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SHORT REVIEW ARTICLE

EMBRYOLOGICAL DEVELOPMENT OF RETINA AND ITS CORELATION WITH RETINOPATHY OF PREMATURITY

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INTRODUCTION:

DEFINITION:

- Retinopathy of prematurity is a mulifactorail vasoproliferative retinal disorder primarly affecting premature infants weighing < 1500 gm or born < 28wk of gestation.
- Smaller baby and lesser the duration of gestation greater the posibility of retinopathy of prematurity.
- lowbirht weight α 1 / ROP

HISTORY:

- THEODORE TERRY a pathologist & ophthalmologist from texas in 1942 described ROP as retrolental fibroplasia in a specimen of enucleated eye for retinoblastoma.
- HEALTH first sugested the term RETINOPATHY OF PREMATURITY IN 1952.
- CAMPBELL of australia in 1952 first brought to notice the relation of high O2 suplementation.
- KINSEY conducted first randomised study and established incidence of lowbirth weight α 1 / ROP

PATHOGENESIS:

- NORMAL: At 16 wk gestation mesenchyma comes out from optic disc to grow centrifugaly to reach nasal retina at 36 wk & distal temporal retina by 40 wk gestation.
- A fully vascularised retina is resistent to hypoxia

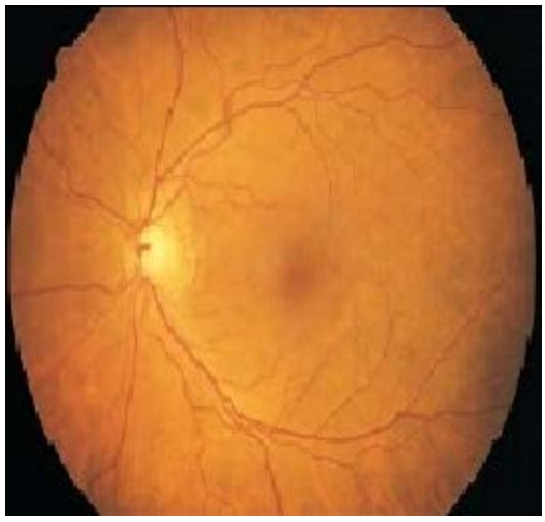

Figure 1: NORMAL ANATOMY OF RETINA

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PATHOGENISIS OF ROP:-

At early stage of retinal vascularisation

↓

High O2 supplementation

↓

Damage to endothelium of growing capillaries

↓

mesencyhmal growth stops & A-V shunts form to make demarcation line

↓

No vasculogenesis for few days to months

↓

↓ ↓

- **REGRESSION:-**
- Vasculogenesis restarts with normal cell diferentiation of capillary endothelium
- Normal vascularisation of rest of retina ,occurs in 90 % of cases.

PROGRESSION:-

Extra retinal neovascular proliferation occurs as primitive cells multiply & break through internal limiting membrane.

This pathological process occurs and progress in 10 % of cases.

CLASSIFICATION:

LOCATION

- Zone I (posterior pole or inner zone):- A circle with radius extending from optic disc to twice the disc -macula distance
- Zone II (middle zone): From zone1 peripherally to the edge of retina on nasal side and around to near temporal equator
- Zone III (outer zone): Residual crescent of retina anterior to Zone II, least retina anterior to Zone II, least vascularized and most frequently involved ,and most frequently involved in ROP.

LOCATION OF ZONES IN ROP.

