PEDIATRIC OPHTHALMOLOGY UPDATE

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PEDIATRIC OPHTHALMOLOGY
SANFORD HEALTH

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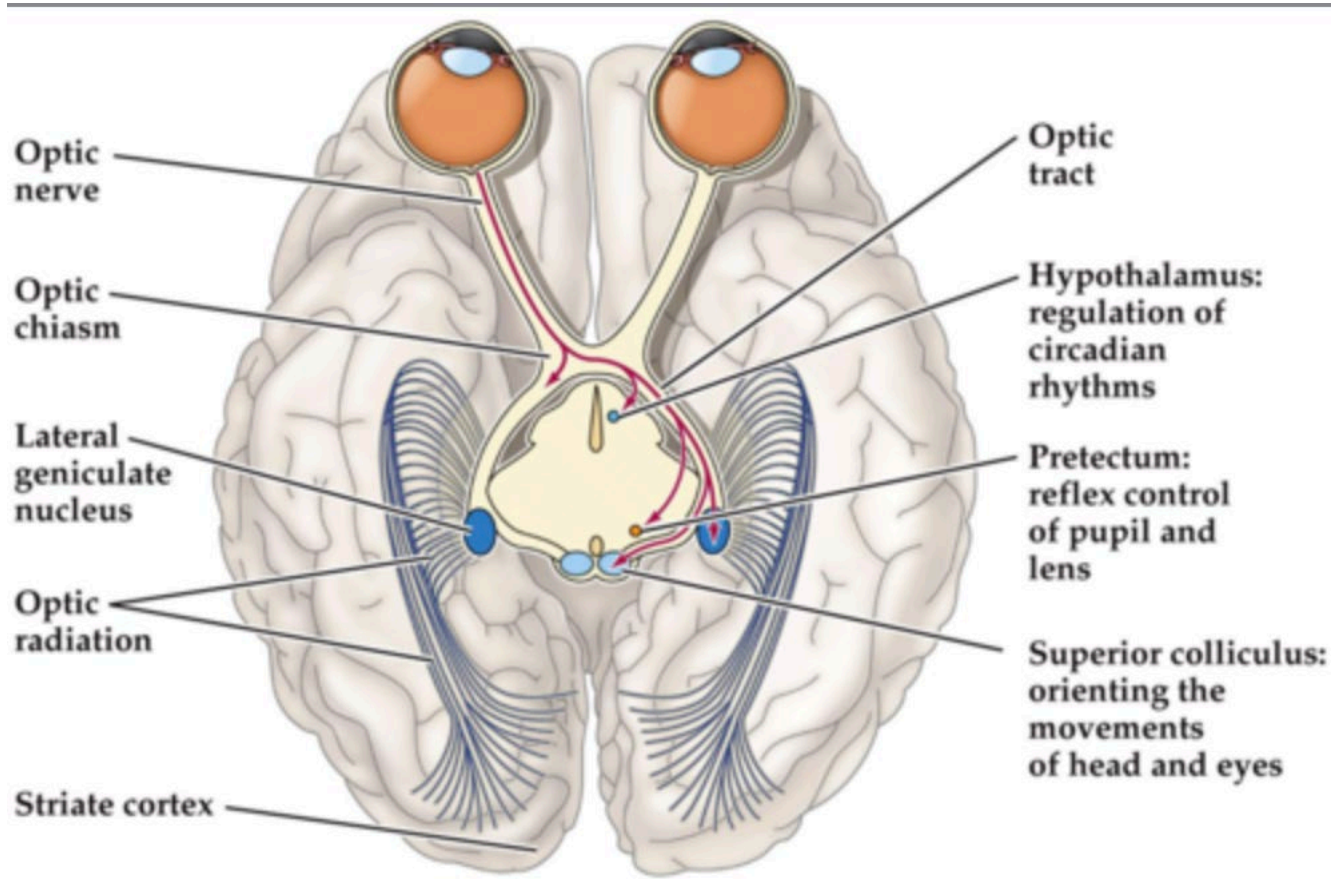
OVERVIEW

- Cerebral visual impairment
- Retinopathy of prematurity
- Myopia control
- Pediatric ocular surface disease

CEREBRAL VISUAL IMPAIRMENT



CEREBRAL VISUAL IMPAIRMENT

- Most frequent cause of childhood visual impairment in developed countries (30-40% of all visually impaired children and 10.5% of children with developmental disabilities
- Can be cortical or subcortical retrogeniculate
- A/E include PVL, intrauterine infection, hypoxia, intracranial hemorrhage, structural CNS, seizures, and hydrocephalus. Acquired causes include accidental trauma, abusive head trauma, meningitis, and encephalitis
- Optic atrophy and optic cupping sometimes noted due to trans-synapic degeneration but otherwise normal

WHAT ARE THE COMMON SIGNS?

