Study of Retinopathy of Prematurity in Suburban Population in India

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Research Article

Abstract: Retinopathy of Prematurity (ROP) is avoidable disease requiring early detection and treatment to prevent blindness as targeted by "Vision 2020 Programme". The cost of screening and managing an infant is much lower than the lost productivity cost on the state exchequer. In developed countries severe ROP is generally limited to extremely preterm infants (weighing less than 1000gms at birth). In developing Countries with suboptimal neonatal care bigger, more mature babies (weighing 1500–2000 gms at birth) are also at risk of severe ROP. This study presents the incidence of ROP and important associated risk factors in the suburban population of India. Study was conducted in a referral centre Krishna Hospital and Medical Research Centre, Karad for a period of 2 years. Incidence of ROP was 18.50% in the 200 infants screened when the study group included infants with Birth weight <2000 gms, Gestational Age < 34 wks and oxygen therapy exposure > 30 days. Screening infants with <_32wks of gestational age and or <1500g birth weight increased the incidence of ROP to 25.8%. Low birth weight and gestational age are the important risk factors for ROP. Apnoea, Respiratory Distress Syndrome and Oxygen therapy are also independent risk factors and depend on the quality of neonatal care provided to the infant. These risk factors increase the incidence and severity of the ROP. National guideline for screening for ROP has to take into account country specific risk and health care conditions.

Introduction

Retinopathy of prematurity (ROP) is a proliferative disorder of the retinal vessels peculiar to premature infants. ROP was first described in 1940 as Retrolental Fibroplasias by Terry. In India there was a phase of rise in incidence of ROP with better screening protocols, improved neonatal care with availability of assisted ventilation services and survival of sicker and smaller neonates. Relatively mature neonates developed ROP due to suboptimal neonatal care. Following this there has been reports of gradual decline in incidence of ROP especially of more severe variety from some centres. We are presenting a study of incidence of ROP from a suburban population in Karad, Maharashtra. The study cases include patients admitted in NICU (neonatal intensive care unit) of Krishna Institute of Medical Sciences Deemed University during period of 2 years. Prematurity is the single most important risk factor responsible for retinopathy of prematurity. However, not all preterm neonates develop ROP. We have studied the relation of apnoea, respiratory distress and oxygen administration as independent risk factors for ROP and have found to be significantly related to ROP. Because of the sequential nature of ROP progression and the proven benefits of timely treatment in reducing the risk of visual loss, effective care now requires that at-risk infants are identified; receive carefully timed retinal examinations by an experienced ophthalmologist and active intervention done whenever needed.

Aims and Objective

To study the incidence of retinopathy of prematurity in babies with gestational age less than or equal to 34 weeks or birth with weight less than or equal to 2000 gms. Some known risk factors related to lung immaturity such as exposure to supplemental oxygen therapy, apnea and respiratory distress have been studied to verify their role in incidence of ROP.

Materials and Methods

It is a Prospective longitudinal cohort study including all preterm babies admitted in NICU of Krishna Hospital and Medical Research Centre, Karad during period of 2 years from September 2011to August 2013. Inclusion criteria for the study were Birth weight less than or equal to 34 weeks or birth with weight less than or equal to 2000 gms and oxygen therapy exposure for more than 30 days. Retinal screening examinations was performed after pupillary dilation using binocular indirect ophthalmoscope. The ophthalmic examination was carried out by a single ophthalmologist. Detailed history included the birth weight, gestational age, the postnatal problems and their management. A special note was made of the oxygen administration. The findings were noted as per the guidelines of International Classification of Retinopathy (ICROP).

Observations

The study was carried out in Krishna Hospital and Medical Research Centre, Karad. 200 babies were screened during the study period of 2 years.

Table 1: ROP Incidence

No Of Babies Screened	ROP	NO ROP
200	37(18.5%)	163(81.5%)

The incidence of ROP in our study was 18.5%

Table 2: Sex Distribution of Screened Babies

Sex	No of babies
Male	108(54%)
Female	92(46%)
Total	200(100%)

Male: Female ratio was 1.17:1

Table 3: Sex Ratio in ROP

Sex	No ROP	ROP	Total
Male	97(48.5%)	24(12%)	121(60.5%)
Female	66(33%)	13(6.5%)	79(39.5%)
Total	163(81.5%)	37(18.5%)	200(100%)

Male: Female=24/13=1.846:1.Iincidence of ROP was more in male infants. But gender is not a significant risk factor for ROP (p value>0.08)

Table 4: Distribution as Per Gestational Age

Gestational age	No of babies
Less than or equal to 28 wks	4(2%)
Less than or equal to30wks	12(6%)
Less than or equal to32wks	38(19%)
Less than or equal to34wks	146(73%)
Total	200(100%)

The mean gestational age of screened infants was 33.24+_1.37 wks. Minimum gestational age included was 28wks and maximum was 34 wks.

