

Prevalence and Predisposing Factors of Retinopathy of Prematurity in Very Low-birth-weight Infants Discharged from NICU

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Abstract

Objective: Retinopathy of prematurity (ROP) is a disease of the eye caused by disorganized growth of retinal blood vessels resulting in scarring and retinal detachment. All preterm babies are at high risk for ROP, and very low birth weight is an additional risk factor. An increased incidence of ROP is expected in Iran because of improved survival of low birth weight and premature babies, and it is obvious that pediatricians and ophthalmologists are concerned about prevention and timely treatment of ROP in these children. To assess the real situation of ROP in our NICU we studied its prevalence and risk factors.

Methods: This was a retrospective analysis of premature infants with birth weight of ≤ 1500 grams or gestational age of ≤ 32 weeks, admitted April 1, 2005 to March 28, 2006, to the Neonatal Intensive Care Unit of Qaem Hospital, Mashhad, Iran. The collected data of 47 cases in this cross-sectional study are analyzed by SPSS (Mann-Whitney, t-Student).

Findings: Forty five infants were included in the study. Out of these, 4 (8.5%) developed ROP (inclusive all stages). Our analysis revealed that low gestational age, sepsis and respiratory distress syndrome were independent predictors for the development of ROP.

Conclusion: The frequency of ROP in our hospital was lower than the range reported in developed countries, and our risk factors were a little different.

Key Words: Neonate; Low birth weight; Retinopathy; Prematurity; ROP

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Introduction

Retinopathy of Prematurity (ROP) is a common cause of blindness in prematurely born babies. It was first described in 1942 by Terry. In 1952 Campbell theorized that ROP was caused by the use of oxygen in premature infants^[1].

ROP occurs in over 16% of all premature births. In babies weighing less than 1,700 grams at birth, over 50% will develop ROP^[2,3]. Incidence of ROP in developed countries is 10–27%, depending on degree of prematurity and birth weight^[4,5]. In developing countries like India the incidence of ROP has been reported at 24–47% among high risk preterm infants^[6,7].

Timing is one of the important factors that make the treatment successful in ROP, because the disease can advance very quickly and delayed treatment often reduces the chances of success^[8].

ROP seems to occur at about 37 to 40 weeks post-conception, without consideration of gestational age at birth^[1].

Improved survival of LBW and premature babies in Iran is expected to increase the incidence of ROP. For this reason we decided to determine the prevalence and risk factors of ROP in Qaem NICU in Mashad.

Subjects and Methods

In this prospective cross-sectional study we collected 47 cases discharged from Qaem Hospital in Mashhad, in north east of Iran from April, 2005 to March 2006. We screened all infants hospitalized in Qaem NICU with a birth weight less than 1500 g or gestational age less than 32 weeks. Infants who were born between 32 and 34 weeks gestational age were examined if they had a course of instability (like sepsis, asphyxia or ventilation). Excluding criteria were lethal congenital anomalies and didn't survive until discharge.

The eyes were examined in the neonatal follow up clinic by an ophthalmologist by

indirect ophthalmoscopy at 4-6 weeks postnatal age. All eye examinations were undertaken by the same ophthalmologist starting at 4-6 weeks after delivery. Follow up examinations were done according to the grade of ROP. In severe ROP (Grade 3, 4) the eyes were examined every week and in mild ROP (Grade 1, 2) every 2-4 weeks until the resolution of ROP (retinal maturation). This was in accordance with the guidelines of the American Academy of Pediatric Ophthalmology^[1,9].

All data collected with questionnaire and analyzed data with SPSS. Mann-Whitney and t-Student tests were used for data analysis.

Findings

Forty seven infants were included in the study. Out of these, 4 (8.5%) infants developed ROP (included all stages of the disease).

The mean weight in ROP group was lesser than without ROP group and this difference was significant ($P=0.03$). Analysis revealed that low gestational age, sepsis and respiratory distress syndrome were independent predictors for the development of ROP. There was a significant relationship between ROP onset and sepsis ($P=0.006$) (Table 1).

We found no significant difference between the groups regarding intra-ventricular hemorrhage (IVH) and ROP, O₂ therapy and ROP, seizure and ROP onset. Prevalence of ROP was not different between the genders and gestational age.

