Original Research Paper

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Ophthalmology

HOSPITAL BASED STUDY ON OCCURRENCE AND OUTCOME OF RETINOPATHY OF PREMATURITY

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ABSTRACT Retinopathy of prematurity, previously known as retrolental fibroplasia is a vasoproliferative disease that affects premature infants. Premature retina when exposed to high oxygen concentration , followed by abrupt withdrawal ,easily undergoes uncontrolled vasculo fibrotic proliferation and eventually results in retinal detachment. It is a leading cause of avoidable childhood blindness worldwide

Aim: 1.To determine the incidence of ROP in neonates of gestational age less than 34 completed weeks; weighing less than 2000g
2.To determine its association with various clinical risk factors.
3. To determine the outcome of positive cases

Materials and Methods: This hospital based, prospective study was done in Regional Institute of Ophthalmology, Guwahati Medical College and Hospital. A total of 168 eyes of 84 babies were evaluated and the results were statistically analysed. The period of study was from June 2020 to May 2021.The results were statistically analysed using fisher's exact test or chi square test for independence. **Results:** In a total of 84 babies(168 eyes) the incidence of ROP was found to be 14.28%. The risk factors which had significant association with ROP in this study are: Prematurity, low birth weight, supplemental oxygen, respiratory distress syndrome. In addition, however, risk factors like gestational diabetes, phototherapy and sepsis also show significant association with ROP. All cases of stage1 resolved spontaneously. Of the three cases in stage 2, 2 resolved spontaneously and one had progressed to stage 3. Another 2 new cases (4 eyes) were in stage 3 on screening.

KEYWORDS : ROP, Oxygen supplementation, Prematurity, respiratory distress syndrome, spontaneous regression, inravitreal anti vegf

INTRODUCTION

Retinopathy of prematurity is a vasoproliferative disease that affects premature infants in which there is abnormal proliferation of the developing blood vessels at the junction of the vascular and peripheral avascular retina. It is a leading cause of avoidable childhood blindness worldwide.

Unmonitored supplemental oxygen in NICU as well as increase in survival of premature babies due to advancements in neonatalogy have been attributed as the main causes of increased cases of ROP in the world.

Staging of the disease: Stage 1 – Demarcation Line: a flat white line within the plane of retina at the junction of the vascular and avascular retina.
Stage 2 – ridge at the junction of the vascular and avascular retina.
Stage 3 – external fibrovascular proliferation
Stage 4 – subtotal retinal detachment
Stage 5: total retinal detachment

MATERIALS AND METHODS

The present study was done in RIO, Guwahati Medical College and Hospital. Screening was done as per Indian guidelines. A total of 168 eyes of 84 babies were evaluated and the results were statistically analysed. The period of study was from June 2020 to May 2021. Ethical clearance was obtained from the hospital ethics committee and informed consent of the parents was also taken.

Inclusion Criteria:

1. All neonates with birth weight <2000 grams
2. All neonates with gestational age <34 weeks
3. All infants born at more than 34 weeks gestational age with associated risk factors like prolonged oxygen requirement; respiratory distress syndrome, sepsis, phototherapy

Pupils were dilated using tropicamide 0.4% and 1.25% phenylephrine thrice or more at an interval of 15 minutes till complete mydriasis and examined by indirect ophthalmoscope. The risk factors were statistically analysed using fisher's exact test or chi square test for independence. The p value <0.05 was considered statistically significant.

RESULTS

Out of 84 babies screened, 12 babies developed ROP in both eyes, making the incidence 14.3%

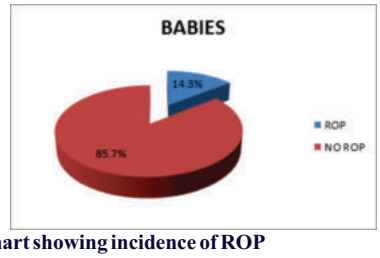


Fig1: Pie chart showing incidence of ROP

During the course of study, 12 cases of ROP were found, i.e. 24 eyes were found to be having ROP

The mean birth weight of all babies who were screened was found to be 1390 grams and that of babies who developed ROP in this study was found to be 1170 grams.

