

Original Article

Retinopathy of prematurity: postmenstrual age at threshold in a transitional economy is similar to that in developed countries

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ABSTRACT

Background: To analyse the timing of threshold disease in infants requiring treatment for retinopathy of prematurity in a transitional economy.

Methods: Design: Retrospective, observational, cohort study. Setting: National Hospital of Paediatrics, Hanoi, Vietnam. Study population: Premature infants in the Neonatal ward requiring laser treatment for threshold retinopathy of prematurity. Main outcome measures: Chronological age and postmenstrual age at treatment.

Results: From January 2002 to November 2004, 42 infants from the National Hospital of Paediatrics required laser surgery for threshold retinopathy of prematurity. The mean \pm standard deviation (SD) of birth weight was 1369 ± 184 g (range 1000–1700); the mean \pm SD of gestation at birth was 30 ± 1.8 weeks (range 27–34); and the mean \pm SD of postmenstrual age at which treatment occurred in these infants was 36.2 ± 2.5 weeks (range 31.4–42). A further 58 infants were transferred from other hospitals for laser surgery between January 2004 and October 2004. The mean \pm SD of birth weight was 1325.5 ± 237.2 g (range 800–1900); the mean \pm SD of gestation at birth was 30 ± 1.7 weeks (range 28–35); and the mean \pm SD of postmenstrual age at which treatment was given in these infants was 36.3 ± 2.3 weeks (range 32.71–44.3).

Discussions: Despite the relative maturity of the gestation of these infants compared with infants in developed countries who develop severe retinopathy of prematurity, the timing of treatment for threshold disease appears to be related to postmenstrual age.

Key words: developing countries, laser surgery, neonatal screening, retinopathy of prematurity, Vietnam.

INTRODUCTION

Retinopathy of prematurity (ROP) has become a difficult problem for countries with transitional economies, such as Vietnam. Transitional economies are those that are changing from a centralized form to an open market economy and they make up a large proportion of today's emerging economies. The work load for ophthalmologists has increased many-fold as attempts are made to deal with the screening examinations and laser treatment of ROP. A trend for the disease to occur in larger and more mature premature infants in emerging economies, particularly those in transition, adds to the burden of screening and treating the disease.¹ The reasons behind this trend are unknown, but presumed to be related to changes in neonatal care that allow increased survival but also increased morbidity.

We evaluated timing of treatment of ROP in a large group of infants treated at the National Hospital of Paediatrics (NHP), Hanoi. The purpose of this analysis was to compare

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Table 1. Baseline characteristics of infants treated with laser for ROP at the NHP

	NHP (<i>n</i> = 42) [†]	Non-NHP (<i>n</i> = 58) [‡]
Birth weight (g): mean ± SD (range)	1369 ± 184 (1000–1700)	1325.5 ± 237.2 (800–1900)
Gestational age (week): mean ± SD (range)	30 ± 1.8 (27–34)	30 ± 1.7 (28–35)
Male (%)	57	41.4
Singleton births (%)	85.7	93
Born in the study hospital (%)	0	0
Race – Vietnamese (%)	100	100

[†]Infants managed at the NHP nursery as their primary care hospital and receiving laser treatment for ROP. [‡]Infants transferred from other nursery settings to NHP specifically for laser treatment for ROP. NHP, National Hospital of Paediatrics; ROP, retinopathy of prematurity; SD, standard deviation.

Table 2. Characteristics of infants at laser treatment at NHP

	NHP infants (<i>n</i> = 42)	Infants transferred to NHP (<i>n</i> = 58)
Chronological age (day): mean ± SD (range)	43.8 ± 11 (24–83)	43.8 ± 11.4 (24–72)
Postmenstrual age (week): mean ± SD (range)	36.2 ± 2.5 (31.4–42)	36.3 ± 2.31 (32.71–44.29)

NHP, National Hospital of Paediatrics; SD, standard deviation.

timing of treatment and diagnosis of threshold disease in Hanoi, with the experience in Western countries.

METHODS

The NHP, Hanoi, began screening for ROP in the year 2000 with the first laser treatment by local staff performed in 2001. Between January 2002 and October 2004, 42 laser surgeries were performed at the NHP for threshold disease on infants out-born but managed at the NHP. A further 58 infants were transferred from nurseries, in other institutions, to the NHP specifically for laser surgery. This included 10 infants transferred (mostly by train) from Ho Chi Minh City. Examinations were performed by LNL and laser treatments were performed by TXN. Screening procedures consisted of weekly examinations for inborn infants. For those born outside the hospital and transferred in for treatment, screening procedures were unknown. One of us (SMC) made annual trips to the hospital to work with the staff in diagnosis and management of ROP. The examining ophthalmologist made a trip to Australia for ongoing calibration of her work, and for education.

