
In the name of God


حلول ماه رجب
و میلاد با سعادت
امام محمد باقر(ع)
بر همه شیعیان مبارک باد

RETINOPATHY OF PREMATURITY

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Definition

Retinopathy of prematurity (ROP), formerly known as retrolental fibroplasia, is a developmental vascular proliferative disorder that occurs in the retina of preterm infants with incomplete retinal vascularization.

Next to cortical blindness, ROP is the most common cause of childhood blindness in the United States

Epidemiology

Both the incidence and severity increase with decreasing gestational age (GA) and birth weight.

ROP occurs in a majority of babies with BWt of less than 1500 (VLBW) with an even greater proportion of babies developing ROP in the less than 1000 g BWt category (ELBW) and in the less than 750 g BWt.

Epidemiology

In developed countries:

infants born at ≥32 weeks are not at risk for developing ROP.

infants born at >28 weeks who develop ROP have mild disease that does not require treatment

Epidemiology

In developing countries:

infants who develop severe ROP are larger and are of a greater GA than those in developed countries.

A survey of ophthalmologists from low, moderate, and highly developed countries found:

the mean birth weight of infants with severe ROP was greater in infants in developing than in developed countries (900 versus 750 gm) .Similarly, the mean GA of infants with severe ROP was greater in developing than in developed countries (26 to 33.5 versus 25 weeks).

Epidemiology

ROP is also more likely to occur in males than females

Epidemiology

- ROP begins at 31 to 32 weeks postmenstrual age with progression over the next 2 to 5 weeks.

- Spontaneous regression commonly occurs in eyes with stages 1 and 2 and early stage 3.

Risk factors

The most important risk factor for developing ROP is prematurity.

More than 50 separate risk factors have been identified.

On multivariate analysis, low birth weight, low gestational age, assisted ventilation for longer than one week, surfactant therapy, high blood transfusion volume, and cumulative illness severity were independently associated with higher rates of ROP

Risk factors

possible risk factors:

sepsis, fluctuations in blood gas measurements, intraventricular hemorrhage, bronchopulmonary dysplasia, systemic fungal infection, and early administration of erythropoietin for the treatment of anemia of prematurity,hyperoxia,hypoxia, acidosis, exposure to light and vitamin E deficiency.

The risk of developing ROP also appears to be related to longitudinal weight gain and serum concentrations of IGF-1 and IGFBP-3.

International Classification of ROP

Four features are evaluated:

- Zone
- Stage
- Extent
- Presence or absence of plus disease.

