Rationale of Retinal Detachment Management

By

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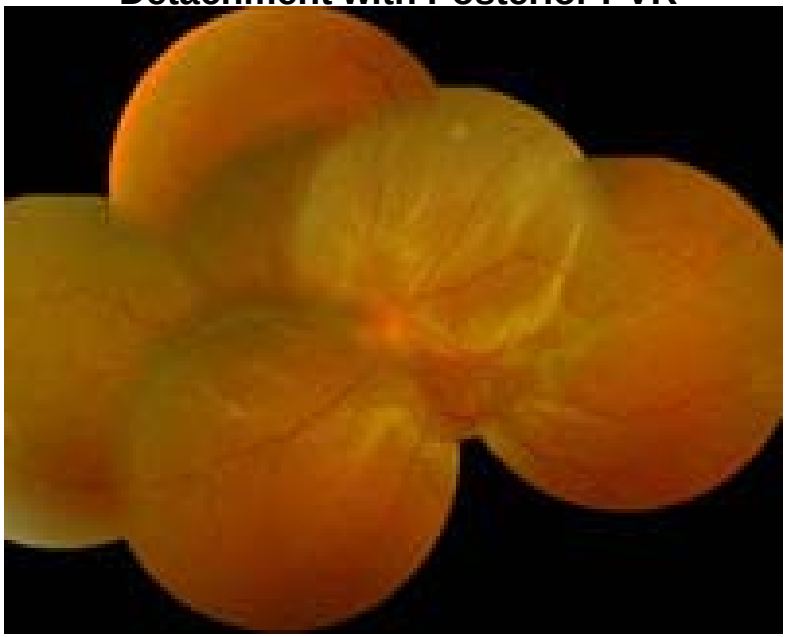
Introduction

- **Retinal detachment occurs when fluid accumulates between the sensory retina and the retinal pigment epithelium unlike retinoschisis or choroidal detachment where retina is elevated but not separated from the RPE.**

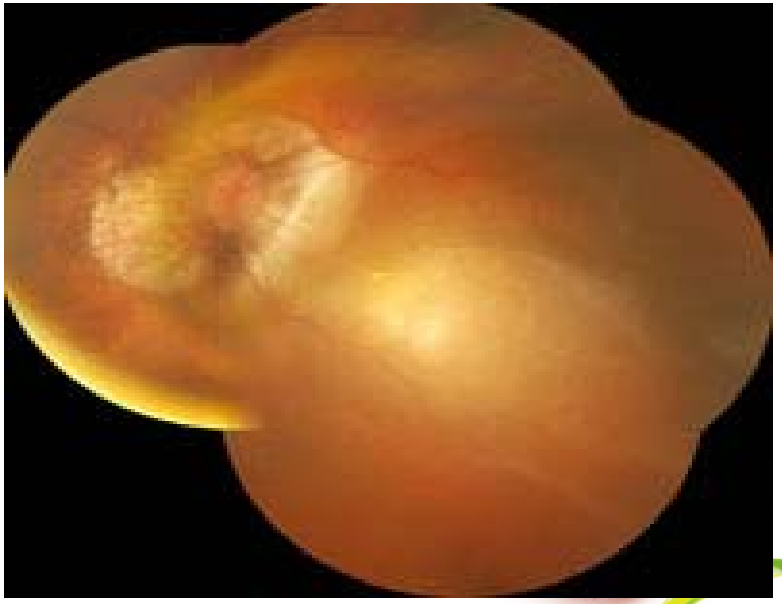
Bullous Superior Nasal Detachment

Detachment with Posterior PVR



Lattice with Atrophic holes with Detachment

Myopic posterior Staphyloma with detachment



CLASSIFICATION

1. **RHEGMATOGENOUS :- fluid from vitreous cavity enters through retinal break in potential subretinal space.**
2. **TRACTIONAL :-Fibroproliferative membranes that mechanically pull the retina away from the underlying RPE.**
3. **EXUDATIVE :- RD caused by retinal or choroidal conditions that disturb RPE or blood retinal barrier, allowing fluid to build up in subretinal space.**

CLASSIFICATION

1. Rhegmaogenous :- detached retina is typically corrugated or bullous and is convex towards pupil, prescence of rhegma or break
2. Tractional :- detached retina is smooth and concave toward pupil, does not extend till ora.
3. Exudative :- Fluid shift

CLASSIFICATION

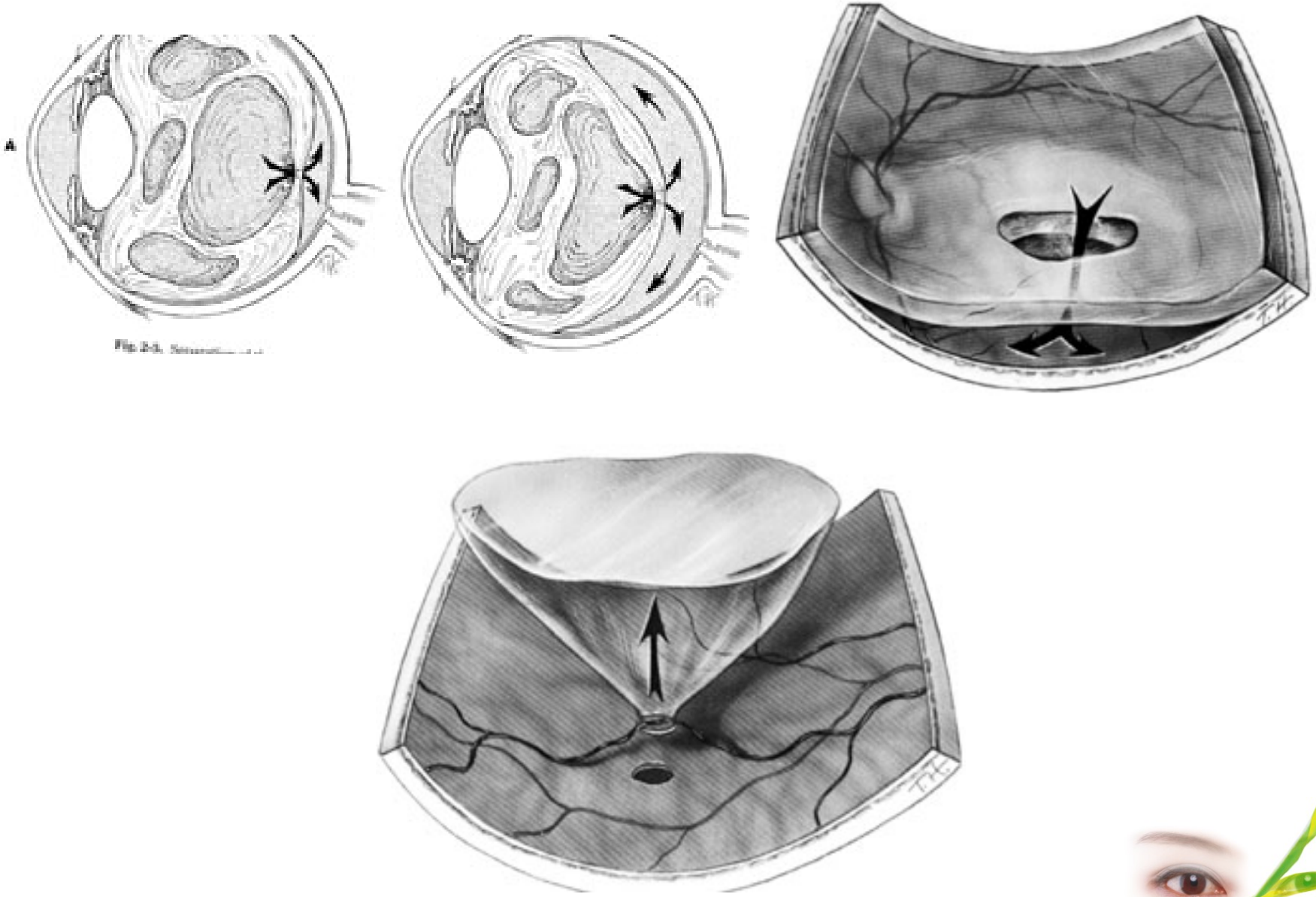
- Treatment differs
- Rhegmatogenous : - Scleral Buckling
- Tractional :- Vitrectomy
- Exudative :- Medical

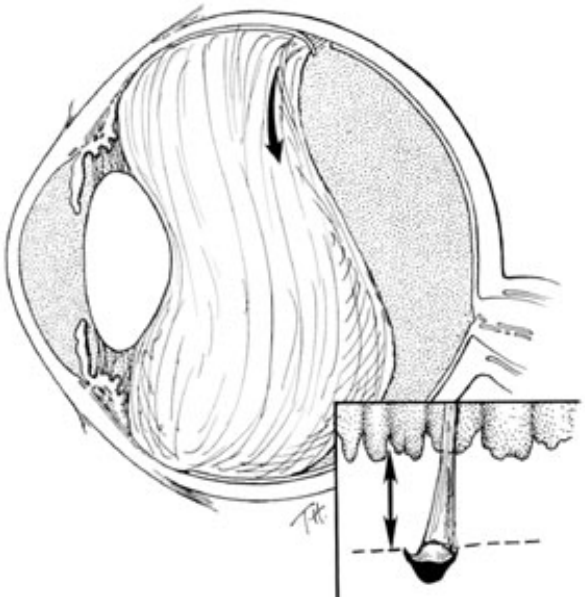
Rhegmatogenous Retinal Detachment Pathogenesis

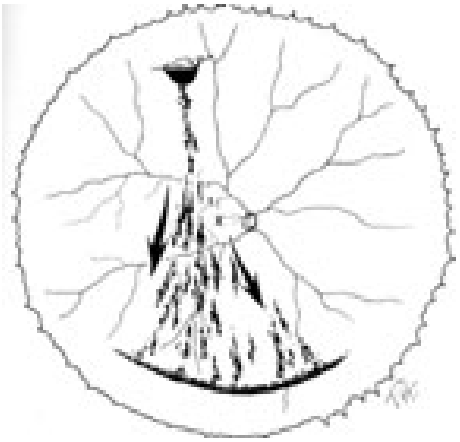
- Acute posterior vitreous detachment with liquid vitreous and retinal tear leads to retinal detachment.
- PVD occurs in elderly patients,aphakics, myopes, following cataract surgery, yag laser, trauma , intraocular inflammation or vitreous haemorrhage.

