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Original Research Article

A hospital based prospective study to determine incidence of retinopathy of prematurity among premature and low birth weight babies admitted to NICU in Rajarajeshwari Medical College and Hospital

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ABSTRACT

Background: ROP is a disorder of the developing retinal blood vessels in the premature infant retina. Objective of present study is to determine the number of babies affected with ROP among the premature and low birth weight babies admitted to neonatal intensive care unit or attending neonatal follow up clinic at RRMCH Hospital during a period of one year.
Methods: This is a prospective observational study conducted in Rajarajeswari Medical College and Hospital Bangalore for 12 months. All eligible babies were screened at Neonatal Intensive Care Unit where temperature is well controlled and the place to handle any emergencies. The pupils were dilated using 2.5% phenylephrine and 0.5% tropicamide eye drops instilled three times into each eye at intervals of 15 minutes about one hour before the scheduled examination.
Results: 100 babies were screened and followed up. The incidence of ROP is 40%. Gestational age (<37weeks) and low birth weight (2500g) are important risk factors for ROP. Our study concluded that ROP is an important complication of prematurity.
Conclusions: The present study highlights the magnitude of the problem due to ROP in a tertiary care centre. Meticulous fundus examination with indirect ophthalmoscopy in all preterm babies with gestational age <37weeks and birth weight ≤2500gms is essential non invasive method for early detection of ROP and its progression.

Keywords: Meticulous, Neonates, Premature, ROP

INTRODUCTION

ROP is a disorder of the developing retinal blood vessels in the premature infant retina. The key pathological change in ROP is peripheral retinal neovascularization.[1] The outcome ranges from minimal sequelae to bilateral irreversible and total blindness.

ROP was first described by Terry in 1942, which was previously known as retrolental fibroplasia. Approximately, 65% of infants with birth weight <1250g and 80% of those with birth weight <1000g will develop some degree of ROP. ROP had been reported to have two epidemics occurred in the past. The first epidemic occurred in 1940-1950s, unmonitored supplemental oxygen was the principal risk factor.[2] The second epidemic occurred during 1970-1980s despite careful

monitoring of oxygen delivery to neonates. It was concluded that this epidemic was due to increased survival of VLBW babies weighing 750-999g.

ROP is becoming a significant problem in developing countries and these countries are experiencing 3rd epidemic due to increased rate of preterm deliveries and NICU for these babies but lack of resources and expertise adequately to monitor blood gases and other variables ultimately leading to complications in these preterm babies.[3] Vision 2020 is a global initiative of the international agency for prevention of blindness where mission is the elimination of avoidable blindness by 2020.[4]

Under this it was estimated that 60,000 children are blind due to ROP globally – Latin America being the region with the largest number. In addition blindness due to ROP is likely to increase in India and China as their economies improve and NICU services expand.[4,5] The global initiative for the elimination of avoidable blindness targets ROP for prevention and treatment in an effort to decrease the prevalence of childhood blindness.

METHODS

A hospital-based, prospective study was conducted in the Department of Pediatrics (Neonatal Division) at rajarajeshwari medical college and Hospital from January 2015 to December 2015.

Source of Data

Premature and/or low birth weight babies born and admitted to neonatal intensive care unit and attending neonatal follow-up clinic at RRMCH over a period of one year.

Inclusion Criteria

- Babies born ≤ 37 weeks of gestation.
- Babies whose birth weight is ≤ 2500 gms.

Exclusion Criteria

- Babies who died before they could be examined or before full vascularisation of retina.
- Babies who did not complete the follow-up for other reasons.
- Babies with other ocular disorders, which interfere with fundus examination and those with other congenital retinal abnormalities.

Informed consent of parents was taken after explaining in detail about methods and procedures involved in the study in their own language. Ethical clearance was obtained. Babies who fulfilled the inclusion criteria were followed up at Neonatal Intensive Care nit on every Monday. Detailed history and risk factors were documented using a structured proforma.

Place of screening

All eligible babies were screened at Neonatal Intensive Care Unit where temperature is well controlled and the place to handle any emergencies.

