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**Conflicts of interest**

There are no conflicts of interest.

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# Commentary: The domain of optical coherence tomography in the spectrum of pediatric retinal disorders

The past two decades in ophthalmology belong to optical coherence tomography (OCT) that provides *in vivo* cross-sectional images of the retina and has revolutionized the way we diagnose and treat vitreoretinal diseases, especially age-related macular degeneration and diabetic macular edema. Commercially available adaptations of the tabletop OCT such as the hand-held OCT (HH-OCT; Bioptigen; Leica Microsystems, Wetzlar, Germany/Morrisville, NC, USA), and the modified innovative techniques using the "flying baby position" made sure that we expanded its utility to pediatric retinal disorders as well.[1,2]

But as they say "children are not small adults," acquisition and clinical interpretation of OCT need correction for smaller axial lengths, steeper corneas, and higher refractive errors normally seen in children. It is also necessary to have an understanding of macular embryology and development, especially in the premature eye where OCT may image a fovea in evolution.[3] Foveal development begins around 25 weeks of postmenstrual age and continues after birth, in some cases even into the second decade of life.[3,4] It involves centrifugal movement of the inner retinal layers, outer nuclear layer (ONL) widening, centripetal movement of cone photoreceptors, and cone outer segment (OS) lengthening (cone specialization) resulting in foveal pit formation necessary to maximize the optical quality of the image formed by reducing light scattering.[3-5] OCT in a premature eye may show any of these stages of development. This "inner retinal immaturity" may be imaged along with cystoid macular edema (CME), which is seen in 45% to 48% of eyes; the true significance of CME remains unclear though increased association with hyperopia and poor neurological development is seen.[6] Although OCT gives unparalleled insight into the development of the immature retina, the presence of these abnormalities should not deter the treating pediatric ophthalmologist to initiate refractive

correction, amblyopia therapy, and vision rehabilitation therapy as appropriate because the association of these abnormalities with poor visual outcome remains to be proven. This has also been elucidated in the present study,[7] wherein even though the macula in the premature babies were seen to be thicker, no association was seen with the visual acuity.

Balasubramanian *et al*.,[8] in their series of children undergoing OCT angiography (OCTA), found significant visual acuity correlates with factors like a smaller foveal avascular zone (FAZ), shallower foveal depth, increased central foveal thickness, and larger inner retinal area. Smaller FAZ area was the most important predictor of visual acuity compared with other parameters such as the superficial and deep plexus vessel density.[8] Smaller FAZ also points toward a developmental modification or alteration that happens in premature babies wherein the normal procedure of development of FAZ through apoptosis of the macular vascular vasculature is halted and is believed to be a consequence of incomplete regression of the inner retinal layers.[9]

The usefulness of OCT in ocular conditions such as nystagmus, foveal hypoplasia, achromatopsia, unexplained visual loss, follow-up in cases with inadequate response to amblyopia, and pediatric retinal tumors is well-documented in the literature. Grades of foveal hypoplasia were described based on OCT features such as foveal pit, ONL widening, and OS lengthening by Thomas *et al*.[4] They described significant differences in visual acuity associated with different grades. Achromatopsia could be differentiated from other causes of foveal hypoplasia because of the presence of atypical features on OCT such as disruption of the IS/OS (inner segment/outer segment) junction associated with photoreceptor disruption and decreased retinal thickness.[4]

Cehajic-Kapetanovic *et al*.[2] extended the applications of OCT in premature babies by exhibiting its utility in decision making prior to surgical intervention; the child was held in the "flying baby position," and the procedure was done under topical anesthesia. The decision for early surgical intervention could be taken and sight-threatening complications were prevented.

Another important role of OCT in children is to evaluate disc drusen as an underlying cause of disc swelling in children. ONH (optic nerve head) drusen, both noncalcific and buried are well picked up on tomography images, especially those with enhanced depth imaging, and can avoid the more expensive and hazardous computed tomography scans.[10]

The OCT is a noninvasive reliable tool in children especially those above 4 to 5 years of age, but the major limitation that remains is the need for general anesthesia for the acquisition of these tomograms in the very young. Also, to be borne in mind is the long learning curve in acquiring OCT images with the HH-OCT as well as the necessity of an age-matched normative data for comparison. Although retinal imaging is a useful tool in various pediatric retinal disorders, it should be used wisely and should not be used merely for documentation of normal retinal anatomy in asymptomatic children.

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