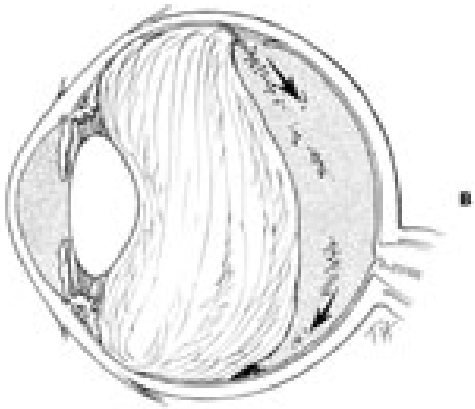
PVD

- **Acute Symptomatic PVD may be followed in 5 to 7 % of patients with acute retinal tear, and if PVD is associated with vitreous haemorrhage, incidence may be 70% of retinal breaks.**









PREDISPOSING PERIFERAL FUNDUS LESIONS

- **LATTICE DEGENERATION: 0.3 TO 0.5 % of lattice degeneration can lead to retinal detachment. Incidence of lattice degeneration is 7% in normal population, small atrophic holes are seen in 25% of all lattices. Atrophic holes rarely lead to detachments.**
- **Retinal detachment is caused by atrophic round holes in30 to 45% of lattice degeneration, whereas 55 to 70% have it due to horse shoe tears at the edge of lattice degeneration.**

LATTICE DENERATION

- **70% of retinal detachments due to atrophic holes in lattice occur in young people (<40 years of age) with myopia, whereas 90 % of retinal detachment due to horse shoe tears at the edge of lattice occur in people above 50 only 43% of the detachments are associated with myopia.**

PREDISPOSING LESIONS MYOPIA

- Myopia has higher risk of retinal detachment than emmetrope(0.7% to 6% compared to 0.06% for emmetropes).
- 30% of all detachments have myopia.
- Detachment in myopia due to : premature vitreous liquefaction and detachment, more incidence of lattice deg, possibly thin periferal retina

PREDISPOSING LESIONS SENILE RETINISCHISIS

- 2 types of senile retinoschisis : reticular and typical, reticular type : 23% had outer retinal layer holes on autopsy, Byer's study : 16 % of retinoschisis had outer layer holes, and 58% of these eyes had localized retinal detachment, rarely it extends to rhegmatogenous retinal detachment and posterior extension of schisis in the macula also does not occur

PREDISPOSING LESIONS CATARACT EXTRACTION

- 40% of all detachments occur in aphakic or pseudophakic eyes, Incidence in ICCE eyes is 2 to 5 %, ECCE : 0 to 3.6%, PHAKO 0.8 to 1.2%, incidence rises three fold after Yag capsulotomy , and is 20% after vitreous loss, Cataract in myopic eyes ,incidence is 6 %,rate goes with high myopia and one study reported 40 % in patients with > -10.0D.
- 50% of retinal detachments occur in 1st year after cataract surgery ,and thereafter it remains higher than phakic eyes.

PREDISPOSING LESIONS CATARACT EXTRACTION

- Congenital cataract surgery, incidence is more, long and bilateral.
- Detachments : bullous, spread faster and involves macula, thin ,multiple,flap tears at the vitreous base,

PREDISPOSING LESIONS: OTHER OCULAR SURGERY

- **Penetrating Keratoplasty 2 to 4% especially when anterior vitrectomy is required**
- **Pars plana vitrectomy 3 to 6% due to traction on vitreous base , or uncut vitreous incarcerated in sclerotomies, repeated entry ,exit of instruments, giant tear when vitrectomy is incomplete especially beginners, measures to reduce are free flow of saline at the end from sclerotomy,**

PREDISPOSING LESIONS: OTHER OCULAR SURGERY

- **SQUINT SURGERY: Inadvertent needle perforation of the globe, leading retinal holes, vitreous liquefaction and retinal detachments**
- **INTRAOCULAR PERFORATION by anesthetic block**
- **Placement of superior rectus bridle suture**

PREDISPOSING LESIONS: TRAUMA

- Blunt trauma constitute about 1/3 of all retinal detachments
- 75% of all traumatic detachments are due to retinal dialysis, typically due to blunt trauma ,more common in males,
- PENETRATING trauma leads to fibroproliferative membranes leading to tractional and combined detachment

PREDISPOSING LESIONS: COLOBOMA OF CHOROID & RETINA

- Retinal detachment occurs in patients with coloboma choroid and disc and is treatable. Breaks occur within coloboma or outside coloboma in general retina.

PREDISPOSING LESIONS: INTRAOCULAR INFLAMMATION INFECTION

- Acute Retinal Necrosis :- 50 to 75% develop retinal detachment
- CMV Retinitis :15 to 35% patients develop Retinal detachment
- Toxoplasma, toxocara, pars planitis can be complicated by retinal detachment

PREDISPOSING LESIONS: SYNDROMES

- **Wagner- Stickler Syndrome:- Optically empty vitreous cavity with peripheral lattice degeneration and retinal detachment**
- **Goldmann Favre Syndrome:- cataract, with optically clear vitreous cavity, peripheral pigmentary retinal degeneration, lattice deg, macular and peripheral retinoschisis and retinal detachment, autosomal recessive condition**
- **X linked Juvenile Retinoschisis :- rarely associated with retinal detachment.**

PREDISPOSING LESIONS: MARFAN'S SYNDROME

- Axial myopia, ectopia lentis, and retinal detachment
- One study showed that Marfan's with normal axial length did not have higher incidence of retinal detachment
- Homocystinuria:- Ectopia lentis and similar incidence of retinal detachment like Marfan's.

TRACTIONAL RETINAL DETACHMENT

- Proliferative Diabetic Retinopathy
- Sickle Cell Disease
- Eales' disease
- FEVR
- ROP

EXUDATIVE RETINAL DETACHMENT

- VKH Syndrome
- Choroidal tumors
- Inflammatory Posterior Scleritis
- Idiopathic CSR
- Idiopathic Uveal Effusion Syndrome
- Nanophthalmos
- Malignant Hypertension, Toxemia of pregnancy
- Disseminated Intravascular Coagulopathy
- Collagen Vascular Disease
- Retinal Telengiectasia

MISCELLANEOUS CONDITIONS

- Optic Nerve Pit
- Morning Glory syndrome

PRINCIPLES OF TREATMENT

- Permanent closure of the hole/holes
- Relieving the traction on holes
- Techniques
- SCLERAL BUCKLING
- PNEUMORETINOPEXY
- VITRECTOMY with gas temponade
- VITRECTOMY with Silicone oil temponade
- Combination

HISTORICAL BACKGROUND

- For almost 50 years, scleral buckling was the mainstay of treatment, though it was not the first treatment ,but the most successful treatment.
- Retinal hole was identified immediately after advent of ophthalmoscope, but it was not attributed as a causative factor for retinal break until Leber suggested it to be a cause in retinal detachment with vitreous bands

HISTORICAL BACKGROUND

- **Gonin first successfully treated retinal detachment by ignipuncture, first described in 1921 , wherein sclera was incised on the retinal break and Paqulin cautery instrument was introduced over the break 3 to 4 mm deep for 2 to3 sec. The procedure was not easily accepted, but eventually gained acceptance as it showed modest success and it proved that closing the retinal break is important in treatment**

HISTORICAL BACKGROUND

- Ignipuncture was followed by chemical cautery and then diathermy in the scleral bed. Then came scleral shortening procedure as myopia was thought to be responsible for detachment , shortening of scleral length seemed logical answer, and it produced the buckling effect on the break, so came in buckling element initially polyviol and then silicone buckles

HISTORICAL BACKGROUND

- Diathermy and scleral buckle (implant) remained for long time, then came cryopexy in 1970 after cryo was used for intracapsular cataract operation.
- So , cryopexy with exoplant became standard treatment.
- Intraocular air injection was undertaken as early as 1911, but Norton popularized it in 1960.
- Machemer started vitrectomy in 1970 and has come a long way since then

PHYSIOLOGIC BASIS OF ATTACHMENT OF NORMAL RETINA

- Retinal Attachment remains due to hydrostatic pressure , acid mucopolysacchrides between RPE and photoreceptors, presence of interdigitating RPE projections containing actin filaments,RPE pump

CLINICAL PRESENTATION OF RRD

- **Symptoms:- Flashes of light, floaters, field loss, loss of acuity, progressive visual field defects**
- **Signs:- Visual acuity, IOP , aqueous flare and cells; identification of all retinal breaks, extent of retinal detachment, various features like fixed folds, subretinal or epiretinal membrane, macular status, choroidal detachment, preop. detailed examination is a must .**

LINCOFF'S RULES

- For the detachments involving superonasal or superotemporal quadrants, the obscure retinal break is found at or near the most superior border of the detachment.
- If detachment involves both superior quadrant, break will be at midline,
-

LINCOFF'S RULES

- For inferior retinal detachments, breaks would be inferior, usually on the side where detachment is higher
- For inferior bullous detachment, break is usually above horizontal meridian.

GOALS OF SURGERY

- **Preservation or restoration of central vision is the primary goal. Indeed surgery would not be indicated if there is peripheral detachment and macula would not be thratened**
- **Closure of retinal breaks is the goal of surgery and relief of inward traction on the retina is another goal of surgery**

PRINCIPLES OF SCLERAL BUCKLING

- Closes the break by bringing the RPE in apposition to sensory retina
- By indentation it reduces inward traction on the retina though these forces are still present.
- Cryopexy or diathermy or photocoagulation closes permanent chorioretinal scarring around the break and closes it.