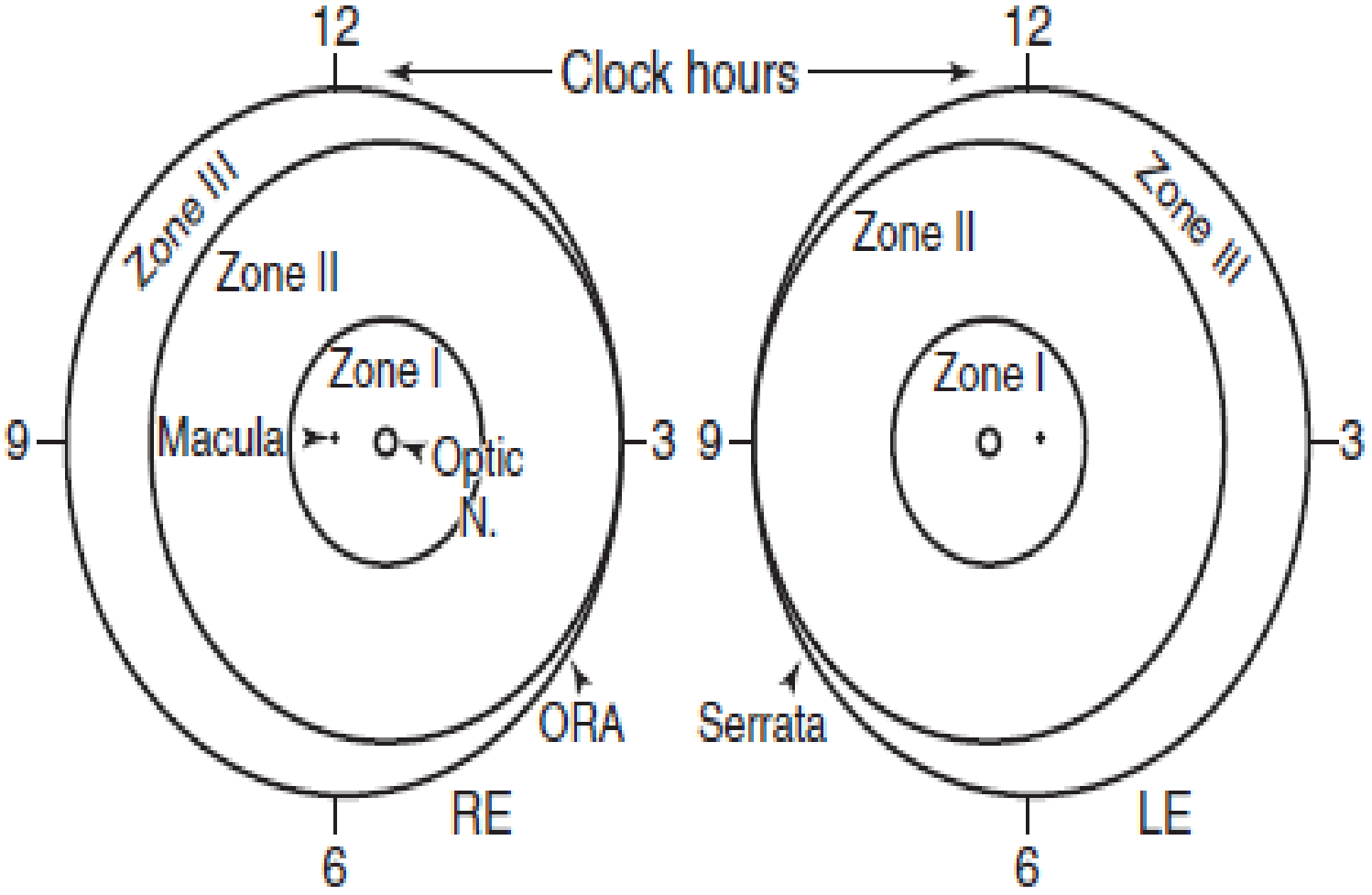
Anterior-posterior location

Zone

- Zone I: retinal area within a circle centered on the disk and with a radius of twice the estimated disk-foveal distance

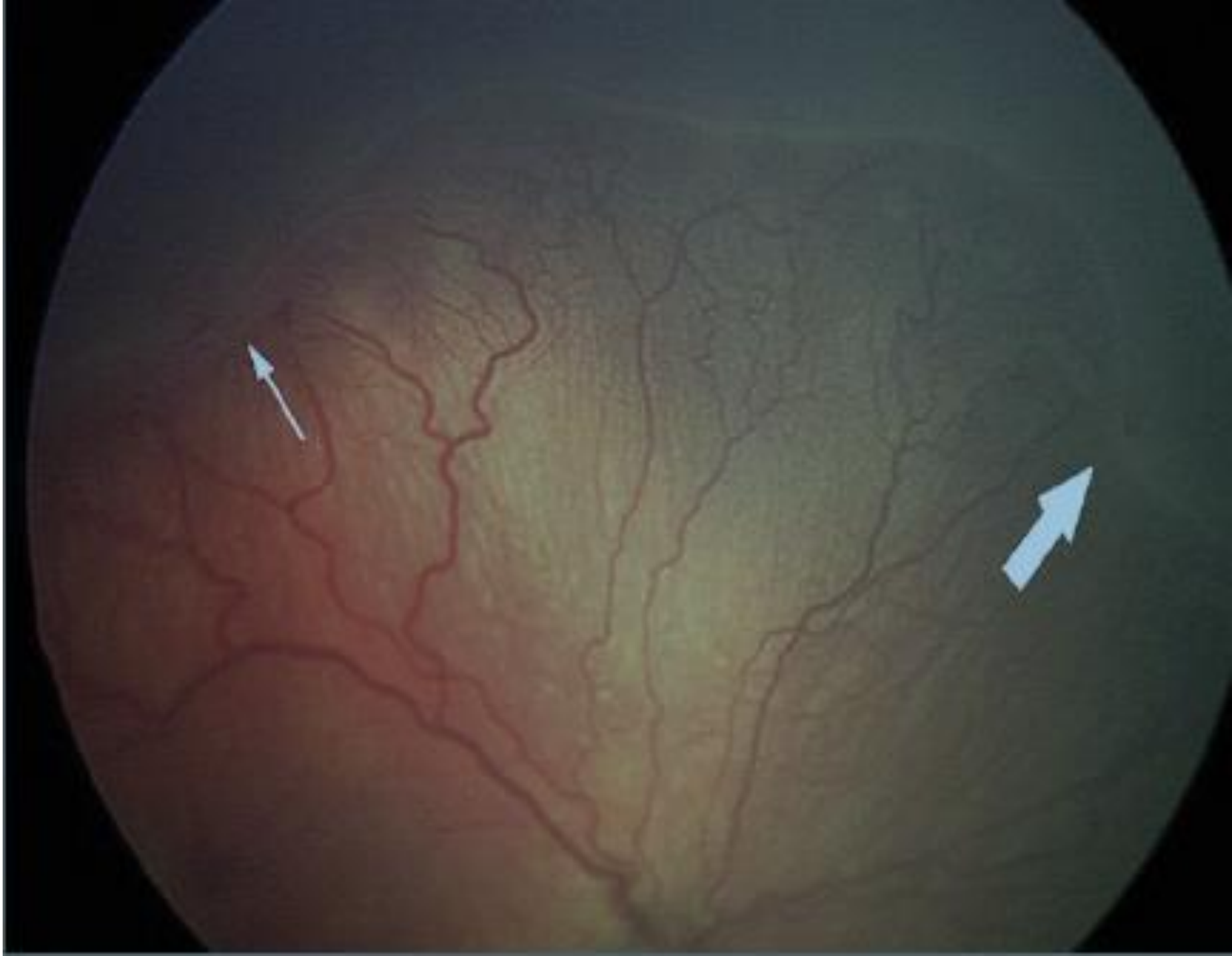
- Zone II: retinal area extending from the edge of zone I to a circle with a radius from the disk to the nasal ora serrata

