Theme of the Issue: Preventing Blindness due to ROP

From Editor's Desk

Retinopathy of Pre-maturity (ROP) has emerged out to be an important contributed sector to the childhood blindness. With the advent of hyperbaric oxygen and opening of a large number of private as well as Govt. NICUs the survival of the prematurely born children (<30 weeks of gestation and 1500 grams of weight at birth) has improved considerably. However, administration of hyperbaric oxygen is wrought with problems of its own and in the eyes, it manifest as retinopathy of prematurity.

Out of 20 million children born annually in India about 3% are pre-maturely born and roughly 10% of them are admitted in NICUs. Approximately 10% those admitted in the NICUs are at the risk of developing ROP. If all the 600,000/-pre-maturely children (3% of total children born) were to be admitted in NICUs all over the country, about 66000 children are at the risk of developing ROP, if left undiagnosed and untreated.

In addition to birth weight and how early a baby is born, other factors contributing to the risk of ROP include anemia, blood transfusion, respiratory distress, breathing difficulties, and the overall health of the infant. With newer technology and methods to monitor the oxygen levels of infants, oxygen use as a risk factor has diminished in importance.

However every low birth weight baby may not be fortunate enough to get the NICUs services. Even if 50% of the low birth weight baby are treated in NICUs. Approximate 33000 children are at the risk of developing ROP. The disease can be mild with no visual defects, or it may become aggressive with new blood vessel formation (neovascularization) which progresses to retinal detachment and blindness.

So here we have this mammoth task of examining peripheral retina of LBW babies being treated at NICUs, to be able to pick up early sign of ROP and treating them with appropriate tools and to keep them under observation till such a period that this child ride of any type of risk of developing any state of ROP. Occurrence of blindness due to ROP is very unfortunate and it has to be cured at all cost, given the number of qualified eye surgeons and availability of the sophisticated diagnostic and therapeutic equipment in this nation.

As per figure given by Clare Gilwert in 2010, there are about 300,000 children (>15 year of age) are blind in India and 10% of them are blind due to ROP. Given the lack of awareness among ophthalmologists and pediatricians about this disease a large number of babies in India reach tertiary eye care centers with advance ROP, and by then the visual prognosis becomes poor.

Incidence of ROP in premature children varies with their birth weight, but for a nursery which saves babies less than 1000 grams birth weight regularly, the incidence would be anywhere between 40 to 60% of 100 premature born less than 1500 grams birth weight 7-8 would go blind unless detected and treated in time. All medical colleges have a nursery, though the level of care and infrastructure available various.

To give a boost to eradication of blindness due to ROP, diagnostic and therapeutic modalities along with awareness of about ROP at all levels have to be augmented substantially and centres of excellence in this regard have to be open all over the nation.

There is a dire necessity to create awareness not only among lay public, but also amongst our ophthalmologists and pediatricians/ neonatologists colleagues. The Regional Institutes of Ophthalmology in India are the backbone of Ophthalmic care and training across India. There is a need to spread awareness about ROP among the pediatricians and ophthalmologists at the RIO’s across India. These RIO’S can later undergo capacity building to and become institutes of ROP teaching and training to spread awareness in their own areas. Hence, there is an urgent need to spread awareness about ROP in the country and motivate ophthalmologists and pediatricians to collaborate and control ROP related blindness in their areas.

In this direction, National Programme for control of blindness, Ministry of Health & Family Welfare has already undertaken new initiatives under 12th Five Year Plan with technical support by apex eye institutions like R.P. Centre, AIIMS including other NGOs hospitals. In collaboration with WHO and AIIMS, 7 workshops (ROP awareness programme) had been emergence of New viable ROP Centre all over the country and, 180 Neonatologists and Ophthalmologists were trained. In another collaboration with Sightsavers in 2008-2010, R.P Centre, AIIMS conducted 12 workshops across India and spread awareness among 650 Ophthalmologists and neonatologists. ROP was included in the 11th Plan and reimbursement was made to the NGOs @Rs. 1000 under the scheme for recurring GIA. Five tertiary centers for ROP have been established in different cities of India.
Retinopathy of Prematurity

Introduction

Retinopathy of Prematurity (ROP) is an important cause of childhood blindness in India. It is important not only in terms of economic burden but its severe social implication, which is very long in terms of blind years. Low birth weight and low gestational age are the two important factors which govern which child will develop ROP and which will not. A very low gestational age again compounds the risk of developing threshold ROP or blinding ROP of a very severe grade.