- Distinct color and high contrast objects preference
- Light-gazing
- Visual latency
- Better vision when viewing moving objects compared to stationary objects
- Visual field defects
- Difficulty with unfamiliar visual stimuli
- Better response near objects
- Difficulty with complex visual objects, groupings or environments

IS IT TREATABLE?

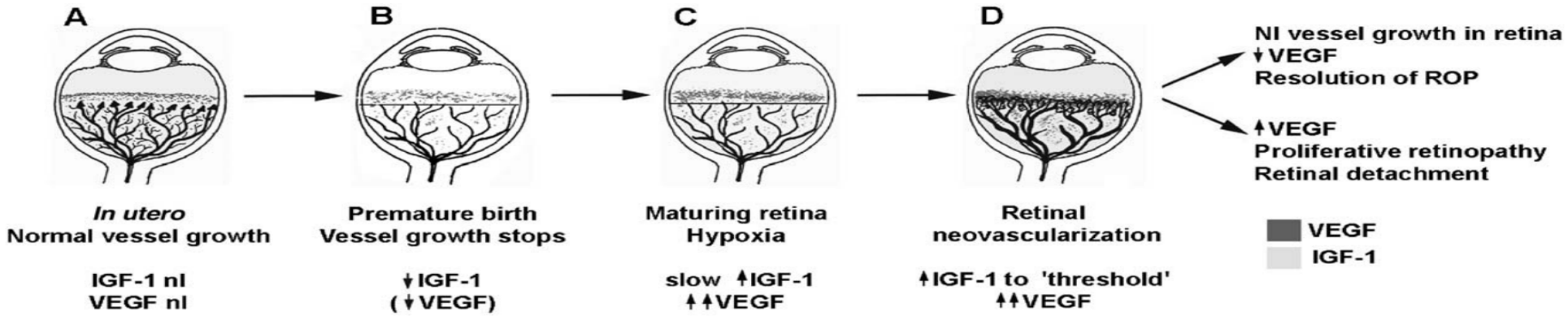
- Early intervention, range assessment and TVI role
- Correcting refractive errors, addressing strabismus and amblyopia
- Better prognosis when no structural lesions noted on MRI

RETINOPATHY OF PREMATURITY

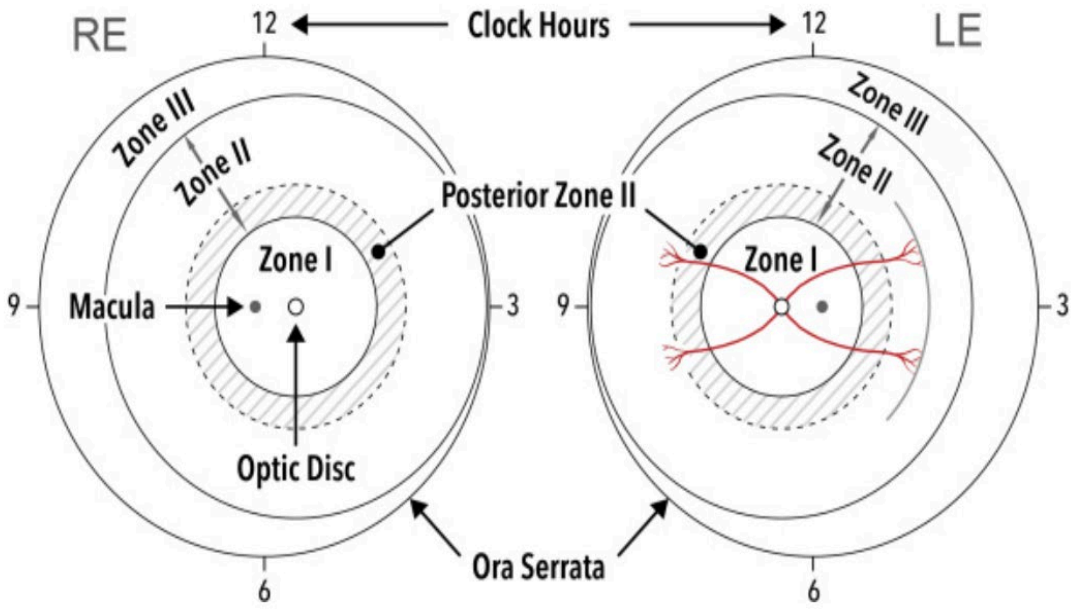
- 14,000 infants are impacted annually. 90% of those affected have only mild disease
- 1,100- 1,500 develop disease treatment requiring ROP
- 400-600 infants each year in the U.S. become legally blind from ROP