PRINCIPLES OF SCLERAL BUCKLING

- **Drainage of subretinal fluid :- reduces the volume of eye so buckling is possible, brings retina in contact with RPE ,primarily reattaches retina.**
- **STEPS IN SB:- localization of retinal breaks, cryopexy, drainage of subretinal fluid, applying scleral sutures and buckle, encirclage , injection of intraocular air or gas**
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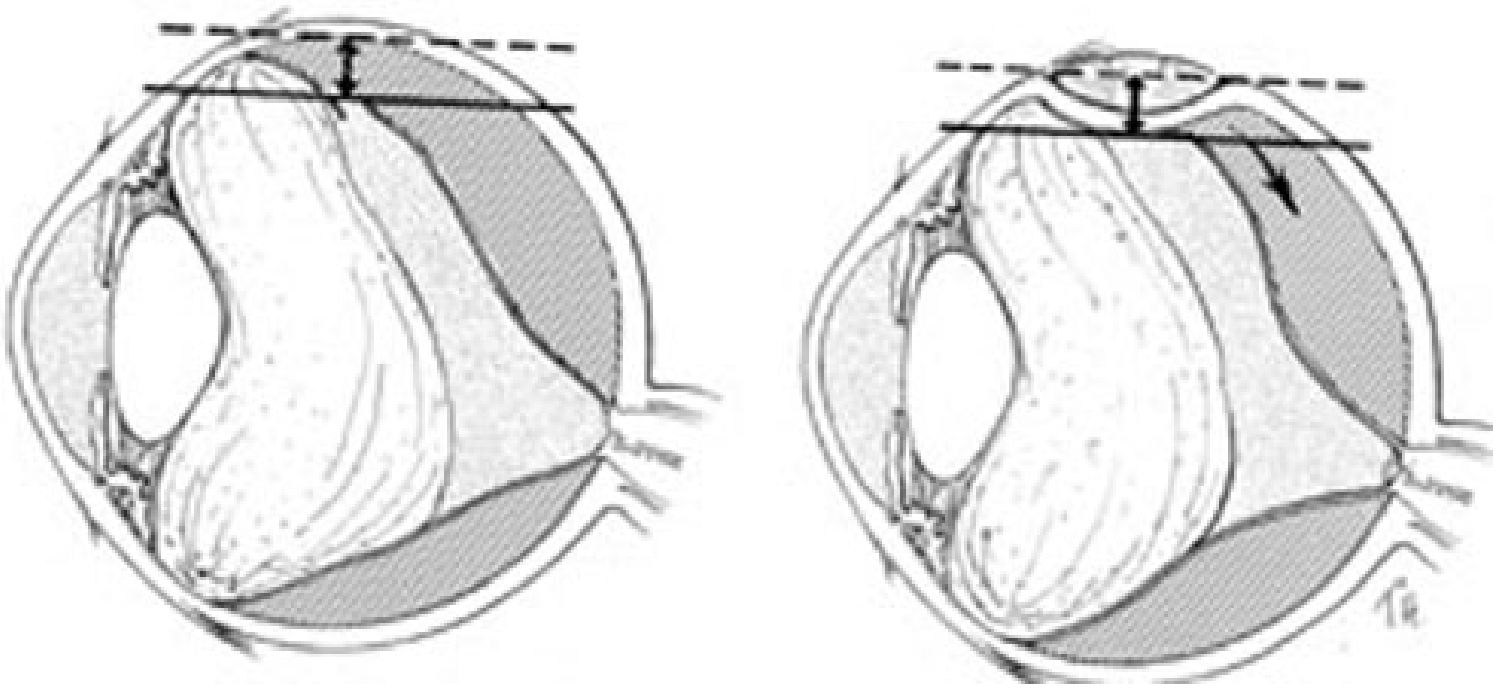

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Post Scleral Buckling

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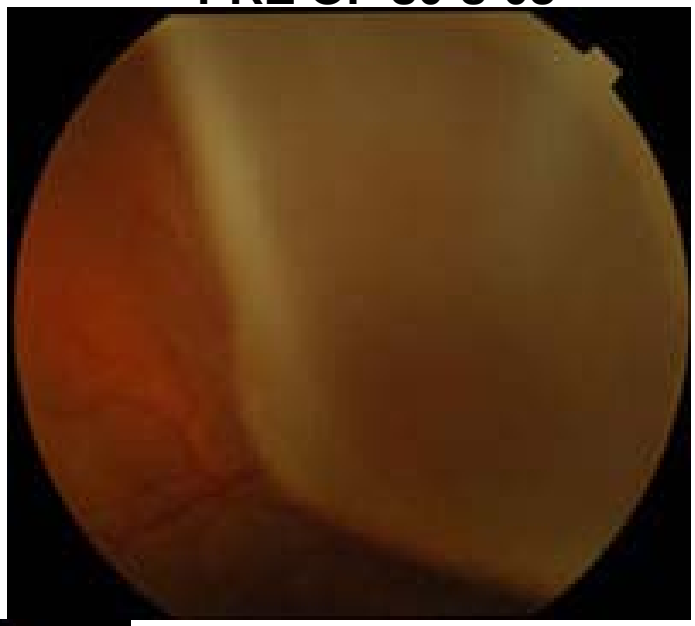
PRE OP 30-8-05



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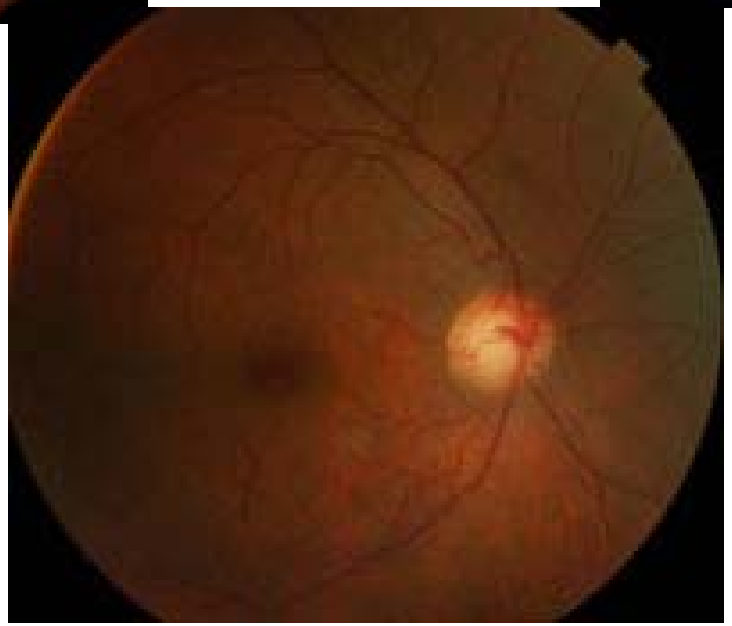

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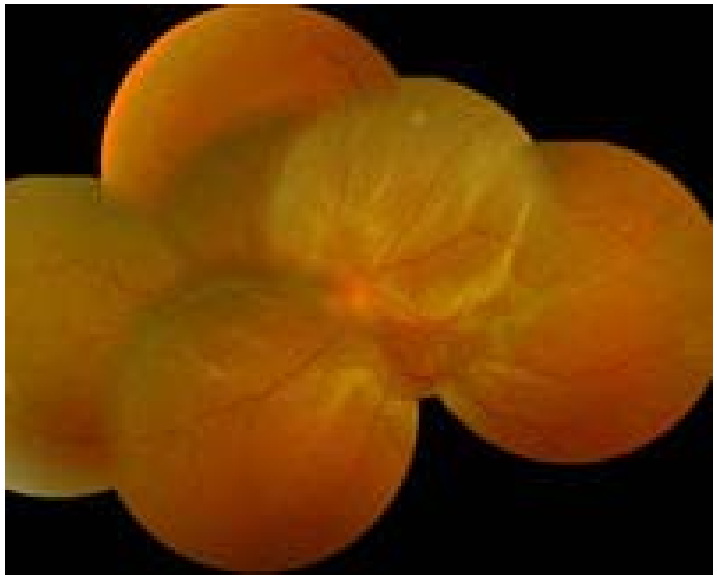
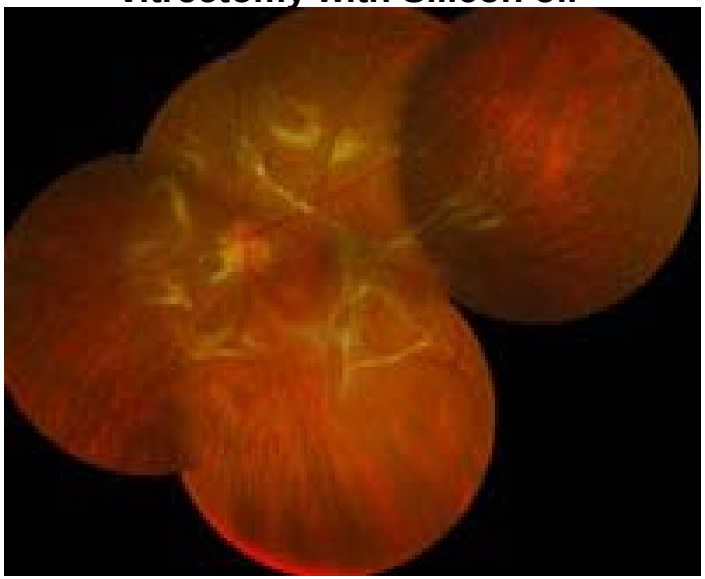
Putting 'EYE' before 'I'

Ref No:- 25319

PRE OP 05-01-06 Detachment with Posterior PVR



POST OP 05-01-06 Macular Pucker follwing vitrectomy with Silicon oil



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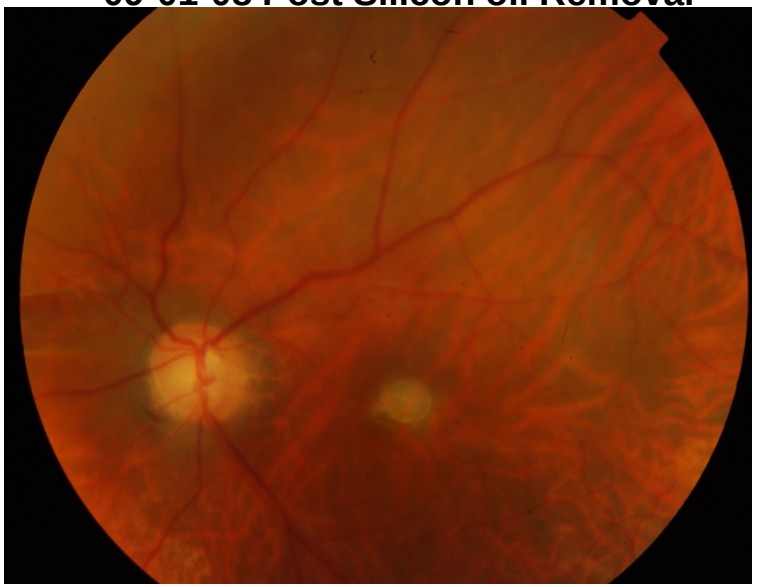