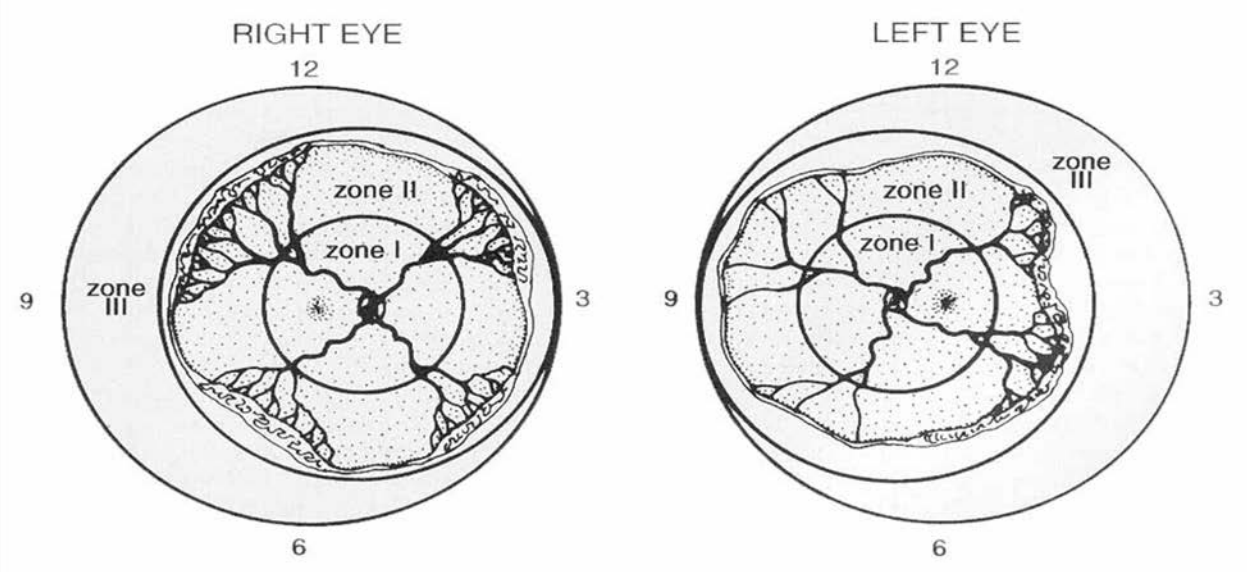

Figure 2:

STAGES OF ROP:

Stage i

Demarcation Line

- A line that is seen at the edge of vessels, dividing the vascular from the avascular retina.
- Retinal blood vessels fail to reach the retinal periphery and multiply abnormally where they end

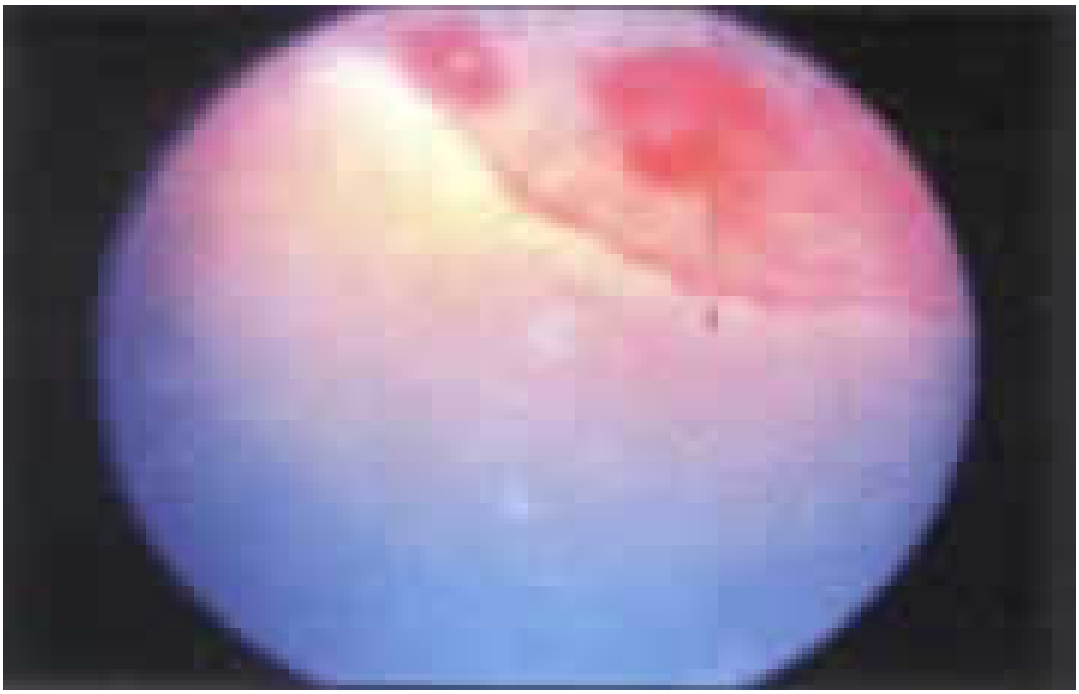

Figure 3:

STAGE ii ROP:

Ridge

- The line structure of stage 1 acquires a volume to form a ridge with height and width.

