EYE M.D.s of Utah

Country Hills Eye Center
Eye Physicians and Surgeons

RISK FACTORS FOR RETINOPATHY OF PREMATURITY

There are several known or suspected risk factors for the development of retinopathy of prematurity. ROP seems to be a multifactorial disease, and many different conditions or stimuli probably contribute to the risk of developing this problem.

GESTATIONAL AGE AND LOW BIRTH WEIGHT

The lower an infant's birthweight and gestational age at birth, the more likely they are to develop ROP, and the more likely it is to require treatment. The CRYO-ROP group found that 47% of infants with a birth weight between 1000 and 1250 grams had some degree of ROP, as compared with 90% of infants with a birthweight less than 750 grams. The percentage of neonates with stage 3 ROP was 8% for the 1000-1250 gram group and 37% for the <750 gram group. A similar pattern was seen for gestational age, with ROP occurring in 83% of infants born at less than 28 weeks gestation and in 30% of infants born at more than 31 weeks gestation.

SUPPLEMENTAL OXYGEN

In the ROP epidemic of the 1950's, oxygen was shown to be a major cause for the development of the disease. It was discovered that infants on higher levels of supplemental oxygen were more likely to have ROP, but infants on lower levels of oxygen were more likely to die or have systemic complications of low oxygen. As arterial blood oxygen monitoring became available, it was possible to monitor the blood oxygen levels more precisely. With today's trancutaneous blood oxygen monitoring, the use of oxygen can be very carefully titrated to minimize the risk of ROP while avoiding the systemic complications of having too little oxygen. Ironically, with the increasing skill and technology available in NICUs, we are seeing an increase in ROP, since more tiny babies are surviving that would have otherwise have died. Although supplemental oxygen is a significant risk factor for ROP, the careful control of oxygen levels in modern NICUs probably reduces this risk as low as possible without compromising the infant's medical status.

VITAMIN E DEFICIENCY

Because of its antioxidant properties, vitamin E has been evaluated as a possible treatment or prophylaxis for ROP. Several controlled clinical trials have been performed, but the results are difficult to interpret. In 1986, the Institute of Medicine published a report in which they stated that there was no conclusive evidence of either benefit or harm from vitamin E administration. They did feel, however, that there was enough evidence to support treatment for vitamin E deficiency in premature infants.

RACE

There are some racial differences in the risk for developing ROP. In the CRYO-ROP study, black infants were found to be less likely to develop ROP and less likely to go on to threshold ROP than white infants. Other racial groups appeared to have a similar risk of ROP as compared with white infants.
My personal experience has been that hispanic infants tend to have a slower course of ROP than white or black infants. While most infants with ROP have gradually increasing retinopathy with regression over a matter of 4-6 weeks, hispanic infants may have persistent stage 2 ROP for 2-3 months before significant regression occurs.

INDOMETHACIN

Patent ductus arteriosus is the abnormal persistence of a small fetal blood vessel leading from the pulmonary artery to the aorta that normally closes spontaneously shortly after birth. The initial treatment of this disorder is with indomethacin, a non- steroidal anti-inflammatory agent similar to ibuprofen. One retrospective study has shown that treatment with indomethacin is associated with an increased risk of severe ROP, while another

study was unable to demonstrate a similar association.

SURFACTANT

The use of calf lung surfactant in the treatment of neonatal respiratory distress syndrome has been a dramatic advance in the care of premature infants. Surfactant therapy not only reduces mortality, but also decreases the incidence of a chronic lung disease known as bronchopulmonary dysplasia, or BPD. A retrospective study by Repka et al in 1992 showed that surfactant treatment is associated with a decreased risk of ROP (64% vs. 85% for any ROP; 3.4% vs. 10% for threshold ROP) independent of birth weight or gestational age. This effect is probably a result of the markedly improved pulmonary and nutritional status in patients treated with surfactant rather than a direct effect of the surfactant on the ROP process.

LIGHT LEVELS

The amount of ambient light reaching the premature eye may have an effect upon the development of ROP. There are some theoretical reasons to suspect that bright light may induce or worsen ROP. Many NICUs now cover their isolettes or cribs with blankets or have less intense lighting systems in an attempt to reduce the light exposure for their infants. This has been suggested as a possible way to lower the risk for ROP, and is presently the subject of a controlled clinical trial.
There has been some controversy recently concerning light as a risk factor for retinopathy. PARADE magazine recently ran a "scare" article about the dangers of fluorescent lights for premature babies' eyes. Much of this controversy has been generated by H. Peter Aleff, the father of a child who is blind because of ROP. His "research" is summarized on a web page entitled Prevent Blindness in Premature Babies The information at this site sounds very scientific because of the numbers of articles from medical and scientific journals that are cited as references. However, many of these articles are misquoted or taken out of context, and very few of the conclusions that he draws are valid. Fluorescent light is certainly not the only or even the primary cause of ROP, since several other unrelated risk factors have been strongly associated with the disease. I also strongly disagree with Mr. Aleff's allegation that NICU nurses and doctors know that lights cause ROP but don't care enough about their patients to protect them. Hopefully, this fanatic and unscientific approach will not detract from the serious research being done in this area.

OTHER POTENTIAL RISK FACTORS

Many other possible risk factors for the development of ROP have been postulated, including:

- Elevated blood carbon dioxide levels
- Anemia
- Blood transfusions
- Intraventricular hemorrhage
- Respiratory distress syndrome
- Chronic hypoxia in utero
- Multiple spells of apnea or bradycardia
- Mechanical ventilation
- Seizures

These factors may have a direct effect on the risk of ROP, or they may simply be indicators of smaller, "sicker" infants who are more likely to develop many of the complications of prematurity, including retinopathy. More study will be needed to further delineate the actual independent risk potential for each of these factors.
The incidence of ROP appears to be independent of whether the patient is male or female, and there is no difference in the incidence of ROP for the right eye versus the left eye. It also does not appear to matter whether the infant is a product of a single or multiple birth.

We have traditionally thought of ROP as a disorder caused by exposure of premature infants to noxious

stimuli encountered after birth. However, we are learning that some of the factors that precipitate ROP are not within our control, and may occur before birth. Chronic hypoxia in utero and intrauterine growth retardation are two prenatal conditions that seem to be related to the development of ROP. Infants have been seen with full blown threshold ROP within a day or two after birth, implying that the retinopathy was already well under way prior to birth. It is suspected that as many as one third of cases of ROP are caused by prenatal rather than postnatal conditions.

The Country Hills Eye Center Home Page

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For information regarding the Country Hills Eye Center phyician specializing in retinal and diabetic eye diseases

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