Retinopathy of Prematurity: A Silent threat to infant vision.

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Introduction

Retinopathy of Prematurity (ROP) is a potentially blinding eye disorder that occurs in some premature infants. It arises due to abnormal development of the retinal blood vessels in babies born before their eyes have fully matured. With increasing survival rates of premature infants, especially in neonatal intensive care units (NICUs), ROP has become a significant public health concern around the world. Though most cases are mild and resolve without intervention, more severe forms of the disease can lead to permanent vision impairment or total blindness if not detected and treated early [1].

The retina is a delicate, light-sensitive layer at the back of the eye responsible for capturing visual information and sending it to the brain. In a full-term pregnancy, the blood vessels of the retina develop gradually and are usually complete by the time of birth [2]. However, in babies born prematurely, this development is interrupted. When these infants are exposed to oxygen-rich environments outside the womb, especially in NICUs where supplemental oxygen is often necessary, the normal growth of blood vessels may stop or become irregular. Initially, oxygen therapy may suppress the production of vascular endothelial growth factor (VEGF), halting normal vascular development. As the infant's body senses a lack of oxygen in the outer parts of the retina, it responds by overproducing VEGF, leading to the growth of abnormal, fragile blood vessels. These vessels can leak, bleed, or form scar tissue that pulls on the retina, potentially causing detachment and blindness [3, 4].

ROP generally develops in two distinct phases. The first phase involves the cessation of normal blood vessel growth due to premature birth and high oxygen levels. This is followed by a second phase, in which the retina becomes hypoxic and stimulates the excessive production of VEGF. This triggers abnormal vascular proliferation. These processes typically begin a few weeks after birth, with the most severe damage often occurring between 32 and 36 weeks of postmenstrual age [5].

The disease is classified according to its location within the retina and the severity of the abnormal blood vessel development. ROP can affect different zones of the retina, with Zone I being the most posterior and high-risk area, and Zone III representing the more peripheral retinal region. It progresses through five stages, beginning with a thin demarcation line and potentially advancing to a ridge, followed by extra retinal fibro vascular proliferation, partial retinal detachment, and ultimately, total retinal detachment in the most severe cases. A condition known as "plus disease" may occur, characterized by severe dilation and twisting of the retinal vessels, indicating an aggressive form of the disease that requires urgent treatment [6, 7].

Infants most at risk of ROP are those born before 32 weeks of gestation or weighing less than 1500 grams. The risk increases with lower birth weight and earlier gestational age. Other contributing factors include fluctuations in oxygen levels, infections, poor postnatal weight gain, anemia, and the need for mechanical ventilation or blood transfusions. Though modern neonatal practices have improved, inconsistent oxygen monitoring and a lack of trained personnel in some healthcare settings continue to contribute to the burden of ROP, particularly in low- and middle-income countries [8, 9].

Diagnosis relies on regular eye examinations by trained ophthalmologists. The first screening is typically conducted between four to six weeks after birth or at 31 to 33 weeks of postmenstrual age, depending on the infant's gestational age and birth weight. Indirect ophthalmoscopy remains the gold standard for diagnosis, but wide-field retinal imaging is increasingly used, especially in telemedicine programs that extend care to remote and underserved areas. Ongoing monitoring is critical, as ROP can progress rapidly and may not present with external signs [10].

Conclusion

Retinopathy of Prematurity remains a leading cause of childhood blindness worldwide. It is a condition shaped by modern neonatal care practices, and its management reflects the quality and equity of healthcare systems. With early detection, proper screening, and timely intervention, most cases of ROP can be managed effectively, preserving sight and improving quality of life for thousands of vulnerable infants. The future of ROP care lies in global awareness, standardized protocols, and ensuring that every premature baby has access to sight-saving interventions, regardless of where they are born.

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