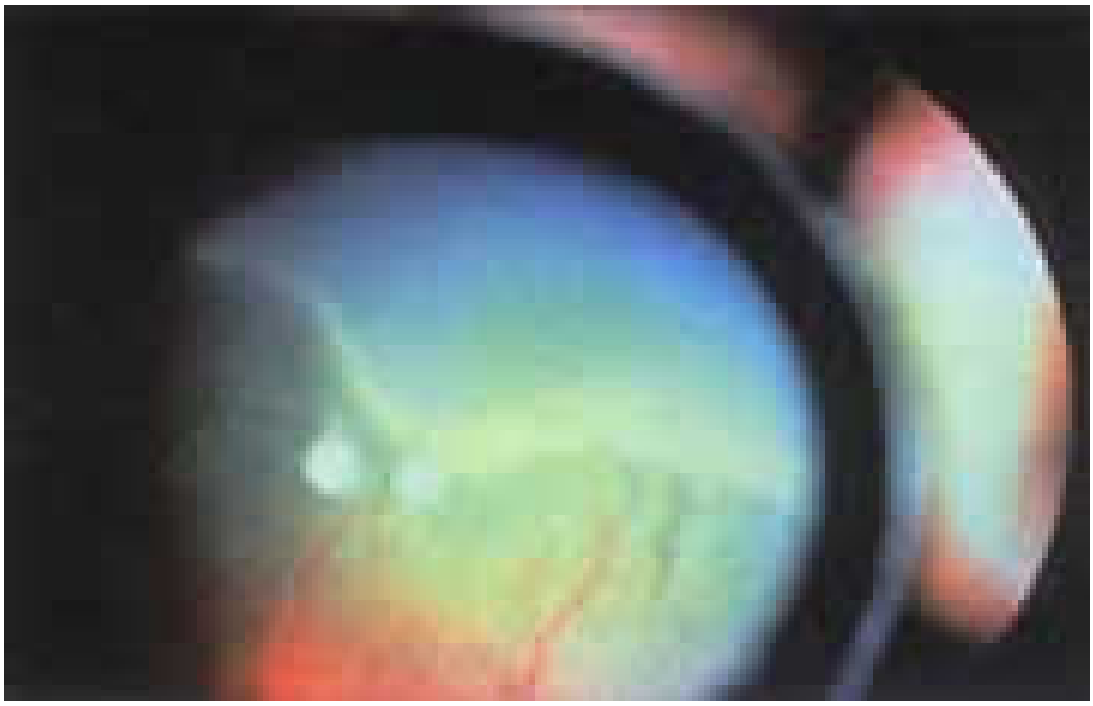

Figure 4:

STAGE III OF ROP:

Ridge with extra-retinal fibrovascular proliferation

- The ridge of stage 2 develops more volume and there is fibrovascular proliferation into the vitreous.
- This stage is further subdivided into mild, moderate and severe, depending on the amount of fibrovascular proliferation

