Original Article

Study of Incidence, Clinical Staging and Risk Factors of Retinopathy of Prematurity in Rural Area

Neeraj Gupta, Narendra P Datti, *Beeregowda Y, Kanthamani Krishnappa, Krishnamurthy D

Department of Ophthalmology, *Department of Pediatrics,

Sri Devaraj Urs Medical College, Tamaka, Kolar

ABSTRACT

Aims: *The aim of our study are twofold (a) Study of incidence and clinical staging of ROP in premature new born infant in rural area. (b) Study of associated risk factors.*

Materials and Methods: *All the babies born between July 2010 to July 2012 at R.L Jalappa Hospital and Research Center, Tamaka Kolar attached to Sri Devaraj Urs Medical College in neonatal care unit of pediatric department were included in the study .*

Results: *A total of 350 children were screened with weight ranging from 2000 gm to 2500gm and gestational age between 30 to 37 weeks. 187(53.4%) of them were diagnosed to have retinopathy of prematurity. Amongst 187 cases (53.4%) which were diagnosed as ROP, 83 (44.4%) of them were having stage 1 ROP (retinopathy of prematurity), 79 (31%) of them were having stage 2 ROP, 22(11.76%) of them were having APROP, Five (1.4%) of them had plus disease and 5(1.4%) of them had preplus disease.*

Conclusion: *Prevention of prematurity, control of preeclampsia, judicious use of ventilation and oxygen therapy are the only promising factors that may reduce the incidence and severity of ROP in the high-risk infant. The analysis of the risk factors for ROP will help us to understand and predict its development in high-risk neonates.*

Keywords: *Cryotherapy, Prematurity, Retinopathy of prematurity, Risk factors.*

INTRODUCTION

Retinopathy of prematurity (ROP) is the single most important cause of childhood blindness. The incidence and severity of disease were closely related with lower birth weights and earlier gestational (post - conceptional age). In India with advancement in neonatal care units, a large number of low-birth weight premature babies are now surviving and are at risk of developing retinopathy of prematurity (ROP). However, there are not enough reports on the incidence of retinopathy of prematurity in rural area in this country. [1] Valuable information regarding the incidence, clinical courses and natural history of retinopathy of prematurity was gleaned from CRYO-ROP trial.[2]

Retinopathy of prematurity is a vasoproliferative disorder occurring predominantly in premature infants. Normal vasculature

Corresponding author:

Dr.Neeraj Gupta

S/O Shri R. D Gupta

155,Doon vihar, Rajpur Road,

Dehradun, Uttarkhand-248001.

Contact number:+919008206305

of the developing retina is interrupted due to some injury. After a latent period there is neovascularization. If this new vessel formation is abnormal, it leads to progressive retinopathy, ultimately resulting in retinal detachment and blindness.[3]

So this study is being undertaken to know the incidence, clinical staging and associated risk factors of retinopathy of prematurity in our setup and also to increase the awareness about this condition.

AIMS AND OBJECTIVES

1. Study of incidence and clinical staging of ROP in premature new born infant in rural area.
2. Study of associated risk factors

MATERIALS AND METHODS

All the babies born between July 2010 to July 2012 at R.L Jalappa Hospital and Research Center, Tamaka Kolar attached to Sri Devaraj Urs Medical College in neonatal care unit of pediatric department were included in the study.

Inclusion criteria: All neonates with birth weight less than or equal to 2500g, with gestational age less than or equal to 37 weeks were included in the study. Any neonate outside these criteria with known risk factors for retinopathy of prematurity (outside delivery, anemia, exchange transfusion and mechanical ventilation) was also included in the study.

Exclusion criteria: All neonates with family history of exudative vitreoretinopathy, features suggestive of Norries disease, congenital hydrocephalus and any baby lost to follow up before the outcome of the disease were excluded from the study.