Gestational Age

The mean gestational age in this study was found to be 30.03 weeks. The p value of gestational age was found to be 0.0065 which is highly significant.

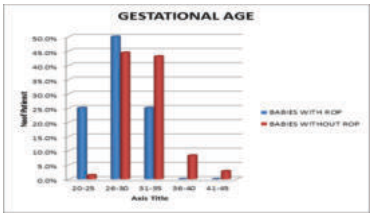


Fig 2:showing distribution of gestational age in babies with ROP

Oxygen Supplementation

TABLE 1: Distribution of oxygen supplementation among screened babies. The two sided P value is 0.0090, considered very significant

O2 SUPPLEMENTATION	TOTAL BABIES	ROP BABIES	PERCENTAGE
GIVEN	48	11	22.91
NOT GIVEN	36	1	2.7

RESPIRATORY DISTRESS SYNDROME (RDS)

TABLE 2: Distribution of RDS among screened babies

RDS	TOTAL BABIES	NUMBER	PERCENTAGE
PRESENT	33	9	27.27
ABSENT	51	3	5.88

The two sided P value is 0.0062, considered very significant
Relative risk ratio is 4.63

HYPERBILIRUBINEMIA

TABLE 3: Distribution of hyperbilirubinemia in the screened babies

HYPERBILIRUBINAEMIA	TOTAL BABIES	ROP BABIES	PERCENTAGE
PRESENT	34	8	23.52
ABSENT	50	4	8

The two sided P value is 0.045, considered marginally significant

PHOTOTHERAPY

TABLE 4: Distribution of phototherapy among screened babies

PHOTOTHERAPY	TOTAL BABIES	ROP BABIES	PERCENTAGE
GIVEN	32	8	25
NOT GIVEN	52	4	7.69

The two sided P value is 0.0277, considered very significant

GESTATIONAL DIABETES

TABLE 5: Distribution of GDM in mothers

GESTATIONAL DIABETES	TOTAL BABIES	ROP BABIES	PERCENTAGE
PRESENT	12	4	33.33
ABSENT	72	8	11.11

P VALUE- 0.0417, considered marginally significant

NEONATAL SEPSIS

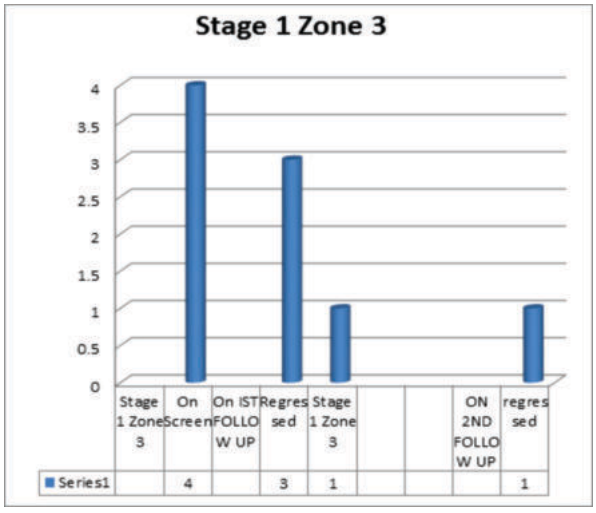
TABLE 6: Distribution of neonatal sepsis among screened babies

SEPSIS	TOTAL BABIES	ROP BABIES	PERCENTAGE
PRESENT	3O	7	23.33
ABSENT	54	5	9.25

The two sided P VALUE is 0.077, considered marginally significant.
RELATIVE RISK ratio is 2.52

