RAJIV GANDHI INSTITUTE OF MEDICAL SCIENCES :: ONGOLE
PRAKASAM DISTRICT

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The C.M.E. Programme is conducted in RIMS., Ongole on 07.07.2013 between 9.00 A.M. to 4.00 P.M.

Speaker: **Dr.B. Babu Rao,**
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Topic: **RETINOPATHY OF PREMATURITY**

Introduction: Retinopathy of prematurity is a rare complication of premature babies born before 37 weeks of gestation for the babies who require unmonitored oxygen therapy. Even though, it is a preventable complication, lot of care has to be taken before administering oxygen therapy particularly for respiratory distress syndrome and also for congenital heart diseases which manifest during the new born period.

All the babies who require oxygen therapy must be monitored and evaluated for ophthalmological complications who require oxygen.

Definition: Retinopathy of Prematurity (ROP) is a vas proliferative disorder of the retina among premature babies or low birth weight babies which sometimes progresses to cause visual impairment or blindness.

It develops between 32 and 34 weeks after conception.

There are 2 phases in the development of (ROP).

1. **Acute Phase: The normal vasculogenesis of the retina is disturbed by the relative hyperoxia of the extrauterine environment.**
2. **Chronic Phase: Subsequent hypoxia causes proliferation of vascular and glial cells, arteriovenous shunt formation, occasionally heading to involution or permanent cicatrical changes and visual impairment.**

In more severe forms, it results in severe visual impairment or blindness.

Incidence:

Risk Factors:

- **Prematurity**
- **Low birth weight**
- **Septicemia**
- **Exchange transfusion**
- **Hyaline membrane disease**
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- **Oxygen administration**
- **Blood transfusion**
- **Acidosis**
- **Twin gestation**
- **Deficiencies of magnesium, copper, and selenium**

Diagnosis:

Regular examination of retina is important in prematures and low birth newborns is important because they are not having any symptoms or signs indicate developing ROP.

It is diagnosed by retinal examination with indirect ophthalmoscopy.

All newborns with weight <500g or with a gestional age <30 weeks should be screened.

Timing of screening for ROP depending on the weeks of gestation.

Weeks of gestation	Screening at postnatal age
26 weeks	6 weeks
27-28 weeks	5 weeks
29-30 weeks	4 weeks
>30 weeks	3 weeks

Patients are examined __ 2 weeks until their vessels have grown out to thora serrata and the retina is considered mature.

Classification:

Internal classification of Retinopathy of prematurity (ICROP) is used to classify (ROP). ICROP described vascularization of the retina consists of four components.

1. **Location: refers to the extent of progression of retinal blood vessels.**

   The retina is divided into three concentric circles or zones.

   a. **Zone-1 consists of an imaginary circle with the optic nerve at the center and a radius of twice the distance from the optic nerve to the macula.**
   b. **Zone-2 extends from the edge of Zone-1 to thora serrata on the nasal side of the eye and approximately half the distance to thora serrata on the temporal side.**
   c. **Zone-3 consists of the outer crescent-shaped area extending from the Zone-2 out to the ora serrata temporarily.**

2. **Severity:**

   a. **Stage-1: Presence of thin white denunciative line separating the vascular from a vascular retina.**
   b. **Stage-2: The line becomes prominent because of lifting of retina to forma ridge having height and width.**
   c. **Stage-3: Presence of extra retinal fibro-vascular proliferation with abnormal vessels and fibrous tissue arising from the ridge and extending into vitreous.**
   d. **Stage-4: Partial retinal detachment; not involving macula (4A) or involving macula (4B).**
   e. **Stage-5: Complete retinal detachment.**

3. **Plus Disease: Presence of dilatation and tortuosity of posterior retinal vessels. Associated with vitreal hase, pupillary rigidity.**

4. **Extent: Extent of involvement of the retina as expressed as clock hours (30 degree sectors)**

5. **Pre-Plus Disease: Vascular abnormalities of the posterior pole that are insufficient for the diagnosis of plus disease but that demonstrates more arterial tortuosity and more venous dilatation than normal.**

Definition:

