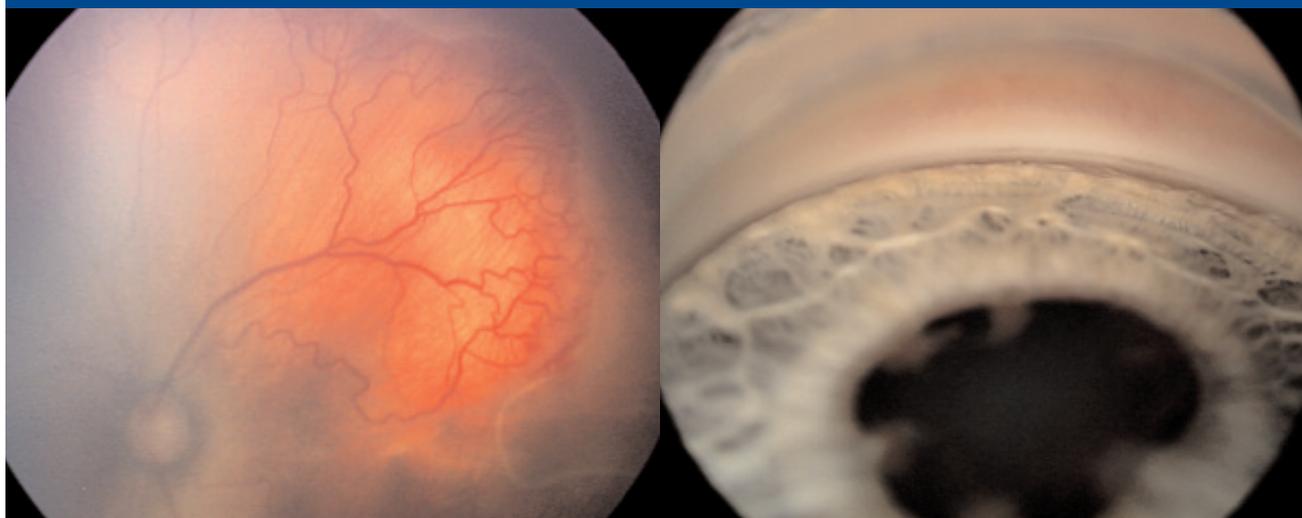


A SUPPLEMENT TO

Retinal
PHYSICIAN.

September 2008

International Experience With Photographic Imaging for Pediatric and Adult Eye Disease



**HIGHLIGHTS FROM A SYMPOSIUM HELD PRIOR TO THE
WORLD OPHTHALMOLOGY CONGRESS**

HONG KONG, ROC ■ JUNE 27, 2008

TABLE OF CONTENTS

Retinal Photography for Management of ROP	3	ROP in Western Australia	8
State of ROP Management: The Indian Experience	4	The ROP Challenge in Rural India: Preliminary Report of a Telemedicine Screening Model	9
Experience With a Telemedicine Screening Program for ROP: The Sundrop Network	5	Use of the EyeCam in Anterior Segment Imaging: An Alternative to Gonioscopy	10
Diagnosis and Treatment of Pediatric Retinal Disease in Hong Kong	7		

CONTRIBUTING FACULTY:



Michael Trese, MD
Chief, Pediatric and Adult Vitreoretinal Surgery
William Beaumont Hospital
Michigan, USA



Geoffrey Lam, MBBS FRANZCO
Clinical Senior Lecturer
University of Western Australia
Princess Margaret Hospital for Children
Perth, Western Australia



Rajvardhan Azad, MD, FRCS, FAMS
Chief, Vitreoretinal Services
Dr. Rajendra Prasad Centre for Ophthalmic Science
New Delhi, India



Anand Vinekar, MD, FRCS
Chief, Pediatric Retina and Pediatric Visual Rehabilitation
Narayana Nethralaya Postgraduate Institute of Ophthalmology
Bangalore, India



Darius Moshfeghi, MD
Adult and Pediatric Vitreoretinal Surgery
Lucile Packard Children's Hospital
Stanford University Medical Center
California, USA



Iqbal Ike K. Ahmed, MD, FRCS
Assistant Professor
University of Toronto
Ontario, Canada
University of Utah
Utah, USA



Dorothy Fan, MD
Associate Professor
The Chinese University of Hong Kong
Hong Kong, ROC

Editorial Staff

EDITOR-IN-CHIEF, *RETINAL PHYSICIAN*: Jason S. Slakter, MD
EDITORIAL MANAGER, SPECIAL PROJECTS: Angela Jackson
SENIOR EDITOR, SPECIAL PROJECTS: Judith Riddle
CONTRIBUTING EDITOR: Susan H. Scher, MD

