfunction with interocular acuity difference.

**SETTING:** Cross-sectional observational study of amblyopic children and adolescents (3-18 years) at a tertiary care hospital in North India.

**METHODS:** All amblyopes aged 3-18 years were classified based on laterality, type and severity of amblyopia. Refractive amblyopes were classified based on the type of refractive error. Logmar visual acuity (VA), interocular acuity difference (expressed as difference in spherical equivalent and stereo-acuity was measured. Stereoacuity was converted to log values. Median log randot values between types of amblyopia, laterality and severity of amblyopia were compared. Binocular function (BF) score was calculated based on random dot stereopsis (Randot) and worth 4 dot test and then correlated with visual acuity of worse eye. For refractive amblyopia difference in spherical equivalent was correlated with severity of amblyopia and log randot stereo acuity using Kruskal-Wallis test.

**RESULTS:** A total of 61 (37 male, 24 female) amblyope children and adolescents between the ages of 4 to 18 years (mean age -12) were included in the study. 42 (68.99%) were unilateral amblyopes and 19 (31.1%) bilateral amblyopes. Amongst these 12 had mild, 27 moderate and 22 had severe amblyopia. Stereopsis with randot could be measured in all 61 cases and converted log stereoacuity ranged from 1.60 to 3.20 with median 2.60. Nil stereopsis was found in 19 subjects with 9 being anisometropic, 5 strabismic and 5 mixed. A statistically significant difference was found in log randot amongst unilateral and bilateral amblyopes amblyopia using Mann-Whitney test ( $p=0.001$ ). Visual acuity of worse eye correlated with stereoacuity overall (Rho -0.58) as well as in unilateral (Rho-0.57) and in bilateral amblyopia (Rho-0.18). The randot values were significantly different between the types of amblyopia using the Kruskal-Wallis test ( $p=0.0000452$ ) and Steel-Dwass test ( $p=0.0178$ ). BF score showed a moderate correlation with visual acuity of worse eye ( $r=0.617$ ). Similarly, there was a significant correlation between visual acuity of worse eye with stereopsis in anisometropic amblyopia ( $r=0.661$ ). Difference of spherical equivalent showed a significant correlation with severity of amblyopia ( $p=0.000024$ ) as well as stereopsis ( $p=0.00004$ ). Visual acuity of the worse eye correlated with stereoacuity overall and in anisometropes. BF Score used to assess suppression showed moderate correlation with VA of the worse eye.

**CONCLUSIONS:** Amblyopia is characterized by a wide range of monocular and binocular visual deficits. The most frequently associated deficit is stereovision deficit, aside the definitive visual acuity deficits. The depth of amblyopia and different types of amblyopia influence the presence or absence of stereopsis. Overall, worse visual acuity seems to correlate with worse stereo-acuity. This relationship seems mostly driven by anisometropic subjects. Strabismic amblyopes are stereo-blind. Monocular decrease in visual acuity has more impact on stereopsis compared to bilateral cases. Interocular difference in acuity is also significantly larger in children without measurable stereoacuity than those with measurable stereopsis. Composite binocular function (BF) score derived from clinical stereoacuity measures and the Worth 4 Dot test can be used to extend the stereoacuity measure in clinical practice especially in subjects with nil stereoacuity since it also correlates with visual acuity of worse eye.

**FINANCIAL DISCLOSURE:** There are no financial conflicts of interest to disclose.

## Improved compliance to spectacles provided free-of-cost via door-to-door screening in a pediatric population in India.

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**Purpose:** Uncorrected refractive error is an important cause of visual impairment and amblyopia in children. The compliance to spectacles provided via school eye screening programs has historically been low. Unlike school screening, the door-to-door screening model provides a direct opportunity to interact with, counsel and sensitize the parents towards the benefits of glasses use in the children. Through this study we assessed the compliance to free-of-cost spectacles in a door-to-door screening model of pediatric vision screening. **Setting:** This was a cross-sectional study among children in the age group of 5-18 years who were prescribed spectacles via the "Comprehensive child eye health program in urban slums of Delhi during COVID times". **Methodology:** Trained vision screeners conducted a questionnaire in local language for both parents and children after 3-6 months of spectacle prescription. They also directly observed the child at home during a surprise visit. The sample size was 400. Full compliance was defined when the child was wearing spectacle at the time of visit, taking spectacles to school, and using spectacles  $\geq 4$  hours/day at home. Qualified compliance was considered when two of the above three criteria were met. When only one or less criterion was satisfied, the child was considered non-compliant to spectacles. The reasons for non-compliance and factors affecting compliance were analyzed. **Results:** Total 434 children (188 males and 246 females) were included in the study. Full compliance, qualified compliance and non-compliance were seen in 296 (68.2%), 34 (7.83%), and 104 (23.96%) children respectively. The common reasons for non-compliance were dissatisfactory vision with the glasses (65.38%), unpleasant color or design of the frame (65.38%), and watering (39.42%) or headache (43.27%) while wearing them. Better compliance was associated with older age, better vision with glasses, and improvement of  $\geq 2$  logMAR lines with the glasses ( $p < 0.001$  for all). Compliance was not affected by parental occupation or education, gender, and parental or sibling's use of spectacles. **Conclusion:** Good compliance to spectacles was seen in 76% of children when they were prescribed glasses free-of-cost in a door-to-door pediatric vision screening model. More than one reason for non-compliance was seen in 80.8% of the children who did not use the glasses. Children were unlikely to wear the glasses if they were not satisfied with the vision with the glasses or the appearance of the frame. **Financial disclosure:** This study is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of the institute performing the research and do not necessarily reflect the views of USAID or the United States Government.



## Eye screening for mentally challenged children with portable vision screener: our experience

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Purpose:-This paper highlights our experience of ophthalmic screening with vision screener (plus optix) for a sample size of 256 differently abled children.

Method:-A team of optometrists, trained technician and paediatric ophthalmologist visited 6 special schools to assess the ocular problems among the differently abled population where initial eye screening by the vision screener followed comprehensive ophthalmic examination. Vision screener result was grouped as pass, refer or inconclusive. Prevalence, sensitivity, specificity, positive predictive value, and negative predictive value were calculated using ophthalmologic examination as the gold standard

Setting:

Vision screening and examination by paediatric ophthalmology team in 6 schools in the neighboring districts of Pondicherry, India

Result:-Among 256 students 169(66%) had ocular problem and 87(33%) subjects had no ocular problem. Ophthalmologist screened 111(43%) subjects to have ocular problem. Vision screener showed an accuracy of 65%. The plusoptix had a sensitivity of 91.1% (95% CI, 83%-94.9%). The specificity was 52.4% (95% CI, 44%-60.8%), the positive predictive value was 59.2% (95% CI, 51.4%-66.7%), and the negative predictive value was 87.4% (95% CI, 78.5%-93.5%). Ocular morbidities detected were squint 21%, myopia 38%, astigmatism 19%, Hypermetropia 1%, absorbed cataract%, chorioretinal Coloboma, 1% Pseudophakia 5% , others 15%.

Conclusion:-Vision screener is a promising portable tool to detect ocular problem among subjects with cognitive delay that simplifies the ocular examination. It can be used as a screening tool effectively in these subset of patients where detection of the problem in the early stages is important . This vision screener screening gains more importance and feasible as these children are scattered , less accessible and difficult to mobilize . Technically also its very easy to train personnel to handle thses screeners effectively.

## An eye-tracking based dichoptic amblyopia home treatment is non-inferior to standard occlusion for amblyopia, 28 weeks follow-up

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Purpose: Lately the effectiveness of dichoptic therapy for amblyopia (CureSight) has been compared to patching in a prospective RCT, and found to be not inferior.

Methods: An RCT to compare the effectiveness and safety of a binocular eye-tracking-based passive home treatment (CureSight) to patching for amblyopia. 103 children aged 4≤9 years with anisometropic and/or mild strabismic amblyopia were enrolled at 6 sites. Participants were tested 12 weeks post-treatment in order to examine the improvement was sustained.

The treatment group was treated with CureSight combined anaglyph glasses and an eye-tracker to induce dominant eye real-time blur around the central vision area on any available streamed video content. The treatment was performed for 90/minutes/day/5days/week for 16 weeks. The control group patched 2-hours/day/7days/week. The primary outcome was the change in amblyopic eye distance visual acuity (DVA) at 16 weeks. Secondary outcomes included stereoacuity, binocular visual acuity (BVA) and compliance.

Results: The binocular treatment group DVA improvement was 0.28 logMAR (SD 0.13,  $p<0.0001$ ) and 0.23 logMAR (SD 0.14,  $p<0.0001$ ) in the patching group at 16 weeks with proven non-inferiority (90% CI of difference [-0.008, 0.076]) of the treatment group. Stereoacuity, improved by 0.40 log arcseconds ( $p<0.0001$ ) and BVA improved by 0.13 logMAR ( $p<0.0001$ ) in the treatment group, with similar improvements found in the patching group in stereoacuity and BVA (0.46 log arcseconds,  $p<0.0001$ . 0.09 logMAR,  $p<0.0001$ ), Compliance was significantly higher in the treatment vs. the patching group (91% vs. 83%,  $p=0.011$ ). Adverse events were uncommon. At week 28 participants from the training group who didn't receive additional treatment ( $n=39$ ) maintained their improvement in DVA (Result + statistics), BVA (Result + statistics) and stereo acuity (Result + statistics)

Conclusions: Our findings demonstrate non-inferiority of a binocular treatment compared to patching. The CureSight group maintained the visual improvement for at least 12 weeks. Higher compliance and treatment preference, with CureSight makes it an acceptable alternative treatment option for amblyopia.

## Evaluation of distance stereoacuity in children aged 4-17 years with a novel digital application

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**PURPOSE** Stereopsis is a fundamental skill in human vision and visual actions. There are several ways to test and quantify distance stereoacuity: traditional and new digital applications are both valid ways to test the stereoacuity. The aim of this study is to compare the results obtained using standard tests for distance stereoacuity measurement with the novel StereoTAB test.

**SETTINGS** Pediatric Ophthalmology Unit at Meir Medical Center.

**METHODS** A group of 120 children (69 females), aged between 4 and 17 years old (mean age 9.16), were tested using different tests for the quantification of stereopsis at distance. These tests were Distance Randot Stereotest, M&S random dots and StereoTAB.

**RESULTS** Stereopsis at distance was statistically significantly better with M&S random dots (2.09) than with Distance Randot test (2.19,  $p < 0.001$ ) or StereoTAB (2.21,  $p < 0.001$ ). A strong correlation was demonstrated between: M&S random dots and Distance Randot (0.83,  $P < 0.0001$ ), M&S random dots and StereoTAB (0.84,  $P < 0.0001$ ), Distance Randot and StereoTAB App (0.88,  $P < 0.0001$ ). The limits of agreement (Bland–Altman) between M&S random dots and Distance Randot was 0.54, between M&S random dots and StereoTAB was 0.55, and between Distance Randot Stereotest and StereoTAB was 0.45.

**CONCLUSIONS** The distance stereoacuity based on random dots stereopsis showed that the better values were obtained in order by M&S random dots, Distance Randot test, and StereoTAB. However, the clinical significance of their values is similar, and they can be used interchangeably. The introduction of versatile, fast, and portable stereopsis test which can be used at different distances with children, having various strabismic conditions, is of primary importance.

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## Quantifying infant's fixation to light and reaction time, before and after surgery for bilateral congenital cataract.

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- Purpose

To objectively evaluate and compare the infants' binocular gaze reaction time to light stimuli before and after cataract surgery for bilateral congenital cataract.

- Setting/Venue

The longitudinal study was conducted at a tertiary eye care center, LV Prasad Eye Institute, Hyderabad, India.

- Methods

Infants diagnosed with bilateral congenital cataract were recruited after their parent's consent. The study protocol was approved by the institutional review board for research and ethics. The infant was placed in a supine position under the Pediatric Perimeter dome. Static stimuli (LED strip) at 60° and 120° meridian were presented in the azimuthal direction, at an eccentricity of 30° to 90°, in an otherwise dark room. These stimuli were used to quantify binocular gaze (combined eye and head movement towards the peripheral target) reaction time. Video recordings of the trials were analyzed for reaction time quantification. The reaction time along with visual acuity was assessed at three visits (one pre-operative, and two post-operative visits after optical correction).

- Results

Five infants (age: 3.9 to 7 months) were recruited. Gaze reaction time and visual acuity were assessed in three different visits (Preoperative, postoperative(POP) 1 month, and POP 5 months). Preoperatively, visual acuity was assessed clinically as Central(C), Steady(S), and Maintained(M) or Fixing & following of torch light(FFL). All subjects couldn't fixate even the demo plates of the Teller Acuity Card(TAC). While these assessment tools are qualitative, the gaze reaction time for the meridian was a quantifiable measure using the Pediatric Perimeter. The mean ( $\pm$  SD) preoperative reaction time was 979.02( $\pm$  187.04)ms, which improved to 505.74( $\pm$ 155.04)ms, and 323.01 ( $\pm$ 71.46)ms at POP 1 month and POP 5 months respectively.

- Conclusions

Gaze reaction time measured using Pediatric Perimeter can give an objective quantification for the visual behavior of infants with congenital cataract before and after cataract surgery. Such a measure can help to assess improvement in the visual function of "fixating to light" longitudinally till other measures of visual acuity are possible.

- Financial Disclosure

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Author PremNandhini Satgunam has a patent on the Pediatric Perimeter device (US Patent No.:10517475 B2, India Patent No.: 425672)

## Interventions to slow progressive myopia: a comparison of atropine drops (0.01%, 0.025%, 0.05%) and new spectacle lenses efficacies in a cohort of evolutive myopic children

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Purpose: Myopia has increased in prevalence around the world. The results of recent studies have highlighted the effectiveness of certain means of slowing myopia such as atropine drops or new generation of spectacle lenses. However, the results on European children are rare, as are the comparisons between the different interventions. In this study, we describe the evolution over two years of children with progressive myopia treated with Atropine at different dosages or spectacle lenses (Highly Aspherical Lenslets – HAL – or Defocus Incorporated Multiple Segments – DIMS).  
Setting/Venue : Department of Ophthalmology, Strasbourg University Hospital, France. Some of the patients come from the Myopie STOP protocol (NCT04173780).

Methods: In a retrospective study, the records of patients aged 6 to 12 years with progressive myopia of at least 0.75 diopters in the year preceding the start of treatment were analysed. Three follow-up groups are described: Control (N = 61), atropine drops (N = 160) (with subgroup analysis: 0.01% (N = 79), 0,025% (N = 41) and 0.05% (N = 40)) and spectacle lenses HAL or DIMS (N = 40). The children were followed for at least two years with a measurement of refraction (RA) under cycloplegia and the axial length (AL) at year 1 and 2.

Results: Myopia progressions in diopters after two years of evolution were as followed (Mean (SD)): Control, 1,38 (0.45), Atropine (All), 0,76 (0.44), Atropine (0.01%), 0.91 (0,72), Atropine (0.025%), 0.70 (0.33), Atropine (0.05%), 0.54 (0.33), spectacle lenses (All), 0.90 (0.54), HAL, 0.84 (0.50), DIMS, 0.95 (0.52). AL elongations in mm were (Mean (SD)): Control, 0.41 (0.13), Atropine (All), 0,31 (0.14), Atropine (0.01%), 0.34 (0.16), Atropine (0.025%), 0,30 (0.12), Atropine (0.05%), 0.26 (0.11), spectacle lenses (All), 0.36 (0.16), HAL 0.34 (0.11), DIMS 0.38 (0.14). The difference in progression of myopia with atropine or spectacle lenses is significant compared to the control group.

Conclusions: Myopia slowing has been observed with both atropine and spectacle lenses. The effectiveness of atropine seems greater than that of spectacle lenses, notable at 0.025 and 0.05 dosages.

Financial Disclosure: none.

## Variable phenotype of congenital corneal opacities in biallelic CYP1B1 pathogenic variants

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Introduction: To describe the variable phenotype of congenital corneal opacities (CCO) occurring in patients with biallelic CYP1B1 pathogenic variants.

Setting: Division of Pediatric Ophthalmology, Strabismus, and Adult Motility, UPMC Children's Hospital of Pittsburgh (Pittsburgh, PA, USA).

Methods: A retrospective chart review was conducted to identify patients with CCO and CYP1B1 pathogenic variants seen between January 2012 and November 2022. Ophthalmic examination, high frequency ultrasound, anterior segment optical coherence tomography, histopathology images, and details of genetic testing were reviewed.

Results: Three children were identified. All presented with raised intraocular pressure (IOP). One showed unilateral avascular CCO, irido-corneal and irido-lenticular adhesions, and classical features of congenital glaucoma in the fellow eye. Two showed bilateral limbus-to-limbus avascular CCO which did not resolve with IOP control. These 2 underwent penetrating keratoplasty. Histopathology revealed a thick but discontinuous Bowman-like layer with areas of abnormal cellularity, and a thin Descemet's membrane with reduced endothelial cells; no pathological changes of Haab striae were identified. Two patients had compound heterozygous pathogenic variants in CYP1B1 causing premature stop codons, whilst one was homozygous for a pathogenic missense variant.

Conclusion: Congenital corneal opacities seen in biallelic CYP1B1 pathogenic variants have a variable phenotype. One is that commonly termed Peters Anomaly type 1 (with irido-corneal adhesions, with or without irido-lenticular adhesions); the other is a limbus-to-limbus opacity, termed CYP1B1 cytopathy. Clinicians should be aware of this phenotypic variability.

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K. K. Nischal: Santen - honoraria, Graybug - advisor, GMAC – advisor, Recordati Rare Diseases - honoraria.