- Zone III: a crescent-shaped retinal area extending beyond zone II to the temporal ora serrata


12
Clock hours
12
Zone III
Zone II
Zone I
Macula
Optic
N.
9
3
ORA
RE
6
Zone II
Zone III
Zone I
9
3
Serrata
LE
6

Severity, Stage of ROP

- Stage 1: a thin, sharp line of demarcation between vascularized central retina and more peripheral avascular retina
- Stage 2: an intraretinal elevation (ridge) at the junction between vascularized and avascular retina
- Stage 3: a ridge with fibrovascular extension into the vitreous
- Stage 4: partial retinal detachment; 4A, does not involve the fovea; 4B: involves the fovea
- Stage 5: total retinal detachment



Extent

The extent of disease is described by dividing the retinal surface into 30º sectors, similar to the hours of a clock.

As many as 12 clock hours can be affected, and the stage of retinopathy can vary among sectors.

Posterior pole vascular abnormalities

- Plus disease:

Presence of dilated and tortuous vessels of the posterior pole present in two or more quadrants

- Preplus disease:

Abnormal vascular dilation and tortuosity that is insufficient for diagnosis of plus disease present in two or more quadrants

Severity, AP-ROP (rush disease)

Aggressive posterior ROP recognized by:

1. marked dilation and tortuosity of posterior pole vessels
2. difficulty in documenting the stage of ROP at junction between vascularized and avascular retina
3. occurs in zone I or zone II

Threshold ROP

ROP is defined as five contiguous clock hours or eight total clock hours of stage 3 and plus disease in zone 1 or 2.

Prethreshold ROP

Defined as one of the following:

- ROP at any stage less than threshold in zone 1
- Stage 2 and plus disease in zone 2
- Stage 3 without plus disease in zone 2
- Stage 3 with plus disease in zone 2 but with fewer clock hours of stage 3 than required to meet threshold

Screening for ROP

Natural history

The course of ROP is more correlated with postmenstrual age (PMA) than postnatal age.

The condition typically begins about 34 weeks' PMA, although it may be seen as early as 30 to 32 weeks. ROP advances irregularly until 40 to 45 weeks' PMA but resolves spontaneously in the majority of infants.

Two-thirds of infants with birth weight ≤1250 g developed ROP, treatment for severe disease was needed in only 6 percent .

Regression of ROP also depends upon PMA and the location of disease.

