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Section on Ophthalmology

AMERICAN ASSOCIATION FOR PEDIATRIC OPHTHALMOLOGY AND STRABISMUS

AMERICAN ACADEMY OF OPHTHALMOLOGY

Screening Examination of Premature Infants for Retinopathy of Prematurity

ABSTRACT. This statement revises a previous statement on screening of premature infants for retinopathy of prematurity originally published in 1997.

ABBREVIATION. ROP, retinopathy of prematurity.

INTRODUCTION

Retinopathy of prematurity (ROP) is a retinal disorder of low birth weight premature infants potentially leading to blindness in a small but significant percentage of those infants. The results of the Multicenter Trial of Cryotherapy for Retinopathy of Prematurity Cooperative Group indicated that treatment is associated with a 41% decrease in the occurrence of posterior retinal traction folds or detachments and a 19% to 24% decrease in the incidence of blindness when evaluated 5 years later.[1–3] Because of the sequential nature of the progression of ROP, the proven benefits of cryotherapy and, more recently, the acceptance of at least equivalent therapeutic benefit of laser therapy for the same indications,[4–7] standards of practice now demand carefully timed retinal examinations of at-risk infants by an ophthalmologist experienced in the examination of preterm infants for ROP to minimize the risk of visual loss by those infants.

This statement outlines the principles on which a screening program to detect ROP in infants at risk might be based. The goal of an effective screening program must be to identify the relatively few preterm infants who require treatment for ROP from among the much larger number born each year while minimizing the number of stressful examinations required for these sick infants. Any screening program designed to implement an evolving standard of care has inherent defects, such as overreferral or underreferral, and cannot, by its very nature, duplicate the precision and rigor of a scientifically based clinical trial. With that in mind and on the basis of information published thus far, the sponsoring organizations of this statement suggest the following guidelines for the United States:

1. Infants with a birth weight of less than 1500 g or with a gestational age of 28 weeks or less, as well as selected infants between 1500 and 2000 g with an unstable clinical course who are believed to be at high risk by their attending pediatrician or neonatologist, should have at least 2 fundus examinations performed after pupillary dilation using binocular indirect ophthalmoscopy to detect ROP. One examination is sufficient only if it unequivocally shows the retina to be fully vascularized bilaterally.
2. Examination for ROP should be performed by an ophthalmologist with sufficient regular experience and knowledge in the examination of preterm infants for ROP to identify the location and sequential retinal changes in this disorder using binocular indirect ophthalmoscopy. The location and sequential retinal changes, if any, should be recorded using the *International Classification of Retinopathy of Prematurity*.[8]
3. The first examination should normally be performed between 4 and 6 weeks of chronologic (postnatal) age or, alternatively, within the 31st to 33rd week of postconceptional or postmenstrual age (gestational age at birth plus chronologic age), whichever is later, as determined by the infant's attending pediatrician or neonatologist. If using the postconceptional age guideline, examinations are generally not needed in the first 4 weeks after birth. The timing of the initial screening examination may be adjusted appropriately on the basis of other reliable data, such as local incidence and onset of ROP or the presence of other recognized risk factors.[8,9] The initial screening examination and subsequent examinations should be timed to permit sufficient time for treatment, including, any extra time required for transfer to another facility for treatment, if necessary. Treatment should generally be accomplished within 72 hours of determination of the presence of threshold 1 ROP to minimize the risk of retinal detachment before treatment.

The recommendations in this statement do not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.