Three hundred and fifty newborns fulfilling the above criteria were screened. Informed consent was taken from the parents of newborn prior to examination. Pupils were dilated using phenylpherine 2.5% and cyclopentolate 0.5% eye drops. All the babies were first screened by a trained ophthalmologist using indirect ophthalmoscopy and +20D lens with sclera depressor after applying lid speculum and topical anesthesia. Later screening was completed using RETCAM .a portable digital camera and details were documented.

Depending upon the severity, retinopathy of prematurity was classified according to international classification of retinopathy of prematurity.

Early treatment has been shown to improve a baby's chances for normal vision. Treatment started within 72 hours of the eye exam. Some babies with “plus disease” need immediate treatment.

Treatment includes cryotherapy (freezing) to prevent the spread of abnormal blood vessels.

Laser therapy (photocoagulation) is used to prevent complications of advanced ROP. The laser therapy stops the abnormal blood vessels from growing. It can be performed in the nursery using portable equipment. To be effective, it must be done before scarring and detachment occurs.

Surgery is done for detached retina. Surgical procedures continue to improve, but may not result in good vision.

RESULTS

A total of 350 children were screened with

weight ranging from 2000 gm to 2500gm and gestational age between 30 to 37 weeks. 187(53.4%) of them were diagnosed to have retinopathy of prematurity.

Amongst 187 cases (53.4%) which were diagnosed as ROP, 83 (44.4%) of them were having stage 1 ROP, 79 (31%) of them were having stage 2 ROP, 22(11.76%) of them were having APROP, Five (1.4%) of them have plus disease and 5(1.4%) of them have preplus disease. [Table 1]

Among children diagnosed with ROP, 148(79%) of them had risk factors. Pre term baby 53(28%), pregnancy induced hypertension 30(16%), Exchange transfusion 20(11%) and anemia 15(8%) were the common risk factors. [Table.2]

DISCUSSION

Retinopathy of prematurity is the single most important cause of childhood blindness.

ROP is strongly associated with smaller, more immature and sicker infants. The main risk factors for development of ROP are extremely low birth weight (BW <1000 g), extreme prematurity (GA <30 weeks). In rural areas routine evaluation of preterm infants at risk is not being done due to lack of awareness of this potentially blinding problem. With improving neonatal care and increasing survival of low and very low birth weight children, the incidence is on the rise and is expected to increase in near future. The aim of screening premature babies for ROP is to detect all treatable cases with minimal expense of time and resources.

The risk factors for ROP that have been mentioned include pregnancy induced hypertension and toxemia has been known to

Table 1: Different staging of ROP in our study

Staging	STAGE 1	STAGE 2	APROP	PRE PLUS	PLUS
No. of cases	83(44.4%)	53(31%)	22(11.76%)	5(1.4%)	5(1.4%)

Table 2: Risk factors for ROP

Pre term baby	53 (28%)
Pregnancy induced hypertension	30 (16%)
Exchange transfusion	20 (11%)
Anemia	15 (8%)
Sepsis	09 (4.8%)
Patent ductus arteriosis	02 (1%)
Pneumonia	03 (1.5%)
Apnea	04 (2%)
Intra uterine growth retardation	5 (2.67%)
Respiratory distress syndrome	5 (2.67%)

cause placental infarcts and compromised fetal blood flow, hence compromising fetal growth and nutrition and resulting in intra-uterine growth retardation (IUGR). Infants weighing less than 1250 grams have an approximately 50% chance of developing some retinopathy of prematurity. As birth weight decreases, the likelihood of retinopathy of prematurity increases. More than 90% of infants weighing less than 750 grams develop retinopathy of prematurity.

We found that the mean duration of oxygen was significantly higher in the ROP group. Retinal vessel growth begins during 14-15 weeks of gestation starting from the optic nerve and progresses peripherally and anteriorly. The progressing vasculature is accompanied by astrocytes which sense the oxygen level and secrete vascular endothelial growth factor (VEGF) as a response to hypoxia. [8,9,10] Today we know that hypoxia stimulates VEGF production which induces neo-vascularization at the border between vascularized and non-vascularized retina, with in the worst case is ending in retinal detachment. Hyperoxia suppresses VEGF. This can be prevented by Placental Growth Factor -1 (PIGF-1) a ligand specific for VEGF-receptor.

