

Should fewer babies be screened for retinopathy of prematurity?

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Abstract

Aim: To determine whether the inclusion criteria for retinopathy of prematurity screening could be safely altered to reduce the amount of screening.

Patients and methods: A retrospective, hospital records-based study of 125 low birth weight babies in a tertiary neonatal care unit.

Results: The overall frequency of retinopathy of prematurity was 32% — 9.6% of infants had severe retinopathy of prematurity. All infants with severe retinopathy of prematurity had a gestational age of ≤ 29 weeks, or birth weight of ≤ 1245 g.

Conclusion: If screening is limited to infants with birth weights of ≤ 1500 g or a gestational age of ≤ 28 weeks, no case of severe retinopathy of prematurity would have been missed and 12.8% fewer infants would require screening. The possibility of using the latest American Academy of Pediatrics guidelines for retinopathy of prematurity screening is discussed.

Key words: Retinopathy of prematurity, Prethreshold disease, Threshold disease

Introduction

With improvement in the survival of very premature infants, screening for retinopathy of prematurity (ROP) is expected to emerge as a major problem in the field of pediatric ophthalmology in Hong Kong. The screening is time-consuming and potentially hazardous to fragile babies. Ideally, the screening program should be targeted only at the at-risk population. Local data on the cost-effectiveness of the

current ROP screening program, however, has been inadequate. This study was undertaken to assess whether the current guidelines have effectively included all at-risk babies, and whether the inclusion criteria can be safely altered to reduce over-screening.

Patients and methods

A retrospective analysis of ROP screening records in the neonatal unit at the Princess Margaret Hospital (PMH) was undertaken between January 1995 and June 1998. The PMH neonatal unit is a tertiary neonatal care ward and the mean annual delivery rate at the PMH from 1995 to 1998 was 3600 babies. All infants with a birth weight of < 1500 g or a gestational age of < 32 weeks, or who were judged as at increased risk by neonatologists, were screened. More than 90% of the dilated fundoscopic examinations were done by 1 of 2 experienced ophthalmologists. The first ophthalmic examination was performed at 4 to 6 weeks postnatal age. Subsequent fundal examinations were done fortnightly until complete retinal vascularization occurred. Infants with retinopathy were followed up at weekly or shorter intervals until the retinopathy had regressed. Treatment (diode laser or retinal cryotherapy) was instituted for eyes reaching the disease threshold.

Details of each examination were recorded according to the International Classification of ROP.¹ The following data were collected from the screening records: birth weight (BW), gestational age at birth, incidence of stage III ROP, the most severe stage of ROP reached, the presence of prethreshold and threshold disease, and whether treatment had been instituted. The effectiveness of the current screening program using the UK screening guidelines is compared with that of the USA screening guidelines.

Results

Of 150 babies screened, 25 were excluded from the study because of death before complete retinal vascularization, incomplete data entry, or default of follow-up before complete retinal vascularization.

Retinopathy of prematurity was diagnosed in 73 eyes of 40 patients (32%) of 125 infants in study. Infants who developed ROP had a mean gestational age of 28.15 ± 2.2 weeks and a mean birth weight of 1071 ± 247 g. Those infants who did not develop ROP had a mean gestational age of 30.6 ± 2.1 weeks, and a mean birth weight of 1316 ± 274 g (**Figures 1 and 2**). Both the gestational age at birth and the birth weight of babies with ROP are significantly lower than those without ROP ($p < 0.001$). The relationship of ROP with birth weight and gestational age at birth are shown in **Figures 3 and 4**, respectively. Mild ROP is defined as stage I and II disease without plus signs, while severe ROP is defined as stage III or above and all prethreshold and threshold diseases. At the stage when ROP was most severe, 13 babies (10.4%) had stage I ROP, 18 (14.4%) had stage II ROP, and 8 (6.4%) had stage III ROP (**Table 1**). One infant developed stage V ROP. Babies with stage III ROP had a mean gestational age of 27.5 weeks (range, 26 to 29 weeks), and a mean birth weight of 946 g (range, 680 to 1245 g). Twelve infants reached either prethreshold or threshold disease (6 prethreshold and 6 threshold). The 6 patients (12 eyes; 4.8% of all patients) with threshold disease were treated with retinal cryoablation. One patient with threshold disease was treated with cryoablation, which was supplemented with diode laser treatment.