## Measuring Ectopia Leptis in Children - a Novel Parameter

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**Purpose:** Subluxation of the crystalline lens can lead to significant visual impairment. Children with genetic disorders such as Marfan syndrome may present with subluxated lenses. There is no established and validated criterion to diagnose and quantify lens subluxation accurately. This prospective study investigated the distance between the zonular fiber insertions and the limbus (ZLD) as a novel parameter to quantify lens subluxation and provide normative data for children.

**Setting:** In 8 eyes of 8 normal children (range 4-16 years) ZLD was measured at the Ophthalmology Clinic at the Charité – Medical University Berlin, and compared to 142 eyes (range 18-68 years).

**Methods:** Pupils were dilated with tropicamide 0.5% and phenylephrine 2.5% eyedrops. ZLD was measured at the slit lamp as the distance between the most central insertion of the zonular fibres on the lens surface and the corneoscleral limbus. If zonular fiber insertions were not visible, the inner pupil margin was taken as a surrogate for ZLD. Vertical pupil diameter (PD) and refractive errors were documented and correlated with ZLD.

**Results:** Average ZLD in children was  $1.4 \pm 0.33$  mm (mean $\pm$ SD), range 0.7-1.9 mm. PD in children was  $8.35 \pm 0.71$  mm, range 7.5-9.5 mm. In adults, ZLD was  $1.34 \pm 0.28$  mm, range 0.7-2.1 mm, and PD  $8.47 \pm 0.66$  mm, range 6.7-9.8 mm. The difference in ZLD and PD between children and adults was not statistically significant (ZLD,  $p=0.31$ ; PD,  $p=0.33$ ). In 7 / 8 eyes of children (87.5%), zonular fiber insertions were visible versus 69 / 142 adult eyes (48.6%), chi-quadrat test ( $p=0.03$ ).

**Conclusion:** Average ZLD was 1.4 mm in normal children. The normative data from this study will help in diagnosing and quantifying lens subluxation in children. Larger studies are needed to confirm our results.

There was not any financial support and no conflict of interest.

## Corneal Topographic Changes in Healthy Siblings of Patients with Keratoconus

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Purpose:

To evaluate the corneal topographic changes and determine the incidence of keratoconus in healthy siblings of patients with keratoconus (KC) in South Indian population.

Setting:

Siblings of children diagnosed as KC, under went topographic evaluation in Aravind eye hospital, Pondicherry, South India

Methods:

Ninety six siblings (192 eyes) of 90 patients with KC were included. Demographic details, clinical data and corneal topography by Pentacam High Resolution were collected and analysed for signs of

clinical KC or topographical signs suspicious for KC.

Results:

Among the total study population, a total of fifteen siblings (22 eyes = 11.4%) had definite keratoconus (Clinical KC=4.7%; Topographical KC=6.8%) and 18 siblings (29 eyes = 15.1%) had possible/suspicious KC. Median (IQR) age was 17.5 (12-21) years. Among the fourteen siblings with definite KC, 7 had bilateral disease. Thinnest pachymetry of  $<480\ \mu$  was seen in 38 eyes (19.8%), abnormal BAD\_D of  $>2.37$  in 43 eyes (22.4%) and  $K >47.2$  in 37 eyes (19.3%). None of the factors like age, gender, eye rubbing/allergy, grade of KC in Probands had a statistically significant association ( $>0.05$  for all) with presence of KC in siblings. Out of the 36 siblings who had KC/subclinical KC, 23 siblings had a bilateral unaided vision of 6/6 with no refractive error.

Conclusion:

Prevalence of keratoconus and KC suspects was significantly higher (34.4%) in the studied sibling population. This study strongly recommends a routine sibling screening to be done among all patients

with keratoconus for early diagnosis and management of KC.



## Presentation of biometric data of children with Marfan syndrome in Hungary

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### Purpose

Descriptive statistical characterization of anterior segment, mainly biometric parameters of children with Marfan syndrome in Hungary.

### Setting

A total of 98 ophthalmological screening examinations of patients suffering from Marfan syndrome were performed in a cross-sectional study over the past 2 years at Semmelweis University, Department of Ophthalmology. Within the examined population, 44 eyes of 22 children were included in the research.

### Methods

A total of 44 eyes, 26 of which were phakic. 18 eyes of 9 children were excluded from the biometric data evaluation due to surgical intervention in the history. The recorded ophthalmological parameters were: family history, best corrected visual acuity (BCVA), myopia greater than 3 dioptres (D), mean corneal refractive power (Kmean), central corneal thickness (CCT), thinnest corneal thickness (THC), corneal astigmatism (CAST), axial length (AL), anterior chamber depth (ACD), lens thickness (LT), ectopia lentis (EL), direction of subluxation, corneal diameter (W-W), indication for eye surgery, type of the operation.

### Results

Percentage of myopia greater than 3 diopters was 52.3% (23/44). EL, which was the only indication for eye surgery, present in 24/44 (54.5%) of eyes. Lens was mostly displaced upwards in 50% (12/24). In 88.9% (16/18) of eyes operated, the prepupillary implantation of iris-clip lens was performed, resulted in satisfactory BCVA ( $0.187 \pm 0.298$  logMAR compared to  $0.199 \pm 0.220$  logMAR in non-operated eyes). Mean CAST was  $1.30 \pm 0.769$  D, while Kmean was  $40.6 \pm 1.32$  D. No significant differences were observed in CCT ( $554 \pm 44.3$   $\mu$ m), THC ( $552 \pm 44.4$   $\mu$ m), AL ( $24.06 \pm 1.195$  mm), ACD ( $3.69 \pm 0.339$  mm), W-W ( $13.0 \pm 0.718$  mm) and LT ( $3.64 \pm 0.23$  mm) compared to the general population.

### Conclusions

In Marfan syndrome, EL and myopia greater than 3 diopters are the most common ophthalmologic symptoms and are listed as minor criteria in the revised Ghent nosology. In the case of subluxation of the lens, the majority of patients at our clinic are treated with iris-clip lenses implanted in front of the iris, which can provide satisfactory postoperative visual acuity even in cases of high myopia.

### Financial Disclosure

The authors had no financial interest in carrying out the research.

## A novel biomechanical model to diagnose pediatric keratoconus

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**Purpose:** Keratoconus is confirmed based on the Pentacam HR map observation and clinical signs such as Fleischer ring, Vogt striae, scissoring of the red reflex etc. Keratoconus in children is known to be more aggressive than in adults. Hence highly sensitive markers are required to diagnose, stage and monitor the disease. This study focuses on presenting a novel corneal biomechanical marker for diagnosing keratoconus.

**Setting:** Narayana Nethralaya, Bangalore, India

**Methods:** 42 normal and 41 keratoconic (KC) eyes of 83 subjects were analyzed in the study. All eyes underwent detailed clinical examination, along with Corvis-ST and Pentacam HR measurement. Corvis-ST recorded deformation data during the air-puff applanation of the eye was separated into corneal deformation and extra-corneal deformation. A model was developed using the waveform from Corvis-ST data which calculated constant (kc (constant)) and mean (kc (mean)) corneal stiffness representing the linear and nonlinear elastic response of the cornea to the applied force, extra-corneal stiffness (kg) and extra-corneal viscosity ( $\mu\text{g}$ ) representing viscoelastic properties of the extra-corneal region.

**Results:** Demographics parameters age ( $p=0.12$ ) and IOP ( $p=0.32$ ) was statistically similar between the groups. Pentacam HR parameters k1 (42.8 and 45.9 D), k2 (44.2 and 50 D), k max (44.6 and 55.5 D), central corneal thickness (537.5 and 453  $\mu\text{m}$ ) and thinnest corneal thickness (529.5 and 442  $\mu\text{m}$ ) was significantly different between the normal & KC group ( $p<0.001$ ). Calculated kc (mean) was significantly different between the groups ( $p<0.001$ ); 117.7 [112.5, 120.3] and 88.3 [84.5, 93.7] N/m respectively for normal and KC eyes respectively. Calculated kc (constant) was significantly different between the groups ( $p<0.001$ ); 119.6 [114.3, 121.2] and 100.4 [97.6, 105.2] N/m respectively. Kg and  $\mu\text{g}$  was statistically similar between the groups.

**Conclusions:** Linear and non-linear stiffness calculated by the novel biomechanical model was able to capture the biomechanical degradation to the cornea due to keratoconus very well. Hence, they can be a valuable tool in diagnosing, staging and monitoring the disease.

## Influence Of Corneal White-To-White (WtW) In Tomographical Interpretation: A Novel Discovery

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**Purpose:** To define the external scleral sulcus (ESS) on a Scheimpflug image and use it for a morphometric analysis of corneal white-to-white (WtW). To study the relationship between corneal WtW and corneal tomography.

**Setting:** Department of Cornea and Refractive Surgery, Narayana Nethralaya, Bangalore, India.

**Methods:** One random eye of 353 subjects aged 5-18 years underwent Pentacam HR (OCULUS Optikgeräte GmbH). A novel technique using densitometry on Pentacam was used to measure WtW. Multiple regression models with WtW and other Pentacam parameters were built. The prediction agreement was validated using the intraclass correlation coefficient (ICC). Using ICC, the estimated horizontal WtW (hWtW) was validated against digital calliper measurement. P-value <0.05 was considered significant. Vertical, hWtW, maximum (maxWtW) and minimum (minWtW) WtW and their meridians were defined. Their associations with Pentacam parameters were analyzed to predict keratometry (K), astigmatism and its axis, and Belin/Ambrósio enhanced ectasia display deviation (BAD-D).

**Results:** The ICC (95% CI) between calliper and hWtW was 0.96 [0.93, 0.97]. Multiple regression prediction of astigmatism, astigmatism axis, Kmean, and BAD-D using WtW parameters, anterior chamber depth, corneal volume, and distance from the corneal thinnest location to apex were significant (p<0.001). These predictions achieved an ICC of 0.34 [0.18, 0.46], 0.82 [0.78, 0.86], 0.87 [0.84, 0.89] and 0.81 [0.76, 0.84], respectively. The astigmatism axis prediction depended on the meridian of minWtW and maxWtW.

**Conclusions:** The WtW metrics strongly correlated with the astigmatism axis, keratometry and BAD-D. The spatial description of WtW may have an important role in corneal treatment planning and disease diagnoses.

## To analyse the indications, visual outcome and parameters influencing the outcome of optical iridectomy in children

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Aim – To analyse the indications, visual outcome and the parameters influencing the effect of optical iridectomy in children younger than 7 years.

Purpose – To analyse the indications and visual outcome following optical iridectomy in children. To also analyse the parameters affecting the outcome.

Setting and Methods – Retrospective analysis of 5 year data of optical iridectomies performed in children younger than 7 years

Results – Total of 53 children age 1 month to 7 years were included. Indications for iridectomy were central and paracentral corneal opacities in more than 90%. In 84% patients the etiology was congenital opacity. More than 66% had improved visual acuity after the procedure. Complications and raised intraocular pressure was not common in this group. Re iridectomy and penetrating keratoplasty was required in one patient each.

Conclusion - Early surgery and absence of other risk factors like cataract and glaucoma were associated with better visual outcome.

Financial disclosure - Nil

## Congenital Corneal Opacities caused by Posterior Hyperplastic Primary Vitreous: a case series

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Purpose: To present a series of patients with Congenital Corneal Opacities (CCO) and Posterior Hyperplastic Primary Vitreous (PHPV).

Setting: Division of Pediatric Ophthalmology, Strabismus, and Adult Motility, UPMC Children's Hospital of Pittsburgh (Pittsburgh, PA, USA).

Methods: A retrospective chart review was conducted to identify patients with CCO and PHPV seen between January 2012 and November 2022. Ophthalmic examination, high frequency ultrasound (HFU), anterior segment optical coherence tomography (AS-OCT), surgery performed, histopathology reports, and details of genetic testing were reviewed.

Results: Four children were identified. One showed bilateral central CCO, microphthalmos, and vascularized plaques behind the lenses. She did not undergo any surgery. Three cases were unilateral with increased axial length: one presented with avascular CCO, irido-corneal adhesions (IRA), and kerato-lenticular touch but intact lens capsule; HFU showed a hyperechoic band going from the lens towards the optic disk. The patient was treated with lensectomy. Two patients presented with anterior staphyloma and IRA; HFU showed the lens embedded into the cornea in one patient. They underwent penetrating keratoplasty, and intraoperatively it was evident that ciliary processes were dragged towards the anomalous lenses.

Conclusion: CCO can be related to PHPV. Anterior segment dysgenesis may vary, likely depending on the moment in which the irido-lenticular diaphragm is pushed forward.

Proliferation and contraction of the posterior lens plaque can cause an anterior shift of the ciliary body and stretching of the ciliary processes. The posterior lens capsule can rupture, with rapid cataract formation, increase of the lens volume, and shift of the lens-iris diaphragm forward. This may result in secondary open angle glaucoma, IRA, kerato-lenticular touch/adhesion, and secondary CCO. This etiopathogenetic mechanism may explain the association rarely reported in the literature between Peters Anomaly and PHPV.

Elena Franco: no financial interests to disclose.

K. K. Nischal: Santen - honoraria, Graybug - advisor, GMAC – advisor, Recordati Rare Diseases - honoraria.

## Is Visual acuity restoration alone a benchmark in treating unilateral traumatic cataract in paediatric patients? - Evaluation of Binocularity and Stereopsis following Intraocular lens implantation in unilateral paediatric traumatic cataract and factors affecting them

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### Purpose

To assess the recovery of Binocular single vision (BSV) and stereopsis after unilateral IOL implantation following traumatic cataract in children and also to evaluate the factors influencing their recovery.

### Setting:

Children who underwent unilateral IOL implantation for traumatic cataract were evaluated in Aravind eye hospital, Pondicherry, South India, India.

### Methods

It included children in the age group of 5 to 15 years with unilateral traumatic cataract as a result of both open and closed globe injuries and who have undergone IOL implantation. Children who had pre-

existing ocular pathologies prior to trauma or pre-existing squint or amblyopia were excluded. Type of corneal opacity was classified as grade 1 if involving central 3mm of visual axis and grade 2 if in the mid-peripheral/Peripheral/limbal region. Closed globe injury with no corneal opacity were taken as grade 0. At 3 month post operative follow up period, the following parameters were measured which included Best corrected visual acuity, anisometropia, amount of strabismus, binocular

single vision (BSV) for distance/near and stereopsis for distant/near. Binocular single vision for distance and near was measured by Worth's four dot

test. Stereopsis for distance was measured by Randot stereogram and Near by TNO chart.

### Results

Of the total 58 children, 72.4% were males. Average duration for IOL implantation was >3 months in 63.8% of children. Loss of BSV for distance and Near was seen in 27.6% and 10.8% respectively.

Loss of Stereopsis for distance and Near was there in 63.8% and 44.8% respectively. Poor BCVA ( $\leq 20/60$ ) and presence of strabismus had a statistically significant association ( $p < 0.0001$  for both) with loss of BSV. 19% had Exotropia of > 10 prism diopter. Amblyopia was there in 27.6%. Other factors like type of injury, duration between trauma and IOL implantation, primary/secondary IOL implantation and Anisometropia were correlated for their impact on BSV/stereopsis deterioration.

### Conclusion

Squint was one of the important risk factor along with Anisometropia and Amblyopia that needs to be evaluated and managed dynamically to make sure that the superior aspects of vision like BSV and stereopsis are restored back for better quality of life.

## Developmental cataract in Wolfram Syndrome – Clinical features and correlation with the phenotypic features of Wolfram syndrome.

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### Purpose

To investigate the profile of cataract in suspected Wolfram syndrome patients, such as the incidence, age of onset, and morphology of cataract, and their correlation with the other clinical manifestations of the disorder.

### Venue

Child Sight Institute, L V Prasad Eye Institute, India

### Method and materials

Type of study : Retrospective, descriptive study.

The electronic medical records of all consecutive patients diagnosed with Optic atrophy with childhood onset Insulin dependent diabetes mellitus, with or without other phenotypic features suggestive of Wolfram syndrome, from 2015 to 2023 at L V Prasad eye institute, Hyderabad, India were reviewed.

Profile of age at presentation with Optic atrophy, other associated systemic involvement, presence or absence of cataract, any surgical intervention for the cataract were documented.

### Results

Eighty patients (Male – 57.5%) were reviewed with a clinical diagnosis of Wolfram syndrome based on the presence of Optic atrophy and insulin dependent diabetes mellitus. The mean age of presentation was 18.18 ( $\pm 7.67$ ) years. 28.75% of subjects also had associated sensorineural hearing loss and 12.5 % had associated Renal involvement. 17.5 % of them had an associated cataract. A total of 26 eyes of 14 subjects had cataract with the most common morphology encountered being posterior sub capsular opacification(38.46 % of eyes). 85.71% of the subjects had bilateral cataract. Only 38.46% of eyes with cataract underwent surgery.

### Conclusion

Cataract, though less often spoken of, is a common manifestation in Wolfram syndrome. Posterior sub capsular cataract are the most common type of cataracts in these patients, followed by cortical cataract. Early detection and regular eye examinations are crucial for preventing vision loss, and they pose an inherent challenge in managing them surgically. Further studies are needed to investigate the pathogenesis of cataracts in Wolfram syndrome and the optimal timing and technique of cataract surgery in these patients.

### Financial Disclosure

None

## The radial peripapillary capillary plexus in children- an optic coherence tomography angiography study

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**Purpose:** To quantify the retinal vessel density (VD) and flux index (FI) of the radial peripapillary capillary plexus in children with optic coherence tomography angiography (OCT-A). To evaluate the effect of nerve fiber layer (pRNFL) thickness, ganglion cell-inner plexiform layer (GCIPL) thickness, age and optic nerve head (ONH) area on these parameters.

