Strabismus / Pediatric and Neuro Ophthalmology 2024

A Vision for 2024 and Beyond

Subspecialty Day

Mar 14, 2024

NEURO OPHTHALMOLOGY

OFFICE BEARERS

Harbansh Lal
President

Samar Kumar Basak
President Elect

Partha Biswas
Vice President

Lalit Verma
Immediate Past President

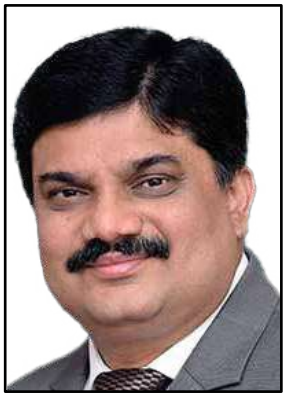
Santosh G. Honavar
Honorary General Secretary

Manoj Chandra Mathur
Honorary Treasurer

Namrata Sharma
Chairperson Scientific Committee

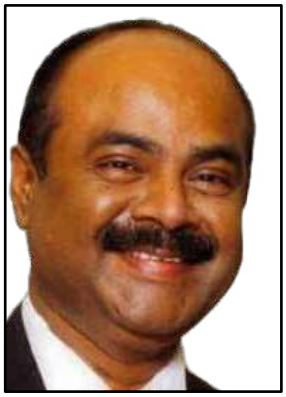
Prashant Keshao Bawank
Chairman ARC

M. Vanathi
Editor-Journal



Krishna Prasad Kudlu
Editor-Proceedings

C. V. Gopala Raju
Joint Secretary



Elankumaran Pasupathi
Joint Treasurer

NEURO OPHTHALMOLOGY

Members - Scientific Committee

Somasheila I. Murthy

Jatinder Singh Bhalla

Pradip Kumar Mohanta

Piyush R Bansal

Vardhaman Kankaria

Amit Porwal

Fairooz Puthiyapurayil Manjandavida

Members - Academic & Research Committee

Tinku Bali
Member ARC (North Zone)

Kasturi Bhattacharjee
Member ARC (East Zone)

Shrinivas M. Joshi
Member-ARC (South Zone)

Anagha Heroor
Member-ARC (West Zone)

Deepak Mishra
Member ARC (Central Zone)

NEURO OPHTHALMOLOGY

Dr Ambika S

Dr Ankur Sinha

How to refract a child and prescribe glasses

Dr Anuradha Chandra

Points to be covered:
- How to make the child comfortable?
- Cycloplegia and the dilated autorefraction
- How to do a good retinoscopy?
- Post mydriatic test
- Optimal correction/undercorrection/overcorrection
- Special situations

How to make a child comfortable?
- Smiling face and child friendly environment
- Non doctor dress
- Talking to parents for first few minutes
- Using cartoons and puppets
- Sleeping in case of infants

Cycloplegia
- Cyclopentolate : may have acute psychosis
- Atropine: to be avoided in history of down 's syndrome, convulsion
- Homatropine : can be given in most cases
- Tropicamide : allergic reaction in some patients. Can be used for follow up cases of myopia

Dilated auto refraction
- Gives you an estimation
- Helps to convince patients ' parents that child may need glasses
- In a child always do dilated AR
- Undilated AR is always fallacious as the child has dynamic accommodation and often can give falsely high values

How to do good retinoscopy?
- Distance interesting target
- Sleeping infant
- Dark room
- Well dilated pupil with good cycloplegia
- Proper documentation of cycloplegic retinoscopy with working distance noted

Post mydriatic test
- Not all children will require post mydriatic test
- First time starting on spectacles
- Myopes may require adjustment of the power, subjective refraction for fine tuning
- Hyperopes for deciding on the minimum power to keep accommodative reserve

Dr Damarius Magdalene

NEURO OPHTHALMOLOGY

Strategies for Management of Third Nerve Palsy

Dr Digvijay Singh
Director, Noble Eye Care, Gurugram, Haryana

There are no financial disclosures

Managing third nerve palsy poses a big challenge as four out of six muscles are involved and aligning the eye in primary gaze may not be achieved despite best efforts. Various factors affect decision making in surgical management of III Nerve Palsy including (a) Complete Vs incomplete paralysis of III nerve, (b) extent of recovery of paralysis, (c) presence of aberrant regeneration, (d) need to operate contralateral eye. For partial third nerve and incomplete third nerve paresis, recession-resection procedure of the recti muscles give good outcomes. The contralateral eye surgery may be needed in certain cases of previously operated cases or aberrant regeneration. For more severe and complete forms of third nerve palsy, procedures such as transposition of the lateral rectus or other functioning muscle, periosteal anchor of the lateral rectus or medial periosteal anchor of the globe is needed. Transposition of the lateral rectus to the medial aspect of globe may be done either as a whole tendon or a split muscle. This procedure changes the force vector of the lateral rectus from acting in abduction to support adduction. In the surgery where the lateral rectus is attached to the periosteum, the force of lateral rectus acting upon the globe is negated and the globe acquires a central orthotropic position based on anatomical and mechanical forces of the orbit. The globe may be directly anchored to the medial periosteum itself and while this can achieve orthotropia or even slight esotropia, there is o movement of the globe after this surgery. An important aspect is to tackle the ptosis induced by the oculomotor nerve dysfunction. This may be tackled through an eyelid surgery or by operating on the contralateral eye rectus muscle if aberrant regeneration is seen. Overall, each case of third nerve paly has to be treated in an individualized manner based on how many and how much of each extraocular muscle is affected.

References:

1. Saxena R, Sharma M, Singh D, Dhiman R, Sharma P. Medial transposition of split lateral rectus augmented with xation sutures in cases of complete third nerve palsy. Br J Ophthalmol 2016;0:1–3.
2. Sharma P, Gogoi M, Kedar S, Bhola R. Periosteal fixation in third- nerve palsy. J AAPOS 2006;10:324-7.
3. Flanders M, Hasan J, Al-Mujaini A. Partial third cranial nerve palsy: clinical characteristics and surgical management. Can J Ophthalmol 2012; 47:321–5.
4. Sukhija J, Kaur S, Singh U. Nasal lateral rectus transposition combined with medial rectus surgery for complete oculomotor nerve palsy. J AAPOS. 2014 Aug;18(4):395-6.
5. Goldberg RA, Rosenbaum AL, Tong JT. Use of apically based periosteal flaps as globe tethers in severe paretic strabismus. Arch Ophthalmol 2000;118:431-7.
6. Sharma P, Gogoi M, Kedar S, Bhola R. Periosteal fixation in third- nerve palsy. J AAPOS 2006;10:324-7.
7. Srivastava KK, Sundaresh K, Vijayalakshmi P. A new surgical technique for ocular fixation in congenital third nerve palsy. J AAPOS. 2004;8:371–377.
8. Saxena R, Sinha A, Sharma P, Pathak H, Menon V, Sethi H. Precaruncular periosteal anchor of medial rectus, a new technique in the management of complete external third nerve palsy. Orbit. 2006 Sep;25(3):205-8.
9. Saxena R, Sinha A, Sharma P, Phuljhele S, Menon V.. Precaruncular approach for medial orbital wall periosteal anchoring of the globe in oculomotor nerve palsy. J AAPOS. 2009 Dec;13(6):578-82.
10. Y Morad, L Kowal, and A B Scott. Lateral rectus muscle disinsertion and reattachment to the lateral orbital wall. Br J Ophthalmol 2005;89:983–985.

