A Study to Analyze the Incidence, Risk Factors and the Treatment Outcomes in Retinopathy of Prematurity in a Tertiary Care Setup - Case Study

Mridula V. Amarnath[1*]

[1]*Chinmaya Mission Hospital, Bangalore, Karnataka, India.*

Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

| Short Research Article |

ABSTRACT

Aim: To study the association between the incidence, risk factors and treatment outcomes in retinopathy of prematurity.
Methodology: A longitudinal observational study was done among 70 babies who fulfilled the criteria for ROP screening at a tertiary care center.
Results: Out of the 70 babies that were screened at our hospital, 25 babies developed some stage of ROP with 10 babies developing Type 1 ROP. It was noted that the mean birth weight, mean gestational age and the duration of oxygen therapy was significantly associated with the development of ROP (P= 0.045,P<0.001 and P<0.001 respectively). Of the 25 babies with ROP, zone 3 was involved in 14 babies and zone 2 was involved in 11 babies.7 babies had stage 1,10 had stage 2 and 8 babies had stage 3. Of the 25 babies with ROP, 12 babies required treatment with laser photocoagulation and all the babies showed regression of ROP following treatment.
Conclusion: Birth weight less than 1.70 kg, gestational age <32 weeks and oxygen therapy were associated with the development of ROP and ROP regressed with laser treatment.

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Corresponding author: E-mail: mridulavenugopal.88@gmail.com;

1. INTRODUCTION

In a developing country like India, the incidence of ROP is between 38% to 52.3 % among low birth weight babies. It is estimated that out of 27 million annual births in India, nearly 2 million babies are less than 2000 grams in weight and are more prone to develop retinopathy of prematurity (ROP). However with the recent advances in the neonatal care, the survival rates have increased significantly [1].

ROP is one of the most common causes of blindness in preterm babies [2]. Initially it was considered that oxygen supplementation is an important risk factor for the development of ROP. However ROP can develop without oxygen supplementation and babies who have received oxygen need not necessarily develop ROP [3]. This suggested that there are other risk factors that can lead to ROP such as an early gestational age, low birth weight, apnea, hyperoxia , intraventricular haemorrhage, blood transfusions and maternal bleeding.

Severe cases of retinopathy of prematurity can lead to impaired vision, large refractive error mainly myopia, strabismus and in some cases it can even lead to potential blindness [4]. Treatment for ROP mainly includes cryotherapy, laser photocoagulation and intravitreal injection of anti VGEF. Though each one has its own merits and demerits, they have been found to be effective in the regression of ROP [5].

1.1 Aim

To assess and study the incidence, risk factors and treatment outcomes in ROP.

1.2 Objectives

  a. To assess the incidence of ROP
  b. To find out the various factors that influence ROP.
  c. To assess the outcome after the treatment of ROP.

2. METHODOLOGY

A prospective longitudinal study was done on preterm babies in the neonatal intensive care unit of our hospital.

2.1 Inclusion Criteria

Babies with a birth weight less than 1700 g**,** gestational age <34 weeks at birth, exposure to oxygen, multiple gestations, respiratory distress syndrome , sepsis, intraventricular hemorrhage ,maternal complications like gestational diabetes mellitus, gestational hypertension, ante partum hemorrhage was identified and taken into consideration.

A detailed obstetric history and postnatal course was noted. For fundus evaluation, the pupils were dilated using half strength tropicamide 0.8 % with phenylephrine 5 % eye drops by diluting commercially available drops (AUROMIDE PLUS) with tear substitutes. The fundus examination was done using indirect ophthalmoscope and with+28 D lens by a vitreoretinal specialist.

High risk babies and babies with features of ROP were monitored at weekly intervals. Those babies who required treatment were subjected to laser photocoagulation with an 810 nm diode laser. The follow up of those babies who underwent treatment were done at weekly interval until the ROP regressed or the retina matured.

The statistical analysis was done using the SPSS version 2.0 .The continuous variables were expressed in terms of percentage, mean, standard deviation and analyzed with the chi square test. Pearson's correlation was used to compare the risk factors and its effects on the treatment outcome.

3. RESULTS

Of the 70 preterm babies that were screened, 25(35.7%) babies develop ROP and 45(64.2%)babies did not develop ROP. The mean birth weight of the babies with ROP was 1.64±0.53 kg and in babies without ROP was 1.93±0.47 kg The mean gestational age in babies with ROP was 30.87±2.53 weeks and in babies without ROP it was 34.21± 1.79 weeks. The mean duration of oxygen therapy in babies with ROP was 12 days and in babies without ROP was 3.45 days.

