The World Health Organization has identified retinopathy of prematurity (ROP) as an emerging cause of childhood blindness in developing and middle-income countries. It is becoming a major public health problem in developing countries such as India and China. ROP blindness in India is increasing due to the highest number of preterm births in the world (3,519,100), suboptimal neonatal care, lack of awareness, screening and treatment programs not in place, and increasing numbers of Neonatal Intensive Care Units and Special New Born Care Units opening all over the country. On the top of it, heavier and more mature preterm infants are developing severe ROP due to variable quality of neonatal services. Due to this, all infants weighing ≤2000 g or ≤34 weeks of gestation need to be screened according to the most recent Indian screening guidelines.

A large number of babies are still presenting late with bilateral, irreversible blindness due to absent or delayed screening. In one study, 86.4% of infants presenting with Stage 5 ROP were never screened. About 74% of infants were picked up by the parents when they noticed that the child was not seeing; an ophthalmologist referred only 25.8% and pediatricians referred none. Awareness about ROP needs to be generated among neonatologists, pediatricians, gynaecologists as well as parents. Telescreening by a non ophthalmologist may offer a viable solution for timely detection of treatable ROP, especially in areas where a trained ophthalmologist is not available. Peripheral retinal ablation with laser is still a gold standard for...

Figure 1: A 1260 g birth weight baby born at 28 weeks of gestation presented with threshold retinopathy of prematurity in zone 1 with severe plus disease in both the eyes. (a) The right eye at presentation. (b) Progression to Stage 4B tractional retinal detachment within 2 weeks despite confluent laser. The baby underwent a 25-gauge lens-sparing vitrectomy. (c) Resolution of the retinal detachment 1 week postoperatively and, (d) a favorable outcome 1 month following the surgery.
the treatment of ROP. However, aggressive posterior ROP and ROP in Zone 1 are less responsive to laser and the disease may progress despite a confluent laser\(^6\) \[Fig. 1a and b\]. Pediatric retinal surgery is required for progression to Stage 4 or 5. Lens-sparing vitrectomy (LSV) is the most exciting recent innovation used for most cases of Stage 4 ROP with a good outcome \[Fig. 1c and d\]. Nearly 74\% of anatomic and 63\% of successful visual outcomes have been reported in Indian population with LSV for Stage 4 ROP.\(^6\)

This issue of the journal carries three articles regarding important aspects of ROP management beyond laser photocoagulation. Gadkari and Deshpande\(^8\) in their study provide an interesting pictorial representation of the differences in the configuration of the vitreoretinal tractional forces in eyes with Stage 4 ROP, which have undergone prior laser- versus treatment-naive cases. The study defines three types of tractional forces – central, peripheral, and lenticular. In the laser-treated eyes, central traction starting posterior to the equator close to the vascular arcades occurred more commonly (76.2\% vs. 23.8\%, respectively; \(P < 0.0001\)) while peripheral traction extending from a peripheral ridge to ora serrata was more common in the untreated eyes (88.2\% vs. 11.76\%, respectively; \(P < 0.0001\)). Notably, the treatment-naive cases required an extensive surgery in the form of lensectomy and vitrectomy while the laser-treated eyes were amenable to the more conservative and visually rehabilitating LSV. Laser treatment may also help to reduce the vascularity and thus chances of intraoperative bleeding during surgery.

Myopia is the most common refractive error associated with ROP. Prematurity in itself is a risk factor for the development of myopia. In addition, disease severity and structural residua contribute to the development of myopia in ROP.\(^9\) Myopia in ROP is believed to be primarily lenticular. The study by Kaur \textit{et al.}\(^{10}\) in this issue supports the lenticular nature of myopia with biometric comparisons. Agarkar \textit{et al.}\(^{11}\) compared myopia in laser-treated eyes with those which underwent LSV for Stage 4 ROP. The study reports that laser-treated eyes had lesser myopia than LSV group till year 1 and after that both the groups had no significant difference. It would have been worthwhile if the biometric parameters and their change over time had also been studied. Nevertheless, there are other reports on the comparison between laser- and LSV-induced myopia. These reports suggest lower myopia in LSV group compared to laser group and include biometric components. The hypothesis suggested is that, although LSV does not significantly alter the axial length, it significantly deepens the anterior chamber to values similar to those seen in full-term myopic infants. Holz\(^{12}\) had reported that the lens position was significantly more posterior in LSV-treated eyes. A crystalline lens that is moved farther toward the retina will have less effective power and therefore reduced myopia.