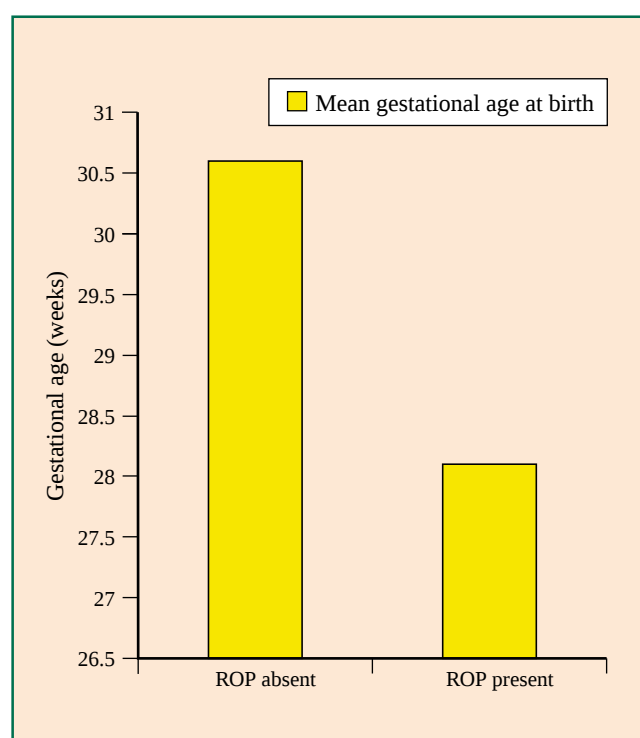


Figure 1. Mean gestational age at birth and retinopathy of prematurity (ROP).

In the present study, the highest gestational age and birth weight associated with severe ROP (stage III ROP and all prethreshold disease) was 29 weeks and 1245 g, respectively. In the current screening program, babies of gestational age of 32 weeks or less or birth weight of 1500 g or less are included for screening. Thus, all cases of severe ROP are promptly detected under such a screening protocol. The effectiveness of this screening guideline can be compared with the USA guideline, by applying the latter to the same group of subjects. The joint statement of the American Academy of Pediatrics, the American Association for Pediatric Ophthalmology and Strabismus, and the American Academy of Ophthalmology recommends screening of infants with a birth weight of ≤ 1500 g or with a gestational age of ≤ 28 weeks.² Using such criteria, only 109 infants should have been included for screening in our study. By using these criteria, only 2 babies with stage I ROP in 1 eye (birth weight 1510 g and 1750g, gestational age 31.57 and 31 weeks, respectively) would have been missed. All infants with severe ROP would still have been included in the screening program.

Discussion

With advances in neonatal care, an increasing number of low birth weight, premature infants are surviving, and are at risk of developing ROP. The significance of screening for ROP has dramatically increased as clinical studies have demonstrated improved visual outcomes in infants with severe, acute ROP treated with either transcleral cryotherapy³⁻⁶ or transpupillary laser.⁷ Local figures concerning the incidence and severity of ROP are, however, inadequate. Collection of local statistics is thus crucial for the understanding of the natural course of this disease, and hence for the development of screening protocols in the local population.