Gestational age assessment

Gestational age was assessed clinically by using New Ballard score. As well age by dates as per history was also noted.

Preparation of the child

The pupils were dilated using 2.5% phenylephrine and 0.5% tropicamide eye drops instilled three times into each eye at intervals of 15 minutes about one hour before the scheduled examination. Resistance to dilation was noted. Care was taken to wipe off any eye drops with sterile cotton that come out of eyes to cheeks and not to feed the baby immediately before examination as the child might vomit or aspirate.

Instruments used

- Indirect ophthalmoscope with 20D lens.
- Pediatric wire speculum.
- Scleral indentor.

First examination

For babies born before 28 weeks, the first examination was at 4 weeks postnatal age (PNA: age in weeks after birth) or 32 weeks post-conceptional age (PCA: gestational age at birth plus the PNA), whichever was earlier. For this purpose, gestational age was calculated from the last menstrual period, where available, or based on New Ballard score (taken from records). Babies born after 28 weeks of gestational age were seen at two weeks after birth.

Follow up protocol

If no ROP was detected at initial examination, the infants were re-evaluated once every two weeks until vascularisation was complete. If ROP was detected, the examinations were performed weekly for stage 1-2 disease and more frequently for stage 3 disease, till the disease started resolving or progressed to threshold stage. Babies showing evidence of regression were followed up till vascularisation was complete. Babies progressing to threshold stage were referred.

Procedure

Indirect ophthalmoscopy was performed by Pediatric Ophthalmologist well trained in ROP screening using a 20D lens. A pediatric wire speculum was used to keep the eyelids apart and a scleral indenter to visualize the periphery. All aseptic precautions were taken. After

decreasing the room illumination, first the posterior pole was visualized for plus disease. Then the periphery was examined to look for the extent of changes. The head may be turned towards the side being examined to increase the visualization of temporal periphery. Care was taken not to put too much pressure on the globe. During examination, untoward neonatal complications were looked for and managed appropriately. Classification of ROP was done according to the international classification (ICROP). Neonatal and maternal risk factors were entered into a prepared proforma

RESULTS

One year hospital based prospective study to know the correlation of gestational age with ROP was conducted at Rajarajeshwari Medical College and Hospital, Neonatal intensive care unit from January 2015 to December 2015. 100 babies were screened and followed up. The incidence of ROP is 40%. Though male predominance is seen, gender did not significantly influence the incidence of ROP in the present study.

Table 1: Distribution of incidence of ROP of patients studied.

Incidence of ROP	Number of babies	%
Absent	54	60.0
Present	36	40.0
Total	**90**	**100.0**

Mean gestational age of ROP babies by dates 32.17±2.88 weeks and by Ballard score system is 33.08±3.07 weeks. Among ROP babies mean gestational age by dates of babies with stage I disease is 33.33±2.87 weeks, stage II disease is 31.81±2.67 weeks, stage III disease is 30.00±3.46 weeks with a significant p value 0.001**.

Table 2: Distribution of gestational age by dates and incidence of ROP.

Gestational age by DT	All babies (n=90)		Babies with ROP (n=36)	
	No.	%	No.	%
28 weeks	5	5.6	5	13.9
29 weeks	5	5.6	4	11.1
30 weeks	3	3.3	2	5.6
31 weeks	4	4.4	2	5.6
32 weeks	25	27.8	6	16.7
33 weeks	8	8.9	3	8.3
34 weeks	18	20.0	8	22.2
35 weeks	13	14.4	4	11.1
36 weeks	9	10.0	2	5.6

Mean gestational age by Ballard score of babies with stage 1 disease is 34.25±2.06 weeks, stage 2 disease is 32.71±3.21 weeks, stage 3 disease is 31.00±4.35 weeks with a significant p value 0.023*.

Mean birth weight of ROP babies is 1470.28±304.21g. Mean birth weight of non ROP babies is 1698.15±272.22g this is a significant risk factor with a p value of <0.001**.