Table 5: Relation between ROP and Gestational age

Gestational age	No ROP	ROP
Less than or equal to 28 wks	1(0.61%)	3(8.1%)
Less than or equal to30wks	6(3.68%)	6(16.22%)
Less than or equal to32wks	22(13.50%)	16(43.24%)
Less than or equal to34wks	134(82.21%)	12(32.43%)
Total	163(100%)	37(100%)

Pearson chi-square value=40.876, p value<0.001, Significant.
Incidence of ROP was higher in infants with gestational age less than 32 weeks.

Table 6: Distribution as Per Weight

Weight group (gms)	No of babies
<999	4(2%)
1000-1199	9(4.5%)
1200-1399	40(20%)
1400-1599	77(38.5%)
1600-1799	60(30%)
1800-1999	10(5%)
Total	200(100%)

The mean weight of the infants screened was 1504.90 +_201.18 gms, ranging from minimum of 760gms to a maximum of 1960gms.

Table 7: Relation between ROP and Birth weight

Weight group (gms)	No ROP(%)	ROP(%)	Total
<999	2(50%)	2(50%)	4(100%)
1000-1199	4(44.44%)	5(55.56%)	9(100%)
1200-1399	27(67.5%)	13(32.5%)	40(100%)
1400-1599	68(88.31%)	9(11.69%)	77(100%)
1600-1799	52(86.67%)	8(13.33%)	60(100%)
1800-1999	10(100%)	0	10(100%)
Total	163(81.5%)	37(18.5%)	200(100%)

(Pearson chi-square value=16.373, p value < 0.001 Significant)

Of the total ROP cases detected 20 cases were from birth weight group less than 1400gms. No ROP case found in weight more than 1800gms.

Table 8: Relation between ROP and Apnea

Risk Factor	Total	ROP	No ROP
APNEA	13(6.5%)	7(18.9%)	6(3.7%)
NO APNEA	187(93.5%)	30(81.8%)	157(96.3%)
TOTAL	200(100%)	37(18.5%)	163(81.5%)

(Pearson chi-square value=5.227, p value=.0172, Significant)
Out of 13 babies with history of apnoea 7(53.9%) babies had ROP.

Table 9: Relation between ROP and Respiratory Distress

Risk Factor	Total	ROP	No ROP
Respiratory Distress	39(19.9%)	19(9.5%)	20(10%)
No Respiratory Distress	161(80.5%)	18(9%)	143(71.5%)
Total	200(100%)	37(18.5%)	163(81.5%)

(Pearson chi-square value=26.904, p value<0.001, significant)
Out of 39 babies with history of Respiratory Distress, 19 (51.3%) babies had ROP.

Table 10: Relation between ROP and oxygen administration

Risk Factor	Total	ROP	No ROP
OXYGEN ADMINISTRED	64(32%)	24(64.8%)	40(20%)
OXYGEN NOT ADMINISTRED	136(68%)	13(35.2%)	123(61.5%)
Total	200	37	163

(Pearson chi-square value=20.719, p value<0.0001, significant)
Out of 64 babies who had supplemental oxygen therapy, 24 (64.8%) babies had ROP.

Table 11: Severity of ROP

Stage of ROP	No of cases
1	29(78.37%)
2	2(5.4%)
3	6(16.2%)
Total	37(100%)

Out of 37 ROP cases diagnosed 78.37% infants had stage 1 ROP and stage 2 ROP (5.4%) had minimum incidence.

Table 12: Treatment with Laser or Avastin Injection

Type of Treatment	No of patients
Laser	5(83.13%)
Avastin	1(16.67%)
Total	6(100%)

Out of 6 infants who needed management, laser treatment (83%) was the preferred modality over injection Avastin(17%).

Discussion

Retinopathy of prematurity (ROP) is a retinal disorder peculiar to premature infants potentially leading to blindness and severe visual impairment.

ROP is a 2 phase disease.

Phase I- Premature birth with delayed retinal vascular growth

Phase II- Phase I induced hypoxia releases factors to stimulate new vascular growth

In addition to prematurity, other risks factors affecting the incidence of ROP include: Low birth weight, apnoea, Heart disease, High carbon dioxide (CO2) in the blood, Infection/sepsis, Low blood acidity (pH), Low blood oxygen, Respiratory distress, Bradycardia, Blood Transfusion, Anemia, Multiple Pregnancy and Vit E deficiency.