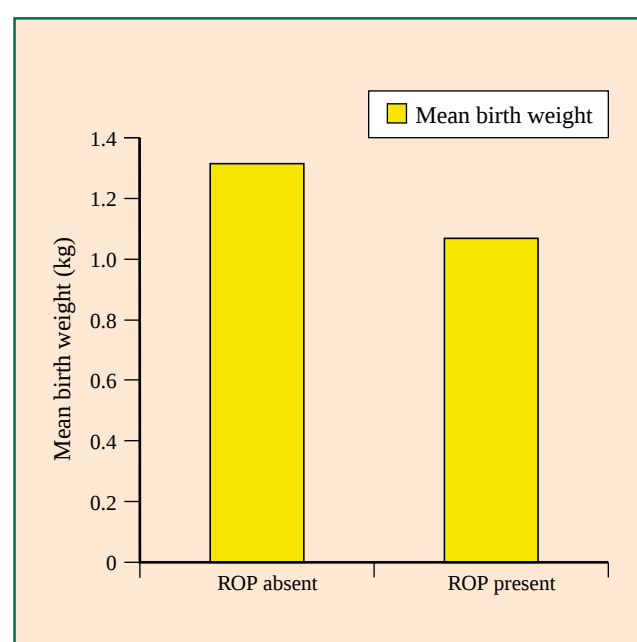


Figure 2. Mean birth weight and retinopathy of prematurity (ROP).

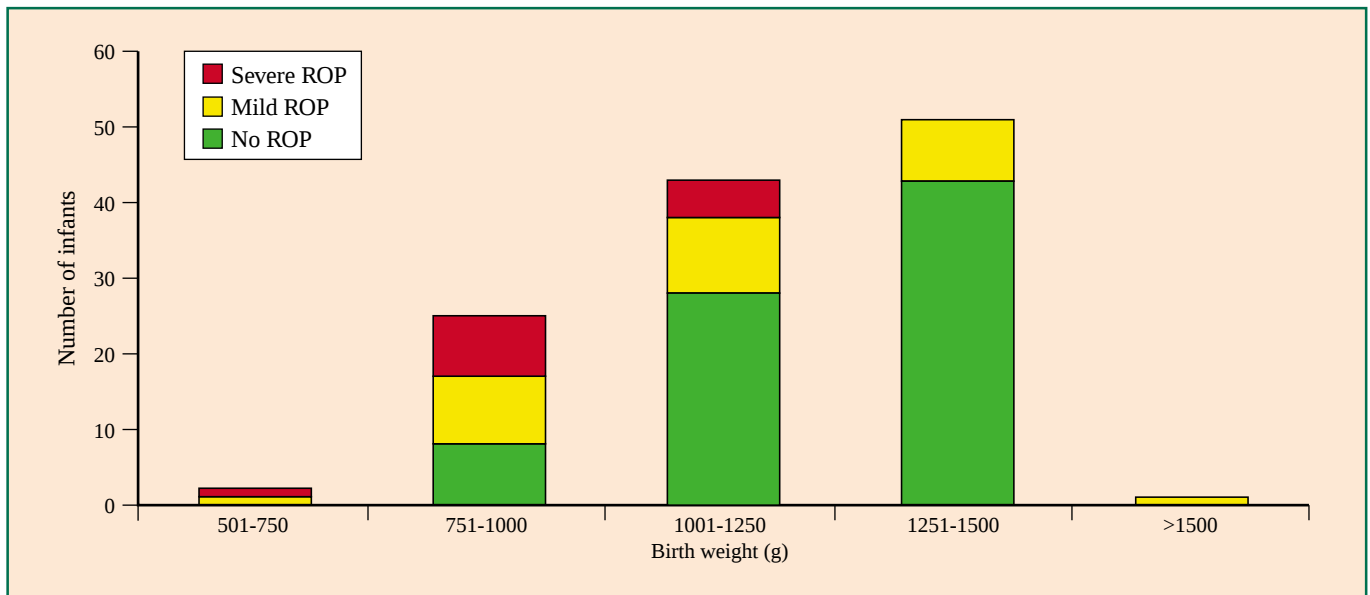


Figure 3. Severity of retinopathy of prematurity (ROP) and birth weight.