In our country clinical presentation is very late because of non-awareness amongst ophthalmologists as well as neonatologists. If detected late with advanced ROP, there are very few centers in our country where it can be managed and hence, visual outcomes in advanced ROP are poor. Mushrooming of NICU’s with poor neonatal practices has led to the survival of many more premature babies, but has also led to a huge rise in incidence of ROP. The key is to run viable screening programs to detect and treat ROP on time which will result in excellent visual outcomes and prevent blindness due to ROP.

Risk Factors

The most important risk factors for ROP are prematurity and low birth weight. The following factors also contribute to development of ROP:

- Hyperoxia / Hypoxia
- Hypotension
- Acidosis
- Respiratory distress syndrome / apnea / duration of ventilation
- Sepsis
- Anemia / blood transfusions
- Patent ductus arteriosus
- Phototheraphy

ROP Classification

International Classification of Retinopathy of Prematurity (ICROP) group has divided ROP into 3 Concentric Zones, where each zone is centered on the optic disc since the normal retinal vasculature proceeds outward from the centre of the optic disc towards the ora serrata.
ROP Zones

Zone-I: Circle from centre of disc with radius of twice distance from disc to macula
Zone-II: From nasal edge of zone I to ora nasally and upto equator temporally
Zone-III: From temporal crescent of retina anterior to zone II

The normal growth pattern is labeled as immature and also classified by zone. The retina is called Mature when temporal retinal is vascularized till disc diameter from are serrata. Thus, if ROP involves all clock hours and is circumferential, then it is in zone I-2. If there is no ROP in the 2 nasal-most sectors, then ROP is in Zone III.

ROP Stages

Stage 1: Demarcation Line - Thin but definite structure. Is flat, white, and within plane of the retina and separates a vascular retina interiorly from vascularized retina posteriorly.

Stage 2: Demarcation Ridge - Arises in the region of the demarcation line, has height and width and extends above the plane of the retina.

Stage 3: Extra retinal Fibrovascular Proliferation - Neo-vascularization extends from the ridge into the vitreous and maybe continuous with posterior aspect of the ridge, causing a ragged appearance. Classified as mild, moderate, or severe depending on the extent.

Stage 4: Partial Retinal Detachment - Extra-Foveal (Stage 4A) and foveal (Stage 4B). Concave and circumferentially oriented and tends to increase in height and extending both anteriorly and posteriorly.

Stage 5: Total Retinal Detachment - Funnel shaped total retinal detachment. Usually tractional, classified based on funnel.

Other terminologies

Plus Disease - is an indication of disease activity and is represented by venous dilation and arteriolar tortuosity of the posterior retinal vessels. There is associated iris vascular engorgement, poor papillary dilatation and vitreous haze.

Pre-Plus Disease - represents vascular abnormalities of posterior pole insufficient for diagnosis of plus disease, yet demonstrate more arterial tortuosity and venous dilatation than normal and may proceed to Plus Disease.

Threshold Disease - Zone II, Stage 3 ROP with Plus disease which is >5 contiguous or 8 interrupted clock hours OR Zone I, any stage with plus or stage 3 with no plus. Was an earlier indication for treatment.

Prethreshold Disease - Zone II stage 3, less than 5 contiguous or 8 non contiguous clock hours or Zone II stage 3, 5 contiguous or 8 non contiguous clock hours without plus diseases or Zone I, stage 3 with / without plus disease. Current indications for early treatment.

Aggressive Posterior ROP (AP-ROP) - a severe form of ROP seen in Zone I, Zone 2 posterior with prominent plus disease. There is vascular shunting in retina with circumferential vessels and may progress to Stage 5 rapidly. It is characterized by flat neovascularization, deceptive featureless junction, and ill-defined retinopathy.
ROP Screening

The aim of screening premature children for ROP is to detect all treatable neonates with ROP in time so that they can be treated in time.