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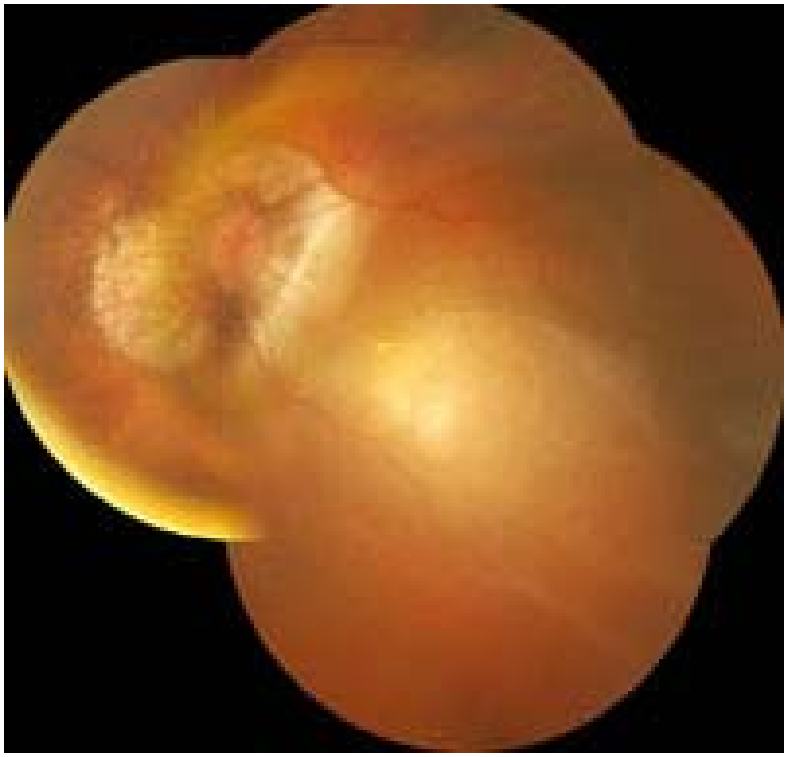

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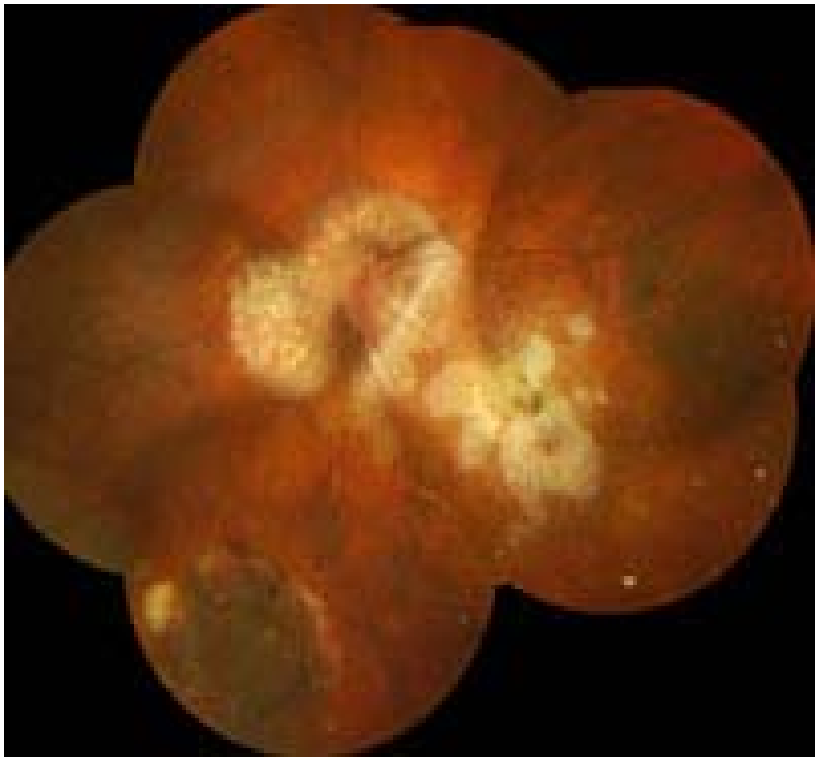

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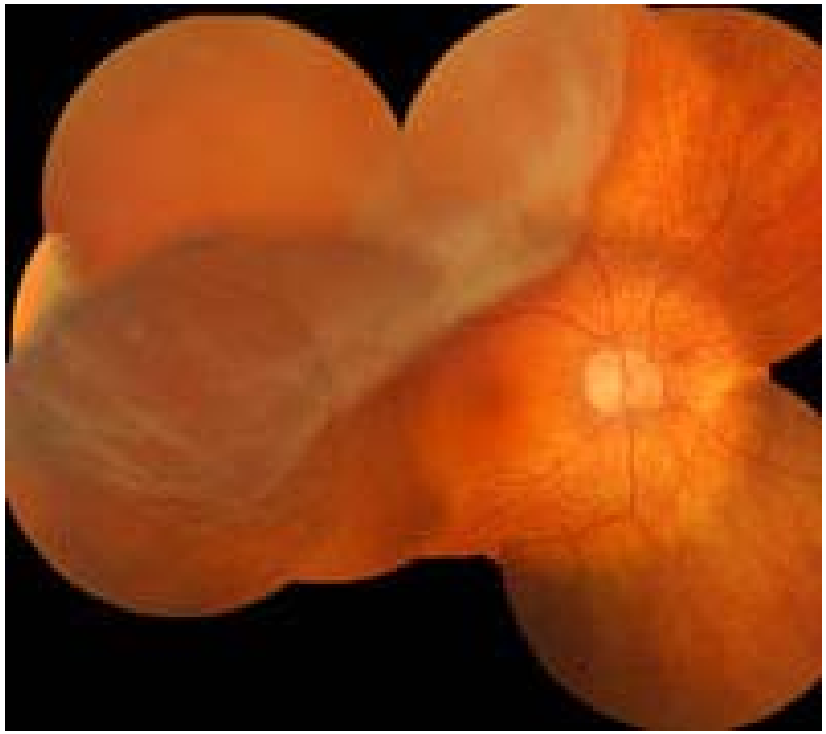

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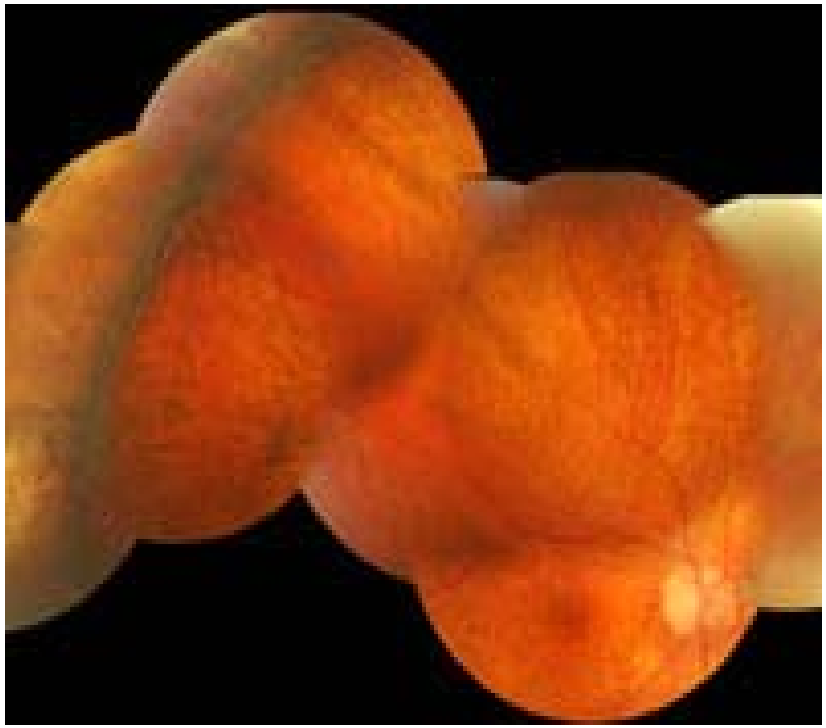

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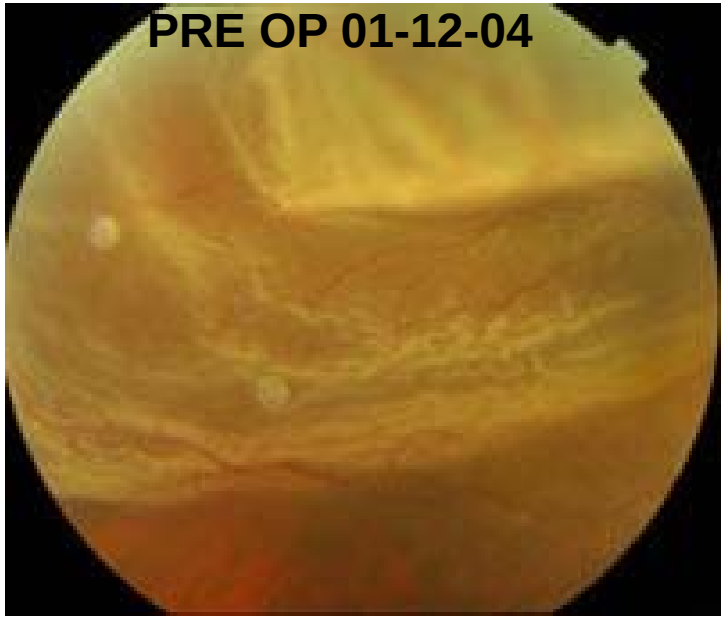

