Risk Factors For Retinopathy Of Prematurity

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Preterm Infant

A preterm neonate is one who is born < 37 completed weeks of gestation.

- Subgroups of preterm infant include the following:
  - **Extremely preterm** infants who are born < 28 weeks
  - **Early preterm** infants are born < 34 weeks
  - **Late preterm** infants are born between 34 0/7 and 36 6/7 weeks
Birth weight

- **Low birth weight infants (LBW)** are less than 2500 g
  
  Although most LBW infants are preterm some are term but SGA

- **Very low birth weight (VLBW)** < 1500 g

- **Extremely low birth weight (ELBW)** < 1000 g
Pathogenesis

ROP is initiated as an arrest of normal retinal neuronal and vascular development in the preterm infant.

The lower the gestational age at birth, the less complete the retinal development.

ROP is usually classified in two post natal phases:

Phase I: cessation of normal vascular growth (obliteration of immature vessels with high O2 use)

Phase II: pathologic vessel growth
Pathogenesis

In phase I, hyperoxia suppresses oxygen regulated angiogenic growth factors like vascular endothelial growth factor and erythropoietin.

Besides oxygen, another important driver of vascular growth arrest is loss of growth factors normally present at optimal level in utero, such as insulin like growth factor 1 (IGF-1) & long chain poly-saturated fatty acids (omega LCPUFA).

Phase II of ROP is characterized by proliferation of blood vessels in response to retinal hypoxia and markedly elevated increases in VEGF and erythropoietin and other factors.
Risk Factors For ROP

- Prematurity
- LBW
- Assisted ventilation
- Surfactant therapy
- High blood transfusion volume
- Cumulative illness severity
- Low caloric intake
- Hyperglycemia and insulin therapy
- Infants with trisomy 21
- Sepsis
- Fluctuations in blood gas measurements
- Intraventricular hemorrhage
- Bronchopulmonary dysplasia
- Systemic fungal infection
- Early administration of erythropoietin
- Poor longitudinal weight gain
Gestational Age and Birth weight

Low gestational age and low birth weight reflect the degree of immaturity of retinal neural and vascular development at birth.
The degree of retinal vulnerability to insult is major risk factor for ROP
Oxygen level and ROP

Oxygen level fluctuations during the first few weeks of life are also associated with increase ROP risk as is frequent intermittent hypoxia during the first 8 weeks of life.

**Hyperoxia** suppresses vascular endothelial growth factor and inhibits normal vascularization.
Low IGF-1

There is strong association between early postnatal low serum IGF-1 concentration and later ROP as well as other prematurity related morbidities
In utero plasma level of IGF-1 increases with gestational age

Most infants before 33 w have a very slow increase in IGF-1 production after birth

In preterm infants low IGF1 serum levels directly correlates with severity of ROP
Hyperglycemia and insulin therapy

Elevated average blood glucose concentrations in the first week of life is independently associated with the development of ROP.

Higher cumulative mean BG, more episodes of HG, and more insulin exposure were associated with an increased incidence and severity of ROP.
Hyperglycemia and Insulin Use

Both hyperglycemia and insulin use are associated with increase in ROP
• Assisted ventilation for longer than one week, increases the risk of ROP.
Need to surfactant therapy is associated with increase risk of ROP
High blood transfusion volume

Blood transfusion in first week of life and repeated blood transfusion resulting in large cumulative volume are very significantly associated with occurrence of ROP
• Intraventricular hemorrhage
• Bronchopulmonary dysplasia
• Sepsis
• Pneumothorax
Candidemia were more likely to reach threshold ROP and require surgical intervention

Low calorie intake and poor weight gain are associated with increase risk of ROP
Poor weight gain after birth in premature babies has effect in ROP
Thank you for your time and attention