**Setting/Venue:** OCT-A of radial peripapillary capillary plexus has demonstrated to be an effective method to identify early glaucomatous lesions and several disorders of the optic disc. There is no information about the influence of the structural measurements (ONH area, pRNFL and GCIPL thicknesses) on VD and FI in children.

**Methods:** Cross-sectional study that included children with spherical refractive error was between  $\pm 1.5$  D, cylindrical  $\pm 1.5$  D, refraction difference between both eyes was  $<2$  D and stereoacuity  $\geq 60''$  arc. All subjects were imaged with OCT-A. Parameters of the optic nerve head (ONH), pRNFL and GCIPL thicknesses, VD and FI were obtained.

**Results:** This study included 172 children, 85 (49,4%) boys and an average age of  $12.5 \pm 1.4$  years. The average optic nerve head area was  $1.89 \pm 0.32$  mm<sup>2</sup>, average VD was  $45.369 \pm 1.197\%$  and FI  $0.475 \pm 0.018$ . Temporal quadrant had the highest VD ( $48.093 \pm 0.018\%$ ) and FI ( $0.500 \pm 0.023$ ) and the lowest pRNFL thickness ( $68.030 \pm 8.449 \mu\text{m}$ ). There was a positive correlation of VD with ONH area ( $r=0.032$ ,  $p=0.006$ ), and a positive correlation of VD and FI with pRNFL and GCIPL thicknesses, in total and by quadrants. A negative correlation was found between VD and age ( $r=0.46$ ,  $p=0.01$ ).

**Conclusions:** In children, the temporal quadrant of the peripapillary capillary area is the one with highest VD and FI. This pattern does not respect de ISNT rule (Inferior>Superior>Nasal>Temporal) used to distinguish glaucomatous from normal discs. The denser microvascular network found in temporal quadrant could be related with a higher metabolic demand and/or lower thickness of glial tissue in the papillomacular bundle.

There is a positive correlation of VD and FI with pRNFL and GCIPL thicknesses. Also, VD decreases with increasing age and decreasing disc area, which makes the assessment of a glaucomatous lesion by OCT-A in younger children with large discs less reliable.

No financial disclosures



## Ologen Augmentation of Ahmed Glaucoma Drainage Devices: 1-Year Follow-Up

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Purpose: Ologen augmentation of Ahmed glaucoma devices (OAGD) has previously been shown to increase the short-term success of Ahmed glaucoma drainage devices (GDDs) in children. In this study, we present longer follow-up with greater number of pediatric eyes.

Setting: Academic/University Children's Hospital

Methods: Retrospective interventional case series of children (<18 years) who underwent OAGD between 2018 and 2022 with >1 year post-operative follow-up. Outcomes included intraocular pressure (IOP) and the number of IOP-lowering medications. Complete success was defined as IOP of 5-20 mmHg without glaucoma medications, visually devastating complication or additional IOP-lowering surgeries. Qualified success was defined as above except IOP control was maintained  $\pm$  glaucoma medications.

Results: A total of 42 eyes of 28 patients underwent OAGD at median age of 2.4 years. Diagnoses included primary congenital glaucoma (12 eyes) and glaucoma secondary to non acquired ocular anomalies (11 eyes), non acquired systemic anomalies (12 eyes), following cataract surgery (3 eyes), and acquired conditions (4 eyes). Twenty-two eyes had previous glaucoma surgery (average  $1.8 \pm 0.7$  surgeries per eye). Preoperative IOP was  $29.3 \pm 9.1$  mmHg on an average of  $2.8 \pm 1.0$  glaucoma medications. At final follow-up ( $1.7 \pm 1.0$  years, median 1.3), IOP ( $13.8 \pm 5.5$  mmHg) and glaucoma medications ( $0.5 \pm 0.9$ , median 0) were significantly decrease ( $p < 0.0001$ ).

Conclusions: OAGD shows continued IOP control in children with complete and qualified success rates of 67% and 90%, respectively. Survival with or without glaucoma medications was greater than 90% at 1 and 3 years of follow-up.

Financial Disclosures: None

## Vision Rehabilitation for Patients with Albinism: Effect of Dark Exposure

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**Purpose:** Vision in albinism is usually very low, and it is difficult to get improvement. We report effects of dark exposure (DE) on vision in patients with albinism.

**Setting:** this is a perspective study conducted a clinical based vision research institute.

**Methods:** 57 patients with albinism (114 eyes) participated in study including 10-days DE and 14-day visual training (VT) immediately following the DE. Their mean age was 10.95 years old. All patients underwent nystagmus surgery before DE plus VT. Among them, 35 were male. Patients with retinal disorders and mental health conditions were excluded.

**Results:** The vision of 114 eyes was significantly improved from 0.8 to 0.5logMAR at the end of VT ( $P=0.001$ ). They were divided into 3 groups. The vision of 9 patients with ocular albinism in group 1 was improvement from 0.7logMAR before DE to 0.5logMAR after VT. The vision of 17 patients with oculocutaneous albinism 1A (OCA1A) in group 2 was improved from 1.0 to 0.6logMAR ( $P=0.001$ ). In group 3, the vision of 31 patients with non-OCA1A was improved from 0.7 to 0.4logMAR ( $P=0.001$ ). Fourteen patients had a long-term follow-up and a long-lasting effect was observed.

**Conclusion:** DE has a strong effect on vision improvement in patients with albinism.

**Financial Disclosure:** None.

## Treatment algorithms for progressive myopia in children: An Australian perspective.

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- Purpose

Research for axial myopia intervention in children has expanded significantly to address the increase in prevalence worldwide of myopia and high myopia. Treatment algorithms have become difficult to navigate, and best practise are yet to be defined. Current interventions, lifestyle, refractive and pharmacology, have not been studied as combination therapies in either clinical trials or clinical practice. Patients presenting to clinical practice with myopia were assessed for risk factors for high progression, including age, family history and initial refractive error. A treatment algorithm was initiated, and axial length (AL) change was used to monitor treatment control over time.

- Setting/Venue

Clinical practice at various clinic sites in Sydney, Australia

- Methods

A retrospective review of paediatric patients presenting for myopia management in clinical practice was conducted. A risk assessment included the patient's age, refraction, and family history. Baseline measurement including cycloplegic refraction and interferometry biometry.

All patients received education regarding lifestyle with reduced near work and increased outdoor exposure (two hours a day) recommended. Patients were monitored at six monthly intervals, and if change in AL >0.1mm, treatment was either initiated or escalated along the treatment algorithm: Atropine (At) 0.01% then At 0.05% (+/- peripheral defocus lenses (PDL) at either dose of At) until change in AL <0.1mm/6months

- Results

At baseline 33 patients (mean 6.6, range 3-12 yrs) naive to myopic control were assessed; mean refraction right (RE) -2.23D and left eye (LE) -2.23D, mean AL RE 23.83mm and LE 24.15mm. At 6 month follow-up (n=33), mean AL progression was RE 0.21mm (range 0.04-0.64mm) and LE 0.23mm (range 0.06-0.58mm); 20 patients initiated At 0.01% and one child with PDL. At 2 years (n=25 comprised of 5 no intervention, 9 on At 0.01%, 8 on AT 0.05% and 3 on combined AT/PDL), mean AL progression was 0.15mm (RE range 0-0.41mm, LE range 0-0.37mm).

- Conclusions

Initial risk profile assessment was limited in the success of predicting fast progression in this patient group. In comparison, axial interferometry provides a safe and accurate measure of fast progression to initiate treatment and measurement of treatment control success.

Children with myopia progression can be safely treated for myopia progression with a combination intervention therapy individualised to their progression using interferometry.

- Financial Disclosure

Nil

## Traffic safety of DIMS lenses and atropine in combination therapy to inhibit myopia progression

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**PURPOSE:** Goal of this study was to evaluate the safety in road traffic when wearing spectacle lenses with Defocus Incorporated Multiple Segments (DIMS) technology in combination with atropine. Both methods are used in myopia management. If one method is not sufficient to receive the treatment goal, clinicians opt for combination therapy. Optical phenomenoms and side effects of atropine might add up and cause concerns regarding the road safety of children.

**SETTING/ VENUE:** This study took place at MVZ Breyer Kaymak Klabe Augenchirurgie and was executed by the Internationale Innovative Ophthalmochirurgie GbR.

**METHODS:** Distance visual acuity (VA) and contrast sensitivity (CS), as well as glare sensitivity were evaluated in 12 young adults (age: 24 to 45;  $30.1 \pm 5.7$  years) when fitted with DIMS lenses alone and in combination with 0.01% atropine.

**RESULTS:** Low dose atropine (0.01%) does not decrease distance VA when looking through the central portion of the DIMS spectacle lens; glare and atropine cause a 0.10 logMAR decrease in VA. With forced gaze through the DIMS area, atropine exposure without glare decreases distance VA by 0.09 logMAR; with glare, no further decrease in VA is observed with atropine. Contrast sensitivity with DIMS lenses is not relevantly changed by added atropine. With regard to glare sensitivity, no visual impairment relevant to vision and road safety is found with DIMS lenses. Additional atropinization has no effect on glare sensitivity.

**CONCLUSION:** DIMS lenses do not impact safety in road traffic and do not cause relevant visual impairment, even under the influence of 0.01% atropine. DIMS lenses are therefore

safe for the treatment of progressive myopia, alone and in combination therapy with low dose atropine.

**Financial Disclosures:** Hakan Kaymak is a consultant for "HOYA Lens Deutschland GmbH"

## Progression of myopia in central India children and teenagers: Monitoring axial length, height and spherical equivalent and keratometry

Dr Varada Gokhale<sup>1</sup>, Dr Aditya Deo<sup>1</sup>

<sup>1</sup>Madhav Netralaya Eye Institute and Research centre, Nagpur, India

### Purpose:

Myopia is a common disorder, affecting approximately one-third of the Indian population and over 90% of the population in some East Asian countries. The aim of this work was to evaluate the progression of myopia in children and teenagers in central India. This was a retrospective study to assess factors like axial length, height, spherical equivalent and keratometry affecting rate of myopia progression in kids in central India.

Setting: Study was conducted at tertiary eye care centre. Approved by institutional ethics committee

### Methods :

A retrospective study involving a central India cohort. children less than 16 years were enrolled.

Myopia was defined as a spherical equivalent (SE) of  $\leq -0.50$  dioptres (D). Data on gender and age, axial length, height, refractive error and K readings were collected between 2018 and 2023

### Result :

Out of 36 children, 18 were males and 18 females. Mean age was  $9 \pm 2.73$  years (Age range 6-16 yrs.).

Progression of myopia was assessed between the first visit and the last visit over up to 2 years.

Parameters were compared from first and last visit mean spherical equivalent at first visit was -

$5.55 \pm 4.25$  D. and at the last visit  $-6.21 \pm 3.79$  D. There was no statistically significant difference in the

mean visual acuity at first visit and last visit. Mean height at first visit  $143 \pm 17.13$  mm and last visit

$150 \pm 15.32$  mm. The proportion of children progressing more than  $-0.50$  D per year was higher in age groups 13-15 years. In multivariate analysis progression was during the first 11-24 months was higher in the 7-9 and 10-12 age groups.

### Conclusions :

The magnitude of myopia progression in children from central India is comparable to that of Caucasians and Chinese. The greater progression is seen in 'severe myopes' across. Gender, age groups, axial length, height and myopia severity are associated with differing rates of progression.

Financial Disclosure of all authors:

No financial disclosure

## Addressing UV Damage and Myopia Progression in Children

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### Purpose

Myopia is increasing worldwide. One of the key lifestyle interventions to limit the development and progression of myopia is spending at least 2.5 hours outdoors daily to expose the child's eye to high-lux light. While we advocate reducing myopia, we must simultaneously acknowledge and advocate that the silent epidemic of ultraviolet radiation (UVR) -related eye diseases exists and will likely be exacerbated if these are not addressed together.

This paper reviews the evidence to protect a child's developing eye from ultraviolet (UV) damage while educating patients and the public on environmental strategies to reduce myopia progression in children.

### Setting/Venue

A review of the literature on UVR-related eye diseases begins in children correlating reduction of Myopia progression to increased high-lux light protected for UV.

### Methods

A literature review compared the prevalence of myopia with UV exposure varying from the combination of outdoor activity (working or leisure), latitude and altitude. A correlation was made between high lux exposure and UV exposure with the myopia progression effect.

### Results

UV damage which results in UV-related eye diseases occurs in childhood when the eye has the least natural defences. Ultraviolet autofluorescence photography detected damage in 30% of those aged 9-11 years and 80% in aged 12-15 years in Australia.

With the protective benefit of high lux visible light to reduce myopia and by excluding the damaging impact of the invisible UVR on the eye with maximally protective sunglasses, both these silent epidemics can be combated simultaneously. This approach can simultaneously encourage outdoor activity for myopia control and maximum UVR protection for the eye and skin.

### Conclusions

The public health message regarding myopia progression in children should also include the important message of protecting their eyes from the damaging effects of UV exposure. Future studies looking at the prevalence of myopia should look at the incidence of UVR eye diseases. This correlation will provide important evidence for protecting children's eyes to reduce the incidence of UVR eye diseases 10-80 years after exposure. Future studies should also help identify the minimum lux required to reduce myopia progression versus damaging UV levels. Public health strategies will then be able to communicate clear recommendations to combat both sight-threatening issues.

### Financial Disclosure

Shanel Sharma hold shares in Beamers.



## Physiological axial length growth as the goal of myopia therapies: Age-Matched Myopia Control (AMMC)

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### Purpose

With the introduction of specially designed spectacle lenses with the aim to inhibit myopia progression in children, the portfolio of myopia therapy has been expanded by an easy-to-use and non-invasive option that can be performed by ophthalmologists and optometrists as well. Currently, however, there is no consensus on the specific goal of myopia therapies, what criteria should be used to monitor the therapeutic success and when an adjuvant therapy should be administered.

### Methods

A literature review on parameters of myopia development and progression, that are collected during myopia therapy, was performed and published epidemiologic studies on refractive development and axial length growth were reviewed.

### Results

To assess myopia progression, the consideration of axial length change is preferable over refractive change. The primary goal of myopia therapy in children should be the reduction of axial growth. Growth curves show that even eyes with an axial length associated with emmetropia in adulthood, experience the highest growth rates during childhood. Consequently, physiological axial growth is always underlying the excessive axial growth of myopic eyes. From data in the literature and own data, curves have now been developed which describe the physiological axial length growth rate dependent on age. This should be defined as the goal for myopia therapies.

### Conclusions

Based on this approach of age-matched myopia control, a web-based tool with a graphical user interface was developed, which classifies the currently observed axial length growth rate in relation to the modeled physiological axial length growth rate in an age-specific manner. Thus, practical information about the individual efficiency of the current myopia therapy can be obtained and therapy recommendation can be given. The use of this tool is conceivable for ophthalmologists as well as for optometrists, since the introduction of new biometers enables everybody to monitor the axial length growth.



## Principle Component Analysis on IOLMaster 700 Biometric Parameters on a population of 1043 Myopes below the age of 14

Mr John Bolger<sup>1</sup>

<sup>1</sup>My Iclinic, London , United Kingdom

**Purpose.** To show how Data Analytics can greatly increase our understanding of the myopia pandemic.

**Setting.** The Zeiss IOLMaster 700 records a rich data set of parameters in addition to Axial Length. It records corneal thickness and curvature in several axes, lens thickness, pupil size, angle kappa, horizontal white to white in addition to parameters from the back surface of the cornea.

**Methods.** All children attending our Myopia Control Clinic have optical biometry performed using a Zeiss IOLMaster 700.

**Results.** Even basic data analytic tools such as Principle Component Analysis (PCA) show impressive previously unseen correlations between ocular biometric parameters.

**Conclusions.** Appropriate analysis of this data set yields many insights into the enigma of the myopia pandemic.

## Ocular biometric parameters of 2200 pediatric myopic eyes and their correlation with the severity of myopia – The Bodhya Eye Consortium myopia biometry study

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**Purpose:** Myopia is an important public health concern affecting populations worldwide. Studying ocular biometric parameters is important to understand the determinants of ocular development in highly myopic eyes. The contributions of axial length, anterior chamber depth (ACD), vitreous chamber depth (VCD), lens thickness, and corneal curvature to the refraction in myopia have not been studied in Indian children. Therefore, the purpose of conducting this study was to analyze the relationship of ocular biometric features with the degree of myopia. **Setting:** This was a cross-sectional multicentric study conducted in five centers of the Bodhya Eye Consortium in India. The participating centers were Dr. Shroff's Charity Eye Hospital, New Delhi; Sadguru Netra Chikitsalaya, Chitrakoot; C L Gupta Eye Institute, Moradabad; Sitapur Eye Hospital, Sitapur; and M G M Eye Institute, Raipur. **Methods:** A retrospective study was conducted including children <18 years of age with the diagnoses of simple myopia or compound myopic astigmatism. Lenticular and corneal myopia were excluded. The biometric measurements were performed using optical biometry (IOL master, Zeiss) at all the participating centers. The data collected was age, gender, height, weight, cycloplegic refraction (Spherical equivalent, SE), best corrected visual acuity (BCVA), axial length (AXL), anterior chamber depth (ACD), lens thickness (LT), keratometry (K), and central corneal thickness (CCT). The various demographic and biometry parameters were compared between the myopia categories (low myopia (0.5D-3D), moderate myopia (3.25-6D), and severe myopia (>6D)). **Results:** 1108 children (2200 eyes). Male: female ratio was 582:526. The mean age was 11.8±3.9 years. Low, moderate, and severe myopia was seen in 35.4%, 29.2%, and 35.4% of children. The mean BCVA was worst in severe myopia (0.29 LogMAR, p<0.001). The mean SE was -1.93±0.71, -4.35±0.84 and -10.2±3.69D and the mean cylinder was -1.24±0.79, -1.62±1.03, and -2.3±1.12D in low, moderate, and severe myopia (p<0.001). The mean AXL, ACD, LT and CCT was 23.97±0.92, 24.74±0.94 and 26.47±1.76, 3.75±0.29, 3.76±0.29 and 3.64±0.34, 3.44±0.29, 3.37±0.28 and 3.42±0.30 and 532.15±32.05, 531.33±36.75 and 524.38±36.5 in low, moderate and severe myopia respectively (p<0.006 for all parameters).