Screening criteria

In the United States, the recommended guidelines for detection of serious ROP indicate:

diagnostic examinations should be performed on all infants with birth weight ≤1500 g or GA of less than 30 weeks, as well as those with birth weight between 1500 g and 2000 g or a GA of more than 30 weeks whose clinical course places them at increased risk for ROP (as determined by the attending clinician)

Screening criteria

In Latin American countries and in urban centers of newly industrializing countries in Asia and Eastern Europe, the same screening criteria likely do not apply, because evidence suggests that larger, older babies are also at risk in these settings, and national or regional guidelines need to be developed.

Screening criteria

less than %10 of infants who are screened require treatment.

Incorporation of postnatal risk factors into the screening guidelines may increase the yield of screening.

Models using various combinations of gestational age, birth weight, postnatal weight gain, and serum IGF-1 levels to predict increased risk of severe ROP have been developed. In initial validation studies, the sensitivity of these models approaches 100 percent, but the specificity ranges from 32 to 84 percent. The use of such models to screen for increased risk of severe ROP has the potential to reduce the number of infants requiring ophthalmologic examinations. However, these methods require additional validation in other populations before changes to the current screening recommendations can be made

Screening criteria in Iran

براساس پروتکل کشوری مصوب کارگروه کشوری رتینوپاتی نوزادان نارس

هر نوزاد نارس متولد شده با سن حاملگی کمتر از ۳۴ هفته ویا وزن کمترومساوی ۲۰۰۰ گرم نیازمند غربالگری میباشد.

نوزادان بزرگتر از مورد فوق باتشخیص فوق تخصصی نوزادان یا متخصص کودکان ارجاع میگردند.

Evaluation schedule

Initiate screening examinations at four to eight weeks after birth, depending upon the GA (at 30 weeks' PMA for infants born at 22 to 26 weeks and at 4 weeks of chronologic age for children born at ≥27 weeks).

Evaluation schedule

زمان اولین معاینه بعد از تولد بر اساس سن حاملگی مشخص میگردد

نوزادان متولد شده با سن حاملگی کمتر از ۲۷ هفته در هفته ی ۳۱ سن اصلاح شده به شرط اینکه هیچگاه بیشتر از ۶ هفته پس از تولد نباشد

نوزادان ۲۷ هفته و بزرگتر در ۲۸ روزگی پس از تولد

Evaluation schedule

Additional examinations are performed at intervals of one to three weeks until the retinal vessels have completely grown out to the ora serrata. If ROP develops, the eyes are examined more frequently, depending upon the severity of disease and rate of progression

Discontinuation of examination

Screening examinations continue until ROP regresses and the vasculature matures.

Screening examinations can be discontinued when any of the three signs listed below is identified