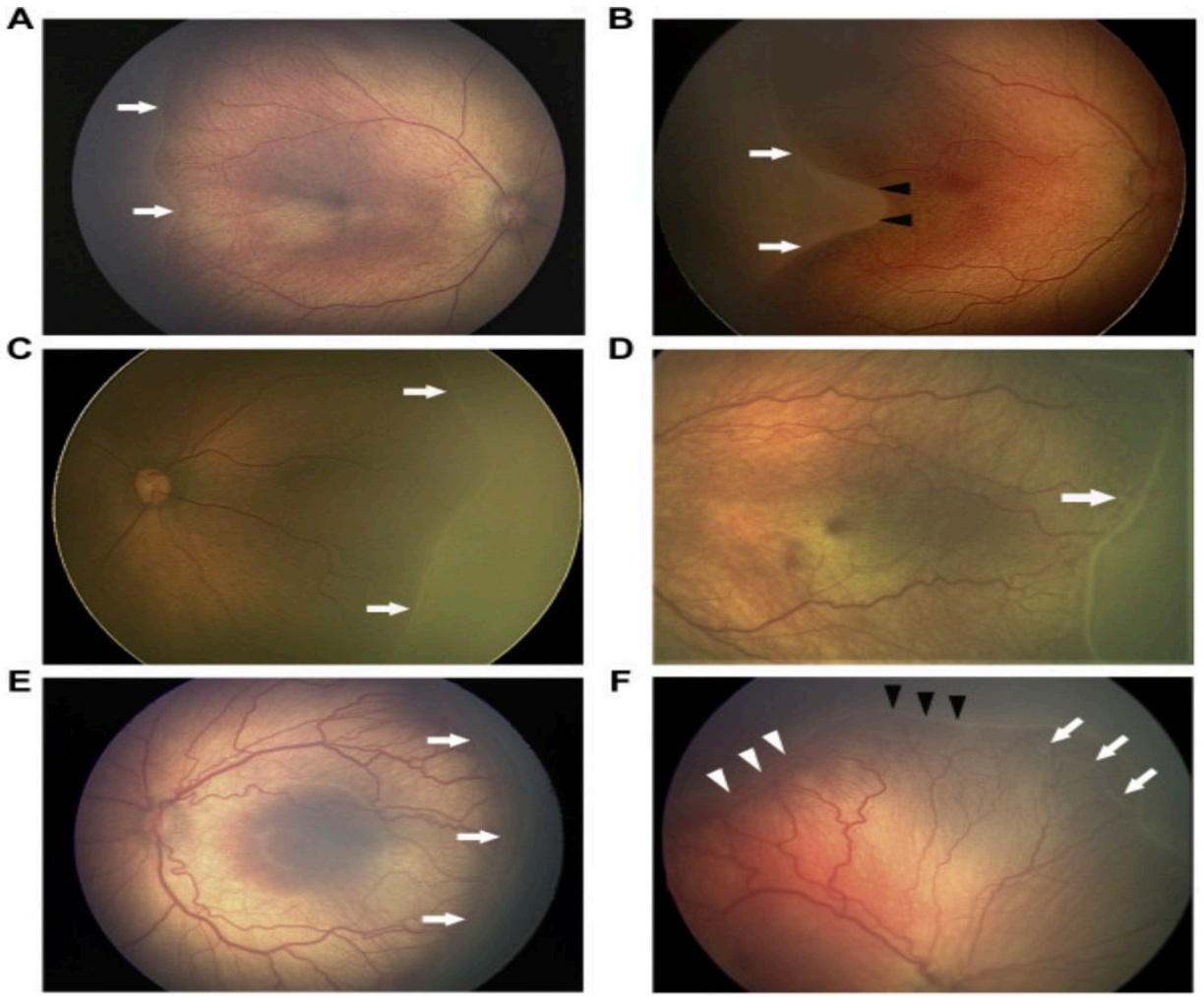
WHY DOES IT HAPPEN?