It was noted that there was a significant relationship between the occurrence of ROP and birth weight (0.047), GA (<0.001), duration of oxygen therapy(<0.001), post conceptional age(0.002) and respiratory distress syndrome. However in this study it was seen that the relationship between ROP and the maternal risk factors such as antepartum haemorrhage, GDM, GHTN and multiple pregnancies was not significant. Out of the 70 babies

screened,25(35.7%)developed ROP 4 babies(16%) had stage zone 2 stage 1,2 (8%) had zone 2 stage 2 and 5(24%) had zone 2 stage 3 .3 babies(12%) had zone 3 stage 1,8(32%) had zone 3 stage 3 and 3(12%) babies had zone 3 stage 3 .12 babies had plus disease. There was no case of stage 4 or stage 5 of ROP.

Out of the 25 babies with ROP, 12 babies required intervention with laser photocoagulation. 3 babies in zone 2 stage 1, 2 babies in zone 2 stage 2 and 6 babies in zone 2 stage 3 while 1 baby in zone 3 stage 3. All these 12 babies had plus disease and they showed improvement on follow up. The other 13 babies regressed spontaneously without any intervention.

4. DISCUSSION

In our study it was found out that among the various risk factors that are responsible for ROP, low birth weight was the most common followed by duration of oxygen therapy and low GA. Our study was in correlation with various other studies done previously. Although multiple gestations, GDM, GHTN and interventicular

hemorrhage were considered as risk factors for the development of ROP [6], it was not significant. In a study conducted by Ameen et al, it showed that multiple gestation as an independent risk factor for the development of ROP [7]. In our study it was seen that zone 3 stage 2(32%) was the most common followed by zone 2 stage 3 (24%).This could be attributed to the meticulous screening protocols and our cohort mainly had older babies. In our study it was noticed that zone 2 was the most commonly involved area. Stage 4 or 5 of ROP was not seen as all the cases were screened regularly in a timely fashion.

In our study, out of the 25 babies with ROP, 12 required intervention with laser photocoagulation. It was seen that laser photocoagulated eyes showed a regression of the disease and the results were excellent. Other studies have also shown that laser therapy has a better outcome [8]. A study done by Erick Dan compared the efficacy of laser with anti vascular growth factor as it has been used in severe forms of ROP [9]. It was concluded that Bevacizumab gives good results in stage 3 + ROP in zone 1 but not in

Table 1. Relationship between retinopathy of prematurity and the risk factors

Parameters	With ROP	Without ROP	P
Birth weight	1.64 ±0.53 kg	1.93±0.47kg	0.047
GA	30.87±2.53 weeks	34.21±1.79 weeks	<0.001
Oxygen therapy	12 days	3.45 days	<0.001
Post conceptional age	35.33± 3.54 weeks	39.27±5.66 weeks	0.002

Table 2. Other risk factors associated with retinopathy of prematurity

	With ROP (n=25)	Without ROP (n=45)
Intraventricular hemorrhage	1(4%)	0
Gestational diabetes mellitus	2(8%)	1(2%)
Gestational hypertension	2(8%)	7(15.5%)
Ante partum hemorrhage	2(8%)	2(4.4%)
Twin pregnancy	0	3(6.6%)
No maternal risk factors	16(64%)	27(60%)
Respiratory distress syndrome.	15(62.5%)	11(24.4%)

Table 3. Stages of retinopathy of prematurity

ROP STAGE	N=25
Zone 2 stage 1	4(16%)
Zone 2 stage 2	2(8%)
Zone 2 stage 3	5(24%)
Zone 3 stage1	3(12%)
Zone 3 stage 2	8(32%)
Zone 3 sage 3	3(!2%)

Table 4. Treatment of retinopathy of prematurity with laser photocoagulation

With ROP(n=25)	Treatment (n=12) With Plus disease	No treatment(n=13)
Zone 2 stage 1	3	0
Zone 2 stage 2	2	0
Zone 2 stage 3	6	0
Zone 3 stage1	1	1
Zone 3 stage 2	0	8
Zone 3 sage 3	0	4

zone 2. However in our study we have not compared the treatment outcomes with Bevacizumab as there were no babies with zone 1 ROP [10].

Sine ROP is essentially asymptomatic is the early stages, it is very crucial to do a timely evaluation of the retina in infants that are at a risk of developing ROP to prevent any unseen complications [11].

Limitation of our study was that a small sample size was taken and a single center study.

5. CONCLUSION

The incidence of ROP among preterm babies was 37%. The prominent risk factors for the development of ROP were low birth weight, prematurity, duration of oxygen therapy and respiratory distress syndrome. Among the treatment choice, laser photocoagulation was found to be effective.

CONSENT AND ETHICAL APPROVAL

The study was approved by the ethical committee. Informed consent was taken prior to the study.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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