Dr Erick Bothun
USA

Workup of Pediatric Cataract

Dr Jaspreet Sukhija
AEC, PGI, Chandigarh

Pediatric cataract is the leading treatable cause of childhood blindness with an estimated prevalence of 0.32 to 22.9/1000 children.1 It contributes significantly to morbidity and economic burden. It presents a unique set of challenges necessitating thorough and precise workup to ensure accurate diagnosis and optimal management.
Cataract in pediatric age group has varying etiologies and each poses distinct problems. These include prematurity, genetic, metabolic disorders, intra-uterine infections, trauma, drug induced, radiation therapy, post laser therapy and intravitreal injections for retinopathy of prematurity. They may be bilateral or unilateral. Workup in a patient of pediatric cataract is detailed below.

1. History taking : A detailed history taking more often then not points towards etiology and is helpful in predicting challenges in management. History of onset of symptoms – diminution of vision or leukocoria - when noticed by parents point toward congenital or acquired pathology, and duration of symptoms and help in prediction of prognosis. Antenatal history of fever or rash in mother of is suggestive of TORCH infections, history of prematurity, any treatment in form of laser or intravitreal injections, trauma, drug intake, metabolic disorders, endocrinopathies, failure to thrive, and family history must be taken. Cataracts are often associated with other systemic disorders and history of developmental delay along with treatment for any other systemic issues must be sought.

2. Clinical examination : A detailed clinical examination both ocular and systemic must be done.
   a. Ocular examination
      i. Visual acuity assessment - Due to the challenges in obtaining reliable visual acuity measurements in very young children, age-appropriate tools and techniques should be employed. Assessment of optokinetic nystagmus, resistance to occlusion, preferential looking tests based on grating pattern or vanishing optotypes, visual evoked potential may be used in infants. Preverbal children can be assessed using recognition acuity such as Cardiff acuity cards or Allen symbols.
      ii. Intra-ocular pressure – It should be done to rule out associated glaucoma in case of intrauterine infections such as Rubella. Non contact tonometry or rebound tonometry may be used in case of uncooperative children.
      iii. Anterior segment evaluation – Dilated slit lamp examination where possible should be done. Hand held slit lamp or examination under microscope under anesthesia may be required in uncooperative children. Features of anterior segment dysgenesis as microcornea, corneal opacities, pupillary abnormalities such as corectopia, synechiae, membranes, lens abnormalities such as microspherophakia, ectopia lentis, features of trauma such as sphincter tears, iridodialysis, phacodonesis and lens subluxation must be examined. Morphology of cataract itself whether zonular, sutural, blue dot, anterior or posterior polar, posterior subcapsular, oil drop, white cataract may help in determining etiology and point to systemic diagnosis.
      iv. Posterior segment evaluation : Indirect ophthalmoscopy or slit lamp examination with 90 diopter lens should be done to rule out abnormalities such as persistent hyperplastic primary vitreous, hemorrhages, colobomas, optic disc and macular abnormalities.
      v. Direct ophthalmoscopy – To look for red reflex and confirm cataract as well as localize the location of cataract whether anterior or posterior.
      vi. Ocular motility examination – Strabismus or nystagmus may be present and indicate poorer prognosis
      vii. Clinical examination of parents – Slit lamp examination of parents may show non-significant cataracts which point to hereditary cause of cataract.
      viii. Retinoscopy – Assessment of refractive error and best corrected visual acuity to assess need for surgery id done. Cycloplegic retinoscopy may be required. Refractive errors such may point to etiology such as high myopia in spherophakia or lens subluxation.

   b. Systemic Evaluation -Detailed systemic examination including general, cardiovascular, renal, and neurologic assessments with head circumference should be done. Multidisciplinary approach with help of pediatrician and geneticist is required. Dysmorphic features may indicate syndromic cause.

3. Investigations
   a. Ultrasound – Dense cataracts may preclude visualization of fundus. A B-ultrasound is used to visualize the posterior segment and rule out abnormalities such as retinal detachment, colobomas, persistent fetal vasculature, vitreous hemorrhage. Integrity of posterior capsule may be assessed in cases of preceding trauma.

   b. Ultrasound Biomicroscopy - In anterior segment dysgenesis or trauma, this is done to assess the angle structures and rule out lens subluxation.

   c. Anterior Segment-Optical coherence Tomography – It may be done in traumatic cataracts to visualize the integrity of anterior and posterior capsule.

   d. Biometry – Optical biometry may be used in older and cooperative children. They have advantages in the form of high reproducibility and more accurate measurement compared to contact techniques. But this is not an option in infants and young children. In them following techniques are used for biometry and intraocular lens power calculation.
   I. Keratometry – Hand held keratometer is used when child is either sleeping or under anesthesia. Two measurements should be taken and there average calculated. When examining under anesthesia, we should avoid corneal dryness or application of speculum since this gives incorrect readings. A conversion table is used to convert values of radius of curvature to diopter.
   ii. Axial length – It is measured using A-scan ultrasound. It may be done using applanation or immersion technique. In applanation technique, the probe is kept directly in touch with cornea. In immersion technique, a fluid filled scleral cup is used as coupling medium which avoids corneal compression and gives more accurate measurements than applanation technique.
   After determination of axial length and biometry, appropriate IOL power formulae may be used. Post operative target undercorrection is determined

NEURO OPHTHALMOLOGY

using established guidelines such as Dahan et al2, Enyadi et al3, etc to determine IOL power to be implanted.

e. Laboratory tests – Congenital cataracts need to evaluated for systemic causes. TORCH titers, VDRL test, Serum calcium and phosphorus, galactokinase levels, blood sugars, thyroid functions tests, and urine for reducing substances should be done. Urinary tests for protein/ copper, echocardiography, may be required in specific etiologies.

f. Genetic testing - Given the genetic basis of many pediatric cataracts, genetic testing has become an integral part of the workup. Identification of causative mutations can guide prognostication, inform family counseling, and contribute to the understanding of associated syndromes. Collaboration with geneticists is crucial to interpret results accurately and provide comprehensive care

The workup of pediatric cataracts demands a meticulous and multidisciplinary approach. Pediatric ophthalmologists must integrate clinical, imaging, and genetic information to formulate an accurate diagnosis and tailored management plan. With advancements in technology and early detection, the prognosis for pediatric cataract patients continues to improve.

Bibliography:

1. Sheeladevi S, Lawrenson JG, Fielder AR, Suttle CM. Global prevalence of childhood cataract: a systematic review. Eye. 2016 Sep;30(9):1160-9.
2. Dahan E, Drusedau MU. Choice of lens and dioptric power in pediatric pseudophakia J Cataract Refract Surg. 1997;23(Suppl 1):618–23
3. Enyedi LB, Peterseim MW, Freeman SF, Buckley EG. Refractive changes after pediatric intraocular lens implantation Am J Ophthalmol. 1998;126:772–81
4. Le CB, Deitz GA, McCourt EA, Puente MA. Diagnostic yield of workups ordered by pediatric ophthalmologists for bilateral pediatric cataracts at a tertiary pediatric hospital in the United States. J AAPOS. 2023 Oct;27(5):271.e1-271.e5