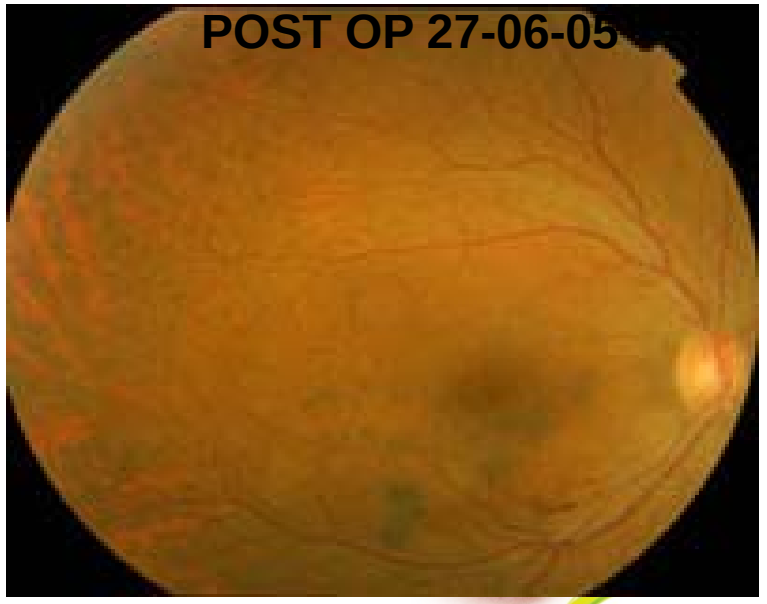

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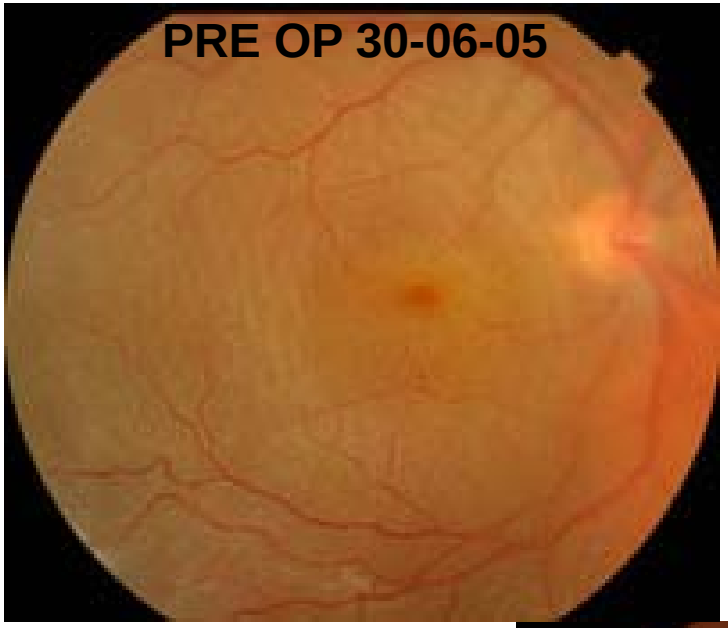

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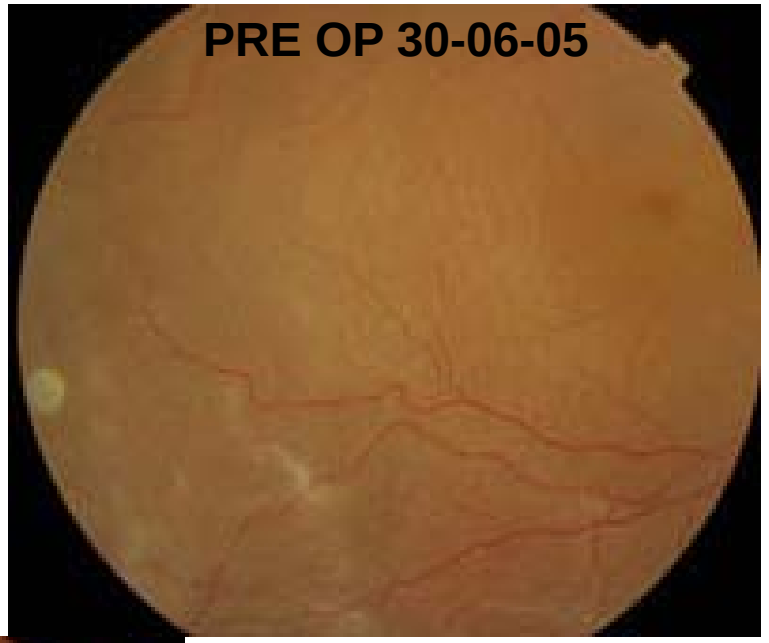

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PRE OP 19-7-05

POST OP 01-08-05

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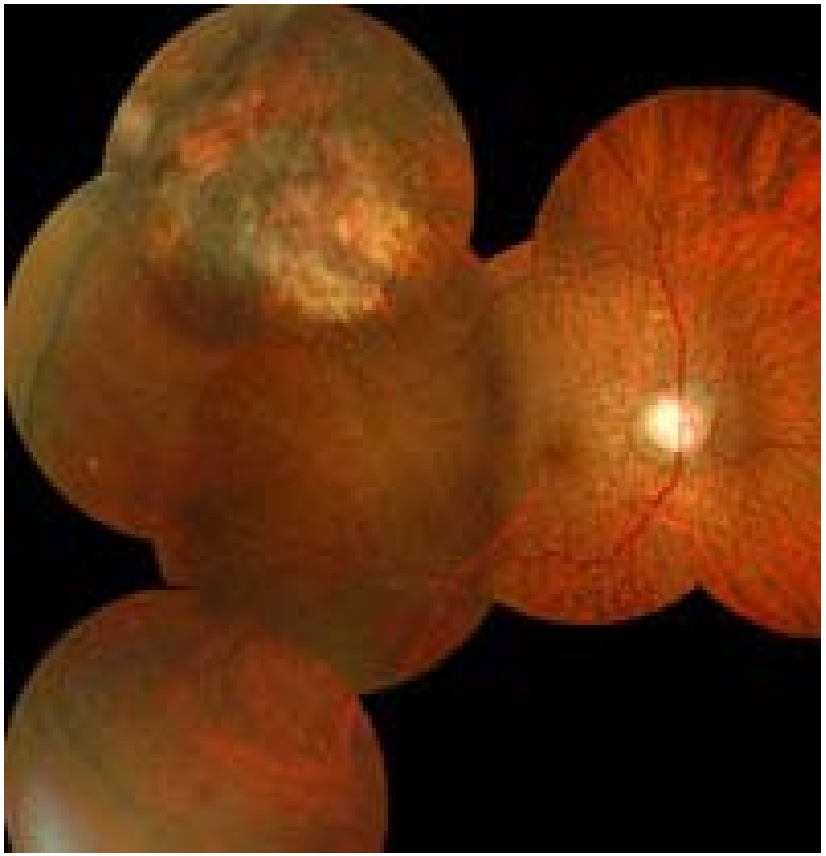

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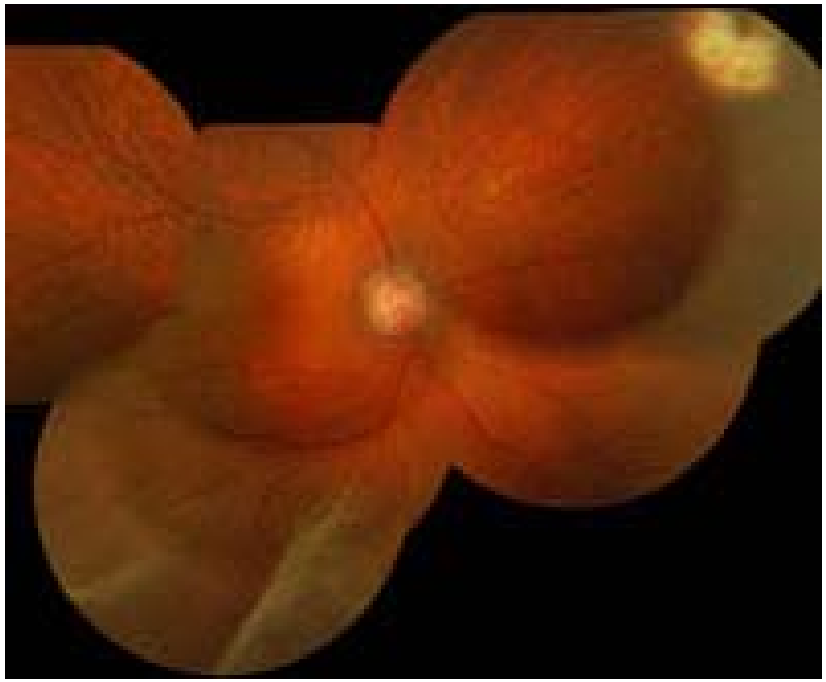

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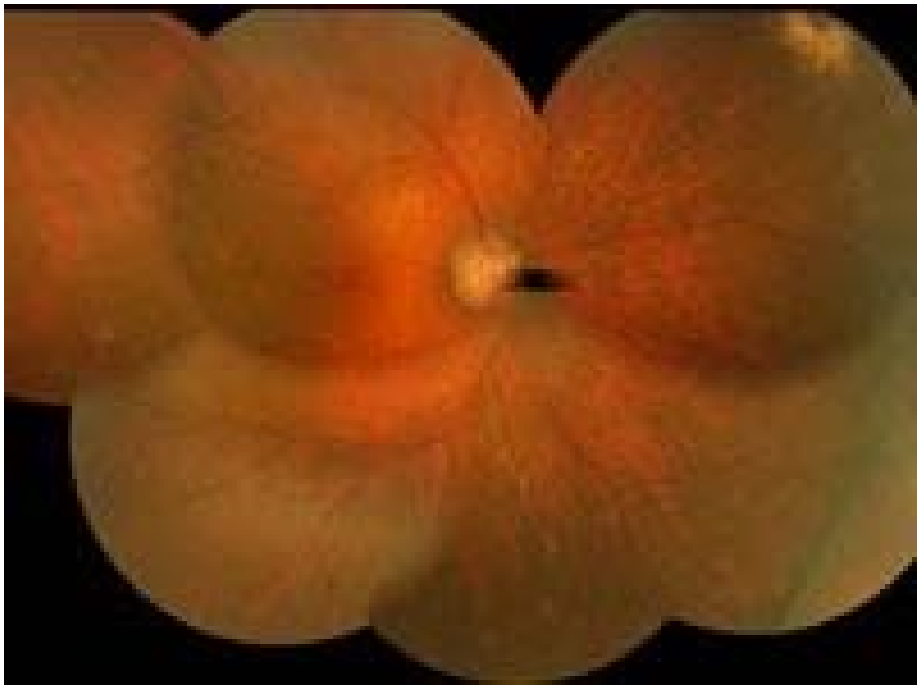