When to Screen - The current international guidelines suggest we screen all preterm babies who are:

a) Less than 1500 grams birth weight  
b) Less than or equal to 32 weeks of gestational age

The Indian experts suggest we can screen babies up to 34 weeks gestational age and 1700g birth weight as well, especially since there is a trend of ROP being observed in bigger babies in India and other developing countries. Besides this there is an important third factor in screening - the pediatrician has choice of referring for ROP screening those babies who are at higher risk of developing ROP. This may include babies with:

1. Respiratory Distress syndrome  
2. Sepsis  
3. Multiple blood transfusions  
4. Multiple birth  
5. Apneic Episodes  
6. Intra Ventricular haemorrhage

First Screening The first screening should be ideally scheduled at a time when early stage of ROP is visible and yet the stages are not so advanced that treatment is ineffective. Thus, it is advised to follow the following schedule for ROP screening:

- First Exam at 30/32 weeks of PCA or 4 weeks after birth, whichever is earlier
- Usually no need to examine the child in first 2 weeks after birth
- An easy guideline to remember is to examine all eligible babies at 4 weeks after birth. (30 days rule)

Follow up examination time is decided by the ophthalmologist depending upon zone/stage of ROP. More immature the retina or more severe the ROP, greater the need for early follow up. ROP screening is complete usually by 45 weeks when the retina matures and the ROP regresses spontaneously or after treatment.

How to Screen Many of the babies will still be in the nursery at the scheduled time of 1st exam either requiring oxygen therapy or critical care, so the ideal place for the screening examination is a temperature controlled room like nursery. The screening should be done in the presence of a neonatologist in a NICU/pediatric ward so that any systemic complication can be handled easily.

The pupils are dilated with a mixture of Phenylephrine 2.5% and Tropicamide 0.5% instilled 3 times at 10 mins interval about 1 hour before the scheduled exam. Care should be taken that the drop goes in to the eye and does not spill out. Care should be taken that the baby has not had a fed one hour before the exam. It is important that the parents are explained the nature of the examination and informed consent taken. Screening is performed by indirect ophthalmoscopic examination of the peripheral retina. A pediatric wire speculum is helpful keep the lids apart, while indentation with a pediatric depressor helps stabilize the globe and visualize the periphery.

Typically the examiner observes the anterior segment first to look for tunica vasculosa lente, papillary dilation, media clarity and then the posterior pole for plus disease. Then the periphery is examined in all clock hours to look for the extent of changes. The findings are carefully noted in the ROP record.
Retcam – This is a wide field digital pediatric retinal imaging system which provides real time video display and instant digital image capture. It examines both anterior and posterior segment and allows fast retinal exam with total documentation with few as 5 photos. It is a mobile self contained system for use in the nursery, ICU, operating room and can be used easily by technicians or nurses. It avoids stress and expertise of indirect ophthalmoscopy and indentation and eliminates inter-observer variability. It is a useful teaching tool for residents and parents and useful for telemedicine purposes.

ROP Treatment

The idea is to ensure regression of ROP and prevent its progression to advanced stages when prognosis becomes poor. The Early Treatment for Retinopathy of Prematurity Cooperative Group (ETROP) has given clear guidelines regarding treatment.

Type 1 ROP  Treat
Zone 1, any stage with plus / APROP
Zone 1, stage 3, without plus
Zone 2, stage 2-3 with plus

Type 2 ROP  Follow Up
Zone 1, Stage 1-2 without plus
Zone 2, Stage 3 without plus

Laser Treatment -  All babies indicated for treatment should undergo laser photocoagulation as soon as possible within 24-48 hours. It is necessary to explain the parents clearly about the nature of the disease, its course of progression, need for laser treatment, and possible outcomes. After informed consent, topical proparacaine eye drops are instilled 5-10 minutes before starting the laser treatment. The aim is to perform laser photocoagulation of the avascular retina anterior to ridge using laser indirect laser delivery system. A good laser treatment in a timely manner ensures excellent regression as observed by decrease in plus disease, disappearance of junctional ridge and neovascularization.

AntiVEFG Drugs - Though many reports indicate attempts at primary treatment of ROP with anti-VEGF drugs like Bevacizumab, there are NO long term safety studies, and there are chances that the drug may absorbed systemically affecting normal vascular development in the vital body organs. Some people try it in advancing ROP despite laser treatment as an adjunct, but informed consent is essential. Ethical and medicolegal issues persist. Long term safety studies are needed.

