

Clinical Profile of Newborn Babies with Retinopathy of Prematurity in a Tertiary Care Centre

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Abstract:

Introduction: Retinopathy of Prematurity (ROP), a potentially blinding condition, is a proliferative retinopathy, occurring in premature and low birth weight neonate. The life-long impact of the disease on vision remains significant. Hence timely detection of ROP in at-risk infants using available screening tools and institution of appropriate therapy proves inevitable for favorable outcome. Based on this aim of our study is to evaluate the clinical profile of Newborn Babies with Retinopathy of Prematurity in a tertiary care center and also to describe the incidence and risk factors of preterm babies with Retinopathy of Prematurity and their outcome.

Methodology: It was done as cross sectional study at Special Newborn Care Unit (SNCU), Department of Pediatrics, Tirunelveli medical college and hospital, Tirunelveli for a period of 18 months in neonates admitted in Special Newborn Care Unit (SNCU), Department of Pediatrics, Tirunelveli medical college and hospital, Tirunelveli. A total of 510 babies were screened for ROP during the study period. Wide Angle Retinal Imaging device (RetCam) was used for screening. ROP was graded into zones and stages according to the International Classification of ROP.

Results: A total of 48 cases was screened ROP positive. Thus the incidence of ROP in this study is 9.41%. In this study, total number of babies screened positive for zone I was 3 (0.59%), zone II was 11 (2.16%) and zone III was 58 (11.37%). These 72 infants had regular follow up according to AAP guidelines. Out of 58 Zone III positive cases, 24 cases (41.3%) had stage 0 ROP while remaining 34 cases (58.6%) had significant stages of ROP. According to ICROP Classification, babies diagnosed of ROP were categorized into zones and stages. In this study, most of the babies were in Stage 1 (24) and Stage 2 (17). Only 7 babies were in Stage 3.

Conclusion: Prevention of preterm delivery is the first step in the prevention of ROP. To avoid premature births without any risk factors, antenatal care should be enhanced. The key to success is oxygen management and inexpensive measures. After stabilization of the preterm infants, a chart should be given to the primary caretaker who should contain details regarding the present status of the infant and the advised follow-up date. Ophthalmologists and Paediatricians should maintain decorum so that no infant would be missed from the ROP screening.

Keywords: Retinopathy, Prematurity, Infants.

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Introduction

The survival of extreme preterm and extreme low birth weight babies has increased in the recent years due to dramatic improvement in newborn facilities, care and monitoring, which has led to the slow emergence of the diseases among preterm and low birth weight babies.

Retinopathy of Prematurity (ROP), a potentially blinding condition, is a proliferative retinopathy, occurring in premature and low birth weight neonates. This condition was first described by Terry in 1942 as Retrofetal Fibroplasia [1]. Owing to the improvement in the neonatal care standards and increased survival of extreme low birth weight

infants in developing countries like India, an increase in the incidence of ROP is expected.

The reported incidence of ROP in various Western studies has been reported to range from 21 to 65.8% [2]. In India, the incidence of ROP according to a study conducted by Dogra et al was found to range from 38 to 51.9% among low birth weight babies [3]. Incidence can be as high as 80 to 100% when the infant weighs less than 900 grams at birth and with a gestational age less than 25 weeks [4]. In India, about 1.9% of the total live births belong to newborn babies born with gestational age below 34 weeks and with birth weight less than 1400 grams

[5]. This urges the need for an effective screening and treatment strategy for ROP since the increasing incidence of newborn babies who could have been successfully managed medically may turn irreversibly blind. The Retina stands out among other eye tissues because it lacks blood flow until the fourth month of gestation. At this period, vascular complexes that originate from the hyaloid vessels at the optic disc are growing to the periphery. A disruption in the physiologically normal growth of blood vessels causes fibroglial proliferation which ultimately leads to vitreoretinal traction. Even though most of the cases of ROP may resolve spontaneously, appropriate treatment must be instituted to prevent vision loss due to total retinal detachment.