1. **Aggressive Posterior ROP: It is a rapidly progressing, severe form ROP. It usually progresses to stage 5 ROP, if it is not treated. The characteristic features of this type of ROP are (1) posterior location, prominence of plus disease, and the ill defined nature of the retinopathy. It is commonly observed in Zone-1, but may also occur in posterior Zone-II. Previously, it is called as "type-II ROP" and "Rush Disease".**

2. **Threshold Disease: Presence of stage 3 with plus disease in Zone-I or II, extending in 5 or more contiguous or 8 cumulative clock hours (30 degree sectors)**
3. **Pre-threshold Diteon presence of less than threshold disease in Zone-I, or Stage-2 plus disease in Zone-2, or Stage-3 plus disease with extent less than that for threshold disease.**

    a. **Type 1 pre-threshold ROP includes:**
        i. **In Zone-1, eyes with any ROP and plus disease or Stage-3 with or without plus disease.**
        ii. **In Zone-2, Stage-2 or 3 ROP with plus disease.**
    b. **Type-2 pre-threshold ROP includes:**
        i. **In Zone-1, Stage-1 or 2 without plus disease.**
        ii. **In Zone-2, Stage-3 without plus disease.**

<u>Management:</u>
<u>Timing of Treatment</u>:

a. **Current recommendations to consider treatment for Type-1 pre-threshold ROP based on the early treatment for ROP (ETROP).**
b. **Close observation is required for Type-2 pre-threshold ROP.**
c. **Judicious use of oxygen therapy: Oxygen is a drug and it should be used in a quantity that is absolutely necessary. The ideal oxygen saturation should be between 85% and 93% in a range of 40-80 mmHg.**
d. **Judicious use of Blood Transfusion: Transfusion of packed RBCs is another risk factor for ROP. Adult RBCs are rich in 2, 3 DPG and adult Hb binds less firmly to oxygen, and releases excess O_2 to the retinal tissue.**
   Packed cells to be given when the hematocrit falls below the normal range.
e. **Vitamin E supplement: Very low birth weight neonates should receive 15-25 IV of Vitamin E daily.**
f. **Prenatal steroids: Use of prenatal steroids prevents respiratory distress and intraventricular hemorrhage which are the predisposing facts for ROP. Prenatal use of steroids prevent acute illness in premature babies and should be used to all mothers with preterm labour between 24-34 weeks of gestation. The drug of choice is Betamethasone to be given in two doses of 12 mg each given 1M, 24L apart.**

<u>Bevacizumab:</u>

Intravitreal injection of bevacizumab, a neutralizing anti VEGE molecule has been demonstrated to diminish the neovascular response significantly.

Prognosis:

Short Term Prognosis:

Risk factors for ROP requiring treatment.

1. **Posterior location (Zone-1 or posterior Zone-2)**
2. **Increasing severity of stage**
3. **Presence of ROP on the first examination.**
4. **Circumferential involvement**
5. **Presence of plus disease, and**
6. **Rapid progress __ of disease.**

Early stages of the disease can regress spontaneously and have an excellent progress.

Long Term Prognosis:

Infants with significant ROP have an increased risk of myopia, anisometropia, refractive errors, strabismus, amblyopia, astigmatism, late retinal detachment, and glaucoma.

Prevention:

There is no proper methods available for prevention of ROP.

- **Vitamin E, reduction in exposure to bright sunlight, and administration of pencilam**
- **Cautious administration of O_2**
- **Early nutritional support, normalization of IGF-1 level, and adequate postnatal weight gain are important.**

Laser Therapy: Laster photo coagulation therapy for ROP is the preferred initial treatment.

Cryotherapy:

- **Anti-VEGF therapy**
- **Retinal attachment can be tried.**

Suggested reading:

1. **Manual of Neonatal Care by John P. Cloherty 7th Ed., 2012; 840-845.**
2. **Deepak Chowta etal ROP, Indian Journal of Pediatrics (April, 2012) 79(4); 501-509.**
3. **Ved P. Gupta ROP – Risk Factors Indian Journal of Pediatrics, Volume 71 – October, 2004; 887-892.**
4. **Avery's Diseases of the Newbron 8th Ed., 2005: 1539-1546.**