DOI: http://doi.org/10.4038/jcosl.v27i2.47

Research article

Audit of retinopathy of prematurity rate (total and treatment needed) in Teaching Hospital, Kurunegala, Sri Lanka*

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The Journal of the College of Ophthalmologists of Sri Lanka 2021; 27: 44-47

Key words: Retinopathy of prematurity, Anti VEGF treatment bevacizumab, ROP laser treatment, incidence or ROP in Sri Lanka, oxygen supplementation, neurodevelopmental outcome

Retinopathy of prematurity (ROP) is a retinovascular disease of preterm, low birth weight neonates who were treated with oxygen and exposed to other risk factors as well[1, 2]. Since the disease was first described by "Terry" in 1942 its management has greatly evolved to prevent childhood blindness[1, 3, 4]. By about 40 weeks of gestation retinal vasculature has reached the ora serrata, hence no ROP in term infants[1,3,5]. Therefore, ROP is a disease of immature developing retina which has a close relationship to O_2 saturation targets[6]. There are 2 phases in the pathogenesis of ROP[3,6]. Phase I involves oxygen supplementation to ex-utero preterm neonate leading to relative hyperoxygenation of immature peripheral retina (supply> demand) causing attenuation of retinal vascular growth and vaso-obliteration which ends up in retinal avascularity[3]. Whereas in phase II, as O_2 supplementation has weaned off leading to a relative retinal hypo oxygenation (supply< demand) results overexpression of cytokines including VEGF ending up in pathological neovascularization which potentially can end up in blindness if not treated[1,3,4,6,7].

Incidence rates of ROP (all stages) vary widely globally from 4.4%-47%[6], whereas in developed countries it is lower (4.4%-23.3%) while in developing countries it is higher as 14%-47%[6]. The incidence rates of treatment requiring ROP ranges from 1.2% to 16.7%[6]. When the global situation of childhood blindness is considered, as per the literature approximately 50,000 children are blind due to ROP and in USA even with the most advanced of care 600 premature children become blind legally each year[3]. In our region (south Asia), while India having 23.4% of all premature births globally 490,000 are born either at 32 weeks of gestation or less and out of this at least 5,000 require ROP treatment[8].

Sri Lanka lacks national level data on ROP incidence except very few studies done in institution wise to find out the ROP incidence rates. One study done in severely sight impaired children attending schools for the blind in Sri Lanka[9] revealed ROP accounts for major proportion of bilateral avoidable causes of blindness (34.9%)[9]. Another study done in neonatal intensive care unit of Sri Jayawardhanapura General Hospital Sri Lanka from 01.01.2014 to 31.12.2014 revealed institutional incidence of ROP 24.8% (28/113) in neonates screened 34 weeks or less period of gestation and/or 1.5 kg of birth weight while 42.9% of diagnosed ROP (12/28) or 10.7% of total screened (12/113) required ROP treatment[2]. Whereas Abeysekara et al, 2014 reported a higher rate of ROP incidence 37.6% (214 out of all 568 screened neonates in Lady Ridgeway Hospital for Children Sri Lanka) in which 18.7% (106/568) needed ROP treatment[10]. There are 734 average number of deliveries a month in three VOG units in Teaching Hospital Kurunegala and on average there are 190 admissions a month to premature baby unit or neonatal intensive care unit of Teaching Hospital Kurunegala Sri Lanka.

Therefore, the objectives of this audit study are 1). To report the institutional incidence of ROP in Teaching Hospital Kurunegala Sri Lanka 2). To report the rate of treatment required ROP out of total ROP 3) To report other characteristics of screened neonates for ROP.

Method

An audit with retrospective case review of all screened neonates presented to eye unit of Teaching Hospital Kurunegala Sri Lanka from 01.06.2020 to 01.12.2021. Institutional ethical committee approval obtained for

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audit of retrospective case review. ROP screening of all the cases performed by a single consultant vitreoretinal surgeon according to the guidelines[5]. Only the cases who were screened, diagnosed, and discharged from the hospital as to the last assessment date of the study included in the study (Table 1). Those who were identified requiring laser treatment were referred to Sirimavo Bandaranayake Children's Hospital Peradeniya Sri Lanka and after the laser treatment they were sent back for follow-up in teaching hospital Kurunegala Sri Lanka. When indicated intravitreal Bevacizumab 0.625mg/0.025cc was given under aseptic precautions in operating room of Teaching Hospital Kurunegala Sri Lanka. All the data were collated with a data collection tool (Figure 1) and parental consent obtained in consent/information sheet (Figure 2). Descriptive statistics were used for calculation of incidence rates, means and ranges.