Anemia and oxygen therapy are independent factors which significantly predicted the development of ROP. Since there was a high correlation between anemia and blood transfusions, this effect may be due to anemia *per se* or due to blood transfusions. Anemia may produce tissue hypoxia and hence predispose to ROP and adult blood transfusions could increase oxygen dissociation.

Other risk factors include apnea, sepsis, patent ductus arteriousus, congenital heart disease, intra uterine growth retardation, respiratory distress syndrome and blood transfusions. [7] The risk factors that we found significant were gestation <32 wks, pregnancy induced hypertension oxygen administration, anemia and blood transfusion.

We feel that the incidence of ROP in our study is significant and the risk factors are also similar to those mentioned in other studies. Appropriate screening of high risk babies has been shown to be cost effective. We recommend that first assessment be done as early as 3-4 weeks postnatal age or 34-35 weeks post conceptional age and stress the need to follow up till term gestation. Cryotherapy is a relatively safe procedure which can be done in the neonatal unit itself and should be done when there is threshold disease.

CONCLUSION

Prevention of prematurity, control of preeclampsia, judicious use of ventilation and oxygen therapy are the only promising factors that may reduce the incidence and severity of ROP in the high-risk infant. The analysis of the risk factors for ROP will help us to understand and predict its development in high-risk neonates.

ACKNOWLEDGEMENT

We are thankful to the pediatric department of our college for providing us with the required help.

REFERENCES

1. Charan R, Dogra MR, Gupta A,Narang A. The incidence of retinopathy of prematurity in a

neonatal care unit. Indian J Ophthalmol 1995; 43:123-126.

2. Palmer EA, Flynn JT, Hardy RJ**,** Meza JL, Qiu F, Ingvoldstad DD et al. Incidence and early courses of retinopathy of prematurity. Ophthalmology 1991;98:1628-40.

3. Rekha S, Battu RR. Retinopathy of prematurity: Incidence and risk factors. Indian Pediatr 1996; 33:999-1003.

4. Alme AM, Mulhern ML, Hejkal TW, Meza TL, Qui F, Ingvoldstad DD et al. Outcome of retinopathy of prematurity patients following adoption of revised indications for treatment. BMC Ophthalmology 2008; 8:23. doi:10.1186 /1471-2415-8-23.

5. Schaffer DB , Palmer EA , Plolsky DF, Metz HS, Flynn JT, Tung B et al. Prognostic factors in the natural course of retinopathy of prematurity. Ophthalmology 1993; 100:230-7.

6. Shah VA, Yeo CL,Ling YL. Incidence of risk factors of retinopathy of prematurity among very low birth weight infants in Singapore. Ann Accd Med Singapore 2005; 34:169-78.

7. Chaudhari S,Patwardha V,Vaidya U, Kadam S, Kamat A. Retinopathy of prematurity in a Tertiary care center. Indian Pediatr 2009; 46:219-223.

8. Ferrara N, Houck K, Jakeman L, Leung DW. Molecular and biological properties of the vascular endothelial growth factor family of proteins. Endocr Rev 1992; 13:18-32.

9. Chan-Ling T, Gock B, Stone J. The effect of oxygen on vasoformative cell division. Evidence that 'physiological hypoxia' is the stimulus for normal retinal vasculogenesis. Invest Ophthalmol Vis Sci 1995; 36:1201-14.

10. Pierce EA, Avery RL, Foley ED, Aiello LP, Smith LE. Vascular endothelial growth factor/vascular permeability factor expression in a mouse model of retinal neovascularization. Proc Natl Acad Sci USA 1995; 92:905-9.

Source of Support: Nil Conflict of Interest: Nil