- Retinal vasculature begins 16 weeks GA & concludes nasally at 32 weeks and temporally at 40 weeks
- Relative postnatal hyperoxia causes retinal vasculature VC and retinal ischemia reducing VEGF in phase I
- In phase II, further ischemia increases VEGF production with fibrovascular ridge formation and subsequent tractional retinal detachment
- IGF-1 initially deficient in preterm infants acts as permissive factor allo[illegible]

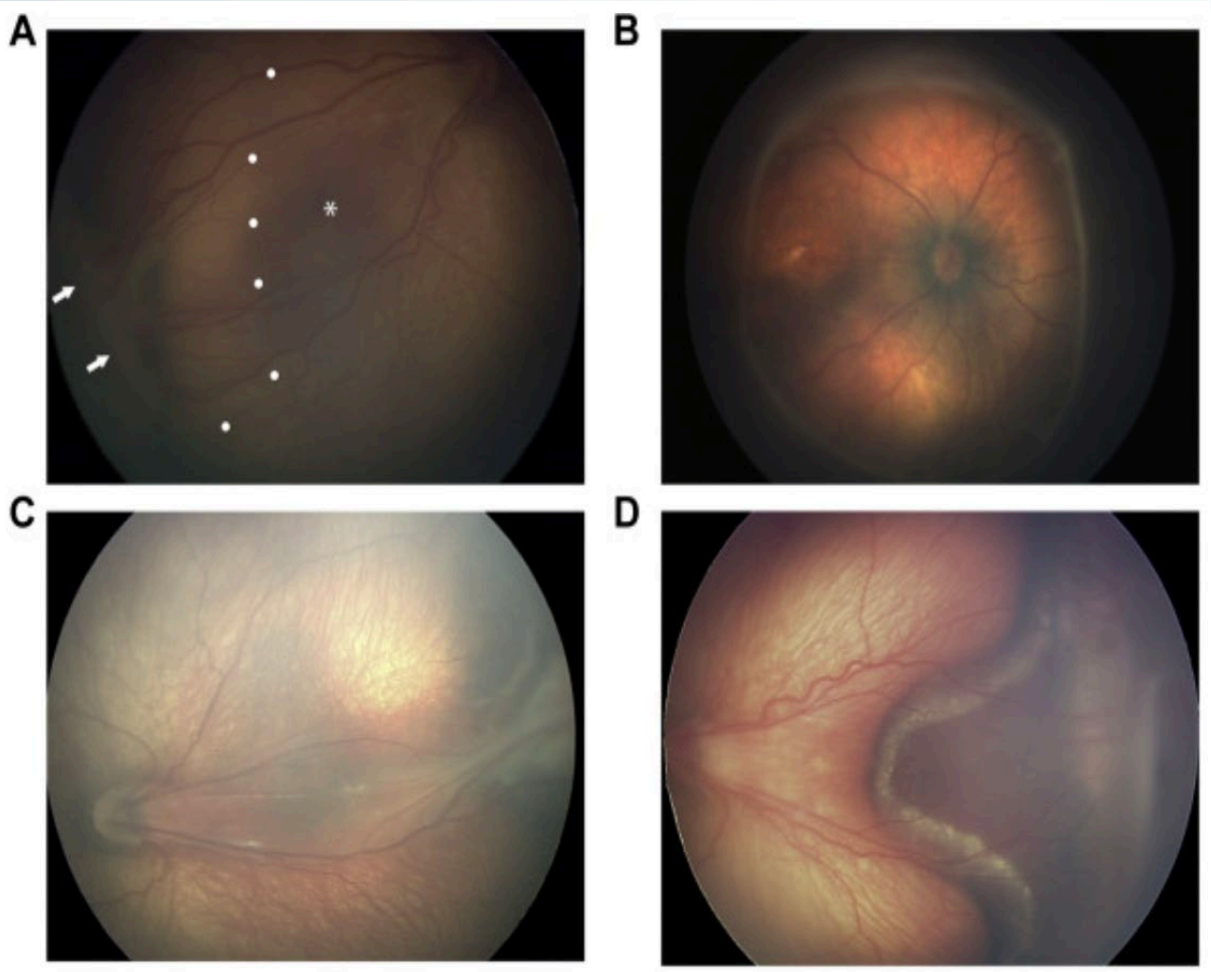


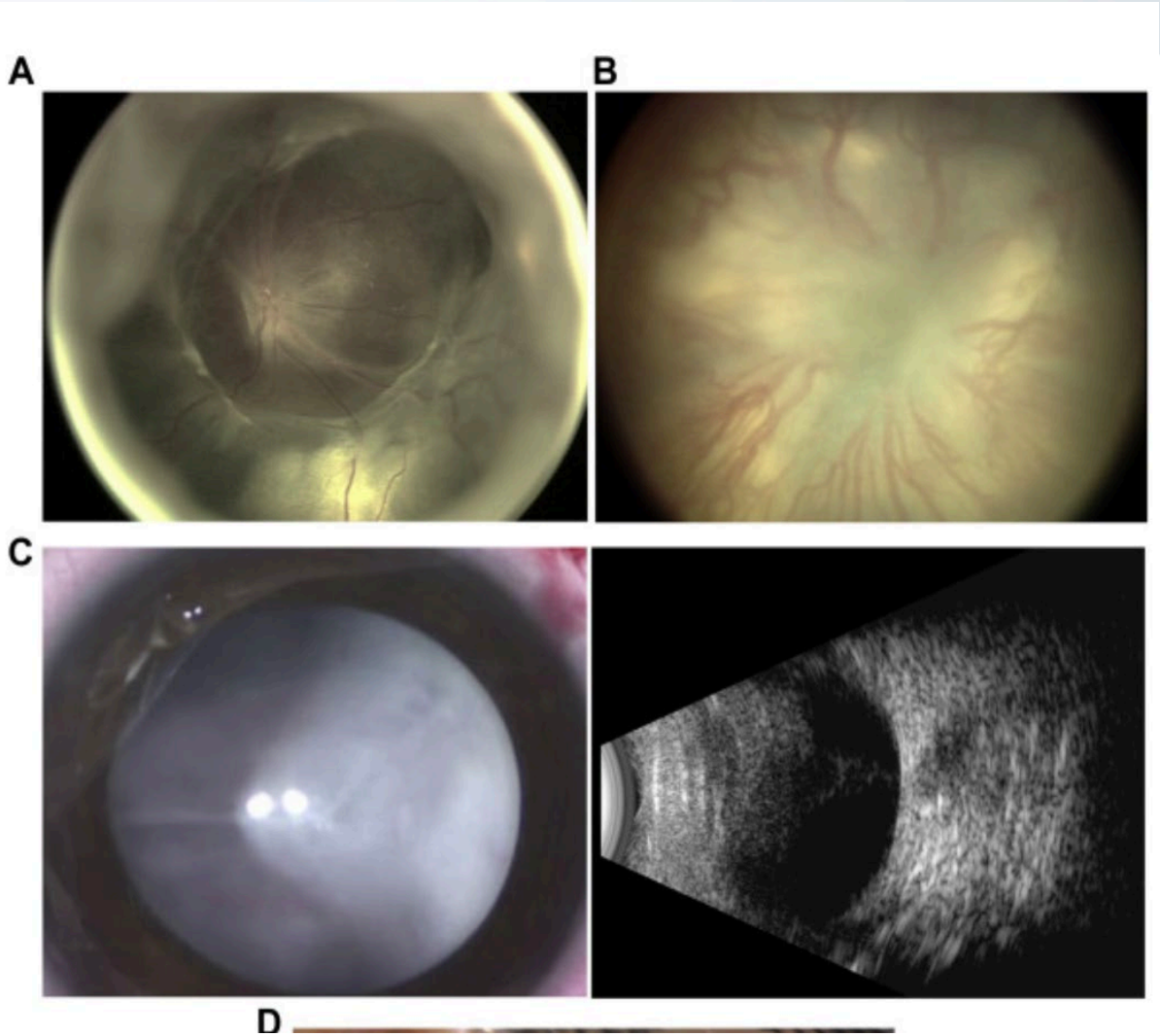
ICROP 3 CLASSIFICATION





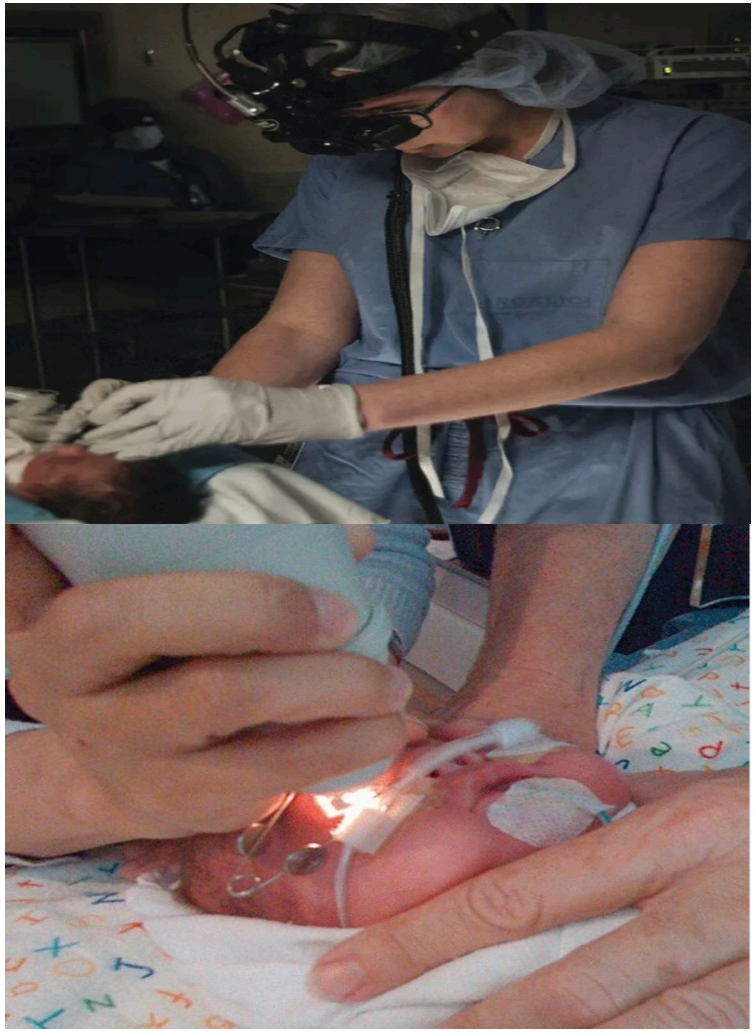
ICROP 3 (CONTD)