Dr Jitendra Jethani

Dr Jon Peiter Saunte
Denmark

Role Of Optical Therapy in Myopia

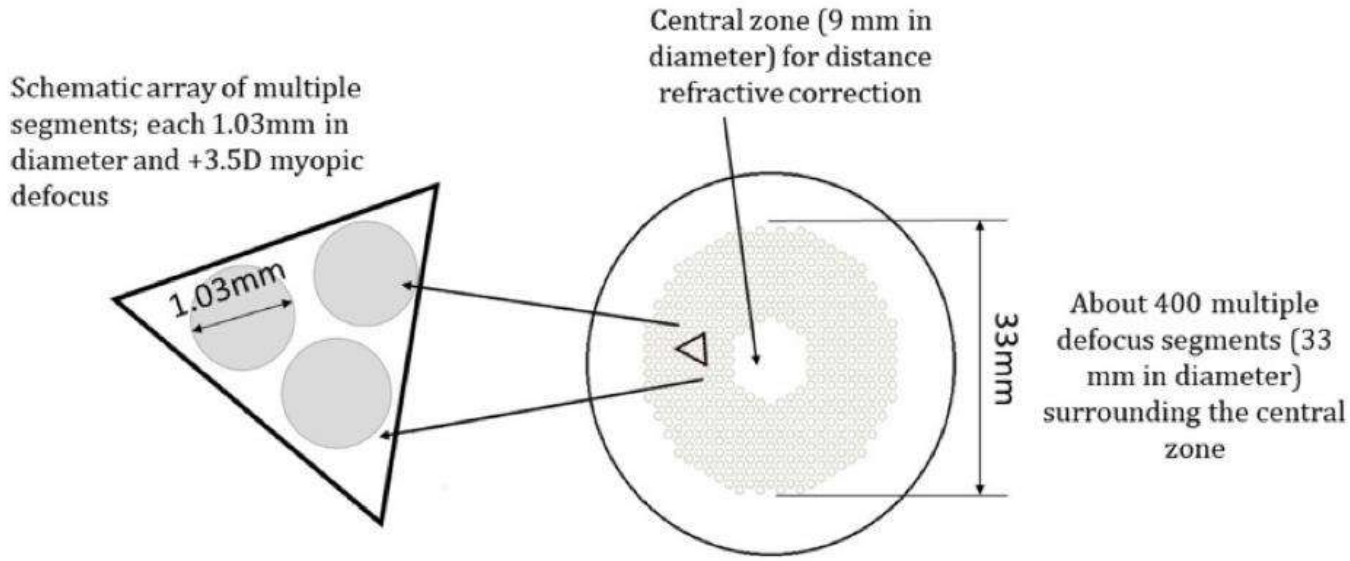
Dr Jyoti Matalia

Today, treating myopia, which is on the verge of becoming a pandemic soon, is not just about prescribing single vision glasses. In addition, progression of myopia is on the rise with the changes in lifestyle like increased indoor activities and screen time with reduced outdoor activities and hence it prevention and management is the need of the hour.

Multiple studies stating the various theories of myopia progression and their treatment options are published in the literature. The long-standing contender of myopia progression is the peripheral defocus theory where myopic defocus in the peripheral retina helps slowing down the progression. This forms the basis of the optical treatment for myopia. However, there is still a lack of substantial evidence regarding what works the best.

The optical treatment options practiced for myopia control include glasses and contact lenses. Glasses prescribed for myopia control include single vision glasses but with undercorrection, progressive additional lenses (PALs) and defocus spectacles. Contact lenses (CL) are in form of rigid CL or orthokeratology or ortho-K (overnight lenses) and day-time soft bifocal or multifocal CL. Of these, studies have shown that undercorrection lenses and PALs have no benefit in controlling myopia progression.
Defocus glasses: These spectacles that not only correct but even control myopia, are based on the following four technologies –

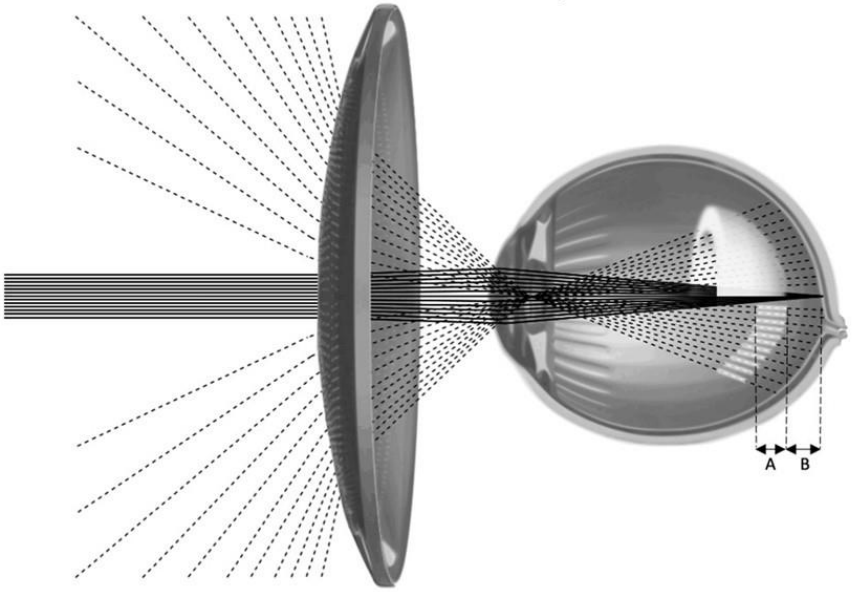
1)Defocus Incorporated Multiple Segments (DIMS)[1][Miyosmart by HOYA Vision]- comprises central (9 mm) clear optical zone with surrounding (33 mm) multiple segments of myopic defocus (+3.50D). This creates two planes of focus- one on the retina to correct the myopia and other in front for myopic defocus which thus helps in preventing myopia progression.



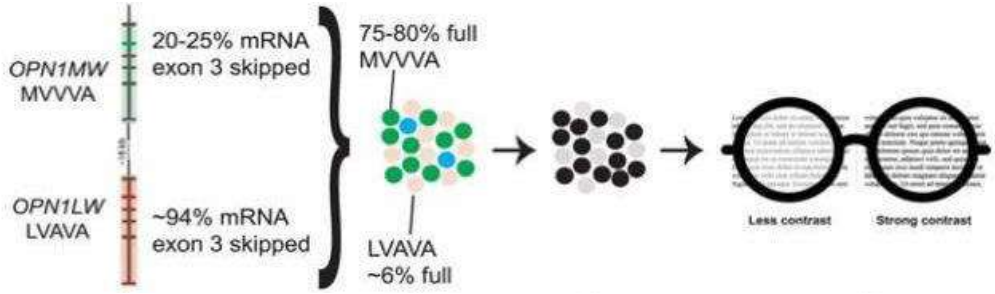
2) Highly Aspherical Lenslet target (HALT) [2]- Stellest by Essilor- 11 concentric rings of contiguous aspherical lenslets which create a volume of myopic defocus (VoMD) which is a 3-dimensional volume of defocus in front of the retina.

NEURO OPHTHALMOLOGY

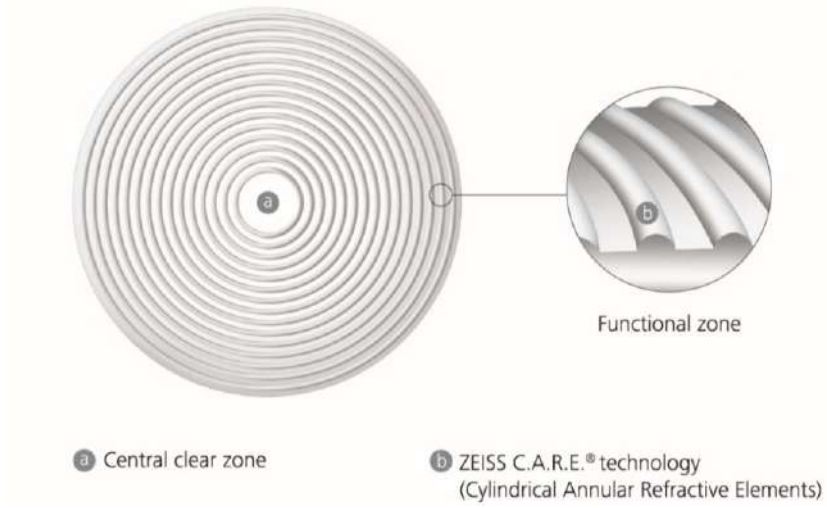
Illustration of the study device providing a volume of myopic defocus (VoMD) (white shell) in front of the retina through 11 concentric rings of contiguous lenslets (A=depth of VoMD and B=distance from the retina).