Design and Production

PRODUCTION DIRECTOR: Leslie Caruso
ART DIRECTOR: Michael F. Higgins
PRODUCTION MANAGER: Stacy Drossner

Editorial and Production Offices

323 Norristown Road, Suite 200, Ambler, PA 19002
Phone: (215) 646-8700

Business Staff

GROUP PUBLISHER: Douglas A. Parry
ASSOCIATE PUBLISHER: Dan Marsh
ACCOUNT EXECUTIVE: Kathleen Malseed
MARKETING MANAGER: Amy Wauhopp
PROMOTIONAL EVENTS MANAGER: Michelle Kieffer
CIRCULATION DIRECTOR: Deb Benward

Vice President, Journals Business Development

R. Patricia Herron

Copyright 2008. Wolters Kluwer Health Inc., LWW VisionCare Group. All Rights Reserved.

The Rop Challenge In Rural India: Preliminary Report of A Telemedicine Screening Model

BY ANAND VINEKAR, MD, FRCS



The ROP situation in India is defined by the numbers. With more than 27 million live births each year, and about 2% of these premature, the number of infants who require screening is very large and growing. This contrasts with the near drought of experts to manage this disease countrywide. It is indeed a grim reality that we have perhaps 20 ophthalmologists in the entire country who are involved in ROP screening and comprehensive treatment.

In India and other middle-income countries, as in the West, ROP is the single most important and preventable cause of infant blindness. In the past decade, improvements in neonatal care, increased survival rate and better awareness of ROP have resulted in a surge of ROP. It is not surprising that India is said to be suffering from the 'third epidemic' of the ROP wave.

In addition to very low birth weight infants, we are now seeing an increasing number of heavier infants developing ROP, a finding not unique to India but seen in other countries in the region. These 'heavy babies' are extremely sick children and have been oxygenated for weeks, often unmonitored. These at-risk heavy infants would be missed if we adhered to Western screening guidelines.¹

We have launched an initiative to create a comprehensive framework to address ROP in India, not just in infancy but with visual rehabilitation through early childhood. The backbone of the initiative is a "Triple T" strategy. First is the Tele-ROP program, which is the focus of this presentation. Second is the Training of peripheral (outreach) ophthalmologists to perform screening and laser treatment. This is done by means of in-situ training sessions followed by a structured ROP fellowship. The third component of the initiative is Teaching the pediatrician (or neonatologist) and the obstetrician about their role in ROP management. We believe it is important to reach the latter because these physicians share a long rapport with the mothers and can prompt them to seek an eye exam once a premature delivery is inevitable.

The Tele-ROP program we have underway validates whether a trained technician can accurately screen for and identify referral-warranted disease. The pre-pilot study has three rural, one semi-urban and one urban center (as a control). In the protocol, the technician acquires the images, and using a simple logic sheet and grading chart makes a 'decision' whether the infant requires follow up, immediate

referral, or no follow up. Simultaneously, the infants are also evaluated by an ROP specialist using the gold standard of indirect ophthalmoscopy as the control measure. The autonomy of the treating ophthalmologist is supreme. In the final study with 10 centres, the images will also be simultaneously graded by a group of Indian and international experts in near "real-time" settings to validate these grades.

We now have data from the first 90 infants. Screening criteria are a birthweight of less than 2 kgs or gestational age less than 34 weeks, consistent with the guidelines described earlier. The mean birth weight varied from 1153-1795g and mean gestational age from 30-34 weeks. As would be expected, the infants managed in the rural hospitals are older and heavier, while the smallest or most premature infants are treated in the urban or semi-urban centers. We see a variably high rate of ROP, from 7.7% to 46%, with the rate increasing as we move from the rural to semi-urban to urban centers where the sicker infants are.

The graph shows how the technicians performed compared to assessment by binocular indirect by an ROP expert (Figure 1). When we look at the more severe forms requiring immediate examination by an ophthalmologist, for example, AP-ROP, zone 1 disease and zone II posterior disease, the technicians assessment correlates 100% with the gold standard. In other words, the technicians correctly identified every case where the infant needed treatment.

