Retinopathy Of Prematurity

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Retinal Development

- The retina is a thin layer of tissue covering the back of the eye.
- Begins at the optic nerve and progresses into the periphery.
- Retinal vascular development begins at 15 to 18 weeks gestation.
- By 32-34 weeks gestation, the blood vessels in the eye are well developed.
- Maturation of the vessels supplying the optic nerve is not complete until term.
The Road to ROP—Pathophysiology

• The preterm infant is in a hypoxic environment in utero (Pa02 25 to 35 mmHg)

• When babies are born premature, the blood vessels on the retina are not fully developed

  • The relative increase in oxygen extra utero (hyperoxia) inhibits vascular endothelial growth factor (VEGF), causing vasoconstriction of fragile, immature retinal vessels which progress to vaso-obliteration

• The second phase of ROP occurs at 32-34 weeks. The vascular obliteration that occurs secondary to hypoxic stimulation up-regulates VEGF & the retina responds by creating LOTS of vessels (vaso-proliferation)
The Road to ROP—Pathophysiology

- This rapid growth can damage the retina
- Improper growth of the blood vessels on the retina and the damage caused by the growth
- One of leading causes of childhood blindness
- If the new vessels proceed to develop abnormally the capillaries may extend into the vitreous body and/or over the surface of the retina.
- Leakage of fluid or hemorrhage from the abnormal vessels may occur.
The Road to ROP

▪ Zone
  • Refers to the location (I, II, III) - how far developing retinal vessels have progressed

▪ Staging
  • Standardized approach for describing ROP
The Road to ROP

ZONES

Clock Hours

Zone I
Zone II
Zone III
MACULA
Optic N.
ORA Serrata

Top view left eye
Anterior nasal edge of retina
Anterior temporal edge of retina

Top view left eye
Anterior nasal edge of retina

Stages of ROP

• **Stage 1**: Mildly abnormal growth of retinal vessels. Usually gets better without any treatment and has no long-term effects

("Retinopathy of Prematurity | Pediatrics Clerkship", 2018)
Stages of ROP

- **Stage 2**: Growth of retinal vessels is moderately abnormal. Usually gets better without any treatment and has no long-term effects.

("Retinopathy of Prematurity | Pediatrics Clerkship", 2018)
Stages of ROP

• **Stage 3**: Ridge with Fibrovascular proliferation. Growth of retinal vessels is severely abnormal. Infants with Stage 3 may require treatment and have a higher risk for long-term problems

("Retinopathy of Prematurity | Pediatrics Clerkship", 2018)
• **Stage 4:** Partial retinal detachment. Usually requires treatment and may lead to long-term vision problems or blindness

• **Stage 5:** Complete retinal detachment. Requires treatment and may lead to long-term vision problems and blindness

("Retinopathy of Prematurity | Pediatrics Clerkship", 2018)
• **Plus Disease** – Sign of ROP advancing quickly.

• Usually requires treatment
  - Plus disease frequently leads to vessel contraction and scar formation, which in turn, leads to macular displacement.
  - Rush disease: Aggressive form of ROP. Develops between 3-5 weeks after delivery, may progress rapidly.
Factors Associated with ROP

- Placental Insufficiency
- PREMATURITY
- Supplemental oxygen
- Ventilatory Support
- Apnea and Bradycardia
- Hypercapnia/Hypocapnia
- Sepsis
- Steroids

- IVH/Seizures
- Nutritional deficiency
- Low plasma vitamin A concentrations
- Ethnicity
- Exposure to bright light
- Bilirubin/phototherapy
Prevention

• Treat Oxygen like a drug
• Monitor Pa02 on ABGs – keep 50 to 70 mmHg
  • Even if the infant requires only room air, the Pa02 can rise to 60 to 100mmHg
• Protect the eyes
• Set high alarm limits on Pulse Ox
The Road to ROP

▪ Surveillance

▪ Cryosurgery (rarely done)

▪ Laser Surgery

▪ Intravitreal administration of Anti-vascular endothelial growth factor agents (Avastin)

▪ Retinal Buckling for complete detachment
Complications of ROP

• Varying degrees of visual impairment may require corrective lenses or surgery.
  ▪ Strabismus (Crossed-eyed)
  ▪ Nystagmus (Rapid involuntary motion of the eyeball)
  ▪ Glaucoma (Abnormal high fluid pressure in the eye)
  ▪ Cataracts (Opacity of the lens)
  ▪ Amblyopia (“Lazy eye” Dimness of sight – Visual transmission not recognized properly)
  ▪ Macular ectopia (displacement of ocular muscles)
  ▪ Myopia (nearsightedness)
The end
References