Incidence of ROP in our study is 18.50%. Screening of babies with <_32wks of gestational age and or <_1500g birth weight in studies, increases the incidence of ROP to 25.8%. Male preterm babies have shown greater incidence than female babies but gender did not prove to be a significant risk factor for ROP (p-value>0.086). In our study incidence of ROP was significantly inversely proportional to both birth weight and gestational age (p<0.0001). Oxygen administration is an independent risk factor for development of ROP (p<0.0001). 37.5% of babies who received oxygen therapy developed ROP in present study. ROP is known to be associated with apnea. 83.8% babies of ROP have history of apnea in present study (p=0.0172). RDS is a significant independent risk factor in present study (p value<0.0001). Of 39 babies who suffered from RDS in present study, 51.3% developed any stage of ROP. Surfactant used to treat

hyaline membrane disease has been shown to reduce the incidence.

Laser and anti VEGF has emerged as a saviour for preventing retinal blindness in premature infants, although longer follow ups of these infants has shown myopia, and astigmatism of varying grades. A longer follow-up of these children is therefore needed to assess the structural and functional outcome of these eyes in both treated and untreated ROP. Late referrals, inadequate laser and progression of ROP despite laser further complicates the situation in our country.[53]

Conclusion

The incidence of ROP in our study is 18.5%. Of the total ROP cases detected 78.4% (29) babies had stage 1ROP, 5.4% (2) had stage 2ROP and 16.2% (6) had stage 3 ROP. 3 (8.1%) babies had zone I vascularisation, 24 (64.9%) babies had zone II vascularisation and 10(27%) babies had zone III vascularisation. Incidence of ROP peaks at 46.29% when we use gestational age <_32 wks or <_1250 g. and incidence was found to be significantly inversely proportional to both birth weight and gestational age ($p<0.001$). Apnea, RDS and oxygen administration are the independent risk factors for ROP ($p<0.05$). Our study highlights the magnitude of problem due to ROP in Indian suburban population. The incidence is likely to increase with the survival of the smaller and younger infants and meticulous management of the sick babies is the primary requirement. . Western screening guidelines may require modifications before application in developing countries. We suggest that ROP screening should be performed for all preterm babies with gestational age less than 34 wks or with birth weight less than 2000gms.

References

1. Terry TL. Extreme prematurity and fibroplastic overgrowth of the persistent vascular sheath behind the crystalline lens. Am J Ophthalmol 1942; 25: 203-204.
2. Reese, A. B., and Payne, F.: Persistence and hyperplasia of the primary vitreous,Am. J. Ophth, 1946., 29: 1-24.
3. Owens, W. C. and Owens, E. U. (1949).Retrolental Fibroplasia In Premature Infants, Iii: The Pathology Of The Disease Amer. J. Ophthal., 32, 1.
4. Mallek And Spohn: Retrolental Fibroplasia Canad M A J dec 1950 vol 62,586-8.
5. Campbell K: Intensive oxygen therapy as a possible cause of retrolental fibroplasia: a clinical approach. Med J Aust 1951; 2: 48–50.
6. Bembridge BA, Coxon M, Houlton ACL, et al. Retrolental fibroplasia a problem of prematurity. Br Med J 1952;i:675-80.
7. Rubinstein K Mechanism Of Retrolental Fibroplasia BrJOphthalmol(1952) 36, 303.
8. Ashton NB, Ward B, Serpell G. Effect of oxygen on developing retinal vessels with particular reference to the problem of retrolental fibroplasia. Br J Ophthalmol 1954; 38: 397-432.
9. Mc Donald A D. Cerebral palsy in children of very low birthweight. Arch Dis Child 1963; 38: 579-88.
10. Procianoy RS, Garcia-Prats JA, Hittner HM, et al. Use of indomethacin and its relationship to retinopathy of prematurity in very low birthweight infants. Arch Dis Child 1980;55:362-4.
11. Keith CG Visual outcome and effect of treatment in stage III developing retrolental fibroplasia Br J Ophthalmol 1982, 66, 446-9.
12. Yu VYH, Hookham DM. Navc JRM. Retrolental fibroplasia controlled study of 4 years experience in a neonatal intensive care unit. Arch Dis Child 1982;57:247-52.
13. Committee for the classification of retinopathy of prematurity. An international classification of retinopathy of prematurity. Arch Ophtalmol 1984;102:1130–4.
14. Reisner SH, Amir J, Shohat M, Krikler R, Nissenkorn Ben-Sira I. Retinopathy of prematurity: incidence and treatment. Arch Dis Child 1985; 60:698-701.
15. Fielder AR, Ng YK, Levene MI. Retinopathy of prematurity:age at onset. Arch Dis Child 1986; 61:774-8.