3)Diffusion Optics Technology (DOT)[3] [SightGlass Vision]- light scattering features across entire lens using diffusers that are shaped as dots except for a small clear aperture aligned with pupillary axis. This tests the hypothesis that abnormal contrast between adjacent cones provide a signal for axial elongation and myopia development or progression.

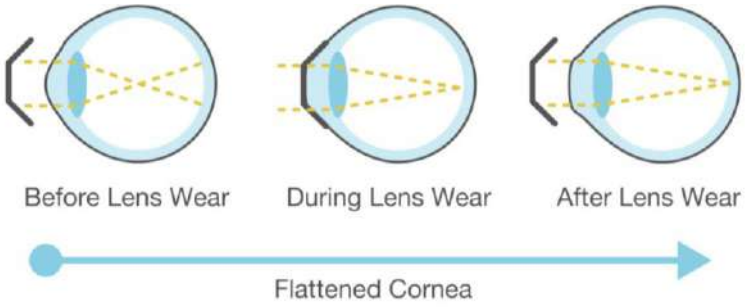


4) Cylindrical Annular Refractive Element (CARE)[4] by Zeiss: They employ micro-cylinders to generate high-order aberrations in the peripheral retina. It consists of alternating defocus and correction zones in a ring-like pattern on front surface, expanding towards the periphery of lens.

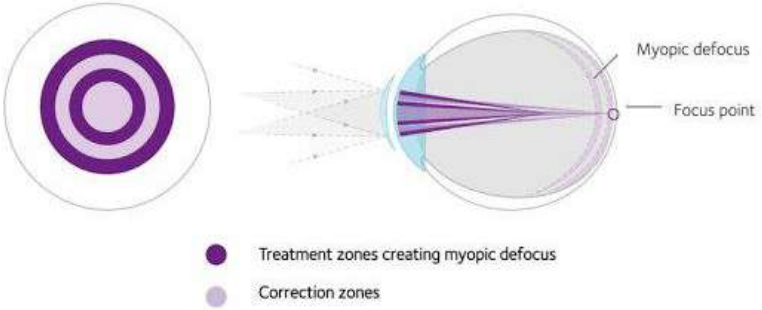


Clinical studies have shown slower myopia progression with DIMS and HAL technology of defocus glasses in Chinese population by 60-70% after a 2-year follow-up while studies using DOT and CARE are still awaited.

Contact Lens:
Orthokeratology CL by SEED, Bausch-Lob are specially designed rigid gas permeable CL to be worn overnight - 'night wear CL'. It reshapes the cornea and eliminates the need of any correction to be worn during daytime.



Soft CL in the form of bifocal and multifocal CL like MiSight by Cooper vision, Acuvue by Johnson and Johnson are 'daytime wear CL'. These have two zones creating a peripheral myopic defocus and thus slow axial elongation.



Studies with contact lenses have shown control of myopia progression of 50-60% but has limitations with high myopia and high astigmatism.
Though multiple optical treatment options are available, long term studies comparing efficacy of each modality in Indian scenarios are necessary for substantial results.

References:

1. Lam CSY, Tang WC, Tse DY, Lee RPK, Chun RKM, Hasegawa K, Qi H, Hatanaka T, To CH. Defocus Incorporated Multiple Segments (DIMS) spectacle lenses slow myopia progression: a 2-year randomised clinical trial. Br J Ophthalmol. 2020 Mar;104(3):363-368.
2. Bao J, Yang A, Huang Y, Li X, Pan Y, Ding C, Lim EW, Zheng J, Spiegel DP, Drobe B, Lu F, Chen H. One-year myopia control efficacy of spectacle lenses with aspherical lenslets. Br J Ophthalmol. 2021:318367.
3. Rappon J, Chung C, Young G, Hunt C, Neitz J, Neitz M, Chalberg T. Control of myopia using diffusion optics spectacle lenses: 12-month results of a randomised controlled, efficacy and safety study (CYPRESS). Br J Ophthalmol. 2022 Sep 1:bjophthalmol-2021-321005.
4. Liu X, Wang P, Xie Z, Sun M, Chen M, Wang J, Huang J, Chen S, Chen Z, Wang Y, Li Y, Qu J, Mao X. One-year myopia control efficacy of cylindrical annular refractive element spectacle lenses. Acta Ophthalmol. 2023 Sep;101(6):651-657.

NEURO OPHTHALMOLOGY

Risk factors for childhood progressive myopia

Dr Kaushik Murali, Dr Navya D, Dr Neha, M , Dr Vidhya C, Dr Sowmya R
kaushik@sankaraeye.com; Sankara Eye Hospital, Bangalore

Myopia a multifactorial condition is the most common cause of visual impairment worldwide . With increased prevalence , there is a concern that progression will result in complications and resultant visual impairment. Certain individuals may be at greater risk of progression and/or developing high myopia, and therefore identification of the 'at risk' group helps tailor interventions to suit the individual.

Strongest independent risk factor for progression of myopia is age of onset (myopic refraction of at least -1.25D at young age of 6-7 years). Children of Asian ethnicity have shown a more rapid progression. Some of our preliminary studies collaborate parental myopia has been shown as a risk.

Patient-related factors largely has been on the peripheral hyperopic defocus, near phorias have also been attributed as has lag of accommodation. One study we are looking at is the increase in accommodative convergence that results in focalization of the centre and affects the accommodation – vergence balance with a pull in effect, making children hold gadgets closer to face.

Environmental factors including reduced outdoor time in sunlight & increased near work especially use of digital devices have been shown to impact progression. Near work such as closer reading distance (<30 cm) and continuous reading (>30 minutes) independently increased the odds of having myopia studies. We have not found posture to impact accommodation or vergence. These associations may indicate that the intensity rather than the total duration of near work is an important factor. These were exacerbated by COVID-19 quarantine-related lifestyle changes. Vitamin D levels being low again seem to be a risk factor.

As we capture more data of myopic children , our understanding of risk factors and how we could intervene continues to evolve. We continue to work so that there will be a time where we could proactively offer options to children at risk to continue a lifestyle allowing them to achieve their maximum productivity with efficient control of the progression.

References:

1. Padmaja Sankaridurg . Myopia Control , Contact Lens Practice, Chapter 31, 333-343
2. Fricke , et al. T. R., Jong , M., Naidoo , K. S., et al. (2018). Global prevalence of visual impairment associated with myopic macular degeneration and temporal trends from 2000 through 2050: Systematic review, meta-analysis and modelling. Br. J. Ophthalmol., 102, 855–862.
3. Kaushik Murali., et al. Impact of Outdoor Play in Sunlight – An Additive Factor with Atropine 0.01% for Preventing Myopia Progression. Acta Scientific Ophthalmology 3.2 (2020): 25-28.
4. Liangde Xu PhD , et al.COVID-19 Quarantine Reveals That Behavioral Changes Have an Effect on Myopia Progression.. Ophthalmology, 2021-11-01, Volume 128, Issue 11, Pages 1652-1654
5. Sowmya Raveendra Murthy. Analysis of Vitamin D Levels in Children with Progressive Myopia. Acta Scientific Ophthalmology4.6 (2021): 60-63.