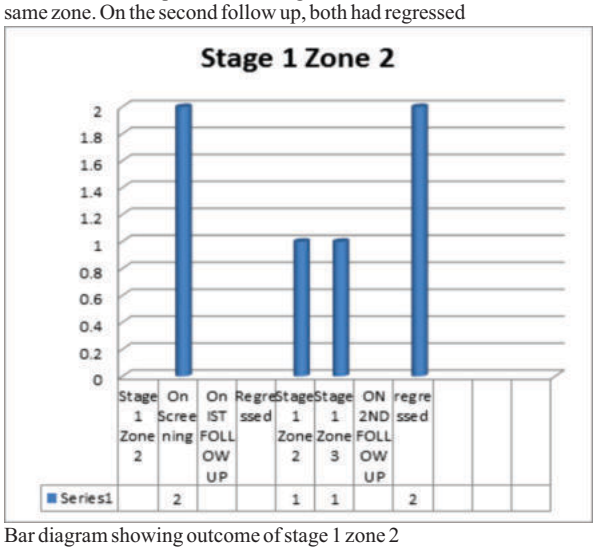
Distribution Of Staging And Outcome

1. STAGE 1 : total 6 cases were found in stage 1. Out of them, 4 cases were in zone 3 and 2 were in zone 2



Bar diagram showing outcome of stage 1 zone 3

STAGE 1 ZONE 2: On screening, 2 cases were found in stage 1 zone 2. On first follow up one was in stage 1 zone 3 and the other was in the same zone. On the second follow up, both had regressed

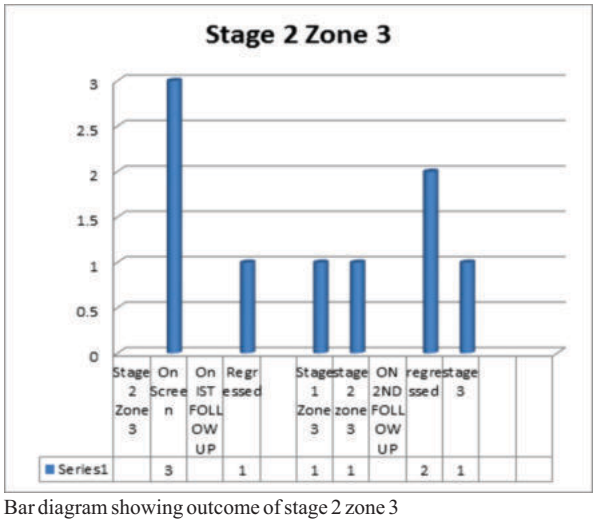


Bar diagram showing outcome of stage 1 zone 2

3.STAGE 2 ZONE 3: On screening, 3 cases were found in stage 2. On first follow up, 1 case had regressed, 1 was in stage 1 zone 3 and one was in same zone. The case progressed to stage 3 in second follow up and was treated with laser photoablation in both eyes following which there was regression. The other two cases regressed spontaneously without any intervention in subsequent follow ups,

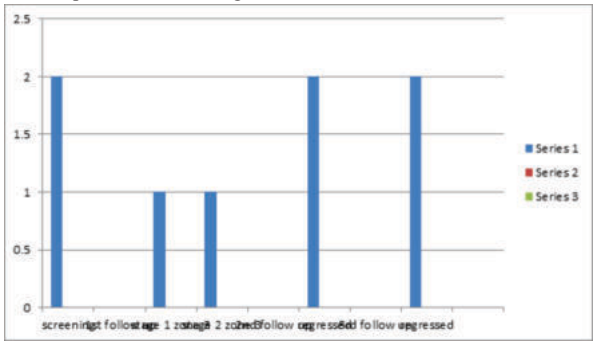
3.STAGE 3: On screening, 2 cases(4 eyes) were found in stage 3 . 2 eyes were treated with confluent laser.1 eye was given laser followed by antivegf and one was given only intravitreal anti vegf.

On first follow up, both cases showed regression to stage 1 zone 3



Bar diagram showing outcome of stage 2 zone 3

In second follow up, both cases showed anatomical regression. In third follow up, both cases had regressed



Bar diagram showing outcome of stage 3

4.Stage 4 and 5: In one case, one eye was in stage 4 (partial retinal detachment) and the other was in stage 5 (total retinal detachment). The case was referred for vitreoretinal surgical correction.

DISCUSSION

In our study, 84 babies fulfilling the inclusion and exclusion criteria were examined.

Incidence of ROP

In the current study, in a total 84 babies(168 eyes) the incidence of ROP was found to be 14.28%

In England, a dataset derived from the National Health Service (NHS) database revealed that 12.6% of babies with birth weight (BW) less than 1500 g had ROP in 2011[1]. This is similar to the finding of our study.