ROP Surgery  For advanced stages IV and V ROP, vitreoretinal surgery is the only option. But the surgical results are poor in stage 5 ROP and surgery facilities are available at very few centres across India.

Summary

Early and prompt management offers very high success rates in ROP. Not only is blindness prevented but the structural and functional outcome is excellent. Laser treatment is the treatment of choice today and has excellent outcomes if performed when indicated on time.

ROP is by large a preventable disease and good nursery practices can prevent ROP to a large extent. The need of the hour is to launch a massive awareness campaign among ophthalmologists, pediatricians and parents of such babies. The future of ROP program in India is dependent on the performance of more viable ROP centers. Together we can help to prevent childhood blindness due to ROP and give a brighter vision to these babies.
References


Prof. (Dr.) Rajvardhan Azad, Dr. Parijat Chandra
Dr. R.P. Centre for Ophthalmic Sciences, AIIMS, New Delhi
Measures being taken by NPCB for early detection & treatment of ROP.

Incentive to NGOs for ROP management under 12th Five Year Plan

An amount of 450 lakh rupees has been allocated for the treatment of 30,000 children suffering from childhood blindness including ROP patients. An NGO who shall provide free diagnosis and treatment of an ROP child shall receive rupees 1500/- for the same.

Opening of new ROP treatment centres all over the Nation.

In addition to five Regional ROP management centres mentioned earlier the NPCB alongwith RAPCOS, AIIMS, New Delhi, plans to open many more centres located preferably in the Regional Institute of Ophthalmology (RIOs), Medical Colleges and major NGO hospitals. The requisite required staff for these centres shall be trained in all the aspects of management of ROP.

The queen Elizabeth Diamond Jubilee Trust (the Trust) is a charitable foundation established in 2012 to mark and celebrate the Diamond Jubilee of Her Majesty The Queen.

As part of the Trust’s avoidable blindness theme, a Retinopathy of Prematurity Programme which will focus on India is being developed. This will support the creation of a national plan for India with funding for a five year programme of work. The objective of this programme is to prevent blindness from the retinopathy of prematurity for babies across India.

A national summit was convened by the trust to provide a forum for all the relevant professional groups, agencies and government department to develop a national strategy for controlling ROP blindness. The summit was attended by 43 delegates from across the country, including representatives from the Ministry of Health, obstetrics, neonatology, nursing, ophthalmology, the international non-government organization who support eye care, and other agencies including Standard Chartered Bank, Vision 2020 India, UNICEF and the UK’s Department of International Development.

Strategies at the nation level

Strategies which could be implemented within the first two years include integrating ROP into government initiatives, developing educational materials for doctors and nurses who care for preterm infants, publishing a special issue of the Indian Journal of Pediatrics on all aspects of ROP and undertaking a national situation analysis, to identify gaps in programme . The National ROP Task Force, which is embedded within the Ministry of Health, will establish working groups to take the work forward, working with implementing partners. During years two to five, support will include developing and learning from model ROP programme in three to five States, implementing strategies to increase public awareness and to support parents, advocacy with government regarding the accreditation of neonatal units, exploration of the role of new technology (e.g. new cameras, an on-line reading centre for image analysis) and operational research.
A Task consisting of the following members has been constituted in the Ministry of Health & Family Welfare to deliberate and recommend necessary measures to take care of Retinopathy of Prematurity (ROP) under the National Programme for Control of Blindness:-

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<th>Sr. No.</th>
<th>Name &amp; Address</th>
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<td>9.</td>
<td>Dr. Anand Vinekar</td>
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Task Force will deliberate and make recommendations to the NPCB, MOHFW on following aspects:-

1. Situations Analysis
   - (1) Current status of infant eye care, especially of premature babies in India.
   - (2) Infrastructure and trained Human Resource (Both Ophthalmic and Non Ophthalmic) in India.
2. Prepare roadmap for infant eye care (ROP) in the country.
3. To monitor ROP child eye care programs in India from time to time.
4. To engage in capacity building for ROP services.
5. Rehabilitation and training of blind children.