



Dr Anand Vinekar

INTERVIEW/ DR ANAND VINEKAR

Training is the Crux of a Telemedicine Program

The idea that the RetCam could be used as a telemedicine tool for retinopathy of prematurity struck Dr Anand Vinekar, 34, when he was pursuing a fellowship in pediatric retina in the US. He returned to Bangalore in 2007 with a sketchy draft and started looking for centers that would buy his idea. Fortunately, Dr Bhujang Shetty of Narayana Nethralaya did. "He supported it right from inception when there was no guarantee of success," says Dr Vinekar, who is now the Chief of Pediatric Vitreoretina Services at Nethralaya. The portable RetCam Shuttle (Clarity) was acquired and within a few months he was on the road to dusty villages and small towns in Karnataka, making need-based changes to the TeleROP program. The changes include training of technicians and graders, and using the iPhone to aid distance screening and diagnosis. So far, Dr Vinekar and his team of technicians have already screened close to 2,000 babies in 18 centers. "The experience in Karnataka will hopefully give us enough teeth to take this to a national level," he says. Incidentally, he talked to *World Report* while en route to an NICU at Mandya in southeast Karnataka.

by Mridula Chettri Singh

Q How did you get interested in ROP and telescreening of children?

I got interested in ROP while studying at St John's Medical College in Bangalore and then in PGI-Chandigarh where I did my MS. In fact, PGI did the first prospective study on ROP in 1995. My thesis was on heavy babies developing ROP. It was a 10-year study and it is the largest series on heavy babies with ROP to be published.

Then, when I was in the US for a fellowship in pediatric retina under Dr Mike Trese, I was exposed to the imaging technology for ROP and utility of screening. Babies from small towns, who have never been

screened, are referred to you when they have stage 4 or 5 ROP. I wanted to take the RetCam Shuttle (portable) to them.

Q What are the guidelines for ROP screening in India?

There are no national guidelines but every country is evolving a consensus. Now in India, there is a consensus to make guidelines from two parallel bodies—National Neonatology Foundation and the AIOS. Both are converging on the same parameter—<2,000 gm. The western standard is <1,500 gm. Babies in Latin America and Asia seem to be developing ROP even if they are born heavier or are more mature. In

other words, a 28-week-old baby born in India is at a higher risk of ROP than one born in the US. And a 34-weeker in India probably has risk but one in US has minimal risk. Nutritional factors really don't play a big role since it is not a deficiency disease.

We haven't understood the reasons but the belief is that it has something to do with environmental and genetic factors. Environmental factors are oxygen, management of sepsis, and maternal anemia, while genetic predisposition is being studied. In a study on Caucasian babies, which was part of my thesis in the US, we found that if the child had a particular type of gene mutation ROP progresses despite your best efforts.

Q Is ROP more of an urban phenomenon?

Part of the belief that it was an urban issue stemmed from the fact that all the publications on ROP have come from urban cities like Delhi, Chennai, Bangalore, and Chandigarh. Also, babies have to survive to get ROP and if the healthcare facilities are not good in rural areas, chances of survival are less. But it doesn't mean that ROP is not there in rural areas. The belief about diabetic retinopathy was similar. But an epidemiological study in Punjab and Haryana showed the incidence of diabetes—and eventually DR—was just as high in rural areas. This led to the evolution of telemedicine in DR. Neonatal care is improving in peripheral areas and that means higher risk of ROP.

Q What are the statistics on incidence of ROP?

Our experience in the past 18-24 months suggests that the incidence of ROP varies between 18.25% and 48% of all babies who are <2,000 gm and <35 weeks. According to published data, the incidence varies between 20% and 54%—20% in the Delhi study and 38% and 47% in Chennai and Chandigarh. They are not comparable studies but roughly 40% is considered national average.

Q How does the TeleROP project work?

We begin by going to an NICU in an area. First, we create an IEC model (information, education, communication) for pediatricians and neonatologists in and around that area. Awareness on ROP is created and we inform them that screening will take place on a certain date so that they can refer all the babies to the NICU on that day. Before we reach the NICU, the eyes are dilated. The images are taken by the technicians and uploaded with the data card (we have a hardware/software template for this purpose). The expert views these images and using a reporting template, keys in the diagnosis and decision details, which immediately goes on to the server, and is accessed by the technician who now knows what to tell the baby's mother.

The role of the neonatologists, pediatricians and gynecologists is creating awareness on ROP. They are the backbone of the program because they are the first ones to know about preterm babies.

Q How did you involve technicians in reading images?

Our first idea was to train someone to take images in peripheral areas and neonatal ICUs, upload the images on Internet, and get an expert in the city to view and diagnose. But soon we realized certain things were not in our hands, like Internet speed or availability of the expert. So, the first big thing we did was train technicians to take images and diagnose the condition live.

Let me cite the example of Mandya where we will screen 25-30 babies. Only 6-7 babies may be admitted to the NICU; the others will be from smaller villages around Mandya. The mothers have to catch the last buses and trains to get home. They can't be told to wait for 2-3 hours because the Internet is down, there is no electricity in the city hospital, or the expert is yet to arrive. So, we have trained technicians to take the image, write down

“ We have trained technicians to take the image, write the diagnosis, and grade the severity of ROP.

the diagnosis, and grade the severity of ROP, which the expert independently validates. The good news is the technician is 100% accurate if a baby requires treatment and when the disease is severe, that is Zone 1 or Aggressive Posterior ROP.

Q Is it feasible for technicians to do the grading?

