Rate of and Risk Factors Associated with Retinopathy of Prematurity: A Prospective Study from Kuwait

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Key Words

Retinopathy of prematurity · Low birth weight · Cryotherapy

Abstract

Objective: To determine the rate of retinopathy of prematurity (ROP) among a population of preterm infants in Kuwait, and to review the risk factors associated with the disease.

Methodology: A prospective cohort study of all preterm infants of less than 2,000 g birth weight and/or 36 weeks gestational age who were screened for ROP during 1995 at the neonatal unit of the Maternity Hospital in Kuwait. The rate of and some of the possible risk factors associated with the disease were determined. **Results:** A total of 130 babies were screened of which 59 (45.4%) developed some stage of ROP. The frequency of blindness was 3 (2.3%). Low birth weight, oxygen therapy, patent ductus arteriosus, intraventricular hemorrhage and blood transfusion were the risk factors found to be associated with the disease. However, with logis-

tic regression analysis, only low birth weight and oxygen were independently associated with ROP. **Conclusion:** The rate of ROP in our unit is not different from that of the other centers, and low birth weight and oxygen therapy are the main risk factors associated with the disease.

Introduction

Retinopathy of prematurity (ROP) is one of the important causes of blindness and impaired vision among children [2–4, 20]. With rapid advances in the field of neonatology more extremely premature babies are surviving possibly with an increased risk of chronic illnesses including ROP. The incidence of ROP varies in different countries but there are no published figures for Kuwait. Identification of risk factors for ROP is an important task for neonatologists and different studies have identified different risk factors [5–11, 13, 14, 18, 23].

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Table 1. Frequency of ROP stages

	Right eye		Left eye	
	n	%	n	%
Stage 1	24	18.5	24	18.5
Stage 2	15	11.5	16	12.3
Stage 3	18	13.8	15	11.5
Stage 4	1	0.8	0	
Plus disease	2	1.5	2	1.5

We present here the first report of the incidence of ROP in a large cohort of newborn babies in a large center in Kuwait, and identify the important risk factors.

Patients and Methods

Routine eye examination of preterm babies was first introduced in a systematic manner in Kuwait in 1995. Our neonatal center at the Maternity Hospital, Kuwait is the largest center in the country conducting around 13,000 deliveries each year. We included all babies admitted to the unit during the year of 1995 who were less than 2,000 g birth weight and or less than or equal to 36 weeks gestational age.

Ophthalmic examination was performed by indirect ophthalmoscopy. The pupils were dilated using 2.5% phenylephrine and 0.5% tropicamide eye drops instilled into each eye 3 times at intervals of 15 min prior to examination [22]. For extremely premature babies, we followed the protocol of examining them at 4 weeks of postnatal age and/or at 32 weeks corrected age, and those above 32 weeks were examined in the 1st week of birth. If no ROP was detected at the initial examination, the infants were reevaluated once every 2 weeks until discharge and then every 4 weeks until 3 months of corrected age. If ROP was detected, the examination were performed every week until the disease started to regress. The changes of ROP were classified according to the International Classification of Retinopathy of Prematurity [4, 5]. Prospective collection of the data was done for each patient, and the following risk factors were examined; birth weight, gestational age, oxygen therapy, blood transfusion, phototherapy, presence of patent ductus arteriosus, and the use of surfactant (Survanta®). Cryotherapy or laser treatment for threshold ROP was done under general

anesthesia in another center after transporting the babies [1]. The babies were then seen weekly until the regression of the disease.

The data were entered on the SPSS database program and analyzed statistically using Student's t test for continuous variables and chi-square test for categorical variables. Stepwise logistic regression analysis was used to determine the independent variables associated with the development of ROP.