4. Scheduling of follow-up examinations at the recommendation of the examining ophthalmologist is best determined by the findings at the first examination using the *International Classification of Retinopathy of Prematurity*. For example, if the retinal vasculature is immature and extends into zone II but no retinopathy is present, follow-up examination should be planned at approximately 2- to 3-week intervals until normal vascularization proceeds to zone III (ie, in the nasal periphery, there is no retinopathy and normal vessels are present within 1 disk diameter of the ora serrata).
5. Once an infant has been determined on first examination to be at risk for ROP, the following schedule is suggested:
   A. Infants with ROP that may soon progress to threshold ROP should be examined at least weekly. These include:
      1. Any infant with ROP less than threshold in zone I
      2. Infants with ROP in zone II, including:
         a) those with stage 3 ROP without plus disease (defined as posterior pole dilation and tortuosity of the retinal vessels);
         b) those with stage 2 ROP with plus disease; and
         c) those with stage 3 ROP with plus disease not yet extensive enough to justify ablative surgery.
   B. Infants with less severe ROP in zone II should be examined at 2-week intervals. Those without ROP but with incomplete vascularization in zone I should be seen at 1- to 2-week intervals until retinal vascularization has reached zone III or until threshold conditions are reached.
   C. If the retinal vascularization is incomplete in zone II but no ROP is detected, follow-up examination should be planned at approximately 2- to 3-week intervals until vascularization proceeds into zone III.
   D. Retinas with incomplete vascularization only in zone III usually mature completely; ROP in zone III normally regresses (involutes) without adverse consequences. However, the finding of normal vascularization in zone III is unusual in the initial examination of very low gestational age infants. In cases in which zone III vascular maturation seems to be present on initial examination of very low birth weight infants, this finding should be verified by at least 1 repeat examination within 2 to 3 weeks.
6. Infants reaching threshold 1 disease (stage 3 ROP in zone I or II in 5 or more continuous clock hours or 8 cumulative clock hours [30° sectors] with plus disease [posterior retinal vessel dilation and tortuosity]) should receive ablative therapy for at least 1 eye within 72 hours of diagnosis, generally before the onset of retinal detachment. Stage 3 ROP with vascularization in zone I or borderline zone I to II may appear different from purely zone II stage 3 disease in that proliferation may appear flat, only appearing to be significantly elevated when it has become extremely severe. In view of this difficulty in distinguishing between stages 2 and 3 in posterior regions, infants with suspected stage 3 ROP in zone I or border zone I to II with plus disease should be examined especially carefully to determine if they meet the threshold criteria noted above.
7. Parents of infants with ROP should be informed of the nature and possible consequences of this disorder throughout the infant's hospital stay, beginning at the time of first diagnosis and continuing on an ongoing basis with updates on its progression during hospitalization.
8. Responsibility for examination and follow-up of infants at risk for ROP must be carefully defined by each neonatal intensive care unit. Unit-specific criteria for examination for ROP should be established for each neonatal intensive care unit by consultation and agreement between neonatology and ophthalmology services. These criteria should be recorded and should automatically trigger scheduled ophthalmology examinations. If hospital discharge or transfer to another neonatal unit or hospital is contemplated before retinal maturation into zone III has taken place, the availability of appropriate follow-up ophthalmologic examination must be ensured, and specific arrangement for that examination must be made before such discharge or transfer occurs. The transferring primary physician should have the responsibility of communicating orally and in writing what eye examinations are needed and their required timing to the infant's new primary physician. The new primary physician should ascertain the current ocular examination status of the infant from the record and through communication with the transferring physician so that any necessary examinations by an ophthalmologist with regular experience and knowledge of the examination of preterm infants for ROP can be arranged promptly at the receiving facility. If responsibility for arranging follow-up after discharge is delegated to the parents, it must be clearly understood by the parents that blindness is a possible outcome, that there is a critical time window to be met if treatment is to be successful, and that timely follow-up examination is essential to successful treatment; this information should be transmitted to the parents orally and in writing. If such arrangements for follow-up after transfer or discharge cannot be made, the infant should not be transferred or discharged.

These recommendations replace the previous American Academy of Pediatrics statement on ROP,[10] are evolving, and may be modified as additional ROP risk factors, treatment, and long-term outcomes are known.

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RELATED READINGS

Hutchinson AK, Saunders RA, O'Neil JW, Lovering A, Wilson ME. Timing of initial screening examination in retinopathy of prematurity. *Arch Ophthalmol*. 1998;116:608–612

Palmer EA, Flynn JT, Hardy RJ, et al. Incidence and early course of retinopathy of prematurity. *Ophthalmology*. 1991;98:1628–1640

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