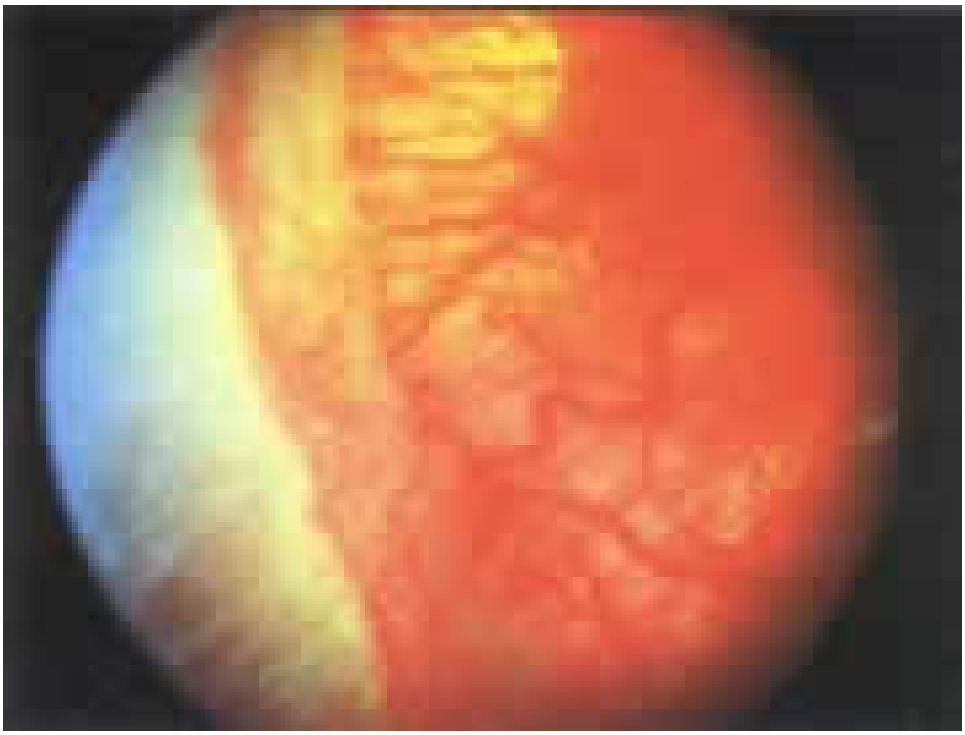

Figure 5:

STAGE iv OF ROP:-

- Partially detached retina.
- Traction from the scar produced by bleeding, abnormal vessels pulls the retina away from the wall of the eye.

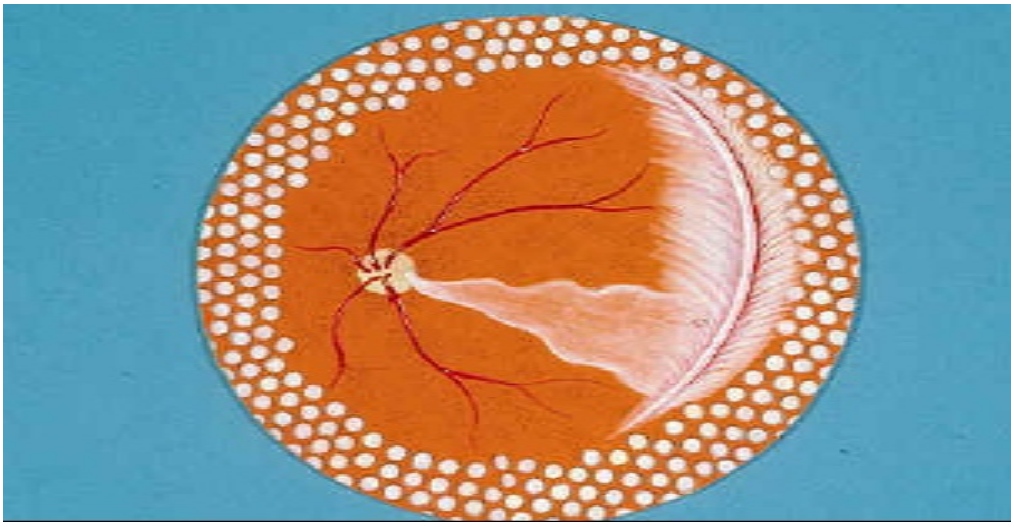

Figure 6:

STAGE v OF ROP:

- Completely detached retina and the end stage of the disease.
- If the eye is left alone at this stage, the baby can have severe visual impairment and even blindness.