Results

A total of 130 cases each had on an average 5 examinations. The mean birth weight of the babies examined was 1,217 g (range: 700–2,000 g) and the mean gestational age 30.7 weeks (range of 26–36 weeks). There were 62 males and 68 females, 15 pairs of twins, one set of triplets and a set of quadruplets. The mean corrected age at first examination was 33.1 weeks (range 30–37) and that at final examination was 39.5 weeks (range 34–68).

There were 59 babies (45.5%) who had various stages of ROP, 3 of whom became blind. Of these, 2 were lost to follow-up but returned with a very advanced stage of the disease when surgery was not possible, and the 3rd was not improved by laser treatment. Three babies died. One baby had the disease in zone 1 of the left eye, 44 babies (33.8%) had it in zone 2 of the right eye and 40 (30.8%) had it in zone 2 of the left eye. The stages of ROP are shown in table 1. There were 27 babies weighing more than 1,500 g at birth of which 3 had ROP (11%), while among those above 34 weeks gestation, none had the disease.

Risk factors and their relation with ROP were studied, and of these low birth weight, oxygen therapy, presence of patent ductus arteriosus, presence of intraventricular hemorrhage, receipt of blood transfusion and surfactant therapy were found to be significantly associated with the disease (table 2). With stepwise logistic regression analysis, however, only low birth weight ($p < 0.0005$) and oxygen

Table 2. Risk factors associated with ROP

	ROP (n = 59)	No ROP (n = 71)	p value
Mean birth weight, g	1,039	1,216	0.026
Oxygen therapy	56 (95%)	52 (73%)	0.001
Presence of patent ductus arteriosus	33 (56%)	18 (25%)	0.001
Presence of intraventricular hemorrhage	20 (34%)	10 (14%)	0.01
Blood transfusion	55 (93%)	56 (79%)	0.025
Surfactant therapy	39 (66%)	30 (42%)	0.008
Phototherapy	56 (95%)	60 (84.5%)	0.08

Table 3. Incidence of ROP

Study	Number	Incidence of ROP, %	
		total	severe
Ng et al. [6] (UK)			
(birth weight <1,701 g)	505	60.1	6.3
Smith et al. [7] (Australia)			
(birth weight <1,501 g)	94	16.0	4.2
Bassiouny [8] (Oman)			
(birth weight <1,501 g)	73	34.0	NA
Maheshwari et al. [9] (India)			
(birth weight <1,501 g)	66	20.0	7.0
Present study (Kuwait)			
(birth weight <1,500 g)	103	54.3	8.3

therapy ($p < 0.05$) were found to be independently associated with the development of ROP.

Discussion

This study documents the cumulative incidence of ROP in a large neonatal center and is the first report from Kuwait. The frequency of ROP varies from 16 to 60% in studies around the world (table 3). In babies of <1,500 g in our study from Kuwait the cumulative incidence of ROP was 54% and in 8% the ROP was severe. Since this was the first time that a screening program for ROP was introduced in Kuwait, larger birth weight and gestational

ages were also included [16, 17]. After logistic regression analysis [12], low birth weight and oxygen therapy were the only risk factors out of the seven factors under consideration or entered into the model, that were independently associated with ROP [21]. However, we did not specify the concentration and duration of oxygen therapy used in the babies. Some other known risk factors were not included like episodes of apnea, use of total parenteral nutrition, episodes of sepsis and some maternal risk factors [5–11, 13, 14, 18, 19, 23, 25].

Further studies taking these factors into consideration are to follow. The high rate of ROP in the multiplets can be explained by the premature low birth weight that these multiplets have. This could probably be prevented

in some cases [15]. There was a high rate of blindness in spite of widening our inclusion criteria for screening. This can be explained by the poor compliance for follow-up by the parents who could not recognize blindness in their babies. This can be avoided by more frequent eye examination and by not discharging

any suspicious cases from the hospital during the early stages of ROP.

Our ROP management confirmed the usefulness of cryotherapy with a 100% success rate, and a possible role for laser treatment (66% success rate) [24]. This is in conformity with other studies.

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