Table 3: Distribution of gestational age and incidence of ROP.

Gestational age by BS	All babies (n=90)		Babies with ROP (n=36)	
	No.	%	No.	%
28 weeks	6	6.7	6	16.7
29 weeks	0	0.0	0	0.0
30 weeks	12	13.3	9	25.0
31 weeks	0	0.0	0	0.0
32 weeks	21	23.3	4	11.1
33 weeks	0	0.0	0	0.0
34 weeks	29	32.2	11	30.6
35 weeks	1	1.1	0	0.0
36 weeks	18	20.0	5	13.9
38 weeks	3	3.3	1	2.8

Table 4: Gestational age VS severity of ROP.

	Non ROP	Stage I	Stage II	Stage III	P value
GA DT	33.80 ±1.94	33.33 ±2.87	31.81 ±2.67	30.00 ±3.46	0.001**
GA BS	34.28 ±2.18	34.25 ±2.06	32.71 ±3.21	31.00 ±4.35	0.023*

Table 5: ROP VS birth weight.

Variable	ROP				P-value
	Absent (n=54)		Present (n=36)		
	No.	%	No.	%	
Birth weight					
<1000	0	0.0	2	5.6	<0.001**
1000-1500	12	22.2	13	36.1	
1500-2000	35	64.8	19	52.8	
2000-2500	7	12.9	2	5.6	

DISCUSSION

Retinopathy of prematurity is a bilateral vasoproliferative retinopathy affecting preterm or low birth weight babies which sometimes progresses to cause visual impairment or blindness. It is an avoidable cause of childhood blindness and its control is given priority in WHO's VISION 2020 programme.[6] Its secondary prevention, i.e. its early treatment to prevent blindness, requires that qualified ophthalmologists to screen babies at risk soon after birth.

On Univariate analysis gestational age, birth weight, oxygen administration, RDS, surfactant therapy and PDA were found to be significant risk factors. Our study

concluded that ROP is an important complication of prematurity. Meticulous fundus examination with indirect ophthalmoscopy in all preterm babies with gestational age <37weeks and birth weight ≤2500gms is essential non invasive method for early detection of ROP and its progression. Screening should be intensified in the presence of factors like RDS, Surfactant therapy oxygen administration and patent ductus arteriosis. Timely referral of detected ROP cases for early treatment prevents blindness. There is need for the obstetricians, neonatologist and ophthalmologist to work in close cooperation to prevent blindness due to ROP.

Incidence of ROP

The overall incidence of ROP in the present study 40%. Various Indian studies had reported overall incidence ranging from 17.5% to 51.9% and International studies ranging from 10.0% to 45.4%.

Maheshwari et al in 1996 reported overall incidence as 20% and severe ROP as 7%.[7] They studied 66 babies with <35wk or <1500gms. Patil et al reported overall incidence as 17.5% and no severe ROP.[8] They studied 40 babies with <32wk or < 1250gms.

Gupta et al in 2003 reported overall incidence as 21.7% and severe ROP as 5%.[9] They studied 60 babies with ≤ 35wk or ≤1500gms. Dutta et al screened 108 babies of ≤32 wk or ≤1700gms and reported overall incidence as 21%.[10] However, in most instances it is not possible to compare studies, as the inclusion criteria are different. Some centers include only smaller preterm babies, while others have more liberal inclusion criteria.

CONCLUSION

- The present study highlights the magnitude of the problem due to ROP in a tertiary care centre.
- Gestational age (<37 weeks) and low birth weight (2500g) are important risk factors for ROP.
- Meticulous fundus examination with indirect ophthalmoscopy in all preterm babies with gestational age <37 weeks and birth weight ≤2500 gms is essential non-invasive method for early detection of ROP and its progression. Screening should be intensified in the presence of factors like RDS, oxygen administration, PDA, surfactant therapy.
- Timely referral of detected ROP cases for early treatment prevents blindness.

There is need for the obstetricians, neonatologist and ophthalmologist to work in close cooperation to prevent blindness due to ROP.

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