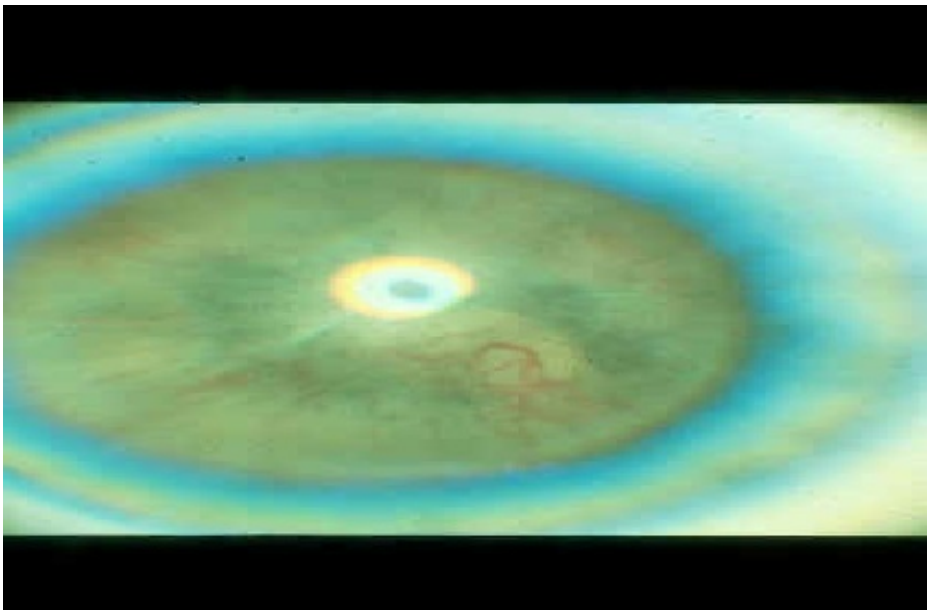

Figure 7:

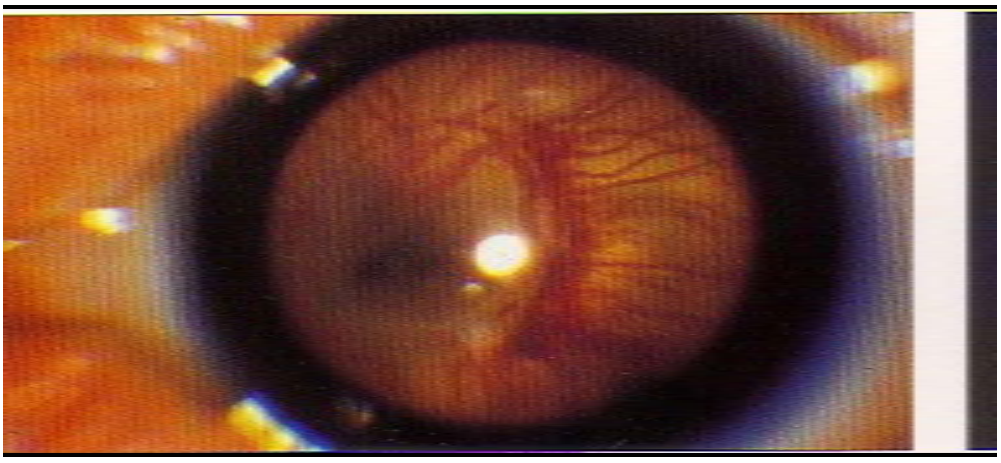

Figure 8: EXTENT OF ROP:- Recorded in "clock hours " on each eye in the appropriate zone

PLUS DISEASE:

- Sign of vascular activity which can accompany any stage
- Indicates greater likelihood of progression to stage III
- Characterization by tortuosity and engorgement of retinal vessels, vascular engorgement and rigidity of iris and vitreous haze

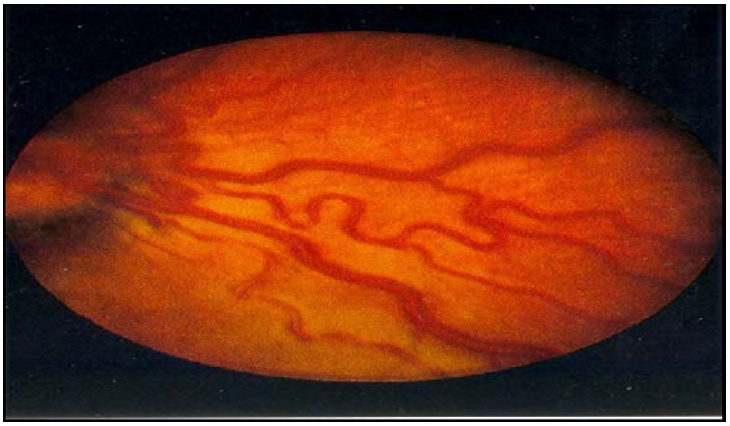

Figure 9:

PRE THRESHOLD & THRESHOLD ROP

1) Pre-threshold ROP threshold ROP
   ROP with increased likelihood of progression to retinal detachment if left untreated (zone I any stage or Zone II, "plus disease" with stage II or III).
2) Threshold ROP
   5 or more contiguous or 8 cumulative clock hours of stage III "plus disease "in either Zone I or II.

