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Research Article

Monitoring ROP for Long Term to Defer Lasers to Prevent Laser Induced Myopia

Chhaya Bharti*

MBBS, MS, FTVPEI, Assistant Professor, Shri Shankracharya Institute of Medical Sciences, Bhilai, Chhattisgarh, India

***Corresponding Author:** Chhaya Bharti, MBBS, MS, FTVPEI, Assistant Professor, Shri Shankracharya Institute of Medical Sciences, Bhilai, Chhattisgarh, India.

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Abstract

Objectives: Retrospective study from January 2020- December 2025. 1) Birth related factors and its co-relation with severity of APROP. 2) Co-relate various systemic growth factors and progression of APROP. 3) Evaluate the efficacy and safety of I/V without laser as primary treatment modality in AP-ROP with plus disease. 4) ROP of Zone 2 stage 3, involving 1-2 quadrants can be observed. 5) To defer lasers and prevent laser induced myopia.

Method: 40 eyes were studied. 26 eyes of APROP were seen. 16 eyes had PLUS disease having NVI in 1 or 2 clock hours out of which in 13 eyes I/V 0.025 ml Ranibizumab was injected and in 3 eyes Biosimilar was injected. In 4 eyes of re-injection of Ranibizumab was done twice at the interval of 1 month. In 4 eyes without plus disease biosimilar was injected. Out of the 40 eyes 14 eyes had Zone 2 Stage 3 ROP in 1or 2 clock hours and observation was done. Of these eyes in 4 cases stage 4a zone 3 ROP at temporal sector from 3-5 clock hour was seen after 6 weeks of observation and in 3 eyes stage 4a was seen in zone 2 after 4 weeks of observation so immediately I/V Ranibizumab followed by laser after 3 days was done. FUP was done in post-operative 3rd day, 1 weekly for 1 month, monthly for a year, yearly till date.

Result: Mean birth weight was 1033 g, mean gestational age at birth was 29.2 weeks, mean age at the time of injection was 1.6 months. Out of 40 only 5 eyes were lasered in one eye in which the ridge didn't resolved retinal detachment was seen near temporal ora in 3 clock hours. No re-activation is seen in last 6 years of FUP.

Discussion: Anti-vegf immediately halts neovascularization in moderate to severe ROP also vitreous haemorrhage was seen resolving in 2-3 days so they are useful in progressive or unresponsive rush disease.

No re-activation was seen after a period of 6 years. Myopia of -6D to -2.5D with vision upto 6/12 is seen in patients in which I/V was injected twice. Ridges of 2 clock hours regress and can be seen as elevated vitreous after period of 4-8 weeks but should be closely monitored.

Conclusion: After 5 years of follow up I/V injections are safe and effective modality of therapy for moderate to severe ROP to enhance growth of retina.

Keywords: APROP-Aggressive Posterior Pole Retinopathy of Prematurity; I/V-Intra-Vitreal; FUP-Follow Up

Introduction

Preterm infants are born with immature organs so the retinal vasculature is also not developed fully. During the neonatal period due to various systemic reasons the retinal vasculature gets compromised leading to abnormal growth of vessels hence resulting in retinopathy of prematurity (ROP), that can lead to retinal detachment and blindness [1,2]. Retinopathy of prematurity is one of the most common causes of severe visual impairment and blindness in children worldwide [3]. The number of extremely preterm infants who survive has increased because of advanced neonatal care, resulting in a corresponding rise in cases of severe ROP [4-7]. The prevalence of myopia has been reported to vary with severity of ROP, ranging from 0% to 16% for preterm infants with no ROP [8-10] to 21% to 100% for children whose severe ROP was laser-treated [11]. The prevalence of myopia in children with severe ROP is astonishingly high, especially in those who received peripheral laser-photocoagulation [11-13]. The Early Treatment of Retinopathy of Prematurity (ETROP) study found that, between six and nine months, the prevalence of myopia in infants with severe ROP (and laser-photocoagulation at either high-risk pre-threshold or at threshold) increased from ~60% to ~70%, with little further change in prevalence between 9 months and 3 years. 12 The prevalence of high myopia (‡_5.00 diopters [D]) steadily increased from 17% to 26% at 6 months to 51% at 3 years [12]. However, little is known about the developmental time course of myopia or changes in the magnitude of myopia with age in individuals who were treated by laser photocoagulation for severe ROP. The prevalence of myopia is much lower among preterm children with no/mild ROP.

According to Wang., *et al*. infants with h/o laser in severe ROP are having early and rapidly progressing myopia [14]. Geloneck., *et al*. said that higher myopia is seen in lasered eyes as compared to those who received Bevacizumab for zone 1 ROP [15]. In a study by Banker., *et al*. in 2009 63 eyes with severe AP-ROP I/V Bevacizumab was injected and no re-activation was seen after 1 year [16].