The treatment options include Laser photocoagulation, Cryotherapy or Anti-VEGF (Vascular Endothelial Growth Factor) therapies which can reduce the incidence of blindness by approximately 25%. In late stage ROP, the children often develop poor visual acuity after treatment [6]. The life-long impact of the disease on vision remains significant. Hence timely detection of ROP in at-risk infants using available screening tools and institution of appropriate therapy proves inevitable for favorable outcome. The advancements in neonatal care have led to a rise in the survival rates of preterm neonates. Based on this aim of our study is to evaluate the clinical profile of Newborn Babies with Retinopathy of Prematurity in a tertiary care center and also to describe the incidence and risk factors of preterm babies with Retinopathy of Prematurity and their outcome.

Materials and Methods

The study was started after getting approval from the Tirunelveli Medical College Institutional Research Ethics Committee. It was done as cross sectional study at Special Newborn Care Unit (SNCU), Department of Pediatrics, Tirunelveli medical college and hospital, Tirunelveli for a period of 18 months in neonates admitted in Special Newborn Care Unit (SNCU), Department of Pediatrics, Tirunelveli medical college and hospital, Tirunelveli.

All preterm babies with gestational age less than 34 weeks and birth weight less than 2000 grams admitted in Special Newborn Care Unit (SNCU), Tirunelveli medical College and Hospital, Tirunelveli were included in the study. Preterm babies having ocular congenital anomalies and syndromic anomalies were excluded. Informed Consent was obtained after meticulous explanation of the aim of the study to the parents of the study subjects before including them in the study. A total of 510 babies were screened for ROP during the study period. A complete history including name, age, sex, mode of delivery, gestational age, birth

weight and risk factors such as Respiratory Distress, Oxygen therapy, Use of CPAP, Mechanical Ventilator, Surfactant, Asphyxia, Apnea, Sepsis, Blood Products Transfusion and Phototherapy were noted. After selecting the eligible candidates for screening, the first ROP Screening was done as per AAP screening recommendation guidelines. However, all eligible infants were checked before discharge even though it was early.

Parents were informed prior to the ROP examination and informed consent was obtained. Newborns were breastfed at least an hour before the procedure. Tropicamide 0.5 - 1% with Phenylephrine 2.5% eye drops was used to dilate the pupils. During the screening procedure, infant's vital signs were continuously monitored. Wide Angle Retinal Imaging device (RetCam) was used for screening. ROP was graded into zones and stages according to the International Classification of ROP. Data were presented as mean, standard deviation, frequency and percentage. Categorical variables were compared using Pearson's Chi-square test of independence. Significance was defined by P values less than 0.05. Statistical Analysis was performed using IBM-SPSS version 21.0 software.

Observation and Results

This study was conducted for 18 months as a cross sectional study. During this study, 510 preterm infants were included based on the inclusion and exclusion criteria. The information collected regarding the enrolled infants was noted in the master chart.

Out of 510 infants, 264 were males (51.76%) and 246 were females (48.24%). The gestational age of the study group ranged from 26 weeks to 34 weeks. Most common being 31 to 32 weeks (n=215).

The birth weight varied from 750 grams to 2000 grams. 35% of babies were below 1000gm and rest were between 1-2 kg. 345 babies got delivered by normal vaginal delivery and rest 165 by LSCS.

Among 510 babies in our study 341 had respiratory distress and they required oxygen therapy. CPAP required in 313 (61.3%) of babies. Ventilator required in 89 (17.5%) of babies. Surfactant was administered in 52 (10.2%) of babies.

On clinical examination asphyxia was present in 54 babies; apnea was present in 67 babies. Sepsis was seen in 52 babies. In our study population 38 babies required blood products and 50 required phototherapy.

A total of 48 cases was screened ROP positive. Thus the incidence of ROP in this study is 9.41%. In this study, total number of babies screened positive for zone I was 3 (0.59%), zone II was 11

(2.16%) and zone III was 58 (11.37%). These 72 infants had regular follow up according to AAP guidelines. Out of 58 Zone III positive cases, 24

cases (41.3%) had stage 0 ROP while remaining 34 cases (58.6%) had significant stages of ROP.