**Conclusion:** Severe myopia was seen in 1/3rd of the study sample. There was no difference in the duration of outdoor exposure or near activities among the three groups of myopia. Severe myopia was observed more in older age (p<0.001) and in children with lesser height and weight (p<0.001). The ocular biometric characteristics varied depending on the magnitude of myopia. The SE, AXL, and cylinder values increased in severe myopia, while the ACD was lower and CCT was thinner. The average K was 44.4±1.71D and did not differ among the three groups.

## Ophthalmic findings in Pediatric Linear Scleroderma: The Experience of a Combined Cleft Craniofacial Clinic at the UPMC Children's Hospital of Pittsburgh

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Purpose: To describe the ophthalmic findings in pediatric patients with Linear Scleroderma.

Methods: Retrospective chart review of pediatric patients referred for ophthalmic evaluation between June 2021 and May 2023 as part of a combined cleft-craniofacial clinic at UPMC Children's Hospital of Pittsburgh.

Results: Forty (N=40) patients were included with a mean age of 13 years (range 4-26) of which 14 were males. Refractive errors ranged from -7.125 to +1.75 (SE) with a mean of -2.68(SE).

Accommodative lag or insufficiency was found in 7 patients (17.5%) and Strabismus in 5 patients (12.5%). At least one ocular adnexal abnormality was found in 51 % of patients (N=23); meibomian gland dysfunction was found in 13 patients (32.5%), Lagophthalmos was detected in 10 patients (25%) and a form of lid notching in 4 patients (10%), 5 patients with enophthalmos (12.5%) of which 1 had hypoglobus, Demodex infestation was noted in 3 patients, and Madarosis in 2 patients. A form of dry eye disease was commonly encountered, N=26 (65%). Central Corneal thickness < 540  $\mu\text{m}$  was found in 9 patients (22.5%), 6 of which were <530  $\mu\text{m}$  (15%). Other anterior segment findings included Axenfeld anomaly (N=1), conjunctival lymphangiectasia (N=1), conjunctival telangiectasia (N=1), papillary conjunctivitis (N=1), and iris nevus (N=2). Eighteen patients (45%) had one or more posterior segment abnormality; congenital hypertrophy or retinal pigment epithelium (CHRPE) (N=7), lattice degeneration (N=4), anomalous optic nerve (N=4), optic disc drusen (N=1), Peripheral vascular looping or arteriovenous malformations (N=2), straightening or retinal vessels (N=1), peripheral retinal thinning (N=2), chorioretinal scar (N=1), and torpedo maculopathy (N=1).

Conclusion: Linear scleroderma may present with a broad variety of ocular findings and has not been well described in the pediatric population. Managing these patients requires meticulous ophthalmic assessment. The development of a standardized examination approach may lead to higher detection rates and improve management.

Financial Disclosures: No relevant financial disclosures

## COMPARISON OF PUPIL SIZE AND ACCOMMODATIVE FACILITY BEFORE AND AFTER SCREEN USE.

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**Purpose :** In the era of ever rising digital screen use the symptoms and assessment of digital eye strain still does not have a uniformity and there is no significant study to quantify or evaluate accommodative system derangements. Our study is to test the effect of digital screen use on accommodative facility and pupil size and to test the null hypothesis.

**Methods :** It is a hospital based prospective interventional study conducted from April to August 2022 in Medical and Paramedical students of a tertiary care centre in North Kerala

**Results :** The average pupil size was  $5.7 \pm 0.88$  mm before and  $5.7 \pm 0.85$  mm after screen use. The accommodative facility was  $7 \pm 2$  cycles before and  $9 \pm 2$  cycles after screen use .Paired t test refuted the null hypothesis of screen use on accommodative facility and the null hypothesis of pupil size was proven (  $p < 0.0001$  ).

**Conclusion :** Accommodative facility increases after short duration of screen use but more studies are required to assess the correlation of duration of screen use and the effect on accommodative facility to prove that it is an integral parameter to be evaluated in digital eye strain.

No financial interests

## CORNEAL CURVATURE AND DEVELOPMENTAL DISABILITIES IN SPECIAL NEEDS STUDENTS : IS IT CORRELATED?

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Purpose : To analyze correlation between corneal curvature among special needs students with developmental disabilities in Malang, Indonesia.

Methods : This consecutive cross-sectional study involved 330 eyes (165 students) with developmental disabilities in all special needs schools in Malang on September 2019 until February 2020. The age range was between 7 and 17 years old. All students underwent measurement using handheld auto refractometer (ARK) Handyref (Nidek ®) and the result was stated in diopter (D). We analyzed the corneal curvature by type of disability and age.

Results : Among 330 eyes (165 respondents), 103 were boys (62%) and 62 were girls (38%). The most common disability was intellectual impairment (35%). The steepest average corneal curvature of 45.64 D (SD ± 2.85) was found in respondents with down syndrome, while the flattest of 41.60 D (SD ± 2.87) was found in respondents with attention deficit hyperactivity disorder (all p=0.040). Against the rule, oblique, and with the rule astigmatism were found in of 256 (82%), 32 (10%) and 25 (8%) eyes, respectively. The steepest average corneal curvature of 45.82 D was obtained at the age of 17, while the flattest of 42.47 D was obtained at the age of 15 (all p=0.502). The average corneal curvature girls was steeper than in boys.

Conclusions : There is a significant correlation between corneal curvature and type of disability.

Respondents with down syndrome had steepest corneal curvature due to its frequent eye rubbing. Against the rule astigmatism was the most common type in all age ranges.

Keywords : corneal curvature, type of disabilities, astigmatism and children

## One-year outcomes of Defocus Incorporated Multiple Segments (DIMS) spectacle lenses: Evaluation of axial length growth rate according to the AMMC (Age-Matched Myopia Control) System

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### Purpose

In randomized controlled trials (RCTs) DIMS spectacle lenses have shown to efficiently inhibit myopia progression in Asian eyes. Clinical results from European children, however, are lacking. Also missing are real-life data from actual clinical practice outside the strict regimen of a RCT. The purpose of this study was to evaluate the efficacy of DIMS spectacle lenses primarily with respect to axial length growth.

### Setting

This study took place at MVZ Breyer Kaymak Klabe Augen Chirurgie and was executed by the Internationale Innovative Ophthalmochirurgie GbR.

### Methods

DIMS spectacle lenses have been recommended to 321 children, that came to our myopia consultation. In January 2023, 131 children already had their 12-month follow-up visit. Axial length measurements of 166 eyes (of 83 children) at baseline visit and 12 months later were retrospectively analyzed. To evaluate axial length growth under therapy with DIMS spectacle lenses, the annual axial length growth rate was calculated and compared to the physiological axial length growth rate according to the AMMC System. If the annual axial length growth rate was within the range of physiological growth rate, this was considered a successful treatment.

### Results

Considering all eyes, the treatment goal was achieved by almost 50%. Eyes with shorter baseline axial lengths (between 50th and 98th percentile of reference curves by Truckenbrod et al) achieved the treatment goal in a larger proportion than eyes with longer baseline axial lengths (62% vs. 36%). However, this finding is largely due to the growth behavior of the male eyes. Female eyes with baseline axial lengths below and above the 98th percentile achieved the treatment goal to a similar extent.

### Conclusion

Overall, in 50% of the cases the treatment goal of physiological axial length growth was achieved. Furthermore, differences were evident with respect to achieving the treatment goal for shorter and longer eyes. Therefore, it should be considered to start directly with a combination therapy (spectacle lenses and low-dosed atropine) in children with longer eyes. Possible differences in the efficacy of myopia progression inhibitory methods on axial length growth between the two sexes are a field that still needs to be explored.

### Financial Disclosure of all authors:

Prof. Dr. Hakan Kaymak is a consultant for Hoya Lens Deutschland GmbH.

The remaining authors have no financial disclosure to declare.

## Paediatric ophthalmology for non-specialists: Management pathways for general practitioners, Introductory online course and Workshops for secondary schools

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Purpose: Referral refinement may help reduce backlogs after the COVID-19 pandemic. It requires building paediatric eyecare competence in health and eyecare professionals (HCPs, ECPs) and empowering them to manage selected conditions independently or with advice and support from a children's eyecare provider. Here we present two initiatives: management pathways for general practitioners and an online introductory course to paediatric ophthalmology.

Setting: Moorfields Eye Hospital, London, UK, Children's Service, North Central London Integrated Care Board, London UK, Moorfields' Education Department, London, UK

Methods: Our hospital service developed management recommendations for general practitioners (GPs) and optometrists. Working with the leads of other children's eye care departments in North Central London (NCL), the local GP lead for children's services and the NCL pharmacy review group, we refined and finalised 19 pathways.

We also developed an online introductory course to children's eyecare for non-specialists, bookable on (<https://checkout.moorfields.nhs.uk/product?catalog=CR809-2101CEPO>). In 16 modules, the course covers basic aspects of how to interact with children and families, safeguarding, child and visual development, assessment techniques, management of common childhood eye conditions, and research with children.

Lastly, we developed a workshop for secondary schools to tell young people about eye health and work roles and professions surrounding eye health. A "visually" workshop session takes 45-60 minutes and can be delivered by eye clinic staff to 11-18 year olds. To evaluate "visually", we monitored the numbers of workshops and young people applying for volunteering roles. We asked those who started working with us about their experience.

Results: Following approval by the NCL Clinical Adoption Group in February 2023, the pathways were adopted as "NCL-Integrated Care Board pathways for paediatric ophthalmology" and made available to GPs via their website. Work with optometrists is ongoing, to reconcile hospital recommendations with those from the College of Optometrists.

Since its launch in 2021, the introductory course has been completed by 80 professionals – ophthalmic nurses and technicians, clinical physiologists and scientists, other nurses, a consultant in paediatric neurodisability, ophthalmic trainees, and optometrists. Participants feel it deepened their understanding and covered all topics in the required detail.

Over 6 months, we held 15 "visually" workshops in secondary schools. Ninety students applied for volunteering roles, and 20 have completed the Human Resources onboarding process. Young volunteers report that this work has increased their confidence and that they have gained insights into how a hospital works. One is considering training to become an orthoptist.

Conclusions: Joint development of resources facilitates new ways of working beyond traditional professional boundaries. “visually” workshops can facilitate outreach activities and encourage young people to consider volunteering as a first step towards a career in eye health.



## IMPACT OF ONLINE CLASSES ON EYE HEALTH OF CHILDREN AND YOUNG ADULTS IN THE SETTING OF COVID-19 PANDEMIC: A SURVEY BASED ANALYSIS.

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Purpose : To analyze the impact of online classes on the eye health of children and young adults in the setting of COVID-19 pandemic. Ever since the country wide lockdown due to COVID 19 began in India, we saw a substantial increase in children and young adults with complaints of blurring of vision, dry eye, headache, and diplopia attending the outpatient services of our hospital and this prompted us to devise this questionnaire based survey.

- Setting/Venue : An observational study based on a written questionnaire and comprehensive ophthalmic evaluation provided to all children and young adults attending online classes, coming to the Pediatric ophthalmology & Strabismus OPD, of a tertiary eye care center in South India, from August 2020 to January 2021 during the COVID-19 pandemic.
- Methods : All were asked to fill a written questionnaire regarding details of online classes including duration, mode, working distance, lighting, break in between classes and any eye complaints. They were also asked if they used electronic gadgets after the online classes and if so, the duration of use. All underwent a comprehensive eye evaluation including vision, refraction, binocular status, slit lamp and fundus examination. Presence of any refractive error, squint, any worsening of refractive error or squint or new onset refractive error or squint were noted. Statistical analysis of risk factors was done using univariate and multivariate logistic regression analysis.
- Results : Of the total 496 patients, most (44.9%) were 5-10 years old, having 1-2 hours of online classes/day. 48.2% had >2 hours of classes with 14.7% having > 4 hours/day. 95.6% used electronic gadgets even after classes and 28.6% used >2 hours/day. 50.8% had eye complaints due to Digital Eye strain (DES), of which head ache/eye ache was most common (30.8%). Duration of online class was found to be the single most independent factor with significant association of developing eye complaints ( $p=0.001$ ). Duration of class hours ( $p=0.007$ ) and light setting ( $p=0.008$ ) were found to be independent determinants of developing DES.
- Conclusions : Increased screen time, inadequate light setting and excessive application of near vision can produce undesirable effects, including development of DES. We recommend not > 2 h of online classes for younger children (5–10 years) and not > 4 h of online classes for older children (10–15 years) and young adults. The light setting should be ambient and classes should preferably be split into 3–4 sessions; each of 30–45 min with adequate breaks (15–20 min) in between. Regulating the duration of e- learning and ensuring adequate lighting is recommended to improve the eye health of students.
- Financial Disclosure: Nil

## The Integrated Continuum of Care: An Impact Study on Pediatric Cataract Profile in Blind Schools of Northeast India

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**Purpose:** A temporal comparison to assess the impact of integrated Primary Eye Care in Primary Health Care approach on paediatric cataract profile in children attending blind schools of Northeast India.

**Setting:** Hospital based community eye care service

**Methods:** Blind and severely visually impaired children aged  $\leq 16$  years, enrolled in blind schools of 8 Northeast Indian states were examined 10 years apart. 258 children in 2008 and 465 children in 2018 were examined using standard WHO protocol and reporting format.

**Results:** In 2008, 48.5% of the children were blind from avoidable causes and 10.9% from cataract. In the latter study, the blindness from avoidable causes and cataract significantly reduced to 12.26% and 5.8% respectively.

**Conclusion:** The focus on a people centered integrated approach with a robust referral system to the base hospital helped build a crucial bridge between the community and health facilities.

## Ophthalmologists' Attitudes, Knowledge, And Willingness To Report Child Abuse

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**Purpose.**

Child abuse is known to be a leading cause of death in infancy. Most of these early deaths are attributed to abusive head trauma (AHT). Eye injury due to abuse can appear in any part of the eye. The aim of the present study was to explore ophthalmologists' attitudes, knowledge, and willingness to report child abuse.

**Venue.**

The study was approved by the Helsinki Committee of the Barzilai Ashkelon University Medical Center. The researchers contacted the Israeli Ophthalmologists' Association, which distributed the questionnaire via e-mail to ophthalmologists in Israel. One-hundred-and-fifty e-mail messages were sent to 150 ophthalmologists, constituting 20% of all ophthalmologists in Israel.

**Methods.**

Participants completed a questionnaire designed by Glasser and Chen (2006). The first part collected ophthalmologists' sociodemographic and professional data, including their training experiences on child abuse. The next two parts explored ophthalmologists' attitudes towards the identification and reporting of child abuse and their willingness to report abuse in the future. The questionnaire included three knowledge questions exploring basic knowledge regarding identification of child abuse by an ophthalmologist and the legal aspects of reporting the suspected child abuse, for a maximum score of three points. The questionnaire was translated into Hebrew. It was reviewed by three content experts and found to be valid.

**Results.**

One-hundred-and-seven completed questionnaires were obtained, for a response rate of 71.3%. Less than half the ophthalmologists (44.9%) reported that they had treated children whom they identified or suspected as being victims of child abuse. Of these, only 43.9% claimed that they had reported the suspected child abuse.

Most of the ophthalmologists (89.7%) reported that they had not undergone a formal study course on child abuse.

Residents were found to have a higher level of knowledge regarding the identification and management of child abuse ( $M = 1.7$ ,  $SD = 0.70$ ) than specialists ( $M = 1.25$ ,  $SD = 0.78$ ).

Female ophthalmologists tended to agree more to screen for and report child abuse.

**Conclusions.**

The present study reveals that underreporting of child abuse, and more precisely the discrepancy between identification and reporting, is present among ophthalmologists. It seems that lack of knowledge regarding identification and reporting of child abuse is the main barrier to reporting, especially among medical specialists. These findings underscore the importance of training programs on child abuse, both during formal education in medical school, and post-qualification, for all ophthalmologists, irrespective of seniority. In addition, the results of this study suggest that gender may play a role in ophthalmologists' attitudes towards identification and reporting of child abuse.

There is no financial disclosure.



## Characteristics of peripheral retinal refraction in different degrees of myopic children

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**Objective:** To explore the characteristics of peripheral retinal refraction in emmetropic, low myopic and moderate myopic children.

**Methods:** A total of 814 subjects (814 eyes) who were admitted to the Pediatric Ophthalmology Department of ShanXi Aier Eye Hospital were enrolled in the study. The participants were divided into three groups according to the central spherical equivalent refraction (SER), which were emmetropia group (E,  $\leq +0.50D$  and  $\geq -0.50D$ ), low myopia group (LM,  $< -0.50D$  and  $\geq -3.00D$ ) and moderate myopia group (MM,  $< -3.00D$  and  $\geq -6.00D$ ). Multispectral refractive topography (MRT) was used to measure the retinal absolute and relative refractive difference value (RDV) in different regions. The range was divided into several areas extending outward from the macular fovea (RDV15, RDV30, RDV45, RDV30-15, RDV45-30 and RDV-45), and Superior, Inferior, Temporal, Nasal RDV (SRDV, IRDV, TRDV, NRDV).