In a study by Dwivedi et al[2] in Madhya Pradesh between 2012-18, the incidence of ROP was found to be 14.2%, which resembles our present study.

Gestational age and birth weight are the two strongest known risk factors for development of ROP. The mean birth weight of all babies who were screened was found to be 1390 grams and that of babies who developed ROP in this study was found to be 1170 grams. The mean gestational age in this study was found to be 30.03 weeks. The p value of gestational age was found to be 0.0065 which is highly significant.

The CRYO-ROP study found that lower birth weight and younger gestational age were strongly associated with developing "threshold" ROP[3]

The risk factors which had significant association with ROP in this study are:

- **Oxygen supplementation:**

In the present study, oxygen supplementation was found to be a very significant risk factor with p value 0.009 and relative risk factor is 2.54
Pioneering works of Campbell and Ashton explored the role of oxygen in the pathogenesis of a disease of the developing vasculature, retinopathy of prematurity[4]

- **Respiratory distress syndrome(RDS)**

In the present study, RDS has been found to have a very significant association with ROP with p value of 0.0062
A study by Park et al[5] in South Korea found RDS to be a significant risk factor for ROP with p value 0.008, which resembles our study

- **Phototherapy**

The present study has found phototherapy to have a significant association with ROP (p value 0.062)

- **Sepsis**

The present study finds sepsis to be a marginally significant risk factor in ROP(p value 0.06).

- **Gestational diabetes mellitus(GDM)**

In the present study gestational diabetes is found to be a significant risk factor with p value 0.04.

- **Fetal distress**

The present study found fetal distress to be only a marginally significant risk factor for ROP

Not many studies have found fetal distress to be a very significant risk factor.

All cases of stage1 resolved spontaneously. Of the three cases in stage 2, 2 resolved spontaneously and one had progressed to stage 3. Another 2 new cases (4 eyes) were in stage 3 on screening.

66.6% cases in stage 3 were treated with confluent laser alone following which all cases showed anatomical regression. 16.6% cases in stage 3 required intravitreal anti vegf after laser and 16.6% where laser was not feasible were treated with antivegf only following which it showed regression in subsequent follow ups.

In present study, 88.8% cases in stage 1 and 2 showed spontaneous regression. Out of total 24 eyes, 16(66.6%) showed spontaneous regression, 25% (6 eyes) required laser photoablation with or without anti vegf and 2 eyes in stage 4 and 5 (8.3%) required surgical correction.

The BEAT-ROP trial[6] elucidated the role of intravitreal ranibizumab in comparison to laser photocoagulation. This study reported a statistically significant reduction in treatment requiring recurrence of ROP in eyes treated with bevacizumab injection as compared with laser ablation.

The CRYO-ROP study[7] recommended treatment when Stage 3 ROP was present in Zone I or II with plus disease in at least 5 consecutive or 8 cumulative clock hours (thereafter termed "Threshold" ROP).

CONCLUSION

The occurrence of Retinopathy of Prematurity in RIO, GMCH in present study (14.28%) is comparable to few studies done worldwide and in India. However, it is slightly lower than few recent studies in India, the reason being smaller sample size due to the prevailing covid 19 pandemic at the time of study.

The mean birth weight of all screened babies was 1390 grams and mean POG was 30.06 weeks which is comparable to other studies.

Significance of risk factors for development of ROP in present study are comparable to other studies, the major risk factors being prematurity, low birth weight, oxygen supplementation and RDS. In addition, however, risk factors like gestational diabetes, phototherapy and sepsis also show significant association with ROP which is reported only by few other studies only.

6 cases were in stage 1- all regressed
3 cases were in stage 2: 2 regressed in first follow up, 1 had progressed to stage 3 and was treated with confluent laser following which it showed regression

2 cases were found in stage 3: both were treated with laser alone (in 2 eyes) as well as laser followed by intravitreal antivegf. Both achieved anatomical correction on subsequent follow ups

In one case one eye was in stage 4 (partial retinal detachment) and the other eye was in stage 5(total retinal detachment). The case was referred for surgical correction.

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