An observational study on retinopathy of prematurity in the neonatal intensive care unit at Teaching Hospital, Peradeniya, Sri Lanka

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Abstract

Introduction: Retinopathy of prematurity (ROP) is one of the few causes of visual impairment in premature infants. Timely screening and initiation of treatment would prevent long term visual disability.

Setting: Neonatal Intensive Care Unit (NICU), Teaching Hospital, Peradeniya (THP)

Objectives: To determine the incidence of ROP in the NICU, THP and to use the results of the study to initiate a ROP screening programme for this unit.

Method: All consecutive babies admitted to the NICU over a 16 month period from 01-02-2003 were included in the study. Data for all patients admitted to the NICU were entered individually into a standard data sheet. Eligible patients were identified according to the International Screening Guidelines and comprised all preterm neonates with birth weight less than 1500g and/or gestational age less than 32 weeks and any other neonate outside the above inclusion criteria, who had an unstable clinical course. First screening examination was carried out at 32 weeks post conceptional age or 6 weeks postnatal time whichever came first. Follow up examinations were done until the resolution of ROP or up to retinal maturation.

Results: There were 130 admissions to the NICU during the study period. Of that106 were eligible for screening. Eighteen of the 106 neonates had varying degrees of retinopathy. Fifteen neonates were found to have significant ROP (i.e. stage 3 and beyond) resulting in an incidence of 11.5% among the high risk population of neonates at THP.

Recommendations: A larger study population would be needed to analyze the association of various risk factors such as steroids, gestational age, birth weight, oxygen administration, and duration of ventilation in the pathogenesis of ROP. It will be necessary to audit the screening programme in a few years time to assess its effectiveness.

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Background

Retinopathy of prematurity (ROP) is the main cause of visual impairment in premature infants[1]. Almost all preterm babies will develop some degree of ROP although in the majority this will not progress beyond mild disease and will resolve spontaneously without treatment[2]. A small proportion develops potentially severe ROP which can be detected through retinal screening. If untreated, severe disease can result in serious visual impairment. Consequently all babies at risk of sight threatening ROP should be screened. Worldwide studies show that in general, more than 50% of premature infants weighing less than 1250 g at birth show evidence of ROP and about 10% of the infants develop stage 3 ROP [3, 4, 5].

The increased survival of extremely low birth weight (ELBW) infants in recent years, due to advances in neonatal care, has produced a population of infants at very high risk of developing ROP. It was believed for many years that oxygen therapy increases the risk of ROP in preterm infants. However, ROP can occur even with careful control of oxygen therapy [6]. Several factors increase the risk for ROP, especially those associated with short gestation and low birth weight[7]. Other identified risk factors include sepsis, intraventricular haemorrhage, exposure to light, blood transfusions and mechanical ventilation[7].

Therapeutic interventions for ROP include cryotherapy and laser therapy[8]. Use of antenatal and postnatal steroids is also considered an important therapeutic modality[9]. However, their effects on the severity of ROP are still in dispute.

The neonatal intensive care unit (NICU) of Teaching Hospital Peradeniya (THP) did not have a proper screening programme to screen the premature babies at risk up to 2003. The present study was carried out

to evaluate the occurrence of ROP in the NICU of THP and to demonstrate the necessity of having a formal screening programme for ROP.

Objectives

- To determine the incidence of ROP in the NICU of THP.
- To use the results of the study to initiate a ROP screening programme for this unit.

Design

Prospective observational study

Method

All consecutive babies admitted to the NICU over a 16 month period from 01-02-2003 were included in the study. Data for all patients admitted to the NICU was entered individually into a standard data sheet which included birth weight, gestational age, oxygen requirement, medical complications and findings of retinal examination. Gestational age was determined by either last menstrual period (LMP) or ultrasound dating when LMP was not available and confirmed by neonatal examination on admission to the unit.

Eligible patients were identified according to the International Screening Guidelines[10] as follows:

- All preterm neonates with birth weight <1500g and/or gestational age < 32 weeks.
- Any other neonate who had an unstable clinical course.

First screening examination was carried out at 32 weeks post conceptional age or 6 weeks post natal time whichever came first.

A single ophthalmologist did all eye examinations according to the above mentioned guidelines. Twenty three neonates needed an in-hospital eye examination since these babies were either too ill or were being nursed in incubators posing logistical difficulties in transporting them to the Kandy Ophthalmology Unit which is 4 km away from THP. The International Classification of ROP was used to classify the severity[11]. Follow up examinations were done until the resolution of ROP or up to retinal maturation[12, 13].

Results

There were 130 admissions to the NICU during the study period. Out of that 106 were eligible for screening (73 according to the birth weight, 68 according to the gestational age and 5 due to other reasons). Eighteen out of the 106 neonates had varying degrees of retinopathy. Fifteen neonates were found to have significant ROP (i.e. stage 3 and beyond) resulting in an incidence of 11.5% among the high risk population of neonates at THP.