Results

Total number of neonates seen in the ROP clinic was 443 and out of that only 314 qualified screening criteria (Table1) were included in the audit. Total ROP screening visits were 1050 from 01.06.2020 to 01.12.2021 while mean number of ROP screening visits to clinic was 3.34 (1-13 range). Mean follow up for ROP screening was 4.30 weeks (0-18 weeks). Mean birth weight was 1621.23 grams (600 grams – 3395 grams) while mean POG at birth was 32.6 weeks (24-37 weeks). Mean POG at referral was 35.85 weeks (28.3-46.3 weeks). Whereas mean POG at discharge was 40.16 weeks (38-52 weeks) [Table 2].

Out of 314 neonates who fulfilled screening criteria 244 (78%) were referred from Kurunegala premature baby unit or neonatal intensive care unit, 49 (16%) from Nikaweratiya Base Hospital, 14 (4%) from Dambadeniya Base Hospital and 7 (2%) from elsewhere hospitals [Figure 1].

Any stage of ROP is seen in 27 out of 314 screened for ROP with a rate of 8.6% in teaching hospital Kurunegala Sri Lanka 14 out of 27 diagnosed ROP needed ROP treatment either with laser alone (n=11) or intravitreal bevacizumab augmented with laser (n=3). Therefore, ROP needed any form of treatment out of total screened was 4.46% (14/314) whereas it was 51.85% (14/27) out of the diagnosed ROP. In a subgroup within the total screened 170 (total 314) were born at either 32 weeks POG or less and/or birth weight 1500 grams or less. 18 out of this 170 were diagnosed having any form of ROP (10.59%) while only 8 needed treatment (4.71%).

Table 1. Inclusion/Exclusion criteria according to national guidelines for screening of ROP by College of Ophthalmologists of Sri Lanka and Perinatal Society of Sri Lanka[5]

Inclusion criteria	*Exclusion criteria*
-POG <32 weeks and/or -Birth weight 1.5 kg or less and/or -Any premature sick child (<37 weeks) with Neonatal sepsis O^2 treatment Blood transfusion / Anaemia Hypothermia Respiratory distress Cyanotic congenital heart disease	-Lost to follow up -Incomplete records -Cases on follow up but not diagnosed having ROP as at the last follow up date of the audit study

Table 2. Summary of characteristics of screened neonates for ROP from 01.06.2020 to 01.12.2021 in Teaching Hospital Kurunegala

Characteristic	*Number*
Total ROP screening visits	1050
Mean number of ROP screening visits	3.34 (1-13)
Mean duration of follow-up	4.30 weeks (0-18 weeks)
Mean birth weight	1621.23 grams (600-3395 grams)
Mean POG at birth	32.6 weeks (28.3-46.3 weeks)
Mean POG at discharge	40.16 weeks (38-52 weeks)

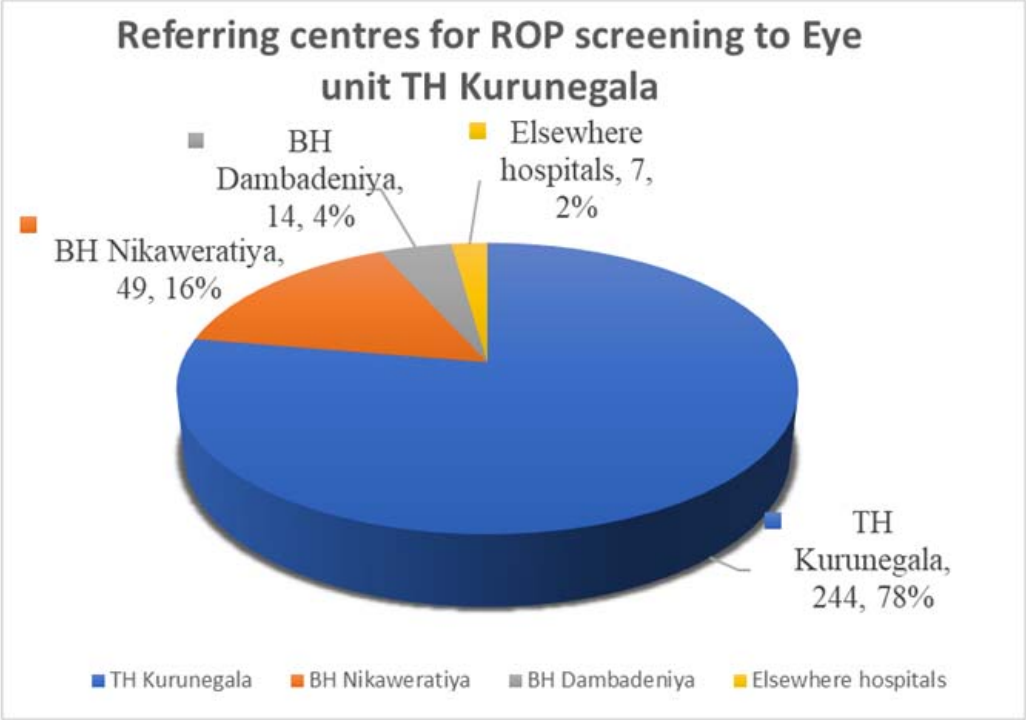

Figure 1. *Referring centres for ROP screening to Eye Unit TH Kurunegala from 01.06.2020 to 01.12.2021 (Total 314).*