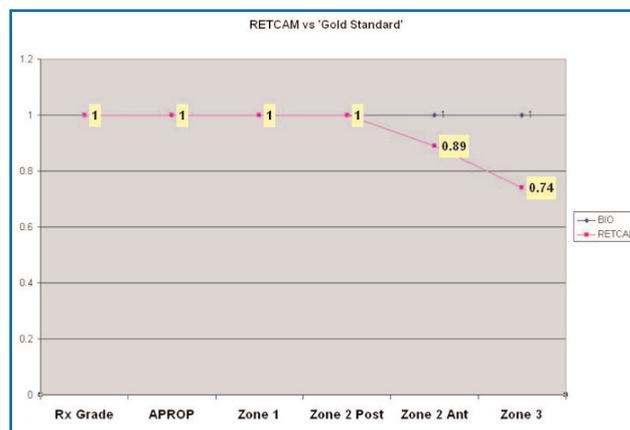


Figure 1. Correlation of ROP screening performed by trained technicians using digital imaging compared to binocular indirect examination by an ophthalmologist. Screening by digital imaging successfully identified all cases of referral-warranted ROP.

In zone II anterior, the number is still very good, 89%. Even in zone III, where we would expect a lower correlation with the BIO, the technicians correctly detected disease in 75% of these cases. This is due to the fact that they are able to image the temporal ora in a good percentage of infants, and we have the images to prove it. So in just a short period of time and with good training, the technicians have become adept “screeners.”

Here is a case of referral-warranted disease that was detected by the technician (**Figure 2**). A 27-week infant, weighing just over 1000g, was correctly diagnosed with referral-warranted disease. The image of the right eye is not processed, but the left eye, after processing, shows flat neovascularization in zone I, suggesting AP-ROP. The technician was able to turn around a seemingly poor quality image and, after processing, to arrive at the right clinical decision. The processing was done by the technician, who used the built-in RetCam software.

We are committed to moving ahead with our triple strategy, including expanding the Tele-ROP program to include internet-based analysis, training peripheral ophthalmologists, neonatologists and gynecologists, and strengthen-

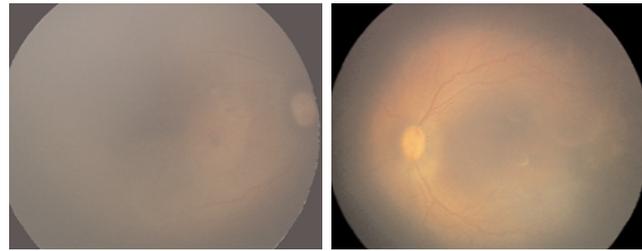


Figure 2. Diagnosis of referral-warranted disease by a trained technician. Image of the right eye (left) is unprocessed. After processing, image of left eye shows flat neovascularization in zone I, suggestive of AP-ROP.

ing our surgical and rehabilitation skills at the tertiary care level. This calls for teamwork. Only with efforts such as these can we hope to effectively address the growing ROP burden and provide excellent care to all of our special patients. **RP**

References

1. Vinekar A, Dogra MR, Sangtam T, Narang A, Gupta A. Retinopathy of prematurity in Asian Indian babies weighing greater than 1250 grams at birth: Ten-year data from a tertiary care center in a developing country. *Indian J Ophthalmol.* 2007; 55:331-336.

Use of the EyeCam in Anterior Segment Imaging: An Alternative to Gonioscopy

BY IKE AHMED, MD, FRCS



An essential part of the diagnosis and management of glaucoma is assessment of the angle by gonioscopy. However, this assessment too often goes unperformed, a finding supported by recent studies from the United States. In fact, it is somewhat alarming to discover how often gonioscopy seems to be omitted from glaucoma examinations.^{1,2} The reasons for this omission may include a lack of appreciation of its importance, the technical difficulty of gonioscopy, the potential for artifact, and lack of standardized documentation.

Some of these challenges may be addressed with the use of the EyeCam. This digital imaging system is already validated for use in pediatric retinal disease (known in that application as the RetCam), where it has been shown to produce high quality, high resolution photographs of the back of the eye. With minor modifications in imaging technique, it is possible to apply this technology to the anterior segment as well.

We have begun evaluating the EyeCam for anterior

segment imaging, particularly as an alternative to gonioscopy. Using a noncontact technique in which coupling gel is applied between the cornea and the lens of the camera, the EyeCam is placed in the appropriate quadrant, where it provides direct visualization of the angle (**Figure 1**).

We've undertaken a study to compare “EyeCam goniography” to the existing gold standard of clinical gonioscopy. The latter was performed by a tertiary care glaucoma specialist to ensure accuracy of diagnosis, while the EyeCam exam was performed by a technician or fellow. This element of the protocol was based on experience with the RetCam in screening for retinopathy of prematurity. It has been shown in that setting that staff without expertise in ophthalmological manipulation, for example, NICU nurses, can readily learn to use the camera and obtain diagnostic quality images.

In our protocol, we looked at angles ranging from zero to grade 4 (Shaffer classification) and sought to determine