Diagnostic imaging has rapidly progressed over the past decade, particularly in regard to the ability to analyze the macula with optical coherence tomography. In contrast, the retinal periphery has proved more difficult to image, and, therefore, it is more difficult to understand the pathologies that affect the periphery. Recent advances in wide-field imaging allow more detailed views of the retinal periphery, which is particularly beneficial in pediatric retina pathologies, such as retinopathy of prematurity (ROP), Coats disease, and familial exudative vitreoretinopathy (FEVR). Widefield fluorescein angiography (WFFA) is quickly becoming essential not only for diagnosis and management, but to further our understanding of pediatric retinal disease.

The Optos 200 Dx (Optos PLC, Dunfermline, United Kingdom) scanning laser ophthalmoscope obtains a 200º wide-range field in a single image. Although the Optos 200 is a good option for adults and children capable of positioning upright, it does not work well for infants. Therefore, the Bascom Palmer Eye Institute in Miami been utilizing the Retcam II (Clarity Medical

Figure 1. Female patient aged 7 years with Coats disease showing significant lipid exudation with dilated capillaries. Montage photos allow documentation of the peripheral pathology of this disorder.

Figure 2. Fluorescein angiography (FA) on the same patient with Coats disease. Note the dilated capillaries and the characteristic zone of ischemia peripheral to these vascular changes.
PEDIATRIC RETINAL IMAGING FEATURE STORY

Systems, Pleasanton, CA) imaging system on infants during examinations under anesthesia to evaluate disease and guide treatment. The Retcam’s ability to obtain good images with poor dilation makes examining a pediatric patient during examination under anesthesia much simpler. With the widefield lens, a single image can obtain a field of view of up to 130°. Detailed images from an area of special interest are also possible with a high-magnification lens. One of the most versatile features of the Retcam II is that it is capable to obtain WFFA, which allows for creation of montages using the AutoMontage program (Ophthalmic Imaging Systems [OIS], Sacramento, CA).

Detailed examination of the far periphery is a fundamental part in the assessment and management of several retinal vasculopathies such as Coats disease, FEVR, and retinopathy of prematurity (ROP). This innovative imaging technology is already revealing new angiographic findings that have not been described before. A recently published case series reported an abnormal retinal vasculature in the contralateral eye in patients with clinically unilateral Coats disease.1

LASER TREATMENT GUIDED BY RETCAM II WFFA

WFFA is a valuable tool to determine the area of necessary laser treatment. Targeted retinal photocoagulation (TRP) may help limit laser treatment to specific

Figure 3. Peripheral view of the uninvolved eye in the same patient with Coats disease. Note the abnormal angled vessels in the far periphery.

Figure 4. Same patient with Coats Disease after laser treatment.

Figure 5. Male patient aged 9 months with a diagnosis of FEVR in both eyes. Note the dragging of retinal vasculature. Findings in right eye (B) are less obvious by fundus photography.
Figure 6. FA is helpful in making the diagnosis of FEVR. Note the abnormal peripheral vessels and prominent area of abrupt nonperfusion in both eyes.

Figure 7. The same patient with FEVR after laser treatment guided by FA.

Figure 8. FA showing no evidence of neovascularization after areas of nonperfusion were lasered.
areas of vascular pathology. This is particularly important in pediatric patients because it may diminish the risk of photocoagulation-related complications.

Mintz-Hittner and colleagues reported that intravitreal bevacizumab (Avastin, Genentech) therapy, as compared with conventional laser therapy, in infants with stage 3+ ROP showed a significant benefit for zone I. They also reported significant development of peripheral retinal vessels after treatment with intravitreal bevacizumab. Conventional laser therapy, however, led to permanent destruction of the peripheral retina. WFFA may allow follow-up of vascular changes and disease progression with more detail than indirect ophthalmoscopy or color fundus photography in patients with ROP.

Coats disease is characterized by unilateral vascular telangiectasias associated with areas of exudation and nonperfusion. Focal laser treatment to pathologic vessels and areas of nonperfusion is recommended. WFFA may be an essential tool in directing TRP for successful obliteration of abnormal vasculature (Figures 1-4).

FEVR is another pediatric retinal disease in which WFFA may play a very important role. FEVR is distinguished by lack of perfusion and neovascularization of the retinal periphery in both eyes. Indirect ophthalmoscopy limits the early diagnosis and treatment of this disease due to the difficulty of examining the retinal periphery in the pediatric population. However, with the use of WFFA the retinal periphery is easily visualized. Digital angiography allows early diagnosis and guidance of treatment. It is particularly helpful to follow these patients (Figures 5-8) with serial angiographies until the eye is stabilized. Often, smoldering neovascularization identified by WFFA after laser treatment responds well to adjunctive anti-vascular endothelial growth factor treatment.

CONCLUSION

Peripheral retinal examination is crucial in pediatric pathologies including retinopathy of prematurity, FEVR, and Coats disease. The ability of WFFA with the Retcam II to image the retinal periphery far exceeds both clinical examination and standard FA. It allows the evaluation of subtle retinal vascular abnormalities and neovascularization often missed in pediatric exams. WFFA also accurately guides the need for initial laser treatment and, more important, the need for laser supplementation. With continued research and exploration, WFFA may become the standard in the care of pediatric patients with retinal vasculopathies.

Geeta A. Lalwani, MD, is an Assistant Professor of Clinical Ophthalmology at the Bascom Palmer Eye Institute, University of Miami Miller School of Medicine. She can be reached at +1 305 482 5161; or via email at glalwani@med.miami.edu.

Timothy G. Murray, MD, MBA, FACS, is Professor of Ophthalmology and Radiation Oncology at the Bascom Palmer Eye Institute, University of Miami Miller School of Medicine and a member of the Retina Today Editorial Board. Dr. Murray is a consultant for Alcon Laboratories, Inc. He can be reached at +1 305 326 6000, ext. 6166; fax: +1 305 326 6147; or via email at tmurray@med.miami.edu.

Audina M. Berrocal, MD, is an Associate Professor of Clinical Ophthalmology and Secondary Appointment in the Department of Pediatrics at the Bascom Palmer Eye Institute, University of Miami Miller School of Medicine. She reports that she is a paid consultant to Clarity Medical Systems. Dr. Berrocal can be reached at +1 305 326 6000; fax: +1 305 326 6417; or via email at aberrocal@med.miami.edu.


Would you like to comment on an author’s article? Do you have an article topic to suggest? We are interested in your feedback. Please email us at letters@bmctoday.com with any thoughts or questions you have regarding this publication.