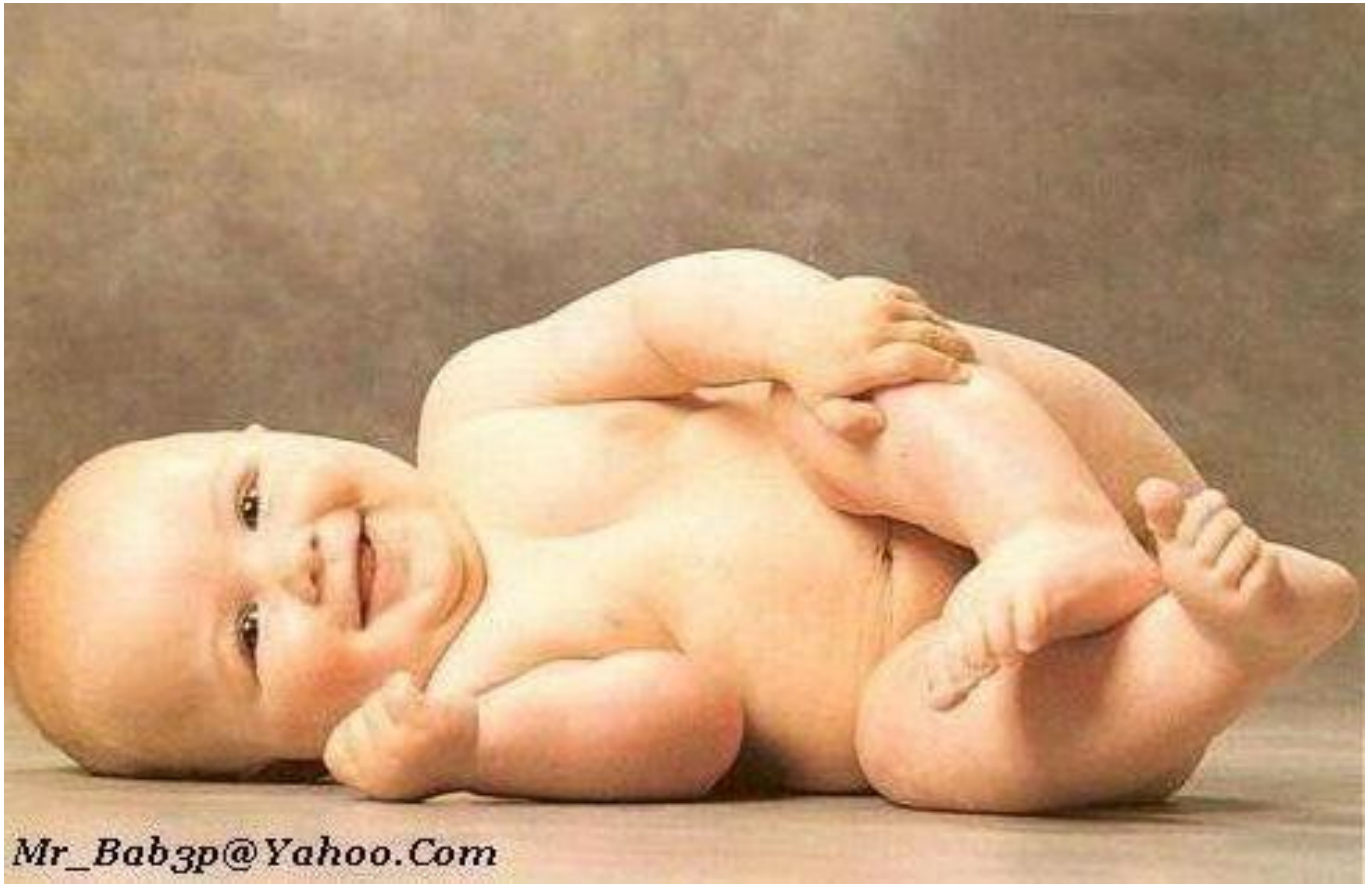
- Lack of development of prethreshold (stage 3 ROP in zone 2 or any ROP in zone 1) or worse ROP by 45 weeks' postmenstrual age
- Progression of retinal vascularization into zone 3 without previous ROP in zone 1 or zone 2
- Full vascularization

Detection of Serious Disease

- Coordination of this schedule among neonatology, ophthalmology, and nursing is essential.

- If outpatient appointments are not kept or proper information is not conveyed when the baby is transferred to another facility, potentially treatable disease may be missed, with disastrous consequences.

Treatment of ROP



Indication of treatment

Peripheral retinal ablation for eyes with serious ROP can prevent progression to blinding disease

Threshold

Prethreshold

Modalities of treatment

- Cryotherapy for ROP

  Results documented a beneficial effect on both visual function and structure in eyes assigned to receive cryotherapy.

- laser photocoagulation was more likely to be used than cryotherapy because of the advantages of using laser, including less discomfort intraoperatively and postoperatively, less pigmentation resulting from the therapy, and direct visualization of the area during treatment.

Modalities of treatment

- Follow-up studies of vitreoretinal surgical treatment for advanced disease (i.e., stages 4 and 5) have shown mixed results that very likely depend on whether the detachment is total and/or long-standing.
- Use of anti–vascular endothelial growth factor (VEGF) drugs (Bevacizumab), good results reported in babies with ROP However, clinical trials must be undertaken.

Prevention of ROP

Interventions to prevent or limit the progression of ROP have been unsuccessful, further evaluation may be needed.

Antioxidant therapies, such as

vitamin E

D-penicillamine

limited exposure to light, have been tested.

Supplemental oxygen therapy

Insulin-like growth factor-1(IGF-1)

Insulin-like growth factor-1 (IGF-1)

IGF-1 was deficient in premature infants almost immediately after birth,

children who were slow to recover to normal serum levels of IGF-1 were more likely to develop ROP.

In several careful follow-up studies:

determining the rate of weight gain, essentially a noninvasive surrogate for growth hormone level, was effective in stratifying the risk of developing serious ROP even before the retinopathy is manifest.