Dr Lav Kochgaway

Optic Neuritis – How to Investigate and Manage

Dr S. Mahesh Kumar

Optic neuritis is an inflammatory condition affecting the optic nerve, usually affecting young adults, especially females, between 18 and 45 years of age. Typical optic neuritis in adults usually presents as acute monocular loss of vision progressing over several hours to days, often associated with ocular pain that worsens on eye movements. Typical optic neuritis may fall into 1.clinically isolated syndrome (CIS) or 2.Multiple sclerosis.

Optic neuritis is reported to have an incidence of 1-5 cases per 100,000/year;

Clinical presentation may be Typical or atypical. Typical presentation may be in an young individual < 40 years of age with defective vision with pain on eye movements. Vision loss may reach its nadir in 2 weeks with slow spontaneous recovery. The ONTT study concluded that IV methyl prednisolone 1 g OD for days does not alter the final visual outcome but hastens the visual recovery.

Optic neuritis in Asian patients has significantly different presenting characteristics from the classic description, particularly with respect to a much higher proportion of bilateral optic neuritis, and a greater proportion of male patients, with severe visual loss at presentation. Pain may be absent. These are considered to be atypical presentations.They may be steroid sensitive or steroid dependant. Work up may reveal conditions apart from multiple sclerosis. However, in the majority of the patients it is usually a benign disease, with good visual outcome and no further events(2).

Biomarkers have helped to guide in prognostication and management of atypical optic neuritis which are autoimmune. The most common ones are NMOSD(neuromyelitis spectrum disorder) or MOGAD (myelin oligodendrocyte antibody associated disease) .others are Autoantibodies against Glial fibriallary acidic protein (GFAP) , collapsing response mediated protein 5 (anti- CRMP-5) , Antibodies against glycine receptor alpha 1 subunit (antiGly R)

Prompt initiation of IVmethyl prednisolone 1 g daily for 5 days is the initial management,. However if no significant recovery in 2-3 days of IV methyl prednisolone early plasma exchange should be considered in NMOSD patients.Other immunomulators like Inj Rituximab mayalso considered in NMOSD or MOGAD in collaboration with a neurophysician.

References:

1. Bennett JL. Optic Neuritis. Continuum (Minneap Minn). 2019 Oct;25(5):1236-1264.
2. BHA Seah, SLC Tow, Ong KCB Ong, CC Yang, CP Tsai, KH Lee, BJ Kim, HT Chong, CT Tan, LW Khin, BC Tai, and the Multiple Sclerosis in Asia Pacific Study Group. The natural history of optic neuritis in Asian patients: An observational cohort study. Neurology Asia 2017; 22(4) : 341 – 348
3. Phuljhele S, Kedar S, Saxena R. Approach to optic neuritis: An update. Indian J Ophthalmol. 2021 Sep;69(9):2266-2276. doi: 10.4103/ijo.IJO_3415_20. PMID: 34427197; PMCID: PMC8544067.
4. Saxena R, Phuljhele S, Menon V, Gadaginamath S, Sinha A, Sharma P. Clinical profile and short-term outcomes of optic neuritis patients in India. Indian J Ophthalmol. 2014 Mar;62(3):265-7. doi: 10.4103/0301-4738.121131. PMID: 24722269; PMCID: PMC4061659.
5. Sarkar P, Mehtani A, Gandhi HC, Dubey V, Tembhurde PM, Gupta MK. Atypical optic neuritis: An overview. Indian J Ophthalmol. 2021 Jan;69(1):27-35. doi: 10.4103/ijo.IJO_451_20. PMID: 33323567; PMCID: PMC7926095.
6. Dhar N, Kumar M, Tiwari A, Samanta R, Bhadoria AS, Vivekanandhan S, Saxena S, Kumar N. Comparison of clinico-radiological profile, optical coherence tomography parameters, and outcome in MOGAD and Neuromyelitis optica spectrum disorder subtypes: A prospective observational study. J Neurosci Rural Pract. 2023 Apr-Jun;14(2):239-251. doi: 10.25259/JNRP_8_2022. Epub 2023 Feb 23. PMID: 37181176; PMCID: PMC10174138.

Dr Manju Bhate

NEURO OPHTHALMOLOGY

Dr Manjula Jayakumar

DVD syndrome is often easily missed than seen. Its a marker of early onset disruption of Binocular vision. However can be seen only at 1 year of age along with a horizontal or vertical deviation. It is a dissociated strabismus as it does not obey Herrings law and there is no hypotropia in the other eye.

The clinical features in DVD syndrome can be varied thus making it even more confusing.

It could be latent or manifest, present as a combination of elevation, abduction and extorsion (DSC) which could occur in different proportion in each case. There could be sometimes association with Inferior oblique overaction. Every case needs to be examined carefully for latent or manifest latent nystagmus.

How to measure DVD accurately is a challenge. DVD measurement differs in an eye with good vision from an one with poor vision. Both methods would be demonstrated.
DVD needs to be distinguished from Skew and primary IOOA.

DVD management surgically would be discussed in detail by illustration of different case scenarios.

Identifying High Risk Children: Prediction and preventing myopia (Gp41)

Dr Meenakshi Swaminathan

Myopia is gaining epidemic proportions in terms of global prevalence. Factors attributed are many and there is a lot of ongoing research in this area to identify risk factors and to mitigate the start of myopia and limiting its progression.

Factors to be taken into consideration are as follows:

1. **Genetic factors**
2. **Environmental factors**

1. Genetic factors play an important role in the onset of myopia and progression. Onset of myopia at a younger age, higher myopia ranges at the onset and rapid progression have all been shown to be more common in genetic myopia. Exact pattern of inheritance is unclear. Twin studies have thrown some light on the role of genetic factors.
   Practical tips: Screening of children born in families with high myopia prevalence should start very early. These children can be screened even as infants. Children from such families should be monitored for onset of myopia throughout their childhood. Environmental factors need to be kept strictly under control in such children who have. A genetic predilection.

2. Environmental factors
   Excessive near work has been clearly linked to myopia onset and progression. There are mixed reports whether this extends to screen time. There is a large body of evidence that supports the exposure to sunlight as both delaying the onset and progression of myopia in children.
   Practical tips: Children from families with a high prevalence of myopia should be brought up with limited near work. They should be encouraged to spend atleast an hour or more in the natural sunlight.

   Future directions: There is early evidence that Low dose atropine (0.01%) is effective in pre-myopes (+/-0.5 sph) in preventing progression to myopia. The Atropine Treatment of myopia study 3 (ATOM3) results are awaited and will throw more light on this issue.

Other children who are at high risk for myopia are children with prematurity and/or Retinopathy of prematurity and some syndromes such as CSNB, Sticklers.

NEURO OPHTHALMOLOGY

The deceptive look of the disc: Avoiding misdiagnosis

Dr Naresh Motwani

Optic disc is not a structural entity, rather a description of the appearance of distal end of optic nerve. But it still remains the most commonly commented on, in any ophthalmic report describing posterior segment of the eye.

The appearance can be very varied, even in absence of pathology.

In this talk, we'll have a quick overview of various features of optic disc & the motley collection of presentations.

Clinically relevant disc pathologies (especially the most common and the most feared) and their diagnostic dilemma will be highlighted for the clinicians, with a few clinical pointers to minimise risk of false negatives (i.e.how not to miss the unmissable).

When and what of Neuroimaging?