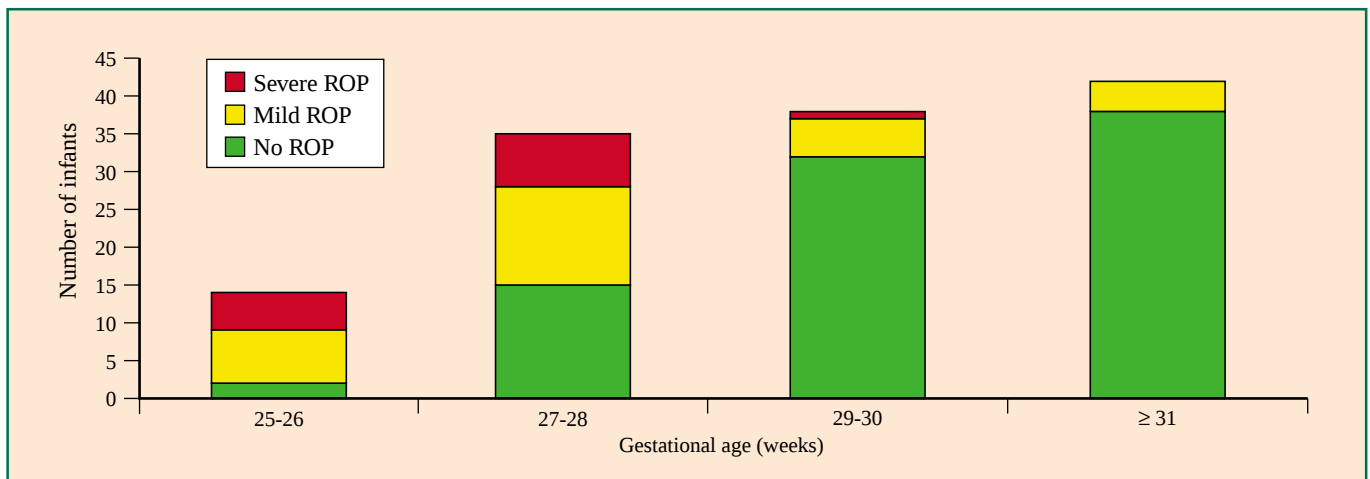


Figure 4. Severity of retinopathy of prematurity (ROP) and gestational age at birth.

The screening criteria currently used at the PMH are based on the guidelines of the Royal College of Ophthalmologists.⁸ Babies with a gestational age of ≤ 32 weeks or birth weight of ≤ 1500 g are included for screening. The purpose of screening is to identify stage III and all prethreshold disease, which have the potential to become severe and may require treatment.⁸ All cases of severe ROP are promptly detected under such a screening protocol. However, the goals of an efficient screening program are to detect treatable disease at a high rate, while simultaneously minimizing the number of examination results that either are normal, or do not alter the course of clinical care. Using the

cut-off criteria of the American Academy of Ophthalmology,² only 2 babies with stage I ROP in 1 eye would have been missed in the screening. All cases of severe ROP are still effectively included. However, by following these criteria, 16 infants with no ROP would have been excluded from screening. This implies that 12.8% of unnecessary examinations could have been avoided.

Screening for ROP can potentially cause ocular trauma, apnea, and/or bradycardia, nosocomial infection, and changes in blood pressure.⁹ In addition to being inefficient use of medical resources, unnecessary screening may also

Table 1. Number of infants with retinopathy of prematurity found at screening.

Stage of retinopathy of prematurity	Number of patients (n = 125)	Percent of patients screened
I	13	10.4
II	18	14.4
III	8	6.4
V	1	0.8

interfere with infant feeding schedules, disrupt the flow of the nursery, and cause parental anxiety. Thus, eliminating unnecessary and stressful examinations is certainly a worthwhile goal. It may not be conclusive enough, and may in fact be dangerous, to alter the existing screening criteria based on the strength of only one local study. However, it is worth considering that the possible problem of over-screening has also been addressed in another local study in a tertiary care unit.¹⁰ There seems to be a definite need to review the existing protocol when more local data is available.

The major limitation of this study is the relatively small number of infants. There is no joint ROP registry among neonatologists and ophthalmologists, and the eye records of a number of infants screened in the neonatal ward could not

be traced upon discharge. While we are confident in our ophthalmologic findings, this study is nevertheless retrospective, and data interpretation is hindered in some cases by the incompleteness and inconsistency of data entry, including both biographic and ophthalmologic data. Attempts have therefore been made to improve the ROP registry and documentation.

Conclusion

The current screening guidelines are extremely effective in that ROP of all stages are included. In future, it is recommended that more local data is profiled, so that a cost-effective, evidence-based screening protocol may be tailored to the local population, with the aim of maintaining an efficient practice without over-screening.

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