SCREENING GUIDELINES

- Any preterm 30 weeks or less or BW 1500 g or less or determined to warrant screening by neonatologist
- Starting at 31 weeks with GA 27 wks or less or 4 weeks old in older babies
- Screening every 1-2 weeks depending on disease severity in Zones I and II extended to 3 weeks in Zone III or with Zone II with no disease
- Termination of screening if infant past 45 weeks PMA with no type I ROP, showing signs of regression or in Zone III with no prior ROP



WHEN AND HOW TO TREAT?

- Stage 3 or plus disease in Zone I
- Stage 3 AND plus disease in Zone II or III
- Treatment using cryotherapy, transpupillary laser photocoagulation and recently Intravitreal injection of Anti-VEGF
- BEAT-ROP demonstrated benefit of Bevacizumab over Laser in Zone I disease. 6% vs 42% recurrence.
- STOP-ROP showed no ROP progression with supplemental O2 at SO2 96-99% but was associated with more adverse pulmonary events
- Colaizy et al. reported reduced need for treatment using baseline target oxygen to 85-95% and increased to >97% after diagnosis of Stage 2 or worse.

ANTI-VEGF IS EFFECTIVE BUT IS IT SAFE?

- Bevacizumab is detectable in systemic circulation for 8 weeks following injection
- No significant effect on neurodevelopment according to meta-analysis
- Bevacizumab is off-label for intravitreal injection. Ranibizumab is only licensed for adults.
- Aflibercept recently FDA approved for use in ROP
- All are associated with reactivation of ROP after several weeks and need for retreatment

FURTHER CONSIDERATIONS

- Exam stressful on fragile preterm. Diminishing workforce
- Already screening too many babies to treat few
- Postnatal weight gain models promising but not 100% sensitive
- Most important cause of poor outcomes is delayed/missed follow up
- Highest malpractice awards in ophthalmology: 15 million USD in 1 case!

MYOPIA EPIDEMIC AND COVID-19

- Impacts 30% of the population and is projected to impact 50% of the population in 2050
- Peak myopia progression correlate with peak height
- Mohan et al. reported increase in annual progression of myopia ≥1 D in 45.9% of children during the pandemic compared to 10.5% pre-pandemic. Similar results reported from China and Hong Kong
- This was correlated to less time outdoors and longer screen time

MYOPIA CONTROL: LOW DOSE ATROPINE

- Mechanism of action unknown but likely related to local scleral or retinal receptors
- Dose-dependent effect in both myopia control and side effects profile
- Rebound effect well-documented after cessation of treatment. Least with 0.01%
- LAMP study reported atropine 0.05% as optimum concentration for myopia control with least side effects
- Better effect in Asian ethnicity according to meta-analysis