**Results:** The absolute value of RDV decreased with increasing degree of myopia in all regions ( $P < 0.01$ ). Subjects with different refractive degrees had different relative value of RDV. In nasal position within  $45^\circ$  and temporal position within  $30^\circ$ , the peripheral retina exhibited significantly different relative hyperopic refractive status among Group E, Group LM and Group MM ( $P < 0.05$ ). Spearman correlation analysis showed that SER was negatively correlated with nasal RDV within  $30^\circ$  (especially in the range of NRDV30-15) ( $r = -0.141$ ,  $P < 0.01$ ), positively correlated with temporal RDV within  $15^\circ$  ( $r = 0.080$ ,  $P = 0.023$ ), and not significantly correlated with SRDV and IRDV when the retina was divided into four parts. AL was positively correlated with nasal RDV within  $30^\circ$  (especially in the range of NRDV30-15) ( $r = 0.109$ ,  $P = 0.002$ ), negatively correlated with temporal RDV within  $15^\circ$  ( $r = -0.095$ ,  $P = 0.007$ ). **Conclusions:** In the development of myopia, the peripheral defocus has significant implications for the genesis of myopia in children. There may be an imbalance between vertical and horizontal eye development. The peripheral defocus of the horizontal direction, especially within the range of NRDV30, has a greater effect on the development of myopia in children.

**Keywords:** Myopia, Peripheral retinal refraction, Relative difference value, Multispectral refractive topography, Children

## Myopia progression in pediatric age group: Early prediction using artificial intelligence

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**Purpose:** To predict myopia progression in pediatric age group using corneal tomography and biomechanics by an artificial intelligence (AI) model.

**Methods:** In this retrospective cross-sectional study, 321 eyes of 321 subjects aged between 5-17 years with myopia were included. Cycloplegic refraction, Corvis-ST and Pentacam HR were assessed. Eyes were sub-grouped into stable or progression if spherical power increased by  $> 0.5$  D, after 1 year follow-up. A decision tree AI classifier (leave one-out validated) was used to predict myopia progression using Orange AI (University of Ljubljana).

**Results:** Extra corneal viscosity ( $< 0.13$  Pasec), extra corneal stiffness ( $>24.47$  N/m), spherical aberration ( $>0.16$   $\mu\text{m}$ ) were the major predictors of progression. The AI had area under the curve, accuracy, and precision of 0.73, 0.71 and 0.72, respectively.

**Conclusion:** Myopic progression was predicted by AI using non inverse imaging data from Corvis-ST and Pentacam HR parameters.

## Ocular cranial nerve palsies in children - A prospective observational study in a tertiary Centre in South India

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**PURPOSE** - To study the etiology, presentation, course of recovery and management of Paediatric ocular cranial nerve palsies.

**SETTING**- prospective observational study of Paediatric patients presenting with ocular cranial nerve palsy to a tertiary eye hospital in South India during the period of December 2020 - may 2022 ( 18 months)

**METHODS**-

Inclusion criteria - All Paediatric ocular cranial nerve palsy presenting to the out patient department.

Exclusion criteria- Ocular myesthesia, Concomitant strabismus, Diplopia due to binocular vision disorders

**Methodology**- Patients satisfying the inclusion criteria undergo complete ocular and cranial nerve evaluation. Neuroimaging and blood investigations are done in relevant cases. If Neuroimaging shows abnormality, patient is referred to concerned specialist ( Neurologist/ Neurosurgeon). If there is trauma or inflammatory etiology, patient is treated with appropriate oral or intravenous steroids. In other cases where the neuroimaging is normal, patient undergoes close observation with regular follow up. Each visit, evaluation is done to look for recovery, development of amblyopia and improvement in diplopia. At the end of 6 months, in case of non resolution surgical intervention will be planned.

Sample size- 28 patients

**RESULTS**-

- Out of 28 children in the study 13 were males and 15 were females

-majority of cases were unilateral (26) only 2 children had binocular involvement.

- Presenting complaint-18 cases presented with squinting as chief complaint. Rest presented with diplopia, ptosis, abnormal head posture and inability to close eyes

-Duration of complaints ranged from 2 days to 10 years.

- Best corrected visual acuity at the time of presentation - (mean ) 0.16 LOG MAR ( standard deviation (SD)- 0.43)

- Laterality-Out of 28 children- 10 had third cranial nerve palsy, 10 had sixth cranial nerve palsy, 5 had fourth cranial nerve palsy, 3 had seventh cranial nerve palsy. 1 had multiple cranial nerve involvement.

-History- 17 had no significant past history, 7 had trauma, 3 had fever prior to onset, 1 had seizure

-Neuroimaging- 20 had normal neuroimaging, 1 had idiopathic intracranial hypertension (IIH), 1 had tuberculoma brain, 1 had vascular abnormality, 1 had astrocytoma, 1 had traumatic optic neuropathy with left orbital roof fracture. Imaging was not done in 2 children.

-management- children with congenital cranial nerve palsy were advised surgical correction during initial visit. All children were started on occlusion therapy to avoid amblyopia. 1 child with tuberculoma was started on anti tubercular therapy. 2 children had oral steroid therapy. 2 children were given prism glasses. 1 child underwent radiotherapy for astrocytoma and 1 child with IIH was medically managed.

Follow up -

-There was no significant difference in visual acuity in most of children as amblyopia therapy was started early

- Binocular single vision (BSV)- children who presented immediately and recovered early regained BSV (10 out of 28). Long standing palsy had suppression (18/28)

Recovery

22 out of 28 children had complete recovery of nerve palsy at the end of study period.6 children had residual deviation post surgery which was either observed or managed with prism glasses

CONCLUSION- Paediatric cranial nerve palsy, although constitute only small percentage of total Paediatric ophthalmological disorders needs special attention and careful workup. A thorough ophthalmic and systemic workup is needed in all cases. Almost all Paediatric cranial nerve palsies require neuroimaging as some of these cases might harbor life threatening intracranial pathology which needs early detection. addressing the etiology and managing them with appropriate therapy shows promising results. Early amblyopia therapy ensures good visual recovery. Thorough work up, careful plan of management at appropriate time is required in all cases.

The Author does not have any financial disclosures



## DIPLOPIA AFTER CATARACT SURGERY: WHEN BINOCULAR VISION BECOMES A BANE THAN A BOON!

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- Purpose : To evaluate the causes of binocular diplopia following cataract surgery
- Setting:Cataract surgery is the most routinely performed surgery in modern ophthalmology.The results are spectacular with patient and surgeon having high expectations.Diplopia post cataract surgery; though infrequent, can be a major cause of distress to the patient and surprise & disappointment for the surgeon.
- Methods : This was a retrospective analysis of electronic medical records of all patients who complained of binocular diplopia within 6 weeks of cataract surgery from the year 2015- 2021; with a minimum follow up of one year. Parameters assessed includes age, sex, type of cataract surgery, eye operated and anaesthesia, details of diplopia like onset, duration and type, presence of systemic and ocular comorbidities, details of pre and post operative binocular vision examination including presence of squint, response on WFDT (Worth Four Dot Test), ocular motility, type and amount of deviation, immediate and definite management strategies.
- Results : Total 38 patients;30 males,8 females Mean age was 72.4 years.94.7% underwent Phacoemulsification and 5.26% had manual small incision cataract surgery; all under peribulbar anaesthesia.Diplopia was pre-existing in 65.79% patients, new onset in 34.21% patients and missed in 10.53% patients.60.5% had horizontal diplopia,36.8% had vertical & 2.6% had both.Majority were decompensated phoria-tropias and cranial nerve palsies.One patient each with post scleral buckle surgery, ocular myasthenia and local anesthetic induced diplopia.71% had relief from diplopia with 15% making spontaneous recovery, 29% using prism glasses, 23.68% underwent squint surgery and 2.6% needed squint surgery + prism glasses at the end of 1 year.
- Conclusions:Of the total 48500 cataract surgeries performed at our centre from the year 2015-2021;only 38 patients (0.078%) with binocular diplopia post surgery.Pre-operative systemic risk factors in 36 patients with majority(19)having > 1 risk factor.Majority were pre-existing causes(55.26%); most being decompensated phoria-tropia, mainly exotropia.New onset diplopia were 34.2%,most being cranial Nerve palsies,mainly Superior Oblique Palsies.Local anaesthetic induced diplopia was rare with only 1 patient developing Inferior Rectus weakness and needing prism glasses.Pre-operatively undiagnosed diplopia contributed to 10.53% of causes with most being Superior Oblique Palsies.Hirschberg test,Worth Four Dot Test,Diplopia charting were able to pick up the majority(95.2%) of pre-operative diplopia.
- Financial Disclosure: Nil

## Observation Series of 6 Cases of big Cystic Lesion Causing Visual Impairment: Ophthalmology and Minimal Invasive Neurosurgery (MIN)

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**Background and Aims:** Preservation of visual function can be optimized in selective cases only by close cooperation of ophthalmology and Minimal Invasive Neurosurgery (MIN). The analysis of the ophthalmological outcomes in this series to prove the effect of functional recovery by minimal invasive neurosurgical procedures (MIN) enclosed 6 cases: 2 supra-sellar cysts, 2 cystic tumors and 2 complex-cystic hydrocephali, in all cases causing disturbance of visual function. Half of the cases were emergency cases.

**Methods:** This concept combined 5 MIN-key techniques to assist microneurosurgery: high-end neurosonography with small probes, mouth-tracking of the microscope -both mandatory-, endoscopy and LASER. Sealing technique was always used. Ophthalmological standard techniques were perioperatively used to meticulously document ophthalmological functions. Visual acuity, 30°-visual field, RNFL and funduscopy were examined as soon as the patients' condition did allow so.

**Results:** In all cases visual functions were improved or preserved. In all cases endoscopy was used, in 2 cases additional LASER assisted the procedure, in 2 cases ultrasound navigation was needed, and in 1 case 4 procedures were needed with micro-surgical technique also. The combination was decided individually for each case. MIN techniques and ophthalmological examinations differ in relation to the patients' individual conditions.

**Conclusions:**

- Cooperation of neurosurgery and ophthalmology can preserve visual functions even in emergency cases.
- Ophthalmology plays in this context the role of an emergency indicator.
- Ophthalmological techniques may support the outcomes analysis as an excellent model to show functional recovery after MIN procedures.
- A close to the patient and an individual management came out to be necessary.
- Individual combination of MIN-techniques in each case is a key-concept of MIN (Ref.: KDM Resch; Key Concepts in MIN, Vol I+II, 2020/22; Springer)

## Outcomes of Fasanella Servat procedure in cases of mild and moderate congenital myogenic ptosis

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**Purpose:** This study aimed to evaluate the outcomes of Fasanella Servat procedure in cases of mild and moderate congenital myogenic ptosis.

**Setting-** Tertiary eye care centre in South India

**Methods-** Twenty eyelids with mild and moderate congenital myogenic cases undergoing Fasanella Servat procedure for mild and moderate ptosis were retrospectively included.

There were 12 male and 8 female cases. The mean age of the cases was  $8.55 \pm 5.3$  years (range, 4-16 years). For all

eyes, vertical palpebral aperture, margin reflex distance, levator functions, and upper eyelid crease height were

measured. Ptosis severity was "mild" when the eyelid elevation was  $\leq 2$  mm; "moderate" when the eyelid elevation was 3 mm.

**Results-** The mean ptosis severity (vertical palpebral aperture) was 5.136 mm preoperatively and 0.818 mm at the postoperative Month 3 ( $p < 0.001$ ). Surgical outcomes were successful in 15 eyes (75%), satisfactory

in 4 eyes (20%), and unsuccessful in 1 eyes (5%).

**Conclusion-** The Fasanella-Servat operation is effective for mild to moderate congenital myogenic ptosis. This procedure has the advantage of high reliability when reasonable preoperative criteria are applied and is minimally invasive.

## The Efficacy and Safety of Prophylactic Agents in the Prevention of Retinopathy of Prematurity: A Systematic Review and Meta-analysis

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**Purpose:** Multiple agents have been investigated for their role in preventing the incidence of retinopathy of prematurity (ROP). However, a general consensus on the efficacy and safety of these agents has not been reached. This systematic review and meta-analysis aimed to assess the efficacy and safety of lipids, vitamin A, and propranolol in preventing ROP.

**Methods:** We searched the Medline, Embase, and Cochrane Central Register of Controlled Trials Databases. We included randomized controlled trials (RCTs) that compared the use of lipids, vitamin A, or propranolol with placebo in preventing ROP and severe ROP in preterm infants with low birthweight. We evaluated the rates of the following outcomes: ROP of any stage, ROP stage 1, ROP stage 2, severe ROP (ROP stage 3-5, prethreshold ROP type 1, and ROP requiring treatment), adverse events, and mortality. Subgroup analysis was performed based on the used agent: lipids, vitamin A, and propranolol. The risk ratio (RR) was used to represent dichotomous outcomes. Data were pooled using the inverse variance weighting method. To assess the quality of evidence, the Grading of Recommendations Assessment, Development and Evaluation approach was used. Risk of bias was assessed using the Revised Cochrane risk of bias tool for randomized trials.

**Results:** Eight RCTs (n= 1101 participants) were deemed eligible. Four RCTs had an overall low risk of bias, three had some concerns, and one had an overall high risk of bias. The pooled effect estimate showed a statistically significant reduction in the incidence of severe ROP in the intervention arm (RR=0.63, 95% confidence interval [CI] 0.46–0.86). The pooled analysis showed no significant reduction among the lipid, vitamin A, or propranolol groups in the incidence of ROP of any stage (RR=0.83, 95% CI 0.69–1.00), ROP stage 1 (RR=1.13, 95% CI 0.72–1.79), or ROP stage 2 (RR=1.04, 95% CI 0.54–2.02). No significant differences were found between the lipid, vitamin A, propranolol, and placebo groups in the rates of adverse events (RR=0.83, 95% CI 0.59–1.17) or mortality (RR=0.93, 95% CI 0.67–1.30).

**Conclusion:** The use of interventions, particularly lipids, was associated with a significant reduction in the incidence of severe ROP in preterm infants with low birthweight. No significant differences were noted when using lipids, vitamin A, or propranolol in preventing ROP of any stage, ROP stage 1 or ROP stage 2. The agents used in this study also had similar rates of adverse events and mortality to placebo.

## Study on the etiological pattern, clinical course, treatment and visual outcome of paediatric uveitis in tertiary care hospital

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### Purpose:

To study the etiological pattern, clinical course, treatment and visual outcome of paediatric uveitis in tertiary care hospital

Setting: ARAVIND EYE HOSPITAL, Pondicherry

Methods: 37 paediatric patients <16 years of age, diagnosed with uveitis were reviewed retrospectively from Jan 2019 to December 2021. Patients diagnosed with uveitis based on clinical signs and symptoms with minimal follow up of three months. Clinical data like visual acuity, IOP, Ocular inflammation details before and after treatment. Complication details and management, amblyopia and its treatment were collected.

### Result:

Mean age of children is 10.49 (3.17) ranging from 4 to 15 years. 10(27%) patient has bilateral involvement. Visual acuity improved from 0.6 (6/24) to 0.18 (6/9) with a significant p value of <0.001

37 patients were analyzed .Posterior uveitis was most common with 43% followed by anterior uveitis with 32% intermediate uveitis with 19% and panuveitis in 5%. ToxocariaSIS and toxoplasmosis were common among posterior uveitis sarcoidosis in anterior and intermitities uveitis, 1 patient with panuveitis had VKH. Patients were treated with oral and topical steroids antibacterial, antiviral drugs were used for 46% of patients, 1 Patients was treated with biologicals. Complicated cataract was seen in 8 patients out of which 5 patients had anterior uveitis. Posterior segment scar was seen in 13 patients secondary glaucoma and Retinal detachment was seen in 1 patient.19 patients had amblyopia out of which 7 patients were advised patching. 3 patients showed improvement of 1 line during follow up.

### Conclusion:

Paediatric uveitis is unique and often asymptomatic. Most of the patients present late and discovered incidentally. Treatment should be closely monitored. After management of the uveitis it is important to identify and treat amblyopia for improvement in visual acuity

## Retinal Findings in a German Population of Highly Myopic Children

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**Purpose:** The axial elongation of eyes due to myopia can cause severe ocular diseases like retinal detachments, early cataracts, or glaucoma in adulthood. Yet myopia associated changes in optical coherence tomography and fundus can be seen even in myopic children. This study aims to find predictors for the presence of dome shaped macula in highly myopic children in a German cohort, as well as the evaluation of fundus statuses of these children.

**Setting:** This retrospective evaluation was conducted and performed with data collected during regular myopia consulting hours at a practice setting.

**Methods:** Systematic retrospective data review was conducted at our clinic. Patients under 19 years old, who received axial length measurement, radial OCT-scan and ultrawide field fundus photography were included in this study. Axial length had to be in or over the 95th-percentile of reference curves for the according age. Logistic regression models were fitted to evaluate the relationship between the presence of a macular dome and age, axial length, presence of myopic changes, gender, refraction, and choroidal thickness. Eyes with myopic fundus changes and eyes without any changes were compared regarding axial length and choroidal thickness.

**Results:** Out of 891 children's eyes, 130 eyes met the 95th-percentile inclusion criteria. 84 eyes of 46 had complete necessary imaging. Mean age of this children was  $10.55 \pm 2.86$  years. Mean axial length was  $25.16 \pm 1.04$  mm, mean spherical equivalent refraction was  $-4.44 \pm 2.59$  Diopters and choroidal thickness  $268.0 \pm 67.10$   $\mu\text{m}$ . Dome shaped elevations were present in 4.8% of eyes (4 eyes of 3 patients, 3 eyes vertical meridian only), 2 eyes of 1 patient presented with subretinal fluid. 42% of eyes showed no retinal changes, 50% showed a tessellated fundus and 6% showed diffuse chorioretinal atrophy. Logistic regression model did not reveal any significant factor influencing the presence of a macular bulging ( $P > 0.05$ ). However, a significant difference in fundi with and without any myopic changes were found for axial length ( $P < 0.001$ ) and choroidal thickness ( $P < 0.05$ ).