Objectives

It's a retrospective study. The purpose of study is to study

- Birth related factors and its co-relation with severity of APROP.
- Co-relate various systemic growth factors and progression of APROP.
- Evaluate the efficacy and safety of I/V without laser as primary treatment modality in AP-ROP with plus disease.
- ROP of Zone 2 stage 3, involving 1-2 quadrants can be observed.
- To defer lasers and prevent laser induced myopia and to buy time for retinal growth.

Method

Among all the cases of ROP studied from a period January 2020-December 2025 only cases with significant findings were recorded. Total 40 eyes were found to be in the category of APROP or having stage 3 ROP.

26 eyes of APROP were seen. 16 eyes had PLUS disease having NVI in 1 or 2 clock hours out of which in 13 eyes I/V 0.025 ml Ranibizumab was injected and in 3 eyes Biosimilar was injected. In 4 eyes of re-injection of Ranizimab was done twice at the interval of 1 month. 6 eyes were lost to FUP out of which 2 eyes returned after 3 months and were found to be normal. In 4 eyes without plus disease biosimilar was injected.

Out of the 40 eyes 14 eyes had Zone 2 Stage 3 ROP in 1or 2 clock hours and observation was done. Of these eyes in 4 cases stage 4a zone 3 ROP at temporal sector from 3-5 clock hour was seen after 6weeks of observation and in 3 eyes stage 4a was seen in zone 2 after 4 weeks of observation so immediately I/V Ranizumab followed by laser after 3 days was done.

FUP was done in post-operative 3rd day, 1weekly for 1 month, monthly for a year, yearly till date.

Monitoring of systemic, ocular, neonatal and pediatric neurological developments were done.

Type of feeding of the neonate on breast milk or on artificial food was also noted. Age of mother and type of conception was also noted,

Outcome at 1-6 year

FUP of 40 eyes was done among which 4 eyes were lost to FUP in 1 months after I/V injection. 6 eyes got lost to FUP within 1 year. Post-injection regression started after 1 week and if re-activation seen in next 4-6 weeks reinjection was done. No proliferative

activity was seen after 2 months of injection and growth of vessels started progressing after 1 month and reached the temporal ora in up to 8-16 weeks.

Mean birth weight was 1033 g, mean gestational age at birth was 29.2 weeks, mean age at the time of injection was 1.6 months. Of the 40 eyes 28 patients had history of sepsis, 30 patients had h/o of ventilator, 15 patients had blood transfusion 18 patients had h/o plasma transfusion. The mean age of mother was 32 years, 80 % of the babies were born by IVF. The re-admission rate in NICU was 4%.

Resolution of severe proliferative activity in plus disease was seen. There was decrease in venous dilatation and arterial tortuosity. Resolution of NVI started from 3rd day of I/V. Fibro-vascularization disappeared in 10-15 days. Progression of retinal vasculature into peripheral avascular retina was seen after 1 month of I/V injection. Out of 40 only 5 eyes were lasered in one eye in which the ridge didn't resolved retinal detachment was seen near temporal ora in 3 clock hours was seen floating like whisp in vitreous cavity after 8 weeks of laser and no further progression of detachment was seen after a follow up of 5 years. No re-activation is seen in last 6 years of FUP. 2 patients had delayed development with 30 degree esotropia after 1 year but the retina appeared normal.

Discussion

AP-ROP is seen more common in twins born pre-term and low birth weight. Severity of AP-ROP is more in case of sepsis, early pre-terms, low birth weight, longer duration of stay on ventilator and history of many blood transfusion. Babies fed with breast milk grow faster, history of repeated NICU admission is less and require lesser FUP's.

Anti-veg immediately halts neovascularization in moderate to severe ROP also vitreous haemorrhage was seen resolving in 2-3 days so they are useful in progressive or unresponsive rush disease.

Advantageous in rigid pupil, hazy media and in sick babies in whom laser would be difficult. Allows vasculature into previously avascular retina in developing eyes. Prevents complications of laser like visual field loss, high myopia, amblyopia, cataract and anterior segment ischemia. No re-activation was seen after a period of 6 years. Myopia of -6D to -2.5D with vision up to 6/12 is seen in patients in which I/V was injected twice. Ridges of 2 clock hours regress and can be seen as elevated vitreous after period of 4-8 weeks but should be closely monitored.

Shortcomings of this study is sample size was small, duration of study is short, angiography not done and fundus picture not available in every case.

It is possible that severe ROP could had been under-diagnosed, whereas some degree of over-diagnosis may have occurred.

Conclusion

After 5 years of follow up I/V injections are safe and effective modality of therapy for moderate to severe ROP to enhance growth of retina.

Intra-vitreal injections halts proliferation, induces less myopia than lasers, allows retinal vasculature to progress further after a pause of about 3-4 weeks thus decreasing the amount of myopia. Strabismus and amblyopia is lesser than one induced by laser. Decision of lasers can be delayed or avoided, most of the lasers are done due to fear of RD or that patient may be lost to follow up.

Laser induced myopia is preventable by I/V injections, frequent FUP's and long term monitoring.

Not all AP-ROP needs laser and not all ridges land in RD.

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Conflict of Interest

No conflict of interest.

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