MYOPIA CONTROL: LOW DOSE ATROPINE

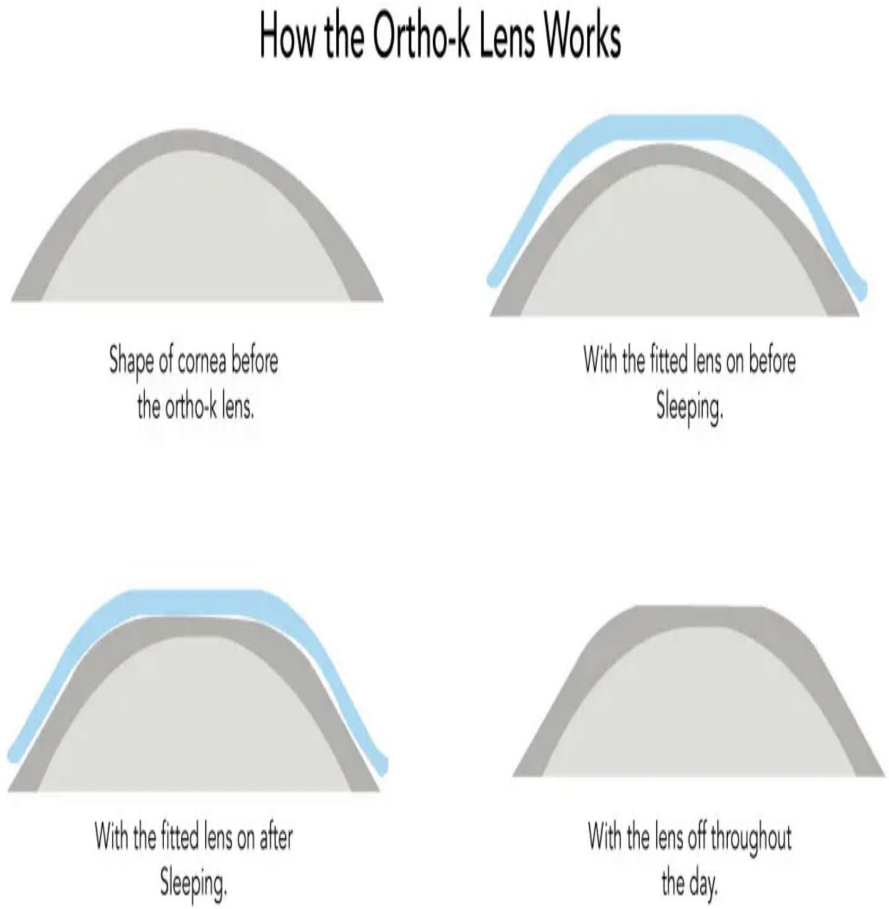
- Consider atropine for children with myopia progression of 1 D or more/year.
- This should be continued for at least 1-2 years prior to stopping. Some experts recommend continuation till 15 yrs of age
- Progression should slow to –0.50 D or less per year
- Children should be monitored every 6 months for at least 1 year following treatment cessation for possible rebound

MYOPIA CONTROL: LOW DOSE ATROPINE- CAVEATS

- Used off-label
- Needs to be compounded. Not covered by insurance
- Systemic side effects are rare. Photosensitivity and near blur can be managed with transition lenses and progressive addition lenses respectively. Local side effects commoner in Caucasian eyes
- Rebound is well-documented particularly with higher doses

MYOPIA CONTROL: ORTHOKERATOLOGY

- Overnight contact lenses conceived to obviate need for glasses during daytime
- A systematic review and network meta-analysis reported ortho-K to be at least effective as low-dose atropine
- Fitting requires special expertise.
- Compliance is a challenge. Some studies had dropout rate as high as 33%
- Has potential for development of sight threatening corneal