RISK FACTORS FOR ROP:

- GESTATIONAL AGE < 28 wks
- LOW BIRTH WEIGHT < 1500 gms
- HIGH O2 SUPPLEMENTATION
- SEPSIS, MULTIPLE BLOOD TRANSFUSIONS,
- SHOCK,MULITPLE PREGNANCIES,
- LOW pH, UV THERAPY, HYPOXIA
- ANEMIA, HEART DISEASE, ETC.

SCRENING & DIAGNOSIS:

- All newborns <1500g or ≤28weeks gestation at birth regardless of O2 supplementation
- Selected newborns between 1500-2000g or 32-34 weeks who have had unstable course.
- At 4-6 weeks age (or at 31weeks post conceptional age whichever comes last) should be considered for **evaluation by ophthalmologist.**

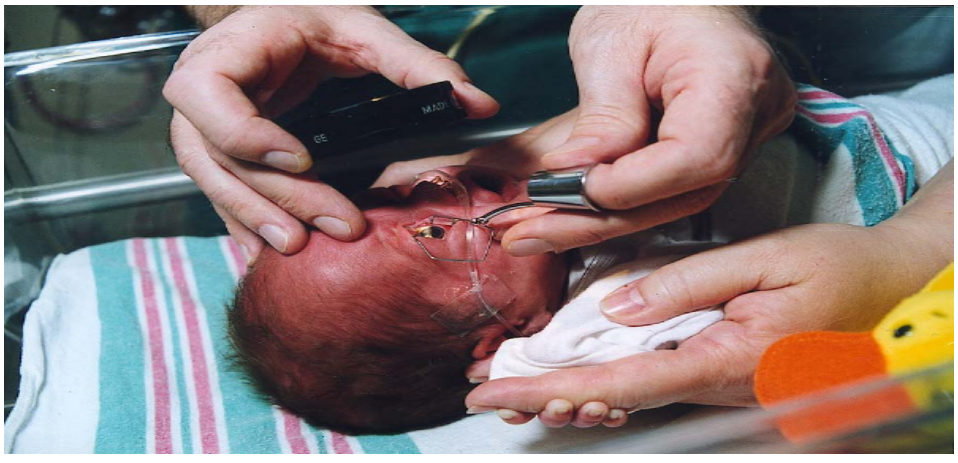

Figure 10:

TREATMENT OF ROP:-

- CRYOTHERAPY.
- LASER PHOTOCOAGULATION.
- SCLERAL BUCKLENING.
- VITREO-REITNAL SURGERY.
- Intravitreal injection of bevacizumab (Avastin)

RECENT ADVANCES IN ROP:

- X linked familial exudative vitreo retinopathy a mutation in Norries disease gene suspected in pathogenesis of ROP.
- Down regulation of VGEF by O2 supplementation used therapeutically.

- Mg & Cu deficiency ,liposomal supply of super oxide dismutase an antioxidant found to be beneficial in ROP.
- Vit E, artificial surfactant supplementation found to be beneficial in ROP.

COMPLICATIONS OF ROP:

- MYOPIA.
- STRABISMUS.
- AMBLYOPIA.
- GLAUCOMA.
- SEVERE VISUAL LOSS.
- COMPLETE BLINDNESS.

FINAL OUT COMES OF ROP:

- STAGE I & II:- Spontaneous regression by 16 wk of post natal age, Treatable abnormalities:- Such as strabismus, amblyopia and refractive errors may occur.
- Stage III and IV:- strabismus, amblyopia and glaucoma may occur . Retinal detachment possible. Limited correctable acuity to total blindness

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