Yes. They have experience with close to 100,000 images, which is probably the largest anywhere. We have two technicians—Sivakumar and Krishna. One is a trained ophthalmic photographer but the other is an 8th standard dropout. I want to stress on this because (I don't mean to demean his level of education) I want to say that it doesn't take rocket science to read images. If I show a 5th grader a hundred images of Stage II ROP, the 101st time he will tell you what it is. Its all about “image processing”. It is imprinted in your mind. You can train anyone to look at all stages of the disease. They can eventually be made excellent graders. The graders flag a case in either of the three colors—green means the child is fine, orange means follow up and red means immediate referral to a doctor. This system is what we have validated in over 2,000 babies.

This model may not work in the West where there are medico-legal liabilities in getting a non-doctor to be a grader. But this can be a good model for us where we have less than 20 pediatric retinal surgeons, less than 400 retinal surgeons, and 27 million live births of which 8% are born <2,000 gm. That is close to 2 million babies requiring screening. So you have to have technology and trained manpower in place. Training is the crux of a telemedicine program.

Q What do you do if a baby requires treatment?

We treat them where they are. Since we cannot be everywhere (and I don't want that to happen), we have tried to train peripheral ophthalmologists to do the laser treatment. In every center, we identify an ophthalmologist who is interested in taking this up further and we train him. In fact, in north Karnataka, from each district we have an ophthalmologist and an optometrist being trained in identifying ROP and giving laser treatment. This is not a simple task that can be quickly since most of them have no exposure to vitreoretinal work.

Q The project process you detailed was before your tie up with the iPhone.

We could have continued with the store and forward facility of regular mail or server-based uploading but it occurred to me that we could get an SMS that alerts us to check the computer when babies are screened. But then we thought, why not images instead of the SMS? Then we would not have to depend on the variability of the Internet. In any case, we were going to north Karnataka where Internet speeds are slow so we had to device a way out.

We approached i2iTeleSolutions, who had helped us create the templates, to create a software where the iPhone could be used in TeleROP screening. The decision to use the iPhone was a conscious one. One, the graphic images on the phone were better at that point of time and the pinch-and-enlarge option seemed intuitive. If you want to concentrate on just one area of the image, you can easily enlarge that. Two, it is a standardized platform. In other phone brands, the interface differs

from model to model. Three, this we realized serendipitously, is that it also publishes in PDF, which makes sense to us because we want to make a report that will not get tampered with.

Now we have commenced a prospective study using the iPhone for Tele-ROP. This is to validate the images and check the accuracy of viewing it on the smaller screen of the phone. We have roped in our international colleagues for this too. Incidentally, the iPhone ROP project has been named as one of the Top 10 Medical Breakthroughs of 2009 by *India Today*.

Q When did the National Rural Health Mission step in?

Once we knew our model was workable scientifically, we approached the government to expand it in north Karnataka. And fortunately, the NRHM (a program of the Ministry of Health and Family Welfare) has signed up for the first public-private partnership for infant blindness in the country till 2012. The government will fund two comprehensive units, one for north Karnataka and the other for the central belt.

Q You have foreign collaborators as well.

My teachers, including Drs Trese and Capone act as my medical mentors and now with the iPhone they are all excited. I am also getting my colleagues and teachers from around the world involved in the project,



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including my mentor Dr Dogra from Chandigarh. They will get the same image, write their diagnosis independently, and a third party will judge the accuracy. We would compare this with the gold standard of indirect ophthalmoscopy and look to see if we agree. Also, Dr Clare Gilbert from the London School of Hygiene and Tropical Medicine, UK, helped in developing the triage algorithm which we use (color code). Dr Anna Ellis from Canada is helping with the iPhone validation.

Q How do you plan to take the project to the rest of India?

Once, we have the support of the NRHM, it is possible to take it across India. For a program like this, it is important for the government to be involved. The initial cost was written off by Narayana Nethralaya. We didn't know if we would be successful and we were not charging patients in peripheral areas. But for it to expand, we will have to collaborate with the NRHM. Childhood blindness is a large component of eye care for NRHM, and ROP is a preventable blindness. These are important components in a public health initiative that would get any government interested. The numbers are huge, the need to do it is huge. The experience in north Karnataka we hope will give us enough teeth to do it at a national level.

Q What has been the biggest challenge?

The mental barrier... of creating awareness among ophthalmologists to shift focus from cataract; to getting neonatologists to understand that this is a serious enough problem; training technicians with little or no

previous experience; making mothers understand the importance of follow up. All these involve breaking the mental barrier that individuals have and reaching out to their minds and hearts. And you have to reach out in a personal way. We have a dedicated project manager, Praveen Sharma, who has phone numbers of mothers of all children requiring treatment or follow up and he calls them up regularly to build up a rapport with them. In fact one of our biggest successes is when we were able to reduce follow up loss from 60% to 7% in one year in one of the poorest centers.

Also, you have to understand that ROP is not the only problem that affects preterm babies. ROP is like the tsunami, it comes when the baby is 6 weeks and goes off by the third month and could leave the baby blind. But if all goes well, the child is still at risk of a few common conditions like refractive error, cataract, glaucoma, and squint. So when we screen or treat babies for ROP, we talk to the parents that the child needs long-term follow up.

Q You are considerably young. Has your age been a negative factor?

The journey has been good thus far, though we have miles to go. I do have mentors in Chandigarh, USA and UK and they are really happy with our progress. And increasing international acceptance augurs well for the project and Narayana Nethralaya. Countries like Thailand, Peru, Kenya, Ghana, and Bhutan are already showing interest in our TeleROP model. If at all, the age is probably an advantage because it gives you more time and energy to devote yourself to what you want to do and with more passion. ■