MYOPIA CONTROL: MULTIFOCAL & DUAL FOCUS CONTACT LENSES

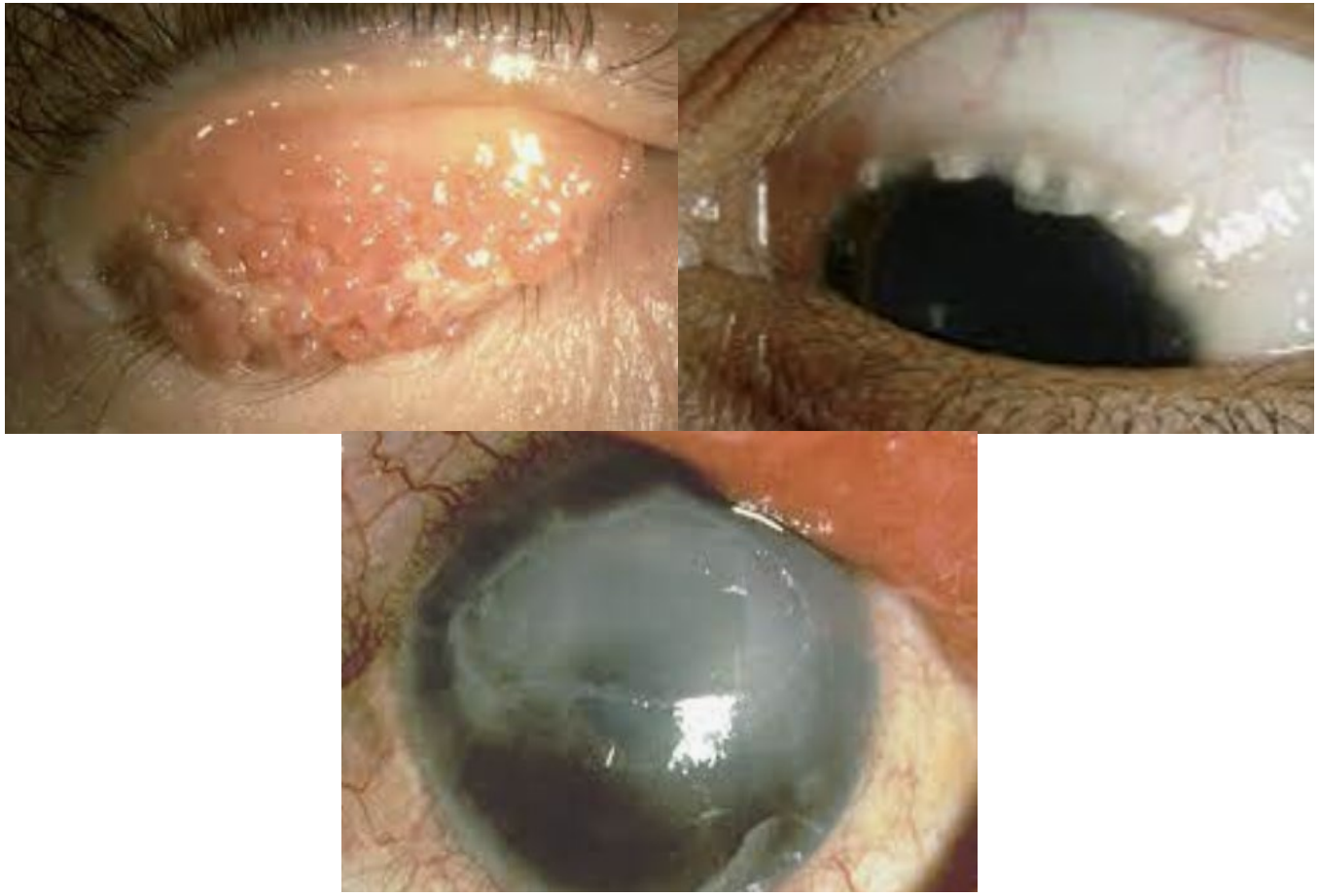
- Thought to reduce myopia progression by achieving myopic defocus on the peripheral retina
- Less myopia progression−0.73 D in test group than in the control group with The Misight contact lens (CooperVision, Inc., Pleasanton, CA) over 3 yrs. Clinically meaningful?
- Defocus Incorporated Multiple Segments' (DIMS) spectacle lenses utilize similar modality but are not available in the US

MYOPIA CONTROL: CONCLUSION

- Evidence supports both low dose atropine and orthokeratology as initial options for myopia control
- Rebound myopia following cessation of both treatment modalities
- Defocus incorporated multiple segment spectacle lenses and Dual focus soft contact lenses have less side effects but not equally effective as atropine and ortho-K lenses

PEDIATRIC OCULAR SURFACE DISEASE NOT TO MISS: VERNAL KERATOCONJUNCTIVITIS

- Commoner in pre-pubertal males
- Other atopic condition, excessive rubbing, photophobia and ropy discharge and itching
- Look for giant papillae, limbal gelationous elevations, Horner-Tarantas dots and shield ulcers in severe cases
- Short term topical CST and long term topical antihistamine gtts are mainstay for treatment
- Cyclosporine 0.1% recently approved for VKC as steroid sparing option in moderate-severe VKC



PEDIATRIC OCULAR SURFACE DISEASE NOT TO MISS: PEDIATRIC BKC DIAGNOSIS

- Delayed hypersensitivity due to tear film bacterial antigens
- Redness, pain, photophobia
- Significant lid involvement with styes, chalazia, blepharitis, meibomitis and madarosis
- Corneal involvement with phlyctens, ulceration and

PEDIATRIC BKC: MANAGEMENT

- Warm compresses and lid hygiene
- Topical CSTs under cover of topical antibiotics
- Long term low dose PO antibiotics (erythromycin or doxycycline depending on age) for 8-12 weeks for severe keratitis
- Systemic immune suppression in recalcitrant cases
- Case reports for use of topical cyclosporine (0.05%-2%) and tacrolimus 0.03% ointment as steroid sparing agents
- No high quality evidence supporting above measures due to lack of clinical trials

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Thank you!