The details of the cohort according to the birth weight is given in table 1

Table 1
Distribution of the study population according to birth weight (n= 130)

Birth weight in g	Number (%)
<1000	05 (04)
1000- 1100	06 (05)
1101- 1200	10 (08)
1201- 1300	13 (10)
1301- 1400	17 (13)
1401- 1500	22 (17)
>1500	57 (44)

The distribution of the cohort according to the gestational age is given in Table 2

Table 2
Distribution of patients according to period of gestation (n=130)

Period of gestation in weeks	Number (%)
27-28	08 (06)
28-29	14 (11)
29-30	10 (08)
30-31	17 (13)
31-32	19 (15)
32-33	12 (09)
33-34	09 (07)
34-35	14 (11)
35-36	07 (05)
36-37	08 (06)
>37	12 (09)

Details of the neonates who had ROP are shown in table 3.

Table 3
Details of the neonates who had ROP

	Period of gestation (wks)	Birth weight (g)	Oxygen requirement FiO_2	Other risk factors	ROP stage
1	27+2	700	0.4- 0.6 IPPV	RDS, BT	B/L stage 3 plus
2	27+6	720	0.4- 0.6 IPPV	RDS, Sepsis	B/L stage 3 plus
3	28+5	1200	0.21- 0.3 Nasal prongs	Sepsis	B/L stage 3 plus
4	28+6	1150	0.4- 0.8 IPPV	RDS, Sepsis	B/L stage 3 R/S plus
5	28+6	1100	0.25- 0.3 Nasal prongs	RDS	B/L stage 3 plus
6	29+3	1250	0.4- 0.6 IPPV	RDS, Sepsis	B/L stage 3 R>L
7	30	1300	0.4- 0.6 IPPV	Sepsis, BT	B/L stage 3 plus
8	30+1	1400	0.25- 0.3 Nasal prongs	Sepsis	B/L stage 3
9	30+3	1300	0.4-0.8 IPPV	Sepsis, BT,RDS	B/L stage 3 plus L>R
10	30+4	1400	0.4- 0.6 IPPV	RDS, Sepsis	B/L stage 3 plus
11	30+2	1250	0.25- 0.3 Nasal prongs	RDS, Sepsis	B/L stage 3 Left-plus
12	30+4	1300	0.25- 0.3 Nasal prongs	RDS, Sepsis	B/L stage 3
13	30+4	1320	0.4- 0.6 IPPV	RDS, Sepsis	B/L stage 3 Right- plus
14	30+4	1200	0.25- 0.3 Nasal prongs	Sepsis	B/L stage 3
15	31+2	1380	0.4- 0.5 IPPV	Sepsis, BT	B/L stage 3 Left- plus
16	31+5	1200	0.25- 0.3 Nasal prongs	-	B/L stage 2
17	32+2	1350	0.4- 0.6 IPPV	Sepsis	B/L stage 2
18	35+3	1250	0.25- 0.3	Sepsis	B/L stage 0

RDS- Respiratory Distress Syndrome, BT- Blood Transfusion, B/L- Bilateral

Babies with stage 3 plus disease were treated with cryotherapy. Five babies eventually were referred for laser treatment. Regression of ROP was noted in ten patients on follow up. Babies who had stage 2 or less showed spontaneous regression. Those who had peripheral avascularity later developed normal retinal vascularization. All affected neonates are on regular ophthalmologic follow up on long term basis.

Discussion

This observational study revealed that 18 patients out of a study population of 130 over a period of 16 months had ROP and 15 required treatment. This implies that ROP is a significant problem in the NICU at THP. The study also showed that timely identification of ROP would help to initiate proper treatment that could ultimately prevent severe visual disability. It was also observed that a significant proportion needed in-hospital examination mainly due to logistical reasons.

Apart from prematurity and low birth weight, many neonates also had other risk factors for ROP. All neonates who developed ROP received oxygen therapy either via mechanical ventilation or other means like nasal prongs and face mask. The oxygen concentration ranged from 0.25 to 0.8. Fifteen

neonates received intravenous antibiotics for either confirmed or suspected sepsis. Twelve babies developed RDS and 3 received blood transfusions.

Following this study it was possible to establish ROP screening guidelines for the NICU at THP. For the first time a screening programme was initiated in THP in liaison with the ophthalmological unit at General Hospital Kandy. It was possible to arrange an ophthalmologist to visit the neonatal unit regularly to examine the babies who were not stable enough to be transferred to the Ophthalmology Unit, Kandy.

The staff members of the neonatal unit realized the importance of such a programme following this study. General awareness of the importance of such a programme was enhanced by presenting the preliminary results of the study in the Kandy Society of Medicine Annual Academic Sessions[14].

ROP is largely preventable by identifying and preventing the risk factors. Our study population was not large enough to assess the association of risk factors with ROP.

Recommendations

- A larger study population is needed to determine the impact of risk factors such as steroids (antenatal and postnatal), gestational age, birth weight, oxygen administration, and duration of ventilation in the pathogenesis of ROP.
- It will be necessary to audit the screening programme in a few years time to assess its effectiveness.

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