**Conclusion:** The presence of any myopia associated fundus changes is significantly influenced by longer axial length and thinner choroid. Dome shaped maculopathy could not be explained by any of the assessed clinical data points, to date there is no explanation on why this bulging of the macula occurs. OCT imaging in different meridians is necessary to diagnose dome shaped elevations of the macula and subretinal fluid. Therefore OCT-imaging in myopic children should become a standard of care.

## Clinical features of X-linked CACNA1F related nystagmus

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Purposes: CACNA1F-related disorders include incomplete congenital stationary night blindness(iCSNB), Åland island eye disease(AIED) and X-linked cone-rod dystrophy (CORDX3).

Phenotypic and genotypic characteristics of the disorder were analyzed for better understanding of the disorders.

Setting: A retrospective data analysis for all patients diagnosed with X linked CACNA1F related diseases by whole exon sequencing(WES).

Methods: We collected data from 32 patients with CACNA1F gene mutation. All patients undertook comprehensive ophthalmic evaluation. They were sub-grouped into iCSNB, AIED and CORDX3 according to clinical characteristics. Phenotypic features were analyzed for patients in each sub-group.

Results:1.Total 32 patient from 20 families were included, their median age was 22 years, ranged from 0.8 to 68y; 2. twenty two patients were diagnosis as iCSNB, 6 were AIED and 4 were CORDX3; 3. BCVA in 14 patients (44%) was lower than 1.0logMar, was 0.5 to better than 1.0logMAR in 16 patients (50%), better than 0.5logMAR in 2 patients(6%). Nineteen patients(15 CSNB and 4 AEID) had moderate to high myopia, 3 patients(cone-rod dystrophy) had moderate to high hyperopia; 4. Fundus pigment dysplasia and fovea hypoplasia were found in 6 patients (AIED), and retinal thinning in 10 cases (6 AIED, 4 CORDX3). f-ERG responses were reduced and negative ERG waveform were identified in all patients. 5. twenty eight patients had head oscillation. All patients were found to have a special waveform featured with low amplitude and high frequency components.

Conclusions: CACNA1F diseases have heterogeneous phenotype, diagnosis should be done according to its genotype as well as clinical characteristics;

Financial disclosure: none.

## Retreatment for reactivation of ROP following initial anti-VEGF injections. A 5-year retrospective study.

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**Purpose:** To present the retreatment rates and the characteristics of ROP reactivation, as well as the differences between bevacizumab and ranibizumab injections in premature babies treated in our department over the past 5 years.

**Setting/ Venue:** Paediatric Ophthalmology Department Manchester Royal Eye Hospital, Manchester, United Kingdom.

**Methods:** A retrospective analysis of babies with treated ROP was performed. 89 babies who required treatment from 2017 to 2022 were examined. We studied the severity of their disease with regards to their gestational age, treatment time and type and the need of further treatment. We also focused on the comparison of anti-VEGF agents for ROP.

**Results:** 22 out of 89 babies (14 boys and 8 girls) with aggressive posterior retinopathy of prematurity (APROP) and mean gestational age of 25+3w received initially anti-VEGF injections. 16 of those (11 boys and 5 girls) required retreatment with diode laser. 9 out of these 16 babies were treated with ranibizumab (Lucentis) and 7 with bevacizumab (Avastin). It is also of note that only 2 out of 67 babies who initially received laser treatment needed a complementary laser session.

**Conclusion:** The majority of babies with aggressive ROP who receive anti-VEGF agents will most probably require further laser treatment. At an equal level of retinal damage, it seems that their response to ranibizumab and bevacizumab is similar.

**Financial Disclosure:** None



## Fleck retina of Kandori associated with a de novo mutation of a heterozygous variant in CAMK2A gene

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Purpose: Fleck retina of Kandori (FRK) has been first described in 1958 as a congenital stationary night blindness without decreased visual acuity. It is defined as a possible focal disturbance of the retinal pigment epithelium (RPE) causing focal, irregular, sharply defined yellow flecks of various sizes on the mid-periphery of the retina sparing the macula, the optic nerve, and the vessels.

Clinical Case: A seven-year-old girl was referred in the context of global moderate development delay and treated ADHD to exclude visual disorders. The mother spontaneously described night blindness and clumsiness. Visual acuity was 1.0 O.U. with a mild correction of myopia and astigmatism. Oculomotility and binocularity were in order. Anterior segments and ocular tensions were normal. Fundoscopy revealed lesions compatible with FRK distributed primarily in the nasal equatorial region with no vitreous haze nor retinal pigmentary changes. The optic discs, macular area and retinal vessels were normal. The parents funduscopy didn't reveal any fleck-like lesions. Automated visual field was uninterpretable due to low compliance. Fleck lesions were hyperautofluorescent and OCT didn't show obvious changes on the external retina. Photopic and scotopic full-field ERG was normal and dark adaptometry slightly delayed. Six-year follow-up confirmed stability of funduscopy and visual function.

Discussion: In parallel with the discovery of FRK, genetic analysis revealed a de novo heterozygous mutation in the CAMK2A gene encoding the Ca<sup>2+</sup>/calmodulin-dependent protein kinase II enzyme and explaining the patient's neuropediatric pathology. This enzyme is essential in neuron survival, synaptic plasticity, neuromodulation, cortical development, learning and memory processes in the brain. In the eye, it seems to be expressed in the retina (including in retinal ganglion cells and photoreceptors). Faced with this case, the question that arises is whether these are two non-associated entities occurring in parallel or whether there may be a pathophysiological link between these two expressions of a neuropediatric and an ophthalmologic pathology, expressed as a mosaicism in the retina.

Conclusion: The association of FRK and a de novo heterozygous CAMK2A mutation causing a global development delay does not appear to have been previously described in the literature and recognition of such an association may have clinical implications and help further diagnosis.

## The effect of lateral rectus and inferior oblique recession on the vertical palpebral fissure height in intermittent exotropia

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**Purpose** – The purpose of this study was to analyse changes in the palpebral fissure width following lateral and inferior oblique recession.

**Methods** – Patients with basic intermittent exotropia and inferior oblique overaction (+2 and +3) between the ages 4 to 50 years were included in the study. Lateral rectus recession and inferior oblique recession (Park's recession) was performed by a single, strabismus-trained surgeon through a fornix incision and the postoperative palpebral fissure width was analysed at 2 weeks, 1 month and 6 months. Preoperative photographs were taken in primary gaze, adduction and abduction. Analysis of the photographs was done using Image J Software version 1.41 (National institute of health; [rsweb.nih.gov/ij](http://rsweb.nih.gov/ij)) and vertical distance between upper and lower eyelid (VPFH) was measured in pixels. Pixel size was then converted to a unit of length. The collected data was entered in Microsoft Excel and then analysed using SPSS-25 version. Normality of each variable was assessed using the Kolmogorov- Smirnov test and Shapiro-Wilk test. The pre-post comparison was done using Paired t test.

**Results** – 18 eyes of 18 patients were analyzed. The amount of recession ranged from 6.0 to 8.5 (mean  $7.25 \pm 0.84$ ) mm and for inferior oblique overaction, Park's recession (2mm lateral and 3 mm posterior to the insertion of inferior rectus) was done. More than 0.6 mm of change in PFW after surgery was defined as a significant change. The average preoperative vertical palpebral fissure height was  $9.77 \pm 1.3$  mm. At 2 weeks it was  $10.55 \pm 1.5$  mm and at 1 month it was  $10.34 \pm 1.26$  mm. At the end of 6 months postoperative it was  $10.26 \pm 1.3$  mm. No statistical significance was found at the end of 6 months ( $p < 0.05$ ). In adduction and abduction, the preoperative height was  $9.45 \pm 1.23$  and  $9.89 \pm 1.44$  mm. Postoperatively, the deviation was  $9.79 \pm 1.33$  and  $10.57 \pm 1.5$  mm. No statistical significance was found in these gazes ( $p < 0.05$ ).

**Conclusion** – In this study, it was noted that there is palpebral fissure width widening after lateral rectus and inferior oblique recession. However, no statistically significant difference was found in primary position, adduction and abduction at 6 months postoperatively ( $p < 0.05$ ). It was found, that the palpebral fissure width changes were greater in patients who had a larger lateral rectus recession. It can therefore be presumed that combined inferior and lateral rectus recession (in the range of 6-8.5mm) does not lead to significant changes in the vertical palpebral fissure height and can be safely performed. Further studies need to be performed for larger recessions (>9 mm) to know if the changes can be significant.

**Financial disclosures**- The author has no financial disclosures.

## Surgery combined with binocular vision therapy for albinism combined with INS

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Objective: To evaluate the effects of nystagmus surgery combined with binocular vision therapy for albinism combined INS patients;

Methods: 1. Data were collected from 57 albino INS patients, who were underwent nystagmus surgery and binocular vision therapy; 2. All patients were classified for Foveal Hypoplasia (FH) according to Thomas grading standard(2011), and genotype was confirmed by genetic testing; 3. BCVA and ANAF (Automatic Nystagmus Acuity Function) were used for therapeutic evaluation before and after surgery, before and after training; The correlation of BCVA with FH and ANAF were also analyzed;

Results: 1. 6 cases were FH grading 1, 4 were grading 2, 6 were grading 3, 39 were grading 4, 2 were grading 5 ; 2. Preoperative and postoperative ANAF was  $\log\text{MAR}0.43\pm0.13$  and  $\log\text{MAR}0.78\pm0.19$  respectively; Preoperative BCVA was  $\log\text{MAR}0.82\pm0.19$ , Postoperative BCVA was  $\log\text{MAR}0.43\pm0.11$ ,  $\log\text{MAR}0.33\pm0.16$  after training; 3. OCA1A group: preoperative BCVA was  $\log\text{MAR}1.0\pm0.20$ , Postoperative was  $\log\text{MAR}0.90\pm0.17$ , was  $\log\text{MAR}0.6\pm0.15$  after training; non-OCA1A group: preoperative BCVA was  $\log\text{MAR}0.7\pm0.19$ , Postoperative BCVA was  $\log\text{MAR}0.58\pm0.17$ , was  $\log\text{MAR}0.26\pm0.12$  after training ; 4. BCVA was negatively correlated with FH, and positive correlated with ANAF;

Conclusion: 1. Nystagmus surgery combine with binocular vision training can improve the vision function of albinism patients with nystagmus; 2. Foveal development is closely related to vision improvement;

## Surgery combined with binocular vision therapy for albinism combined with INS

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infantile nystagmus syndrome, Eye movement recording, Albinism, binocular vision therapy

## Surgical outcome of Full-tendon Modified Nishida procedure: A safe and effective transposition myopexy in varied large-angled complex strabismus

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### INTRODUCTION AND PURPOSE:

Transposition procedures are often useful in improving duction past midline and at the same time correcting large angle primary position deviation in large -angled incomitant squints. But recessing the tight antagonist with full tendon transposition can bear the risk of anterior segment ischemia if done in the same sitting; and even when spaced with time procedure does not become safer. Partial tendon transposition and Modified Nishida and are safe alternatives but their efficacy remains low. Vector forces used in the Modified Nishida's no-split, no-tenotomy transposition procedure consisted of one-third muscle width with mean correction of only 30pd in 6th nerve palsy (6thNP).

The purpose of study was to evaluate the safety and efficacy of our previously described no-split, no-tenotomy "FULL-TENDON MODIFIED NISHIDA (FTMN)" in correcting large-angle deviation in various complex strabismus

### METHODOLOGY:

This retrospective cohort study was approved by the Institutional Review Board of our institute and followed the tenets of the Declaration of Helsinki. The medical records of all patients with complex strabismus who underwent squint surgery at our tertiary institute from December 2017-September 2021 were reviewed. Patients of complex strabismus of varied types who underwent FTMN with minimal follow up of 6 months were included in the study. Informed consent was obtained for all patients. Age, sex, any relevant systemic findings, visual-acuity, anterior/posterior segment examination findings were recorded. Complete orthoptic work-up including pre and post-operative measurements of squint, ductions, any face turn, and force duction test were recorded. Deviation was measured by an alternate prism-bar cover test (PBCT), Krimsky, and Hirschberg corneal reflection tests. Ductions were recorded on a scale from 0 to -4, with 0 indicating full rotation up to canthus, -1 for slight limitation, -2 for half the range from the midline to canthus, -3 for slight movement from midline but not up to halfway, and -4 for not crossing the midline.

### Surgical technique

This described procedure differed from modified Nishida procedure in two ways: firstly, the whole width of muscle was transposed without tenotomy or splitting, and secondly, transposition was in the superior quadrant close to the border of SR. None of the patients showed signs of anterior-segment ischemia.

Details of the post-operative outcome in terms of correction of deviation along with duction improvement in affected gaze, any sign of anterior segment ischemia (ASI), and resolution/persistence of subjective diplopia were recorded and compared with pre-operative findings. Surgical success was defined as the postoperative alignment of at least 10 prism dioptres and omission of subjective diplopia in primary position.

### RESULTS

Operative records of 1021 patients who underwent surgeries under general/local anesthesia between July 2017-September 2021 in Advanced Eye Centre, PGIMER were retrospectively reviewed. 22 patients who underwent FTMN were included in the study. Mean follow up was  $2.7 \pm 1.23$  years. Among them 6 patients were pediatric cases. Mean age of 22 patients was  $24.41 \pm 14.2$  years. Among them 10 were congenital and 12 acquired cases. MRI Brain was done in all acquired patients and only 1 patient had brain stem schwannoma for which patient underwent neurosurgical. Among 22

patients, 7 MED, 8 6th nerve palsy, 3 muscle slippage, 2 ESO-DRS, 2 EXO-DRS. No Anterior segment ischemia was seen in any patient

#### Mono ocular Elevation Deficit:

7 patients of MED (mean age  $21.57 \pm 7.28$ ); M:F- 6:1. All congenital cases. Right eye involved in 6 cases. All had severe ptosis (except 1) with poor LPS with poor Bells. 2 had severe Marcus-jaw winking phenomenon. All 7 patients underwent FTMN and 6 patients underwent Inferior rectus (IR) recession. Mean pre-operative hypotropia was  $65.7 \pm 20.50$ pd and mean post-operative hypotropia at 6 weeks  $18.57 \pm 7.48$  pd ( $p=0.001$ ) and 6 months  $4.29 \pm 4.82$  pd ( $p=0.001$ ). Mean pre-op supraduction deficit was  $-4.2 \pm 0.76$  & mean post-operative supra-duction at the end 6 months was  $-1.36 \pm 0.75$  (p value 0.001). Mean correction achieved by FTMN alone in 7 MED was  $52.57 \pm 7.72$  pd.

#### 6th nerve palsy:

8 patients of 6th Nerve Palsy (mean age  $26 \pm 18.6$  years)

All patients were male. All cases acquired were acquired post-traumatic cases except 1. All 8 patients underwent FTMN and MR recession (mean  $5.88 \pm 1.36$ mm). Mean pre-op esotropia in 8 patients was  $65.71 \pm 20.5$  pd and mean post-operative esotropia at 6 weeks  $10.63 \pm 9.8$  pd ( $p=0.001$ ) and 6-months  $2.25 \pm 6.76$  pd ( $p=0.001$ ). Mean pre-op and post-operative abduction deficit was  $-4.29 \pm 0.76$  and  $-1.36 \pm 0.75$  respectively (p value 0.001). Mean correction achieved by FTMN alone on temporal side in 6th nerve palsy cases was  $41.75 \pm 10.43$ pd.

#### Lost muscle

Mean pre-op exotropia  $71.67 \pm 23.63$  and post operative exotropia  $21.67 \pm$  ( $p=0.001$ ) respectively. Mean pre-op and post-operative adduction deficit was  $-4.67 \pm 0.58$  and  $-2.7$  ( $p=0.04$ ). Mean correction achieved with FTMN on medial side was  $51.67 \pm 10.41$  pd BI.

#### Exotropic-DRS

2 patients of Exo-DRS (exotropia of 60pd BI and 65pdBI respectively) underwent LR periosteal fixation and FTMN on lateral side. Mean abduction limitation of -5 in each patient.

Abduction limitation improved to -2 and -2.5 post-operatively.

Correction achieved with FTMN on temporal side was 25 and 30pd BI respectively.

#### Esotropic –DRS

2 patients of Eso-DRS had esotropia of 45pd BO and 40pdBO respectively. Mean abduction limitation of -4 in each patient. All underwent FTMN & MR recession of 4mm and 3.5mm respectively.

Abduction improved to -1 in each patient

Correction achieved with FTMN alone on temporal side was 30 and 25 pd BO respectively

Overall mean correction achieved was  $43.95 \pm 12.31$ pd. Correction achieved by horizontal FTMN alone was  $39.93 \pm 12.13$ pd and vertical FTMN alone was  $52.57 \pm 7.72$ ).

Overall p value for FTTM correction among all types of incomitant squint was statistically significant. But applying Bon-ferrini correction for multiple comparisons, the adjusted p value for every group comparison was not statistically significant.

#### CONCLUSION:

FTTM is a safe and effective procedure in correction of large-angle incomitant strabismus and improving duction when done in combination with ipsilateral antagonist recession

Without tenotomy this technique displaces the full- thickness pulleys of the bellies and hence the muscle center in the direction of the transposed site which is close to the border of paralysed muscle resulting in greater tonic ducting force

## STRABO SOFT technology in strabismus surgery

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The important step in the treatment of children's strabismus – is surgical correction. All traditional schemes of dosage are based on the angle of deviation, but they don't take into about the individual anthropometric parameters of the patient eyes.