There are many facets in the management of ROP which are as yet evolving and therefore protocols may also see a major change in the coming times. There are also discrepancies in anatomic and functional outcomes after ROP surgery. The ultimate goal is to prevent the progression of treatable ROP to Stage 4 or 5. This requires concerted efforts for early detection and timely treatment which include LSV in selected cases. Amblyopia, anisometropia, strabismus, and nystagmus are other areas of major concern in these infants which need long-term management strategies. In the future, small-gauge LSV will be performed early before going into Stage 4B and Stage 5. The next decade is likely to be an era of combination therapy for achieving better outcome.

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\textbf{References}

1. Blencowe H, Cousens S, Oestergaard MZ, Chou D, Moller AB, Narwal R, \textit{et al.} National, regional, and worldwide estimates of preterm birth rates in the year 2010 with time trends since 1990 for selected countries: A systematic analysis and implications. Lancet 2012;379:2162-72.
2. 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;55:331-6.
3. Shah PK, Narendran V, Kalpana N. Aggressive posterior retinopathy of prematurity in large preterm babies in South India. Arch Dis Child Fetal Neonatal Ed 2012;97:F371-5.
4. Sanghi G, Dogra MR, Katoch D, Gupta A. Demographic profile of infants with stage 5 retinopathy of prematurity in North India: Implications for screening. Ophthalmic Epidemiol 2011;18:72-4.
5. Vinekar A, Gilbert C, Dogra M, Kurian M, Shaines G, Shetty B, \textit{et al.} The KIDROP model of combining strategies for providing retinopathy of prematurity screening in underserved areas in India using wide-field imaging, tele-medicine, non-physician graders and smart phone reporting. Indian J Ophthalmol 2014;62:41-9.
6. Sanghi G, Dogra MR, Katoch D, Gupta A. Aggressive posterior retinopathy of prematurity: Risk factors for retinal detachment despite confluent laser photocoagulation. Am J Ophthalmol 2013;155:159-64.
7. Bhende P, Gopal L, Sharma T, Verma A, Biswas RK. Functional and anatomical outcomes after primary lens-sparing pars plana vitrectomy for stage 4 retinopathy of prematurity. Indian J Ophthalmol 2009;57:267-71.
8. Gadkari SS, Deshpande M. Variation in the vitreoretinal configuration of Stage 4 retinopathy of prematurity in photocoagulated and treatment naive eyes undergoing vitrectomy. Indian J Ophthalmol 2017;65:846-52.
9. Quinn GE, Dobson V, Kivlin J, Kaufman LM, Repka MX, Reynolds JD, \textit{et al.} Prevalence of myopia between 3 months and 5 1/2 years in preterm infants with and without retinopathy of prematurity. Cryotherapy for retinopathy of prematurity cooperative group. Ophthalmology 1998;105:1292-300.
About the author

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Retinopathy of Prematurity (ROP) is the leading cause of preventable vision loss in children. Appropriate screening and timely management results in impressive success. While centralized facilities can provide optimal care, it is often logistically challenging to screen and treat premature babies that survive in rural neonatal units. KIDROP program in Karnataka eminently bridges this vital gap. It has completed over 100,000 infant retinal imaging sessions since 2007, resulting in over 2000 babies who have been successfully treated.

Here is pre-treatment, posterior Zone 1 Aggressive Posterior ROP (APROP) (left) and successful temporal macula-sparing healed laser scars post-treatment (right), in a baby born in a rural neonatal unit.

This issue of IJO carries three informative articles on ROP and a Guest Editorial to put things in the right perspective.

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