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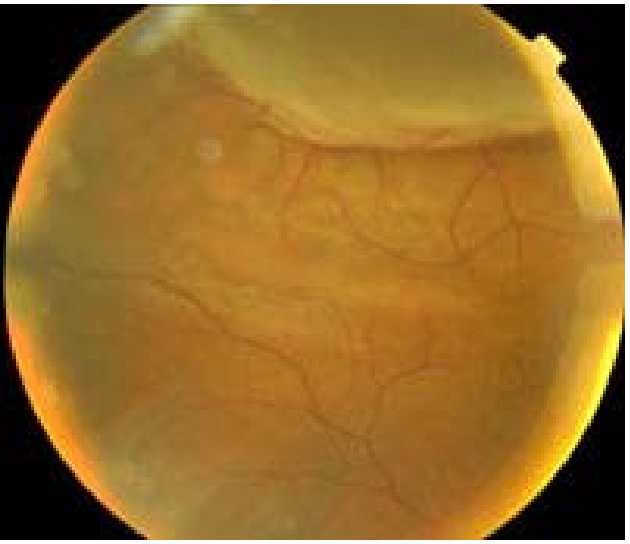

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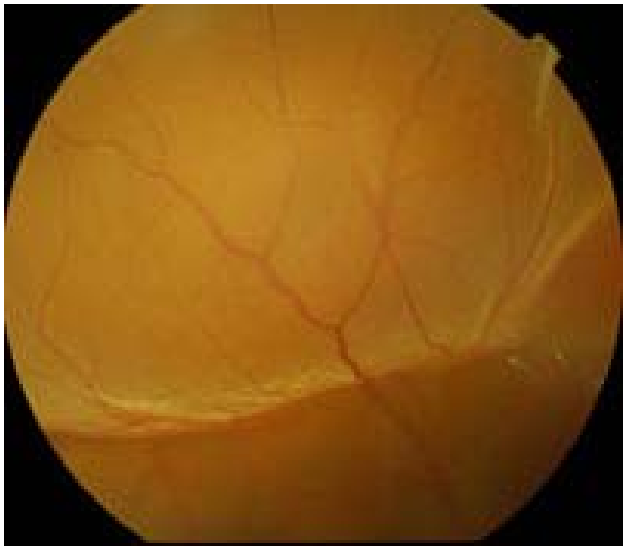

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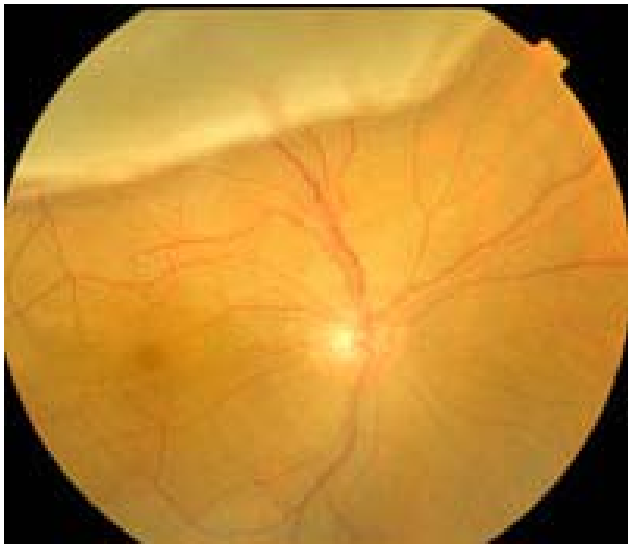

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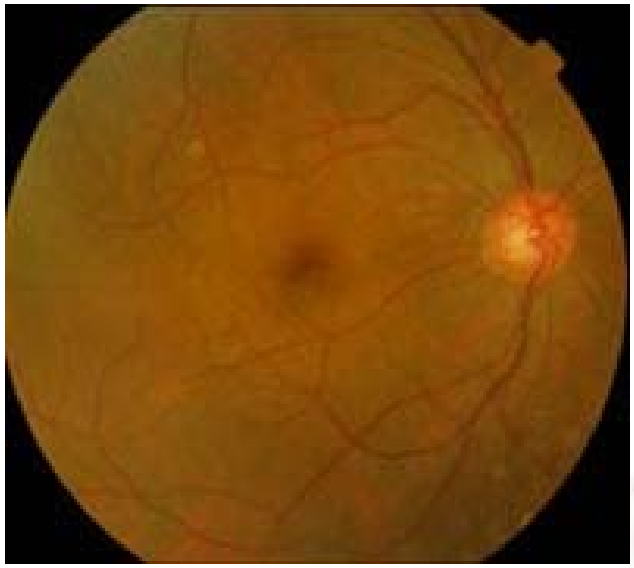

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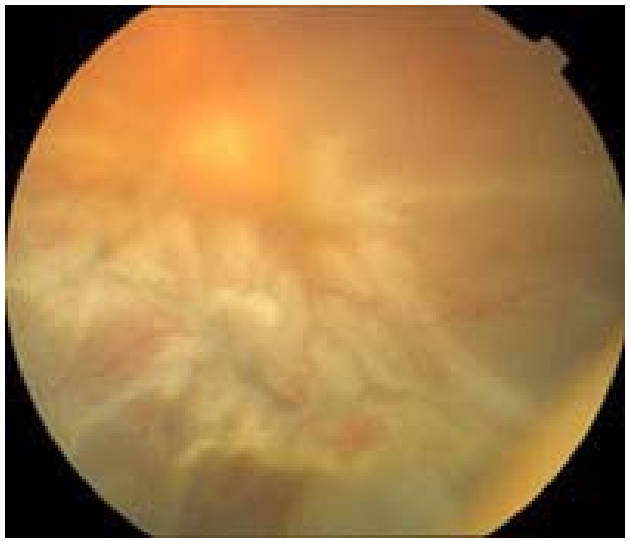
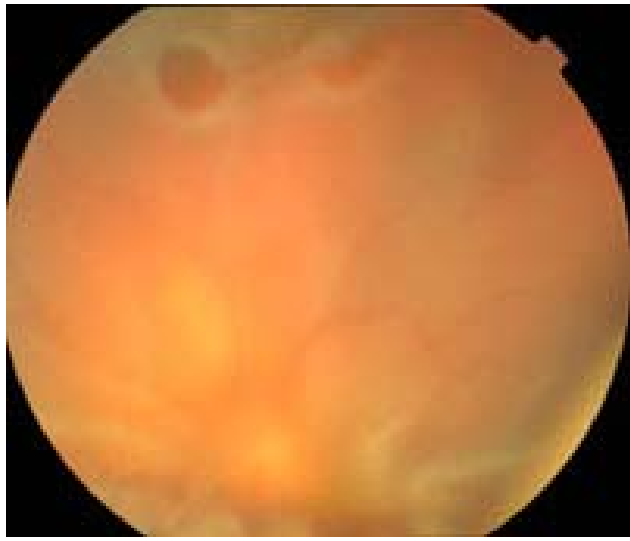
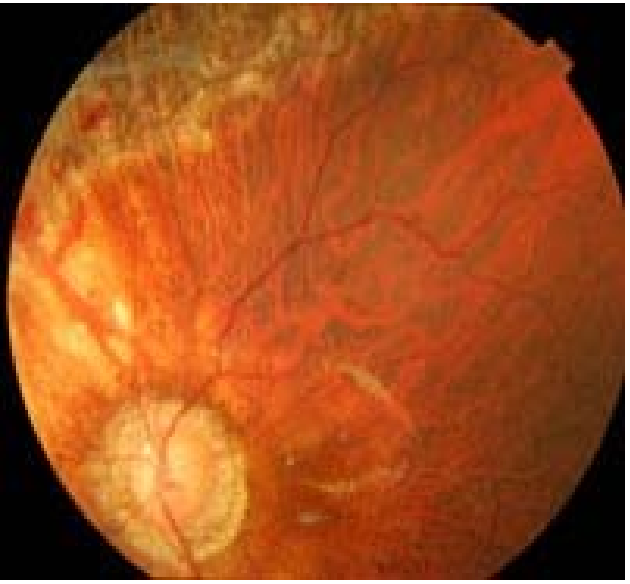
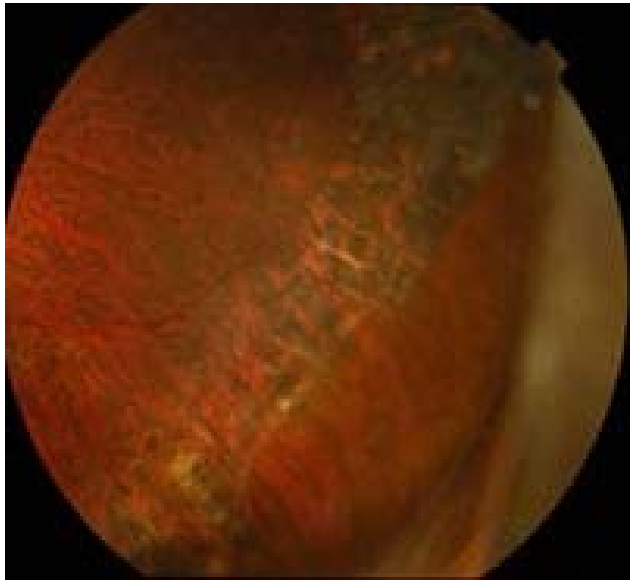
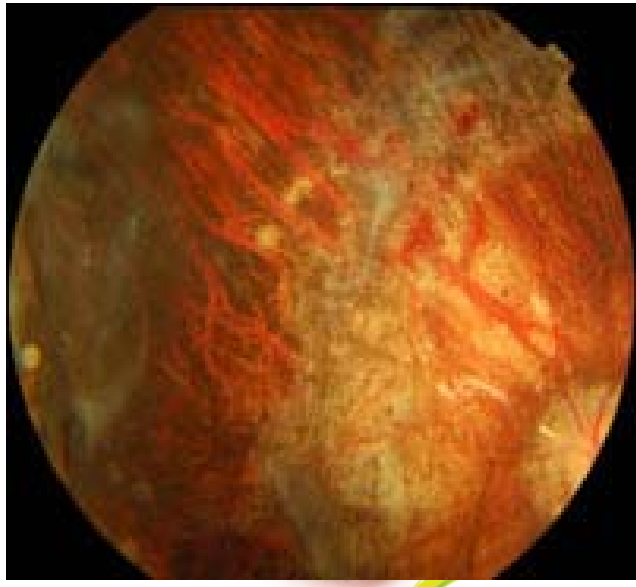