Evaluate the results of interventions on the oculomotor muscles, performed using a dosing program «STRABO soft» in view an individual parameters (angle of strabismus, sagittal eye size, transverse size, corneal diameter, refraction, DPP) in children with converging strabismus compared other operation calculation schemes like Parks M, Wright KW, Coats DK.

Analysis includes 187 children aged from 3 to 13 years old with previously unoperated converging strabismus from +15Δ to +36Δ. Surgery: recession of the internal rectus muscle and plica of external rectus muscle on the same eye. There are 49 patients in main group, dosing with «STRABO soft». 47 patients operated by Parks M, 47 - Wright KW, 46 - Coats DK.

In «STRABO soft» operations orthotropy was achieved in 100% of cases (49). By Parks M orthotropy was achieved in 86% of cases (40), eight children have residual esotropia more then 8Δ, one with exotropia 12Δ. By Wright group orthotropy was achieved in 91% of cases (43), four have residual esotropia more then 8Δ. In Coats DK group orthotropy was achieved in 84% of cases (38), seven have residual esotropia more then 8Δ, one with exotropia 6Δ.

The individual dosage by «STRABO soft» get more accurate prediction of operation results compared with traditional methods and can be recommended for wider usage.

Conflict of interests: Aznauryan I.E. is the only owner of the program «STRABO soft». The other authors have no financial or property interests in the mentioned materials and methods.

## Lost muscle. How to find it?

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Introduction:

The issue concerning strategy planning of the surgical previously operated strabismus treatment remains one of the most difficult in strabismology. Detailed medical anatomic and topographic extraocular muscles check-up is necessary for the successful surgery.

Material and methods:

Clinical cases:

- 1) Patient A., 25 y.o., was operated earlier three times on strabismus. On admission: exodeviation (-35 degrees) and restriction of adduction OS. During MRI displacement of medial rectus muscle (OS) was recognized (the muscle was detected in 2,5mm anterior to optic nerve). Reconstructive operation with displacement of medial rectus muscle to its anatomic insertion was made by us – video.
- 2) Patient F., 6 y.o., was operated on strabismus earlier two times. On admission: esodeviation (+38 degrees), hypertropia OS, restriction of abduction OD, torticollis. During MRI we recognized detachment of lateral rectus muscle OD (the muscle was attached to orbital wall next to optic nerve). Reconstructive operation with displacement of lateral rectus muscle and inferior oblique muscle to their anatomic insertion place was made by us – video.

Results:

On postoperative examination:

- 1) Patient A. had orthotropy in prime position and normal movement of the left eye.
- 2) Patient F. had increased volume of movement OD. Vertical deviation of OS was eliminated.

Conclusion:

When planning strategy concerning surgical previously operated strabismus treatment, it is necessary to establish the topography of the extraocular muscles for the future anatomical structure repair.



## Surgical Outcomes for Sensory Exotropia in a Tertiary Hospital in Manila, Philippines

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### PURPOSE

There is no strict by-the-book rule as to which approach is the best strabismus surgery for patients with sensory exotropia. More commonly, a monocular lateral rectus recession and a medial rectus resection (monocular R & R) is performed in the eye with the poorer prognosis. For larger deviations, a third or fourth horizontal muscle in the better eye is added. A local baseline outcome study of surgeries done in sensory exotropia is desired. This study aimed to determine the outcomes of strabismus surgery performed for sensory exotropia in a tertiary hospital in the Philippines.

### SETTING

Retrospective chart review study at the Department of Ophthalmology and Visual Sciences, University of the Philippines - Philippine General Hospital

### METHODOLOGY

The medical records of all patients with sensory exotropia who underwent strabismus surgical correction were retrospectively reviewed.

### RESULTS

A total of 29 medical records satisfied the inclusion criteria. We reported the surgical outcomes of 29 patients who underwent surgical correction for sensory exotropia. After a mean follow-up of 6.2 months, the overall success (alignment in primary position is within 10 prism diopters of orthotropia) was relatively low, where 34% were successful, 65.5% developed recurrence and none had overcorrections. Survival plots of both surgeries revealed a decline in success probability in achieving desired alignment after 6 months post-operatively.

### CONCLUSION

In conclusion, the surgical outcomes of 29 patients who underwent surgical correction for sensory exotropia were reported. After a mean follow-up of 6.2 months, the overall success was relatively low, where 34% were successful, 65.5% developed recurrence and none had overcorrections. Survival plots of both surgeries revealed a decline in success probability in achieving desired alignment after 6 months post-operatively.

The investigators declare no conflict of interest relevant to the conduct of the study

## Outcomes of various Surgical approaches to strabismus in Congenital Fibrosis of Extra Ocular Muscles

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Purpose – Congenital Fibrosis of Extra ocular (CFEOM) muscles is a rare non-progressive hereditary disorder that severely limits all ocular movements in varying degrees. Here we have reported outcomes in 8 pediatric cases of CFEOM in which strabismus surgery was done.

Setting – These cases presented and were treated over a span of two years in a Tertiary eye care hospital in Southern India.

Cases – All cases had myriad presentation with common features of chin-up abnormal head posture ptosis and hypotropia. Seven of our cases had associated exotropia and one had associated esotropia in primary gaze. In seven case of hypotropia with exotropia , four cases underwent large Lateral Rectus Recession with Inferior Rectus Recession in same sitting , two underwent only Inferior Rectus recession in first setting followed by Lateral rectus recession as secondary procedure and one underwent large Lateral Rectus recession with Medial Rectus Plication and Inferior Rectus Recession. All of these cases had 10-15 pD of residual hypotropia with residual exotropia in three cases and horizontal centration in four cases. In the single case of esotropia with hypotropia , we only did large Inferior Rectus Recession and were left with 10 pd residual hypotropia with esotropia. Ptosis was managed by advising crutch glasses in five of these cases.

Results : All cases of CFEOM should undergo large recessions of extra ocular muscles in order to release the restriction. Horizontal centration can be achieved with careful primary surgery or as a secondary procedure by doing on table Force duction test after each step of surgery. Hypotropia is difficult to correct completely, but the abnormal head posture improved significantly in all the cases by use of crutch glasses.

Conclusion : Every case of CFEOM requires a bespoke approach with large recessions as the basis of all surgeries done in these cases. This being a rare but hereditary disease, multiple family members will need surgical treatment. Overcorrection on table can give long term stable results.

## Intermittent exotropia in congenital myopathy: a case report

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Congenital myopathies are heterogeneous disorders, and ocular manifestations such as blepharoptosis or ophthalmoparesis may be the presenting feature or offer important diagnostic clues. The ophthalmologist may be key to diagnosis, facilitating recognition of associated potentially life-threatening organ manifestations and an integral part of multidisciplinary care. We report an interesting case, a female patient, 10 years old, born with a twin pregnancy, who presented on ophthalmological examination: corrected distance visual acuity: 20/25, intermittent divergent strabismus (35pd far and near) and eyelid ptosis. As clinical manifestations: generalized muscle hypotrophism and tendon hyporeflexia. The muscle biopsy showed congenital centronuclear myopathy and the genetic test, mutation of the RYR1 gene. These patients are more susceptible to malignant hyperthermia, making surgical treatment more challenging. We opted for reinforcement surgery: bilateral plication of the medial rectus 7mm, progressing favorably, remained orthophoric on 6 months follow-up. It is important to bear in mind that when examining children with ptosis and ophthalmoparesis, associated with other muscle weaknesses, we should suspect myopathy and urgently refer them to a neuropediatrician and a geneticist.

There are no financial conflicts of interest to disclose.

## Large bilateral medial rectus recession versus three-to-four horizontal muscle surgery for large-angle esodeviations

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### Purpose

The best surgical approach to correcting large angle esodeviations is still debated. Options for correcting large esodeviations include recessing both medial rectus (BMR) muscles more than 5.5 mm or performing surgery on three or four horizontal rectus muscles. There remains no consensus on which surgery has better survival outcomes. In this research, we are interested in determining the survival rates and long-term outcomes of both surgeries locally in the Philippines.

### Results

A total of 74 medical records were retrospectively reviewed. The mean age at onset of deviation was  $2 \pm 2.9$  years old, and the mean age at surgery was  $14 \pm 12.5$  years, with a mean of  $12 \pm 12.1$  years from onset to surgery. The mean follow-up period was 9.9 months (range 6–24). The mean preoperative deviation at near was  $59.3 \pm 13.6$  PD (range: 35–95) while at distance was  $58.5 \pm 13.6$  PD (range 10–95). The most common type of esotropia (ET) was infantile ET (45%), followed by basic ET. Majority of the esodeviations did not have associated vertical strabismus (67.6%, n = 50). Overall success rate was 48.1% for BMR recessions and 54.5% for 3–4 muscles surgery. Survival analysis revealed the decreasing trends of survival but plateauing of outcomes after 6 months.

### Conclusion

We reported the outcomes for both surgeries. Neither had shown superiority over the other. After a mean follow up of 9.9 months, the overall success was relatively good: 50% were successful, 39.2% overall recurrence and 13.8% overcorrections. Survival plots showed a plateauing of results after 6 months.

## Resection for large recession on each operated recti in nystagmus surgery

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**Purpose :** Nystagmus is a complicated ocular motor disorder with treatment challenges. From our re-operated nystagmus patients, we observed that the post-op new insertion of the extraocular muscle (EOM) was close to the suture points which is far shorter from expected position after regular rectus recession. The purpose of this study was to propose a modification of nystagmus surgical procedure and present outcomes of the clinical and nystagmus data in a cohort of adults who underwent the modified procedure.

**Setting :** this is a prospective study performed in a clinical institute.

**Methods :** Eleven adult patients with infantile nystagmus syndrome were included and 6 of them were male. Their mean age of the patients was 23.8 years old. The surgical procedure involved two steps. Step 1 : resecting the front part of the horizontal recti by 7mm, and step 2: recessing the recti by 12mm for middle recti and 16mm for lateral recti. Their nystagmus eye movements were recorded before and after surgery and the follow-up period was from 5 months to 14 months.

**Results :** Significant improvement in nystagmus amplitudes and dynamic acuity are observed. The amplitude of the nystagmus was reduced from  $6.5 \pm 3.6$  degrees to  $3.7 \pm 2.7$  degrees ( $P=0.0001$ ). The dynamic acuity was improved from 0.5logMAR to 0.3logMAR ( $P=0.0001$ ). post-operative deviation was not observed.

**Conclusion:** The procedure may preserve the rectus tension to be changed by the large dose of recession, so the recti may reach the expected position. With the observe results, we suggest that the procedure can be an additional option for nystagmus surgery.

**Financial Disclosure:** None.

## Graded Miniplication: Untapped surgical treatment to treat small angle residual strabismus

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**Purpose:** Miniplication of rectus muscle is a well documented rectus muscle tightening procedure introduced for correction of small-angle strabismus. However, the procedure has not been widely accepted nor widely studied, and most reports have dealt with conventional miniplication of 5 mm. We reviewed our patients who underwent miniplication of 3-5 mm for small angle esotropia.

**Setting-** Tertiary eyecare Centre in South of India.

**Methods:** The records of 12 consecutive patients undergoing miniplication surgery for small angle exotropia, esotropia and hypertropia ranging in age from 6 to 56 years were selected and analyzed. All patients had a constant strabismus, despite full cycloplegic refractive correction, measuring 8-12 prism diopters for distance and near. Each patient underwent a graded miniplication of 3-5 mm.

**Results-** 11/12 (91.66%) patients achieved "successful" binocular motor alignment (defined as < 4 prism diopters and nil diplopia with a minimum of 6 months postoperative followup). The average preoperative deviation was  $10.1\text{PD} \pm 5.3\text{PD}$  which reduced to  $2.8\text{PD} \pm 3.0\text{PD}$ . The average correction per mm of miniplication was 2 PD for horizontal muscles and 1.5 PD for vertical muscles. There was no overcorrection noted.

**Conclusion-** Mini-plication performed under controlled anesthesia is a safe ,simple alternative to prismatic glasses in residual small deviations and useful for adult with residual strabismus who don't want to use spectacles.

## Green Birefringence in Brown Syndrome

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### Purpose

To present a case series of novel finding of amyloidosis in Brown syndrome

### Setting

Child Sight Institute, L V Prasad Eye Institute, India

### Method and materials

Retrospective review of medical records of five patients (seven eyes) diagnosed with Brown syndrome who underwent muscle biopsy for histopathological examination were analysed. Clinical profile of demography, age at presentation, laterality, presenting complaints and duration, best corrected visual acuity, type of refractive error, stereopsis, were studied in the clinical profile. The preoperative and postoperative details of angle of deviation, abnormal head posture, ocular motility, surgery details and surgical outcomes in these patients were studied.

### Results

Five patients (Male 60%, bilateral 40%) included in our series, mean age of presentation was 4.4 (+/- 2.24) years presented with ocular deviation (80%) and unilateral drooping of upper eyelid (20%). Abnormal head posture was present in 40% which improved post operatively. 60% of our patient had amblyopia. The mean preoperative deviation was 9.8 prism dioptres hypotropia, 28.5 prism dioptres of exotropia and 6 prism dioptres of esotropia in primary gaze for distance. Indications for surgery was abnormal head posture and primary gaze deviation. The mean post operative outcome after three months was 5.2 prism dioptres hypotropia, 5.6 prism dioptres exotropia and 1.2 prism dioptres esotropia in primary gaze. Histopathology samples of all seven muscles revealed congophilia of superior oblique muscle fibers on Congo red stain and apple green birefringence under polarization which is suggestive of amyloidosis with no systemic involvement. Out of five patients, 60% patients had re-surgery for better ocular alignment in primary gaze.

### Conclusion

Orbital amyloidosis involving the extraocular muscle is rare. This case- series highlights a novel finding of amyloid myopathy of superior oblique presenting as Brown syndrome which could lead to secondary changes in the superior oblique tendon with fibrosis resulting in restrictive strabismus. Localized amyloidosis responds well to strabismus surgery and a favourable outcome can be expected. However future prospective study with a larger sample size would be required to confirm these findings.

Financial Disclosure: Nil

## The clinical characteristics and treatment in children with television torticollis

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- Purpose: To observe the clinical characteristics of children with television torticollis and propose treatment of this disease.
- Setting/Venue: The data were collected at the ophthalmology clinic at Shanghai Children's Medical Center in Shanghai, China.
- Methods : Children with television torticollis who visited the clinic from October 2020 to August 2022 were recruited. After refractive error correction and patching one eye to break fusion, they underwent prism alternate cover test for measuring heterotropia, ocular motility examination, Bielschowsky test, and fundus photography. Surgery or prism glasses was performed depending on the child's condition, with the surgical methods including partial recession of bilateral inferior oblique muscles or bilateral inferior oblique myectomy.
- Results: A total of 42 children with television torticollis were included, of whom 22 were boys, with an average age of  $7.7 \pm 2.36$  years old. After breaking fusion, they all displayed mild vertical heterotropia ranging from 3 to 6 prism diopters and mild bilateral inferior oblique overaction during ocular motility examination. All of them had Bielschowsky test negative and no extorsion was found in fundus photography. Both the surgical methods worked well, completely eliminating the television torticollis in the childrens who underwent the surgery, while the 5 children with prism correction also improved.
- Conclusions : This study suggests that television torticollis may be caused by mild heterotropia at the original position due to slight overaction of the bilateral inferior oblique muscles. Abnormal head position can be eliminated or improved in children with television torticollis through surgery or prism correction.
- Financial Disclosure : The presenting author doesn't have a financial interest in the subject matter or receive money from any company.



## A Case of Strabismus Fixus Associated with High Myopia: Esotropia-hypertropia Complex in the Right Eye, Esotropia-hypotropia Complex with Congenital Severe Ptosis in the Left Eye

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- Purpose: We describe a functionally blind patient with an unusual combination of esotropia-hypertropia complex in one eye and esotropia-hypotropia complex in the fellow eye with unilateral congenital severe ptosis. This patient's findings may suggest a novel mechanism of globe herniation in highly myopic strabismus.
- Setting/Venue: The data collection were conducted at Bright Eye Hospital in Shanghai, China.
- Methods: A-scan ultrasound, B-scan ultrasound and Coronal CT scan were performed. A loop myopexy procedure was performed, the lateral rectus (LR) and inferior rectus (IR) muscles of the right eye (RE) and the LR and superior rectus (SR) muscles of the left eye (LE) were united, respectively. Then bilateral medial rectus recession was performed. The frontal muscle suspension was performed to correct the ptosis of the LE.
- Results: The axial length was 33.57 mm RE and 33.20 mm LE. B-scan ultrasound showed bilateral posterior staphylomas and elongated globes. Coronal CT scan demonstrated inferotemporal dislocation of the posterior aspect of the right globe and superotemporal dislocation of the posterior left globe with both globes herniating out from the muscle cones and corresponding deflection of extraocular muscles (EOMs). The posterior staphyloma was located inferotemporally in the RE and superotemporally in the LE. Krimsky testing at 33cm showed a residual esotropia of 25PD and a left hypertropia of 10PD. Ocular motility improved and the left upper lid ptosis was satisfactorily corrected.
- Conclusions: The quadrant of globe prolapse depends solely on the location of the posterior staphyloma and may be entirely unrelated to the overlying muscular coverage of the sclera. Binocular alignment and ocular motility in patients with high myopia and strabismus fixus can be significantly improved by appropriate loop myopexy that functions to normalize EOM paths regardless of the direction of the deviation.
- Financial Disclosure : All the authors do not have a financial interest in the subject matter or receive money from any company.

## Acute acquired comitant esotropia following excessive screen use

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Purpose – the purpose of the study was to report acute comitant esotropia following excessive screen time.