Table 1: Zones of ROP

Zones	Zone RE		Zone LE	
	No of cases	Percentage	No of cases	Percentage
Zone I	3	0.59%	3	0.59%
Zone II	11	2.16%	11	2.16%
Zone III	58	11.37%	58	11.37%

According to ICROP Classification, babies diagnosed of ROP were categorised into zones and stages. In this study, most of the babies were in Stage 1 (24) and Stage 2 (17). Only 7 babies were in Stage 3. In stage 4 and stage 5, there were no babies.

Table 2: Stages of ROP

Stages	Stage RE		Stage LE	
	No of cases	Percentage	No of cases	Percentage
Stage 1	24	50%	24	50%
Stage 2	17	35.4%	17	35.4%
Stage 3	7	14.6%	7	14.6%

Total of 48 ROP cases diagnosed, 10 cases had undergone laser therapy. The incidence of laser therapy in this study was found to be 20.80%. Remaining 38 cases (79.20%) had spontaneous regression of ROP.

Screening of ROP was done for all preterm babies with gestational age < 34 weeks and birth weight < 2000 grams. Individual risk factors for the development of ROP had been discussed earlier. Significance was defined by P values less than 0.05. There is no sex predilection for the development of ROP. From the above study, the significant risk factors are found to be lower

gestational age ($p < 0.001$), birth weight ($p < 0.001$), respiratory distress ($p = 0.0004$), oxygen therapy ($p < 0.001$), CPAP ($p < 0.001$), Ventilator ($p < 0.001$), Surfactant ($p = 0.01$), Apnea ($p < 0.001$), Sepsis ($p < 0.001$), Blood transfusion ($p < 0.001$) and Phototherapy ($p = 0.0017$).

Apart from gestational age and birth weight, Respiratory Distress and Oxygen therapy remain the most important risk factors associated with the development of ROP. In this study, gender, mode of delivery and Asphyxia were not statistically significant.

Table 3: Correlation with Different Parameters.

		Outcome		p value
		ROP	No ROP	
Gestational age	<28 weeks	10	56	<0.001
	28 to 30 weeks	25	87	
	31 to 32 weeks	12	203	
	32 to 34 weeks	1	116	
Sex	Male	31	233	0.06
	Female	17	229	
Birth weight	<1000g	13	46	<0.001
	1000g to 1250g	23	98	
	1251g to 1500g	11	134	
	1501g to 1750g	1	161	
	1751g to 2000g	0	23	
MOD	NVD	37	308	0.142
	LSCS	11	154	
Resp Distress	Yes	43	298	0.0004
	No	5	164	
Asphyxia	Yes	8	46	0.15
	No	40	416	
Apnea	Yes	14	53	<0.001
	No	34	409	
Sepsis	Yes	21	31	<0.001
	No	27	431	
CPAP	Yes	44	269	<0.001

	No	4	193	
O ₂ therapy	Yes	44	301	<0.001
	No	4	161	
Ventilator	Yes	23	66	0.00000005
	No	25	396	
Surfactant	Yes	10	42	0.01
	No	38	420	
Blood Products	Yes	23	15	<0.001
	No	25	447	
Phototherapy	Yes	10	40	0.0017
	No	38	422	

Out of 48 ROP positive babies, 10 babies had undergone laser therapy. Comparing the zones of ROP, all the babies in zone I required laser therapy whereas only 7 babies in zone II needed laser therapy. None of the babies in zone III called for laser therapy. Of the 10 babies who required laser therapy, all the seven babies in stage 3 needed laser therapy. Only 3 babies in stage 2 required laser therapy. Babies in stage 1 did not need laser therapy.

Discussion

The screening standards of ROP have been attempted to be tailored to India in the past. All infants with birth weight 1500 grams or gestational age < 34-35 weeks, as well as children exposed to oxygen for more than 30 days and with birth weight 2000 grams or gestational age 37 weeks and high-risk variables, should be screened, according to Jalali et al [7]. The National Neonatology Forum's [8] screening recommendations state that the first screening should take place between 2 and 3 weeks after birth for infants born before 28 weeks Gestational Age or with a Birth Weight under 1200 grams and no later than 4 weeks after birth for those born between 28 and 34 weeks gestational age with a birth weight less than or equal to 2000 grams.