POST OP 04-07-05 Retina Attached following 360° retinectomy & vitrectomy

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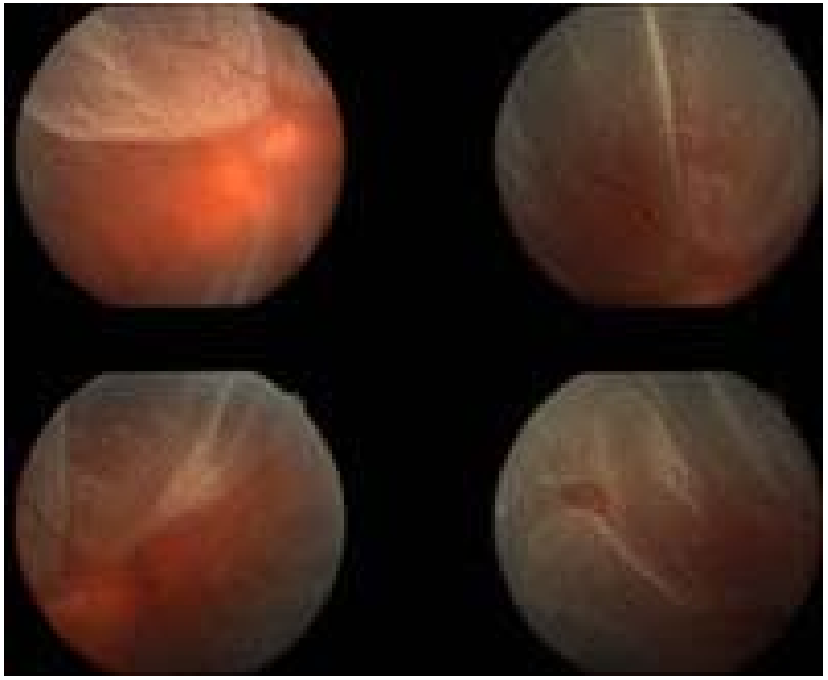

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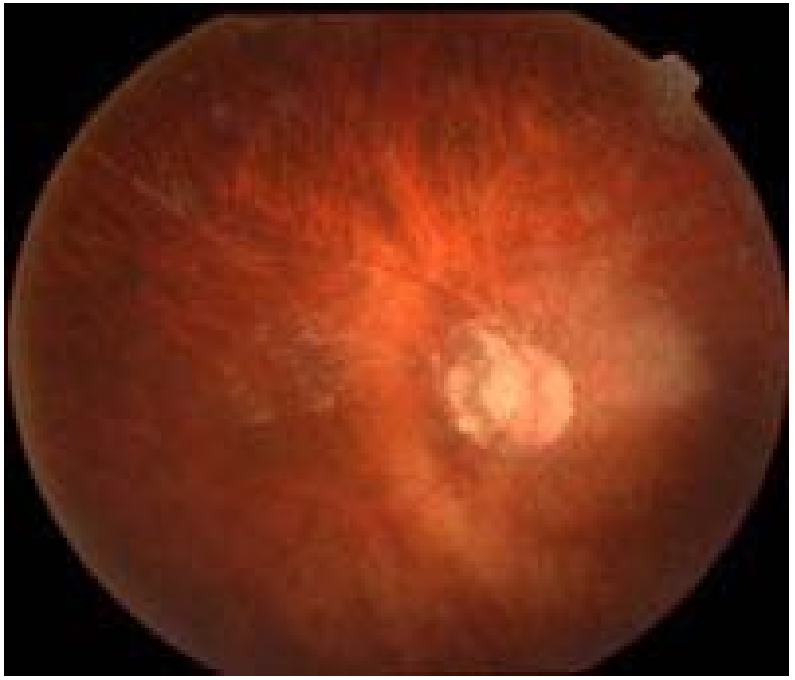

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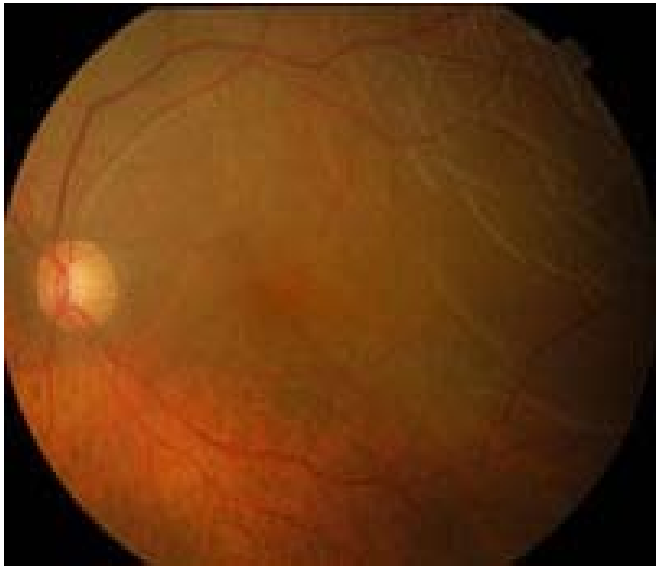

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POST OP 23-08-06

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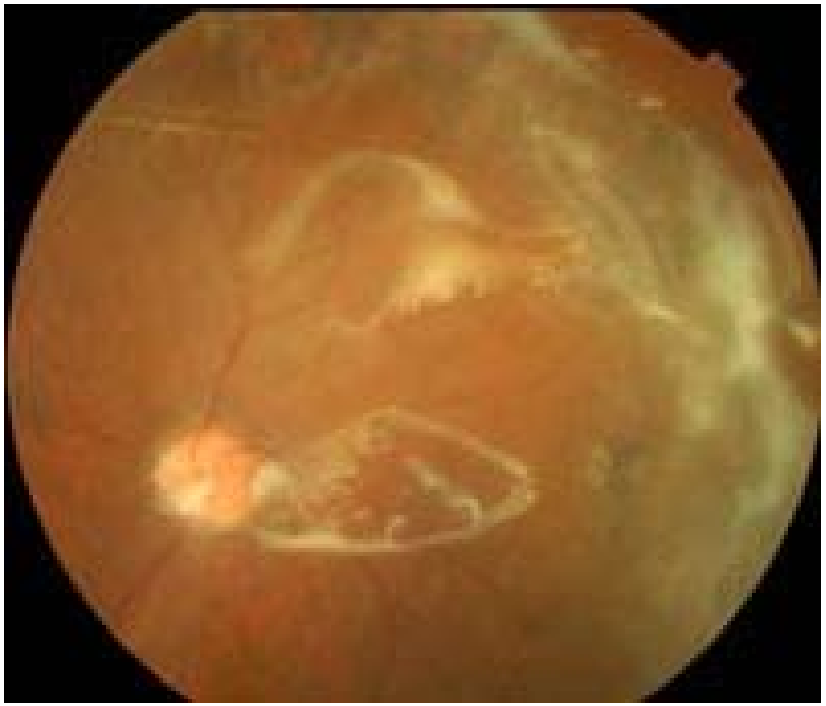

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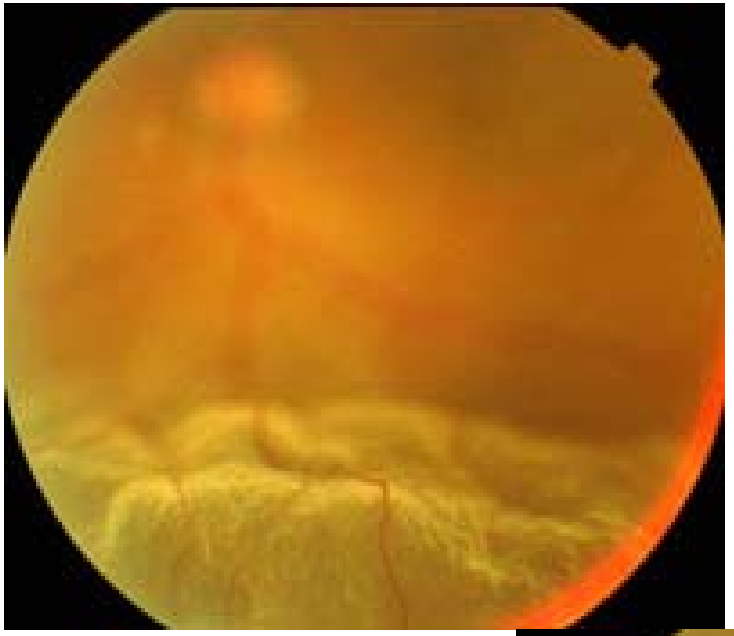
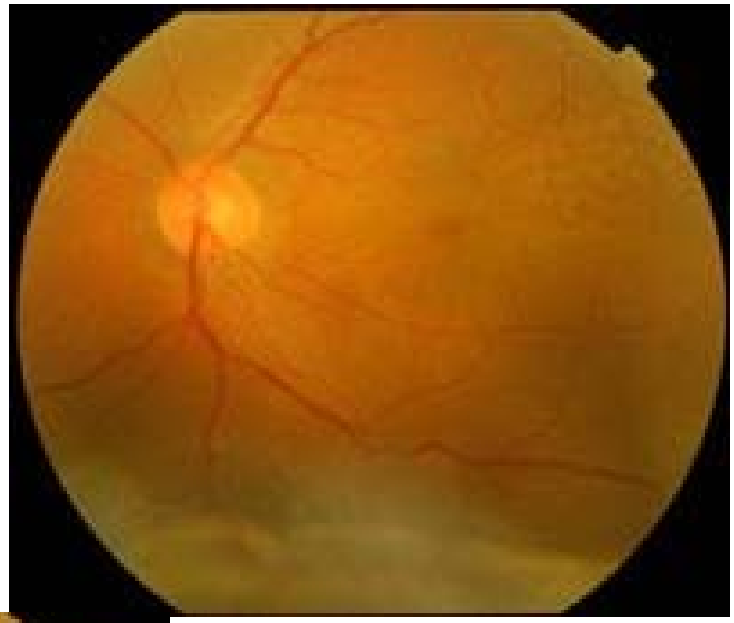
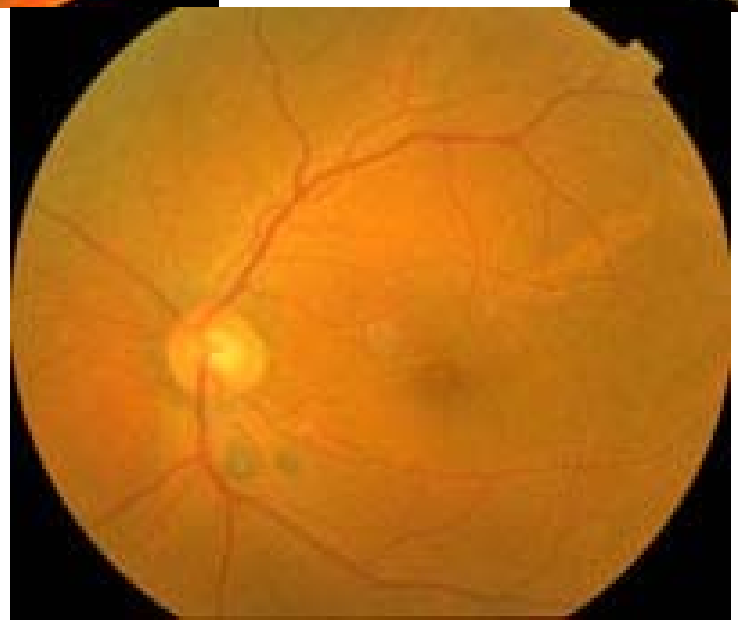