Dr Navin Jayakumar – FRCSEd

Choosing the appropriate neuroimaging modality and protocol depends on the anatomical location and pathophysiology of the suspected etiology.

CT has an important role in orbital disease like orbital fractures, thyroid orbitopathy, and bony orbit lesions, MRI is particularly useful to assess orbital apex, superior orbital fissure, and cavernous sinus pathologies. These anatomical regions have a significant bony component. MRI which does not image bone has an advantage here over CT which suffers from ''volume averaging'' and loss of resolution.

In acute optic neuropathies contrast MRI of the optic nerves, brain (and sometimes the spinal cord) help differentiate typical demyelinating optic neuritis from more serious neuropathies associated with NMO and MOG.

While MRI is the imaging modality of choice for chiasmal lesions, CT helps plan pediatric sellar surgeries and resurgeries.

Besides standard T1/T2 MRI sequences other sequences are used in specific situations. Inversion recovery sequences such as FLAIR (CSF suppression) and STIR (fat suppression) help differentiate pathologies along with T2 images.

Ocular motor cranial neuropathies require additional MR angiography to look for aneurysms. Papilledema in IIH requires additional MR Venography look for dural venous sinuse stenosis or thrombosis.

Steady State Free Precession sequences image cisternal segments of cranial nerves. The heavily T2-weighted thin sections with multiplanar reconstructions create high contrast between CSF and nerves.

In cerebral strokes, while MRI is standard (with additional diffusion and perfusion images), CT has a role in quickly differentiating ischemic from hemorrhagic strokes – important information that influences urgent treatment.

NEURO OPHTHALMOLOGY

Hereditary Optic Neuropathy: What's the latest?

Dr Ramesh Kekunnaya

This talk focuses briefly on an overview of the approach to hereditary optic neuropathy. Phenotype and Genotype correlation is extremely important to reach a proper diagnosis. Leber hereditary optic neuropathy (LHON) is a rare mitochondrial disorder that typically presents in young males with progressive visual loss due to optic neuropathy. LHON was the first disease to be associated with mitochondrial DNA point mutations and is therefore, maternally inherited. The current epidemiological aspects of LHON in India will be discussed.

In patients with LHON, the mitochondria do not produce sufficient energy for the retina to work effectively. Idebenone, a short-chain benzoquinone, is the only disease-specific drug approved to treat visual impairment in adolescents and adults with LHON. Idebenone is thought to help support the mitochondria and allow the retina to function more effectively. This may improve vision or prevent blindness. Updates from RESCUE, REVERSE and REFLECT trails will be discussed.

Dr Rashmin Gandhi

Dr Rebika

Dr Reena Gupta

Duane retraction syndrome: Customised approach

Prof. Rohit Saxena

I have no financial disclosures to make.

Duane retraction syndrome (DRS) is a congenital ocular motility disorder which is under the broad category of congenital cranial dysinnervation disorders (CCDD).

It is observed more frequently in females with the left eye being more frequently affected than the right. About 10% of the cases are bilateral. It is commonly a sporadic disorder, but10% of cases may be familial. Both autosomal dominant and recessive forms of DRS have been documented.

Though the condition has been described in the literature as early as 1887, the aetiology is still not clear. The underlying abnormality is believed to be the absence or partial development of the abducent nucleus and nerve, resulting in aberrant innervation of the lateral rectus by the medial rectus sub-nucleus of the oculomotor nerve. This paradoxical innervation results in the simultaneous contraction of lateral rectus (LR) and medial rectus (MR) on attempted adduction, presenting as globe retraction along with a narrowing of the palpebral aperture. As the globe adducts against the tight lateral rectus, there may be sudden slippage of the tight LR above or below the horizontal plane, resulting in an upshoot or downshoot.

Based on electromyography, Huber classified DRS into three types:

Type 1 – Marked limitation of abduction with minimally defective or normal adduction, mostly presenting as Eso DRS.

Type 2 – Limitation of adduction with normal or slightly limited abduction, mostly presenting as Exo DRS.

Type 3 – Limitation or complete absence of adduction and abduction that can present as eso/exo or ortho DRS.

Evaluation of a patient with DRS is similar to any case of strabismus and includes assessment of vision, cycloplegic refraction, motor evaluation, assessment of binocularity, and other supplemental tests.

Indications for surgical management include:

1) Significant ocular deviation in primary position
2) Marked anomalous head posture
3) Severe up or down shoots or globe retraction and palpebral fissure changes

The limitations of treatment are

1. Normal ductions and versions cannot be achieved.
2. Upshoots, downshoots, and enophthalmous can be greatly reduced but not eliminated.
3. Fusing patient will continue to find areas of diplopia after treatment.

While planning surgery, it is important to look for any contracture/ fibrosis in MR and LR by doing a forced duction test (FDT).

Eso DRS

A tight MR should always be recessed, as per the tightness of MR. Single MR recessions (MRc) can suffice in case of deviations less the 20 prism diopters (PD). If the MR is not tight and the co-contraction is minimal or mild, one may do vertical rectus transposition (VRT) surgery to the lateral rectus. This helps in primary gaze alignment along with gain in abduction which is not possible with just medial rectus recession. The options for vertical rectus transposition surgery are: superior rectus transposition (SRT)/ inferior rectus transposition (IRT) or partial vertical rectus transpositions (pVRTs) where lateral halves of both the superior and inferior recti are split and transposed to the lateral rectus. In cases with significant upshoot or downshoot, the co-contraction needs to be countered by the recession of ipsilateral LR with a Y-split along with the medial rectus recession.