In this study, screening of ROP was done in babies born with gestational age less than 34 weeks and birth weight less than 2000 grams. 510 babies were screened in our study; of which 48 babies were diagnosed to have ROP. Of the 48 babies screened positive for ROP, 10 babies required laser therapy. In a study conducted by Sujit S. Patel et al at a tertiary care centre in Vadodara concluded that the incidence of ROP in 286 infants screened was 24.1% [9]. Based on several studies done in India, Dogra et al at Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh reported that the incidence of ROP in India to be 21.7 to 51.9% of low birth weight babies [3]. Xu et al conducted a study at 2013 with the similar inclusion criteria concluded that the incidence of ROP in India was 17.8% [10].

The incidence of ROP in our study is 9.41% and 20.80% of infants required laser therapy. Therefore the incidence was somewhat lower than the previous

studies. According to Gilbert et al., there may be a relationship between regional variation in incidence rates and the nation's infant mortality rates (IMRs) [11]. These inadvertently represent the socioeconomic degree of development as well as the standard and accessibility of healthcare services. The incidence of ROP is common among male and female infants; there is no sex predilection in our study. The CRYO-ROP study and New York cohort study reported that there was no difference in the gender for the development of ROP [12]. There were conflicting results about the association between mode of delivery and ROP in several studies. Similar to previous studies, there were no relationship between mode of delivery and ROP. Several risk factors were found to be significant for the development of ROP. Respiratory distress and oxygen therapy remain the most important risk factors for the development of ROP. The multicentre study of cryotherapy for ROP (CRYO-ROP) found that lower birth weight and gestational age were strongly associated with ROP. The most frequently identified risk factors for the development of ROP among several studies were the use of supplemental oxygen and prolonged mechanical ventilation.

In a study conducted by Sudha Chaudhari et al concluded that septicemia, apnea and oxygen treatment was risk variables that predisposed to ROP [13]. Maheshwari et al reported that clinical sepsis and blood transfusion as separate risk factors for ROP based on step-wise logistic regression analysis [14]. Several studies investigated the relationship between ROP and surfactant administration. Some of these studies concluded that surfactant therapy can be an independent risk factor for ROP. Numerous studies have demonstrated that, similar to conventional mechanical ventilation, the requirement for nasal CPAP raises the risk of ROP and postpones ROP involution. There has been a hypothesis that phototherapy light might be associated with development of ROP, although this was not yet proven.

In our study, gender, mode of delivery and asphyxia were not found to be statistically significant. Similar to our study, on multivariate

regression analysis, the association between Asphyxia and ROP was not significant in most of the studies. Of the 48 babies diagnosed as ROP, 24 babies (50%) had stage 1 ROP, 17 babies (35.4%) had stage 2 ROP and 7 babies (14.6%) had stage 3 ROP. Regarding the zones of ROP, 3 babies were in zone I (6.25%), 11 babies were in zone II (22.92%) and 34 babies were in zone III (70.83%). Among the diagnosed 48 babies, 38 cases (79.20%) had spontaneous regression of ROP whereas 10 babies (20.80%) required laser therapy. All the 10 babies who underwent laser therapy demonstrated regression of ROP; had satisfactory visual outcome and are currently on long term follow up.

Conclusion

Prevention of preterm delivery is the first step in the prevention of ROP. To avoid premature births without any risk factors, antenatal care should be enhanced. A preterm baby's chances of avoiding retinopathy of prematurity and its problems depend on the neonatal care they receive in their first few days and weeks of life. The key to success is oxygen management and inexpensive measures. The incidence of ROP indicates the quality of care provided. Thus the paediatricians and staff nurses in newborn care unit must be trained to take every possible effort to prevent ROP. Since there are treatment options with better results, timely screening and management are necessary to prevent a poor visual outcome. After stabilization of the preterm infants, a chart should be given to the primary caretaker who should contain details regarding the present status of the infant and the advised follow-up date. Ophthalmologists and Paediatricians should maintain decorum so that no infant would be missed from the ROP screening.

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