- Setting/Venue - The patients were followed -up and surgically treated by a trained strabismus surgeon at Vision Eye Centres, New Delhi.
- Methods – 10 patients who presented with acute comitant esotropia (with and without diplopia) were included in the study. None of the patients had a history of trauma or febrile illness before the onset of the disease. MRI brain and complete blood workup were also normal. A history of excessive use of phones and tablets was present in all the patients (>5 hours/day). Prism cover tests were performed and no near- distance disparity was found. Also there was no incomitance in any of the gazes. Glasses were prescribed after a complete cycloplegic refraction. Unilateral patching was advised in patients with diplopia and botulinum toxin injection into medial rectus was offered to all the patients. However, none of the patients were willing for a temporary treatment. Six months following the onset, if the deviation was stable on two consecutive visits, surgery was performed for the esodeviation. The patients were followed up for 6 months and prism cover tests were performed on each visit.

Results – 10 patients were included in the study. There were 6 males and 4 females. The mean duration of near work was 5.6 hours. Diplopia was present in 3 patients and the average time of presentation was 2.35 months. 4 patients had myopia, 3 patients had no refractive error, 1 patient had hypermetropia and 2 patients had astigmatism. The preoperative angle ranged from 20-45 PD ( $32.5 \pm 12.5$ ) for distance and near and the postoperative angle at 6 months reduced to  $1.4 \pm 2.6$  PD.

Conclusions – Acute comitant esotropia following excessive near work has been documented recently. The prevalence was seen to increase during the COVID lockdown. In our experience, the deviation does not improve with time and standard surgical techniques work well in these patients.

Financial Disclosure - The authors have no financial disclosures.

## The results of anterior transposition of the inferior oblique in patients with dissociated vertical deviation: 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 symmetrical techniques of inferior oblique anterior transposition (IOAT) in patients with DVD.

Methods:

Group 1: 122 patients; the anterior fibers of the inferior oblique (IO) were placed to the temporal corner of the inferior rectus (IR) insertion.

Group 2: 47 patients; the anterior and posterior fibers were separately sutured to sclera.

Group 2 A: IO was sutured at the IR insertion: 15 patients, esotropia, DVD, inferior oblique overaction (IOOA). Group 2 B, 2 B, 2 C: IO was inserted 2 mm posterior to the IR insertion.

Group 2 B: 20 patients, esotropia, DVD and IOOA.

Group 2 C: 8 patients, esotropia, DVD, no IOOA

Group 2 D: 4 patients, exotropia, DVD, IOOA

Results: DVD reduction was 7, 36 PD in group 1 and between 2,5 PD and 7,4 PD in group 2 related to HFOI and IO re-insertion. 15/122 patients developed antielevation syndrome (AES) in group 1 and 5/47 in group 2. In both groups, AES developed in the eye with lower IOOA or lower DVD. When DVD  $\geq$  10 PD re-operation as recession of the superior recti was needed. DVD reduction is similar in group 1 and group 2A, but more cases of AES group 1.

Conclusions: Our results suggest that IOAT with anterior and posterior fibers of the IO separate sutured to sclera is a safe and effective procedure for DVD correction  $\leq$  15 PD, with low risk of AES.

In patients with difference between the eyes in IOOA or in DVD magnitude  $\geq$  6 PD, asymmetrical IOAT should be used in order to avoid AES: In the eye with larger DVD: IOAT insertion at the IR insertion or bunch-up technique when DVD  $\geq$  20 PD in one eye. In the eye with lower IOOA or DVD: IO insertion at 2 - 3 mm posterior to the IR insertion. For residual DVD, moderate bilateral SR recession 6-6,5 mm is used as a second procedure.

I have no financial interest in the material presented.

## Botulinum Toxin (BT) as First- Line Treatment in Acquired Fourth Pair Paresis

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**PURPOSE:** to analyze the response to treatment with BT in acquired fourth pair paresis, studying the relationship between the final result and the following aspects: time of evolution, uni or bilaterality, mean initial vertical deviation ( and eventually horizontal ), number of muscles injected simultaneously or sequentially.

The minimum follow-up was 6 months and complications are registered.

**SETTING:** contrary to sixth, the use of BT in fourth pair paresis is not consensual. Knowing that most publications on this subject do not differentiate between decompensated congenital and acquired and analyse injection in a single muscle may contribute to the fact that until today its effectiveness has not been proven.

**METHODS:** retrospective, uncontrolled single-center study including 36 patients with acquired fourth pair paresis who underwent BT injection in one or more oculomotor muscles, simultaneously or sequentially between 2017 and 2022.

The etiology was undetermined in the majority, microvascular, traumatic and after neurosurgery.

5 were bilateral, all acute ( less than 6 months of evolution ) and 31 unilateral, 20 acute and 11 chronic.

Vertical deviation in primary gaze position (pgp) and horizontal when associated were evaluated pré and after treatment as well as the ability to eliminate diplopia.

The minimum follow-up time was 6 months.

**RESULTS:** considering success the absence of diplopia after 6 months in ppg and reading or a significant increase in the field of binocular vision without diplopia when it manifested itself only in an eccentric position, BT was effective in 30 patients (83,33%), this being success of 87,09% in unilateral and 60% in bilateral; the use of a small prism allowed confort, avoiding surgery on 3 cases with residual diplopia. In acute unilateral paresis success was 94,7% and in chronic ones 75%. There was 5 cases (13,88%) of late recurrence ( more than 6 months after BT ). All side effects were reversible.

**CONCLUSION:** the injection of BT proved to be an effective and safe strategy in cases of acquired fourth pair paresis, namely in the symptomatic control of diplopia and in the reduction of the vertical, torsional and eventually horizontal deviation associated.

The success was greatest in acute acquired paresis. In chronic acquired paresis, although the success rate decreases, it is still quite significant, avoiding the need for surgery. In the acute phase of bilateral paresis can dramatically alter the natural history of the disease.

**FINANCIAL DISCLOSURE:** I have no financial interests to declare

## The Effect of Vessel-Sparing Rectus Plication Surgery on Iris Vessel Density: A Comparative Optical Coherence Tomography Angiography (OCT-A) Analysis

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**Purpose:** The objective of this study is to compare the iris vessel density results before and after rectus plication surgery, a vessel sparing surgical procedure, using a non-invasive method, Optical Coherence Tomography Angiography (OCT-A).

**Setting:** Beyoglu Eye Research and Training Hospital, Istanbul, Turkey

**Methods:** This single-center, prospective study reviewed patients who underwent strabismus surgery between October 2022 and January 2023. Five eyes of five patients were included in the study after excluding patients with systemic or ocular diseases, nystagmus or fixation loss. The anterior segment module of the OCT-A was utilized, and the eye-tracking feature was disabled to obtain the highest image quality. OCT-A imaging was performed one day before or on the day of the surgery and the day after the surgery.

**Results:** Five patients (4 females, 1 male) were included in the study. Three patients had esotropia, and two had exotropia. Two patients received muscle plication in one eye, and the other three received one rectus plication and antagonist recession on the same eye. None of the patients experienced any complications. Preoperative and postoperative images yielded both qualitative and quantitative vessel density measurements. The vessel density near the plicated rectus remained unchanged after the surgery. The mean preoperative vessel density was 57.2%, and it was 56.9% postoperatively ( $p > 0.05$ ).

**Conclusion:** In this preliminary study OCT-A was utilized for the first time to evaluate the qualitative and quantitative changes in iris vessel density before and after rectus plication surgery, a vessel-sparing technique. The results demonstrated that the iris vessel density remained unchanged after the surgery. This non-invasive technique shows promise as a convenient alternative for evaluating changes in iris vessel density after surgical procedures. Further studies are warranted to validate these findings and investigate the effects of other vessel-sparing techniques on iris circulation.

## Art Of Strabismus Surgery

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Purpose: Strabismus – eye misalignment.

The goals of the management of strabismus are the restoration of visual acuity and comfortable binocular vision.

Nonsurgical management of the ocular deviation comprises:

- optical treatment
- occlusion

Methods: Operations on the extraocular muscles are indicated when nonsurgical treatment cannot succeed.

The aim of surgery:

- to restore binocular vision
- to straighten the eyes for improved appearance
- to relieve symptoms

Results:

☐ Case Description:

☐ Patient: Female 13y Old

☐ Vis OD= 0.8 – 0.5ax125=0.9-1.0

☐ Vis OS=0.5-0.6 -0.5 -0.5 ax 65=0.9-1.0

☐ Fundus – without abnormality

☐ Pupil Reaction – N

☐ Lang II – Neg.

☐ Convergence OU - 25PD in the distance. 30 PD – near.

☐ Vertical - Hyper deviation OD=25PD.

☐ Diagnosis:

☐ Esotropia; OD – IV Nerve Palsy; OS Hypotropia

☐ Intra-operative plan: OU medial rectus recession 5mm; OD inferior oblique tenotomy.

☐ Intra-operative Complication:

☐ Hemorrhage – during inferior oblique tenotomy.

Conclusions: Damage to the vortex vein and orbital hemorrhage during strabismus surgery is one of the surgical complications. If a vortex vein is torn, it bleeds profusely and if it cannot cauterize successfully it should be tied off using a 7.0 vicryl suture.

No financial disclosure



## Retro- equatorial inferior oblique myopexy for treatment of inferior oblique overaction

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Purpose : to compare the effectiveness of inferior oblique retro- equatorial myopexy and inferior oblique myectomy in correction of inferior oblique overaction . i have no financial interests to disclose

Setting : Study in memorial institute for ophthalmic research & Mansoura University n Egypt

Methods : This was a pilot study including forty patients with primary IOOA of all grades, with or without primary position horizontal deviations. Patients were randomized to have either IO retroequatorial myopexy, group A, or IO myectomy, group B. Success was defined as elimination of the IOOA at 6 months postoperatively. Secondary outcome measures included residual or recurrent elevation in adduction, development of postoperative hypotropia in adduction, postoperative contralateral IOOA, major intraoperative complications, and reversibility of the procedure.

Results : At 6 months postoperative, the success rate was higher in the myectomy group (76%) than in the myopexy group (58%); however, this difference was not statistically significant ( $P = 0.1$ ). The incidence of residual IOOA in myopexy group was significantly higher in patients with higher preoperative grades of IOOA ( $P < 0.001$ ). While this difference was not statistically significant among patients in myectomy group ( $P = 0.09$ ). Collapse of V-pattern was achieved in nine (69%) patients in myopexy group compared with 8 (57%) in myectomy group with a statistically significant difference ( $P \leq 0.001$ ).

Conclusions Retroequatorial myopexy of the inferior oblique is as effective as inferior oblique myectomy in eliminating lower and moderate grades of primary IOOA; however, it is more effective in collapsing V-pattern associated with IOOA, and is not associated with postoperative hypotropia or contralateral IOOA after unilateral surgery. It can be used as a safe, reversible alternative to myectomy; however, it is not suitable for high grades of IOOA.



## Surgery for Large Angle Exotropia - a three muscle surgical dose table

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**Purpose:** To provide a three-muscle surgical dose table for large angle exotropia

**Setting:** This is a retrospective study that was done at a tertiary eye hospital in south India

**Methods:** 31 cases of exotropia >50 Prism Dioptres (PD) who underwent 3 muscle surgery were retrospectively studied. Amount of surgery done was correlated with pre-operative deviation and post-operative alignment. Standard lateral rectus recessions (LR Rc) and medial rectus resections (MR Rs) were performed by the surgeon. The decision of bilateral (B/L) LR Rc with MR Rs in one eye vs B/L MR Rs with LR Rc in one eye was determined by disparity of the angle of deviation between distance and near. Surgical outcomes were analyzed with respect to achievement of desired end point during the immediate post operative and on periodic follow up. Successful outcome was defined as orthotropia or angle of deviation <10PD post-operatively. Based on the outcome, a surgical dose table was calculated to facilitate easy decision making for large angle exotropia.

**Results:** Of the 31 cases of large angle exotropia, 28 underwent B/L LR Rc and MR Rs in one eye while in the 3 cases where the angle of exotropia was significantly more for near than for distance, B/L MR Rs with LR Rc in 1 eye was done. B/L LR Rc ranged from 5mm to 9mm and MR Rs from 5mm to 6mm for successful outcome. If a pattern strabismus was noted pre-operatively as it was in 6 cases, the horizontal muscles were either shifted up or down as needed and in 4 cases, either an inferior oblique or superior oblique weakening was performed as an additional procedure to tackle the overaction of the oblique muscles. 85% of the cases achieved the desired outcome while 15% required conservative management of the residual angle with convergence exercises or overminus therapy. None of the cases required a re-surgery.

**Conclusion:** Our study determines outcome of large angle exotropia when 3 horizontal muscles are operated upon. There are few definitive guidelines for 3 muscle surgery and we have therefore provided a surgical dose table for the same. It is important for every surgeon to create their own dosage table to allow better planning and hence prevent re-surgery.

## Comparison of the Efficacy and Results of Posterior Optic capture versus in the bag implantation of Intraocular lens in bilateral paediatric cataract

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**Purpose** - Visual axis opacification (VAO) has been found to be the most common complication post paediatric cataract surgery. Optic capture of the intra-ocular lens (IOL) through the primary posterior continuous curvilinear capsulorhexis (PPCCC) provides complete fusion of the anterior and posterior capsule leaflets, which is beneficial to reduce Posterior capsular opacification (PCO). We want to perform a study to evaluate and compare the intraoperative challenges and post-operative complications and visual outcomes following the two techniques of intraocular lens implantation of posterior optic capture versus without anterior vitrectomy versus in the bag implantation of intraocular lens with anterior vitrectomy in bilateral paediatric cataract cases.

**Setting**- Prospective randomised interventional study done in a tertiary eye care centre in Southern India.

**Methods** – Twenty five Children diagnosed with bilateral congenital/developmental cataracts planned for phacoaspiration with primary IOL implantation belonging to the age group of 2-8 years were recruited in the study. One eye of all patients underwent in the bag IOL implantation along with PPCCC and anterior vitrectomy (Group1) while in the other eye Intraocular lens (IOL) implantation with optic capture through a PPCCC without anterior vitrectomy (Group 2). Follow up parameters were noted at 1 week, 1 month, 3 months, 6 months, 12 months, 24 months. Parameter studied were intraoperative technique and time taken, post operative IOL centration and stability, visual axis opacification, intraocular pressure, fibrinous reaction and other complications.

**Results** – The study could be completed in 21 out of 25 recruited cases. In four cases, posterior optic capture had to be abandoned due to ocular structural abnormalities, runaway rhexis or very high myopia. Mean age at the time of surgery was  $17 \pm 12.8$  months. After a mean follow up of  $23.3 \pm 2.1$  months; almost all eyes in both groups maintained a clinically centred IOL with clear visual axis. VAO occurred in 3 cases of in the bag IOL and 2 cases of posterior optic capture. Intraocular pressure was raised in one case of in the bag IOL implantation which was managed medically.

**Conclusion** - The two methods work equally well in preventing visual axis opacification over a long follow-up. But we found in the bag IOL implantation easier to perform in complicated cataracts and is more versatile with a lesser learning curve.

## Application and outcomes of the Modified Nishida's Procedure for various etiologies of in-comitant strabismus

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**Introduction:** Nishida's procedure has gained popularity in the recent times being a ciliary vessel sparing surgery, it facilitates transposition of muscles without splitting or tenotomy, thereby minimizing the impact on the anterior segment circulation

**Aim:** To highlight the various applications of the Modified Nishida's technique and analysis its outcomes in various in-comitant strabismus.

**Material and Methods:** It was a retrospective analytical study. All records of the patients who underwent Modified Nishida's procedure for in-comitant strabismus were studied. The patient with a minimum follow up of 6 weeks post operative were included in the study. Demographic and clinical characteristics such the pre and post operative strabismic deviations and ocular motility were recorded and analyzed.

**Results:** Eighteen eyes of 18 patients were included in the present study that fulfilled the inclusion criteria. There were 13 males and 5 females. The indication for the surgery was trauma in three patients, monocular elevation deficit in six patients and sixth nerve palsy in six patients. There was one patient each of IR aplasia, strabismus fixus and a lost MR following squint surgery elsewhere. The mean  $\pm$  SD best corrected visual acuity (BCVA) (logMAR) in the affected eye pre and post operatively was 0.304  $\pm$  0.44 and 0.18  $\pm$  0.30 respectively. The time from surgery to the last follow up ranged from 45-750 days with the median follow up of 78 days. The mean  $\pm$  SD preoperative horizontal deviations was 48  $\pm$  34.46 PD which reduced statistically significantly to 14.83  $\pm$  15.37 PD at the first post operative day and was 13.94  $\pm$  14.76 PD at the last follow up (P value 0.01 and 00). The mean  $\pm$  SD preoperative vertical deviations was 13.33  $\pm$  16.09 PD which statistically significantly reduced to 4.61  $\pm$  7.16 PD at the first post operative day and was 3.56  $\pm$  5.79 PD at the last follow up (P value 0.00 and 0.00). The preoperative (mean  $\pm$  SD) abduction, adduction, elevation and depression were -1.99  $\pm$  2.46, -0.89  $\pm$  1.81, -1.22  $\pm$  1.55, -0.444  $\pm$  1.29. There was statistically significant improvement in the adduction (-0.50  $\pm$  1.20), elevation (-0.89  $\pm$  1.32) and depression (-0.06  $\pm$  0.99) with p value 0.00,0.00,0.02 respectively. There was improvement in abduction (-1.65  $\pm$  1.96) which was not statistically significant.

**Conclusion:** This novel ciliary vessel sparing surgery is a useful tool in the management of large angle in-comitant strabismus. When combined with the recession of the antagonist muscle it provides good post operative alignment as well as improvement in the ocular motility.