Gestational age is the time from the first day of the last menstrual period to birth. Chronological age is defined as the age from birth and postmenstrual age is defined as gestational age plus the chronological age.² The definition of threshold was that used in the Cryotherapy for Retinopathy of Prematurity Study, being '... at least 5 contiguous or 8 cumulative 30 degree sectors (clock hours) of stage 3 ROP in zone I or II in the presence of plus disease'.³ None of these infants was knowingly treated at prethreshold, nor was any treatment administered if the disease had progressed to stage 4 or worse.

RESULTS

Baseline characteristics for this cohort are shown in Table 1. The mean ± standard deviation (SD) of birth weight of infants from the NHP who had laser treatment was 1369 ± 184 g (range 1000–1700). The mean ± SD of gestation of infants from the NHP who had laser treatment was 30 ± 1.8 weeks (range 27–34). The mean ± SD of chronological age of infants from the NHP at laser treatment was 43.8 ± 11 days (range 24–83) and the mean ± SD of postmenstrual age at treatment for threshold disease of infants from the NHP was 36.2 ± 2.5 weeks (range 31.4–42) (see Table 2).

The mean ± SD of birth weight of infants sent from other hospitals for laser treatment was 1325.5 ± 237.2 g (range 800–1900) and the mean ± SD of gestation of infants sent in for laser was 30 ± 1.7 weeks (range 28–35) (see Table 1). The mean ± SD of chronological age at treatment for infants sent into the NHP was 43.8 ± 11.4 days (range 24–72) and the mean ± SD of postmenstrual age at treatment for threshold disease of infants referred to the NHP was 36.3 ± 2.31 weeks (range 32.71–44.29) (see Table 2).

Structural outcomes could not be ascertained in many infants. This was because parents often had nowhere to stay, and needed to return home to the districts. Once they were home, it may be too expensive for them to come back for follow up.

DISCUSSIONS

Retinopathy of prematurity has become a leading cause of blindness in children in countries with underdeveloped economies.^{1,4,5} Given reports that it occurs unpredictably in

Table 3. Characteristics of infants with severe ROP in Western studies

	Cryo-ROP [†]	ET-ROP [‡]
Number randomized	291	401
Birth weight (g): mean \pm SD	(Restricted to <1251) 800.05 \pm 165.21	(Restricted to <1251) 703 \pm 148
Gestational age (week): mean \pm SD	26.33 \pm 1.85	25.3 \pm 1.4
Chronological age at treatment (week): mean \pm SD	11.33 \pm 2.40	a) High risk prethreshold: 10.0 \pm 2.0; b) Conventionally managed threshold: 11.9 \pm 2.2
Postmenstrual age [§] at treatment (week): mean \pm SD (range)	37.7 \pm 2.8 (31.9–50.4)	a) High-risk prethreshold: 35.2 \pm 2.3 (30.6–42.1); b) Conventionally managed threshold: 37.0 \pm 2.5 (31.9–46.6)

[†]Randomized when reached threshold.^{3,7} [‡]Randomized when reached high-risk prethreshold or treated if reached threshold. 'High-risk prethreshold' meant that an eye had prethreshold ROP, and the risk of progression to an unfavourable outcome in the absence of treatment was calculated to be 15% or higher.⁸ [§]Cryo-ROP used the term 'postconceptional age', defined as '... the gestational age at birth plus the chronological age'.⁷ Today this definition is used for 'postmenstrual age'.² ROP, retinopathy of prematurity; SD, standard deviation.

larger-than-expected infants, the potential burden on fledgling medical staff to screen so many additional infants is significant.⁶ If the timing of development of threshold ROP could be ascertained, this would help make the disease more predictable, and could also potentially shed light on its pathogenesis.

Accurate epidemiology studies of ROP in emerging economies are difficult to perform, and this study has many of the shortcomings inherent in any effort to define the incidence and onset of ROP. These limitations include that the outcome is often difficult to ascertain because patients are unable to represent for follow-up eye examinations. It is often impossible to determine exact gestational ages because routine prenatal ultrasounds are not available and, for instance, in Vietnam, many people use the lunar calendar.⁵ Accurate birth weights may be difficult to determine because many preterm infants are born at home in the districts and some are even transported by bicycle or the family motorbike to hospital.

Nevertheless, it is interesting to note that the mean postmenstrual age at treatment was 36.2 weeks, similar to the mean age at treatment in Western countries (see Table 3), even though infants were born older and larger in Vietnam. Children transferred to the centre from other regions were treated at a slightly older age, suggesting that transfers for treatment resulted in a short delay in treatment initiation.

That threshold disease appears to develop at a similar mean postmenstrual age in a transitional economy as in the West suggests that some premature infants may be born with a predisposition to develop ROP, and perhaps that environmental circumstances then trigger the disease process. Factors such as unwanted oxygen dosing and infant resuscitation, for example, could trigger a disease process.

Although changes to screening guidelines in emerging economies, and in particular transitional economies, cannot be advocated on the basis of this single study, centres that manage ROP should be especially careful to screen infants at or around 34-week postmenstrual age, no matter how mature

the infants were at birth. This screening recommendation might be particularly salient in those centres where resources are stretched to the limit.

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