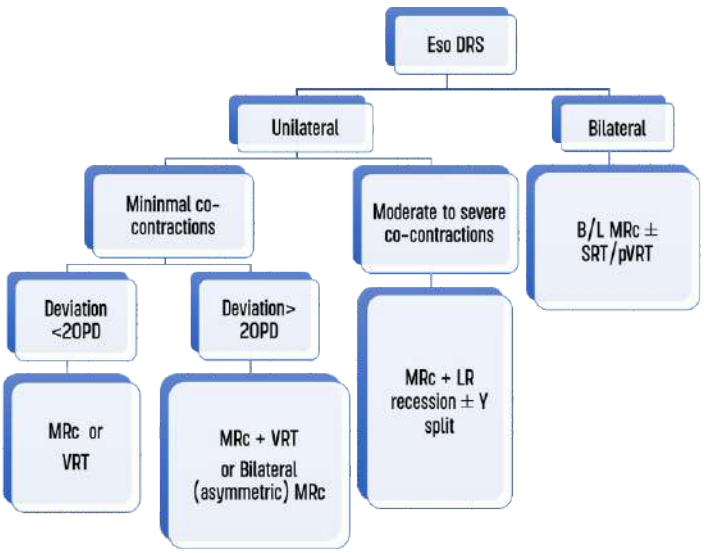


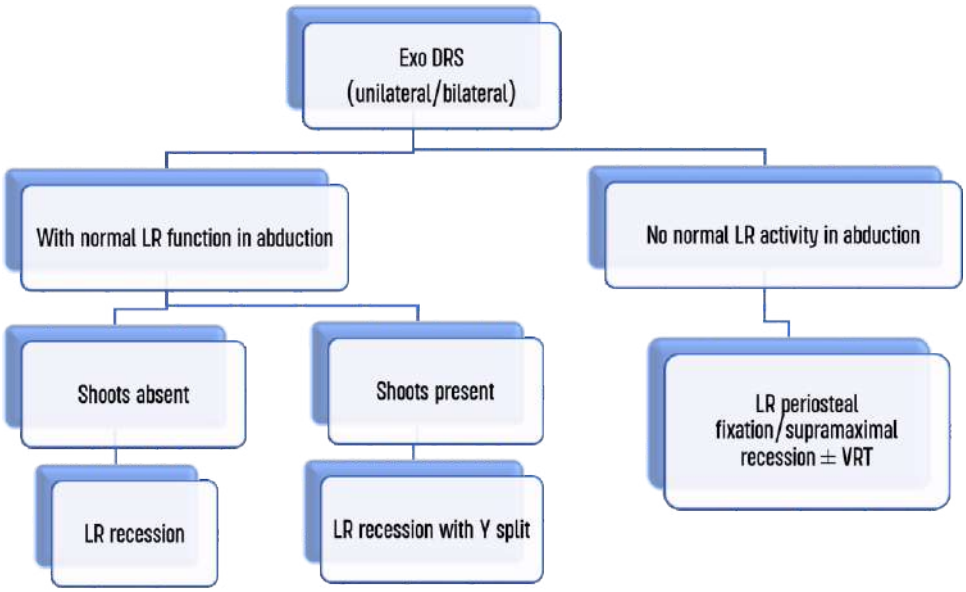
Figure 1: Flow diagram summarizing management of Eso DRS

NEURO OPHTHALMOLOGY

Exo DRS

Exotropic Duane syndrome hase a head posture away from the affected side. The surgical goal is to correct the deviation, improve the head posture, reduce the anomalous movement, improve ocular rotations and enlarge the binocular field of vision.

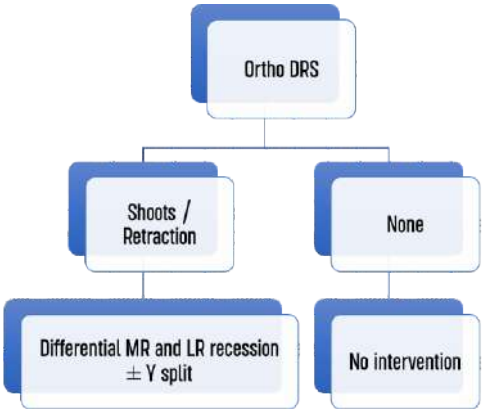
Surgical options include large recession of lateral rectus or orbital wall fixation of the lateral rectus muscle with or without vertical rectus muscle transposition. In cases of Exo DRS with normal LR activity during abduction having upshoots / downshoots during adduction, large LR recession with Y-split is the preferred option. When the exotropia is large with no normal LR activity during abduction and significant co-contraction during adduction, orbital wall fixation of the lateral rectus muscle with or without vertical rectus muscle transposition can provide good outcomes.



Flow diagram summarizing management of Exo DRS

Ortho DRS

If the eyes are aligned in primary gaze without any significant co-contraction, no intervention is necessary. Retractions can be managed by differential recession of both lateral rectus and MR in the affected eye. The presence of a co-contractions might require Y-split of the LR.



Flow diagram summarizing management of Ortho DRS

Bilateral DRS

These cases are treated as unilateral DRS and balancing of MR and LR forces is done depending on the deviation governed by the dominant eye. Bilateral eso-DRS can be managed by bilateral MR recessions, being handled as per FDT. Bilateral exo-DRS is quite rare and bilateral LR recessions have been recommended for its management. LR Y-split can be added in cases with marked shoots.

Suggested reading:

1. Saxena R, Phuljhele S, Sharma P, et al. Periosteal Fixation Procedures in the Management of Incomitant Strabismus. Middle East Afr J Ophthalmol 2015;22(3):320-6. doi: 10.4103/0974-9233.159736
2. Jampolsky A. A new surgical procedure for upshoots and downshoots in Duane syndrome. In: Santiago AP, ed. Clinical Strabismus Management. Philadelphia: WB Saunders 1999:325-46.
3. Saxena R, Sethi A. Duane Syndrome. In Saxena R. Video atlas of strabismus surgery. CBS Publishers 2022; 124-135
4. Gaur N, Sharma P. Management of Duane retraction syndrome: A simplified approach. Indian J Ophthalmol. 2019 Jan;67(1):16-22

Dr. Sachin K
USA

NEURO OPHTHALMOLOGY

Acute Comitant Esotropia - Investigations and Treatment

Dr Sandra Chandramouli

Acute acquired concomitant esotropia (AACE) is a relatively rare subtype of esotropia. characterised by late-onset, minimal accommodative mechanism and good binocular function. Although the aetiology is still not wholly understood, it has been recently associated with excess close work, which could produce an imbalance of the convergence and diverence tone of the extra ocular muscle. The increasing use of electronic devices in our daily activities increased the number of hours people spend on near work. It seems to have contributed to the increase in the prevalence of this type of strabismus in the last years, particularly during the Covid-19 pandemic. Usually patients report transient episodes of diplopia at first, more and more frequently, until it became persistent. The resultant loss of binocularity, following the sudden onset of strabismusresults in debilitating diplopia in adults, which interferes with professional abilities and quality of life. However, in children the loss of binocularity translates into the more insidious outcome of suppressionof the involved eye and subsequent amblyopia.

Acute concomitant esotropia can also be a clinical sign of intracranial tumor, Arnold-Chiari malformation or idiopatic intracranial hypertension. Thus, evaluating other neuro-logic signs, such as nystagmus, muscular palsy, or lateral incomitance, is mandatory. eurologic cause. Hence additional diagnostic tests in case of atypical features or low fusional amplitude, including MRI is mandatory.

Classification - 7 types (Buck et al)
Type I AACE, the Swann - occlusion related ype,

- Type II Burian-Franceschetti, idiopathic, nonaccommodative, precipitated by physical or psychological stress,
- Type III, acute accommodative AACE, characterized by hyperopia higher than 3.00 D and normal fusion; correction of the refractive error alone can adequately control this type,
- Type IV, decompensated AACE, monofixation syndrome or esophoria,
- Type V, less frequent, associated with intracranial pathology, most frequently a lesion of the posterior fossa and the least common types of AACE,
- Type VI, cyclic AACE,
- Type VII, secondary AACE

History taking - Age, gender , occupation, type of diplopia onset (“acute” or “subacute”), the type of near visual activity, and the daily use of electronic devices (such as laptops, tablets and smartphones) at the onset of diplopia.

Evaluation - Best corrected visual acuity (BCVA), Binocular Single Vision (W4DT), stereopsis with TNO stereotest , Extraocular motility , deviation for distance and near fixation and primary and lateral gazes by prism cover test , ability to fuse sensory diplopia with prism , Cycloplegic refraction , fundus evaluation. MRI .

Treatment - There are various treatments for AACE, includes extraocular muscle surgery, botulinum toxin injection, prisms, and divergence training. The gap between the onset of the diplopia and the diagnosis strongly influences the treatment outcome .The main factors that determine good motor and sensorial results are a good visual acuity at the time of diagnosis, a younger age, and an augmented surgery dose. The use of botulinum toxin A in AACE has many advantages including being less invasive than strabismus surgery, no conjunctival and muscle scarring and faster recovery. The injection can be given as early asone month post onset of symptoms whereas we need to wait for longer duration before deciding on surgery especially in patients with variability of measurement angles.