Discussion

Retinopathy of prematurity is a vasoproliferative disorder of the eye affecting premature neonates. Recent data show that there is an alarming increase in the incidence of ROP in developing countries. However, there are few studies on the incidence and risk

Table 1: Relationship between retinopathy of prematurely and Risk factors

Parameters		With ROP‡	Without ROP	P value
Gender	Male	1(25%)	22 (51.2%)	0.6
	Female	3 (75%)	21 (48.8%)	
Birth weight (Kg)		1020 (±302.1)	1242.7 (±186.2)	0.03
Gestational age	26-28(week)	3 (75%)	35 (81/4%)	0.8
	28-30(week)	1(25%)	2(4/7%)	
	30- 2(week)	0	6(14%)	
Sepsis	Yes	2 (50%)	0	0.006
	No	2(50%)	43 (100%)	
O ₂ therapy*	Yes	4 (100%)	22 (51.2%)	0.06
	No	0	21 (48.8%)	
RDS ^Δ	Yes	3 (75%)	13 (30/2%)	0.07
	No	1(25%)	30(698%)	
Seizure	Yes	1(25%)	2 (4/7%)	0.11
	No	3 (75%)	41(95/3%)	
IVH [†]	Yes	2 (50%)	3 (7%)	0.08
	No	2(50%)	40(93%)	

* Oxygen therapy

‡ Retinopathy of prematurely

Δ Respiratory distress syndrome

† Intraventricular hemorrhage

factors of this important morbidity in developing countries.

Early detection and management of ROP can prevent blindness. The prognosis for maintaining functional vision is poor in advanced cases of ROP even with the application of currently available methods of treatment including laser therapy, cryotherapy, scleral buckling and vitrectomy. Unfortunately, in many cases the diagnosis was made at an advanced stage when the condition was not treatable.

Also unfortunately, preterm babies are not routinely examined by ophthalmologists in Iran, despite the common occurrence of multiple risk factors for ROP among hospitalized, preterm infants.

We screened all infants with a birth weight less than or equal to 1500 g or gestational age less than or equal to 32 weeks. Infants who were born between 32 and 34 weeks

gestational age were examined if they had been ill (e.g. with severe respiratory distress syndrome). This protocol is according to the accepted guidelines^[1].

Incidence: In our study, 8.5% infants developed ROP (included all stages of the disease). In one study in Bangladesh, 4.4% children seen in follow-up were diagnosed as ROP^[11,12], and in different studies from India, the incidence of ROP has been reported at 24–47% among high risk preterm infant populations^[6,12]. Incidence of ROP in developed countries is 10–27%, depending on degree of prematurity and birth weight^[4,13]. The incidence rate of ROP in our study is like those found in Bangladesh and lower than in developed countries.

We think it is due to missed patients, because we have no routine screening for ROP. Another reason is that, in developing countries there are not many tertiary care

units (NICU) and some procedures are not performed generally in these countries. For example in Sri Lanka and Lithuania the first reports of ROP have only recently been documented^[14,15]. The third reason is that many of our critical and VLBW patients either die before screening or don't come back for follow up examination.

In Thailand and the Philippines, ROP is not reported in rural areas but causes 15% of visual loss in the cities where better medical facilities are available^[12]. This shows the importance of screening of prematures for ROP during hospitalization. It is predicted that as the survival of premature infants increasingly improves in developing countries, the overall number of children with ROP will increase^[12].

Risk Factors: Although many causative factors have been proposed for ROP, only low birth weight and low gestational age have been consistently associated with the disease, and supplemental oxygen therapy following delivery had a borderline association. A multicenter US study of infants born in 1986–7 reported that of those infants weighing less than 1000 g, 81.6% developed ROP, while 46.9% of those 1000–1250 g developed the disorder^[12]. In another study ROP remains prevalent in very low birth weight infants with as many as 12.5%^[12]. In our analysis the mean birth weight of all cases was 1224 gr.

ROP begins to develop between 32 and 34 weeks after conception, regardless of gestational age at delivery. In the rat model both hypoxia and unstable oxygen levels are important causes of ischemic retinopathy^[12].

In our study there was no significant difference between the two groups (with and without ROP) and O₂ therapy. We think that low number of our cases could explain this finding.

Most epidemiological studies of ROP do not find a sex imbalance. Interestingly, two studies have reported a skewed sex ratio in ROP, with twice the number of male infants affected^[11]. In our study the prevalence of ROP was not different between the two genders.

In our study there was a significant relationship between ROP onset and sepsis.

There was no significant difference between groups regarding IVH and ROP, and seizure and ROP onset. The results of another study in Iran indicated a benefit of earlier intervention for both visual acuity and structural outcome^[13], although rate of complications such as apnea, bradycardia, or intubation following earlier treatment are a little high^[13].

As a limitation of the study we could not screen all patients, as we lost some of them out of sight after discharge from NICU and this could account for the remarkably low incidence of ROP in our patients. We suggest another study with a large number of cases.

Conclusion

The frequency of ROP in this study was lower than the range reported in other studies in developing countries, and our risk factors were a little different. In our study, only low birth weight, sepsis and low gestational age have been consistently associated with the disease.

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