Discussion

This is an audit study in Teaching Hospital Kurunegala Sri Lanka strictly adhering to the national screening guidelines of the College of Ophthalmologists of Sri Lanka and Perinatal Society of Sri Lanka[5]. In the published literature incidence of ROP vary widely from 4.4% to 47% which in developed world is 4.4% - 23.3% whereas in developing countries is 14% - 47%[6]. In our audit, institutional rate of ROP is 8.6% for any degree of ROP which is the lowest reported in Sri Lanka up to now in comparison to reported incidence rates of 24.8% in 2014[2] and 37.6% in 2015[10] in Sri Lanka. On the other hand, ROP required treatment was 4.46% (14 out of 314 screened) which is the lowest reported in Sri Lanka compared to reported 10.62% (12/113) by Liyanage et al in 2014 in Sri Jayawardhanapura General Hospital Sri Lanka[2]. In our audit even the most risk group (born at 32 weeks or less

and/or birth weight 1500 grams or less) for the development of ROP is considered, the rate of ROP remained at 10.59% (18/170) while some form of intervention needed in only 4.71% (8/170). Improved neonatal care even with a high turnover of deliveries and neonatal admissions to premature baby unit helped to keep the ROP incidence rate at a lower level close to international standards in Teaching Hospital Kurunegala Sri Lanka. What this audit study highlights are the need for a national level multicentre audit for Retinopathy of Prematurity incidence and its consequences long term and future neurodevelopmental outcomes of those treated with bevacizumab 0.625mg/0.025cc to know the burden of the disease in Sri Lankan population and the impact to the eye care delivery in Sri Lanka. Limitations of this audit study are it was carried out starting on 01.06.2020 (middle of the year) to the end of next year 01.12.2021 for 18 months and mean birthweight was 1621.23 grams (600 - 3395 grams) while mean POG at birth was 32.6 weeks (24-37 weeks) which is outside the principal screening criteria for ROP. Therefore, a well-planned multi centre national audit on ROP starting from 01st of January to 31st December of a year would reveal the real world situation of ROP incidence in Sri Lanka in future.

Conclusion

Improved neonatal care with controlled oxygen supplementation in premature baby care unit of teaching hospital Kurunegala kept both ROP rate and the rate of treatment required ROP at a lower level in this audit going par with the international standards in the prevention of childhood blindness in Teaching Hospital Kurunegala Sri Lanka.

References

1. Hartnett ME. Retinopathy of Prematurity: Evolving Treatment With Anti-Vascular Endothelial Growth Factor. *Am J Ophthalmol*. 2020; **218**: 208-13.
2. Liyanage IKSY, Perera, Weerasekera M. A study on incidence and associated factors of retinopathy of prematurity in a tertiary care setting in Sri Lanka. *Sri Lanka Journal of Child Health* 2017; **46**(4): 322.
3. Wood EH, et al. 80 Years of vision: preventing blindness from retinopathy of prematurity. *Journal of Perinatology* 2021; 41(6): 1216-24.
4. Seery CW, et al. Update on the Use of Anti-VEGF Drugs in the Treatment of Retinopathy of Prematurity. *J Pediatr Ophthalmol Strabismus* 2020; **57**(6): 351-62.
5. College of Ophthalmologists and Perinatal Society of Sri Lanka, *National Guideline for Screening of Retinopathy of Prematurity*. 2019: College of Ophthalmologists of Sri Lanka, 8.
6. Chow SC, et al. The role of anti-vascular endothelial growth factor in treatment of retinopathy of prematurity – a current review. *Eye* 2022. **36**(8): 1532-45.
7. Park L, et al. Intravitreal bevacizumab injection for retinopathy of prematurity and pulmonary hypertension. *Journal of Perinatology* 2022.
8. Gilbert C, et al. Retinopathy of prematurity: Overview and highlights of an initiative to integrate prevention, screening, and management into the public health system in India. *Indian J Ophthalmol*. 2020; **68**(Suppl 1): S103-S7.
9. Gao Z, et al. A survey of severe visual impairment and blindness in children attending thirteen schools for the blind in Sri Lanka. *Ophthalmic Epidemiol* 2011; **18**(1): 36-43.
10. Abeysekara H, Irugalbandara D, Fonseka C, Early presentation of severe ROP in Sri Lanka. *The Journal of College of Ophthalmologists of Sri Lanka* 2015; **21**: 16-21.