References:

1. Legmann Simon A, Borchert M. Etiology and prognosis of acute, late-onset esotropia. Ophthalmology. 1997;104:1348–1352.
2. Clark AC, Nelson LB, Simon JW, et al. Acute acquired comitant esotropia. Br J Ophthalmol. 1989;73:636–638.
3. Kothari M. Clinical characteristics of spontaneous late-onset comitant acute nonaccommodative esotropia in children. Indian J Ophthalmol 2007;55(2):117–120.
4. Goldman HD, Nelson LB. Acute acquired comitant esotropia. Ann Ophthalmol 1985;17(12):777–778.
6. Repka MX, Connett JE, Baker JD, Rosenbaum AL: Surgery in the prism adaptation study: accuracyand dose response. Prism Adaptation Study Research Group. J Pediatr Ophthalmol Strabismus1992, 29(3):150-156.
7. Savino G, Colucci D, Rebecchi MT, Dickmann A: Acute onset concomitant esotropia: sensorialevaluation, prism adaptation test, and surgery planning. J Pediatr Ophthalmol Strabismus 2005,42(6):342-348.
9. Rowe FJ, Noonan CP. Botulinum toxin for the treatment of strabismus. Cochrane Database SystRev 2012;2:CD006499.
10. Dawson et al . Botulinum Toxin A in Acute-onset Esotropia . Ophthalmology1999;106:1727–1730
11. Neena et al . Acute acquired comitant esotropia precipitated by excessive near work during theCOVID-19-induced home confinement . Indian J Ophthalmol . 2022 Apr; 70(4): 1359–1364.
12. M. J. Wan, I. S. Mantagos, A. S. Shah, M. Kazlas, and D. G. Hunter, “Comparison of botulinumtoxin with surgery for the treatment of acute-onset comitant esotropia in chil- dren,” AmericanJournal of Ophthalmology, vol. 176, pp. 33– 39, 2017.
13. Shi et al.Treatment of acute acquired concomitant esotropia . BMC Ophthalmology (2021) 21:9

NEURO OPHTHALMOLOGY

Dr. Saurabh Jain
UK

Dr. Shubhangi Bhave

Dr. Sonal Farzanwandi
Singapore

NEURO OPHTHALMOLOGY

Nonsurgical management in IDS

Dr. Sujata Guha, Dr. Aditi Yadgire

Intermittent exotropia (IXT) is the divergent squint that begins with exophoria progressing to intermittent exotropia and eventually might become constant. Not every case of IXT is progressive, as some cases remain stable or might improve over a period of time. Increased distance between two eyes with the age and decreased accommodation and tonic convergence are contributing factors for progression of IXT.

Usually, the patient is asymptomatic and unaware of the deviation. Parents might just complain of child closing one eye in bright light or an occasional outward deviation reported by parents, particularly when the child is tired or day dreaming.

Burian has classified IXT into three types:

1) Basic Exotropia where distant deviation equals near deviation
2) Divergence excess where distant deviation > near deviation by more than 10 prism diopters (It is further classified into True and Simulated divergence excess)
3) Convergence insufficiency where near deviation > distant deviation

The control of exodeviation can be assessed subjectively based on speed and recovery of eyes from dissociated state with 'New Castle Scoring' system which is divided into home and office control and the scoring is done for each patient from 0 to 9, 0 being the best and 9 being the worst control. Other objective indicator for control is distant stereoacuity.

The management of intermittent exotropia varies from observation to non-surgical management or surgical intervention. The decision making for when to operate mainly depends on control and stereoacuity while the amount of deviation tells about how much to operate.

Nonsurgical management:

The aim of nonsurgical treatment is to eliminate suppression and encourage use of both eyes together, to build up fusional reserve and to create optimal sensory conditions before surgery.

Suitable candidates for nonsurgical management:

1) Very young children < 4 years in whom accurate measurements cannot be made and overcorrection can lead to monofixation and amblyopia
2) Very small deviation < 20 prism diopters
3) In patients with high AC/A ratio where a good response to nonsurgical treatment is seen.

Different options for nonsurgical management:

1) Refractive error correction: Providing clear retinal images may promote fusion
2) Overcorrecting minus lenses (-2.50D): Stimulate accommodative convergence and thereby reduce deviation and improve control
3) Part-time occlusion: Prevents suppression, improves control and stereopsis
4) Orthoptics: The aim is to promote fusion, to improve vergence reserves and to restore binocular vision. Combination of anti-suppression therapy, accommodation and vergence therapy is recommended. It is recommended in children > 6 years due to understanding barriers in younger children. Several sessions of In-office vision therapy with home reinforcement therapy are required for success.
5) Prism therapy: Base in prisms are given to enhance bifoveal stimulation. A relieving prism (to reduce fusional vergence demand) or an overcorrecting prism (to induce diplopia and stimulate fusional convergence) can be given.

The success of nonsurgical treatment also depends on compliance and commitment on the part of patient and parents.

NEURO OPHTHALMOLOGY

Dr. Suma Ganesh

Dr. Sumita Agarkar

Dr. Swati Phuljhele

NEURO OPHTHALMOLOGY

Role of Oct : Is it a must tool for neuro-ophthalmologists?

Dr. Varshini Shanker

OCT is a non invasive technique useful in evaluating the optic nerve head, peripapillary retinal nerve fibre layer and layers of the macula including the ganglion cell layer. OCT has revolutionised neuro-ophthalmic practice with applications in evaluation, management and prognostication. It is useful in demyelinating, inflammatory, ischaemic, compressive, toxic and hereditary optic neuropathies. It has particular application in evaluation of optic disc drusen and differentiating true from pseudo disc edema.

OCT imaging can quantify axonal loss through measurements of retinal nerve fibre layer (RNFL) and neuronal damage through measurement of ganglion cell layer (GCL) thickness.

OCT is essential for differentiating optic neuropathies from retinal disease in vision loss and normal fundus examination.

Macular GCL thinning occurs early after an acute optic neuropathy (after approximately 2 weeks) even in the presence of persistent RNFL edema. This may be a more sensitive and reliable measure of retinal ganglion cell loss and visual dysfunction. Enhanced depth imaging OCT (EDI-OCT) may now be the gold standard for detection and evaluation of optic disc drusen (ODD). ODD can be visualized as hyporeflective structures located above the lamina cribrosa with a superior hyper reflective margin. Additionally, OCT can be used to quantify associated RNFL and GCL loss, useful for monitoring of progression.

In Idiopathic Intracranial Hypertension (IIH), OCT helps in monitoring response to treatment by serial measurement of RNFL thickness and changes in the angle of Bruch's membrane. Reduction in pRNFL thickness with preserved mGCL indicates treatment success and reduction in both indices indicates progressive optic neuropathy. OCT A helps in imaging the capillary network of the retina. OCT A is helpful in studying early vascular changes in MS and LHON.

References:

1. Minakaran N, de Carvalho ER, Petzold A, Wong SH. Optical coherence tomography (OCT) in neuro-ophthalmology. Eye (Lond). 2021 Jan;35(1):17-32. doi: 10.1038/s41433-020-01288-x. Epub 2020 Nov 25. PMID: 33239763; PMCID: PMC7852683.
2. Tieger MG, Hedges TR 3rd, Ho J, Erlich-Malona NK, Vuong LN, Athappilly GK, Mendoza-Santiesteban CE. Ganglion Cell Complex Loss in Chiasmal Compression by Brain Tumors. J Neuroophthalmol. 2017 Mar;37(1):7-12. doi: 10.1097/WNO.0000000000000424. PMID: 28192385; PMCID: PMC6033516.
3. Kupersmith MJ, Mandel G, Anderson S, Meltzer DE, Kardon R. Baseline, one and three month changes in the peripapillary retinal nerve fiber layer in acute optic neuritis: relation to baseline vision and MRI. J Neurol Sci. 2011 Sep 15;308(1-2):117-23. doi: 10.1016/j.jns.2011.05.039. Epub 2011 Jul 18. PMID: 21764408.