POST OP
04-03-05



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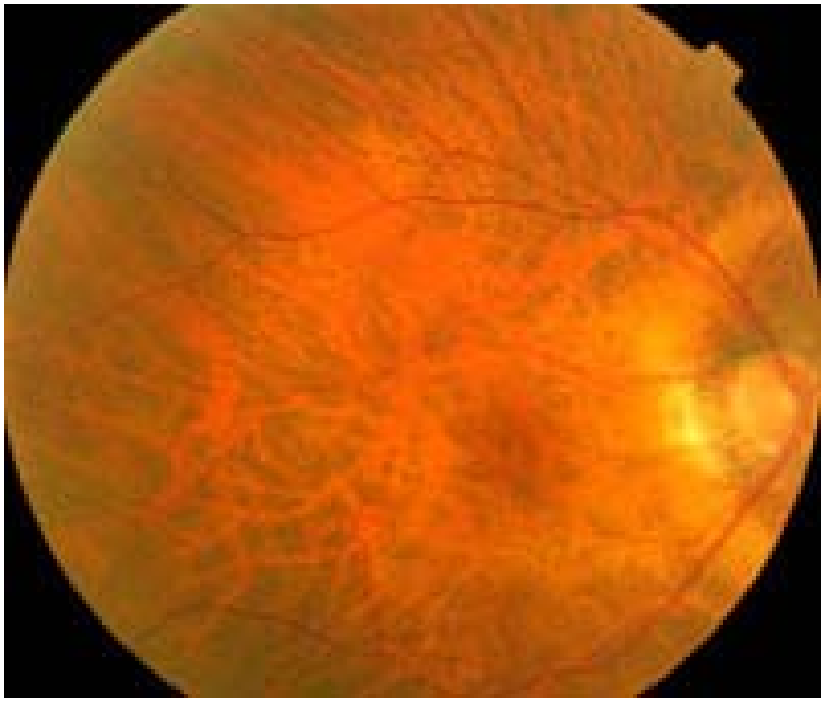
Putting 'EYE' before 'I'

Ref No:- 22764

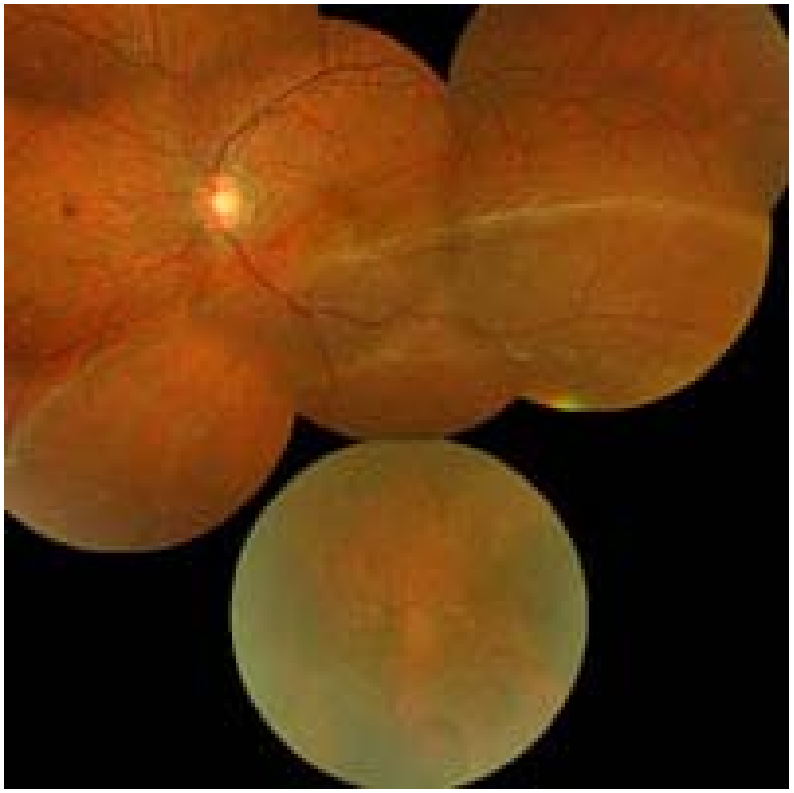
PRE OP 15-11-04

POST OP 14-11-05

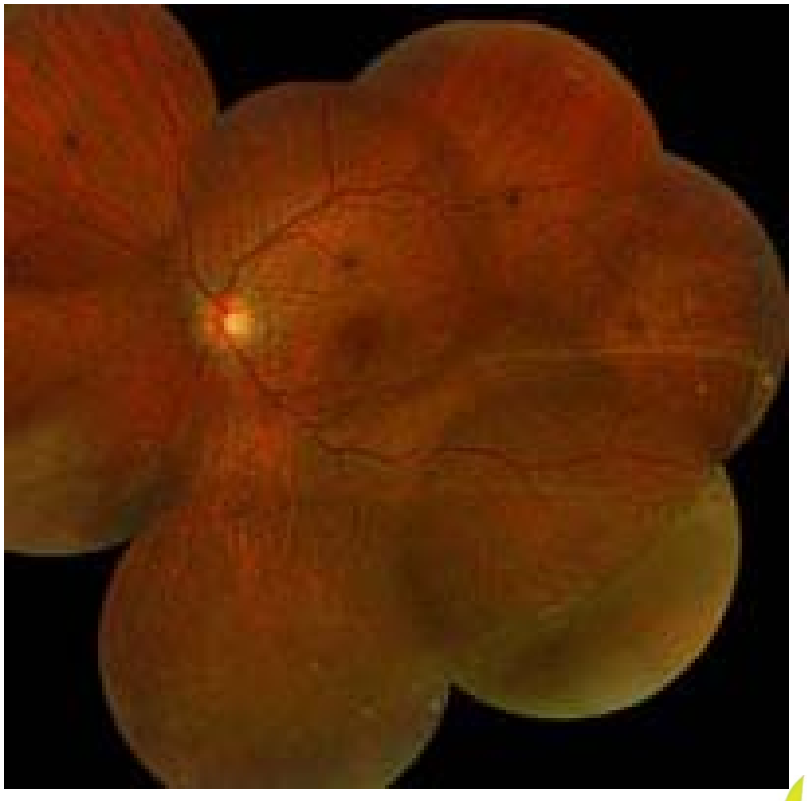


Ref No:- 22692

PRE OP

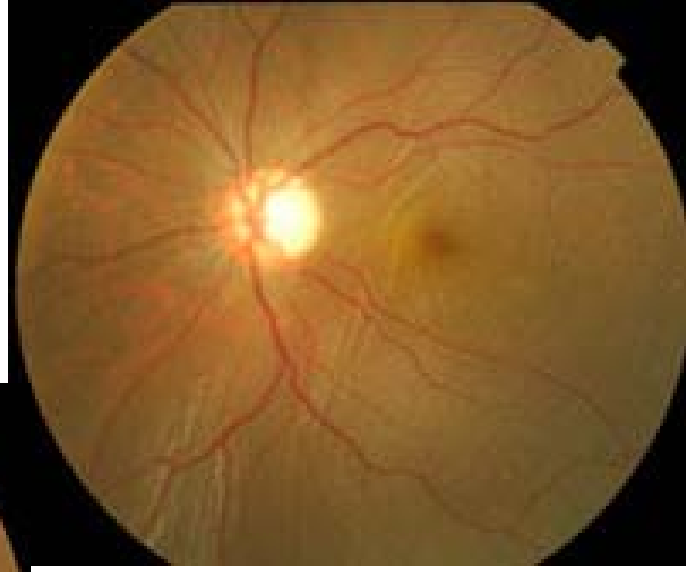


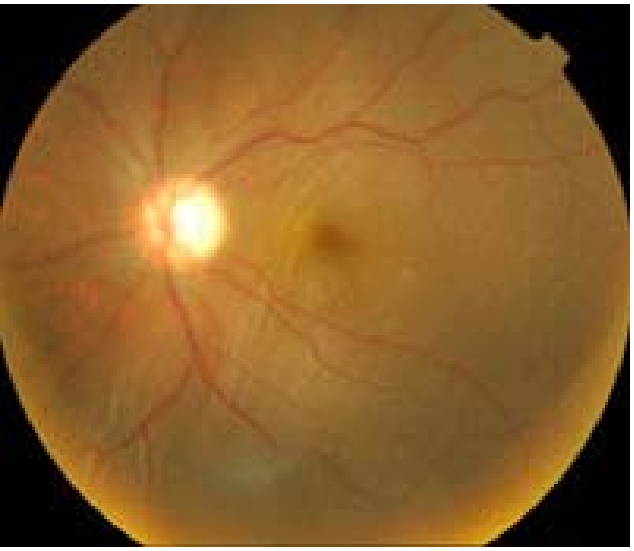
POST OP 27-09-06



Ref No:- 23998

PRE OP 14-5-05





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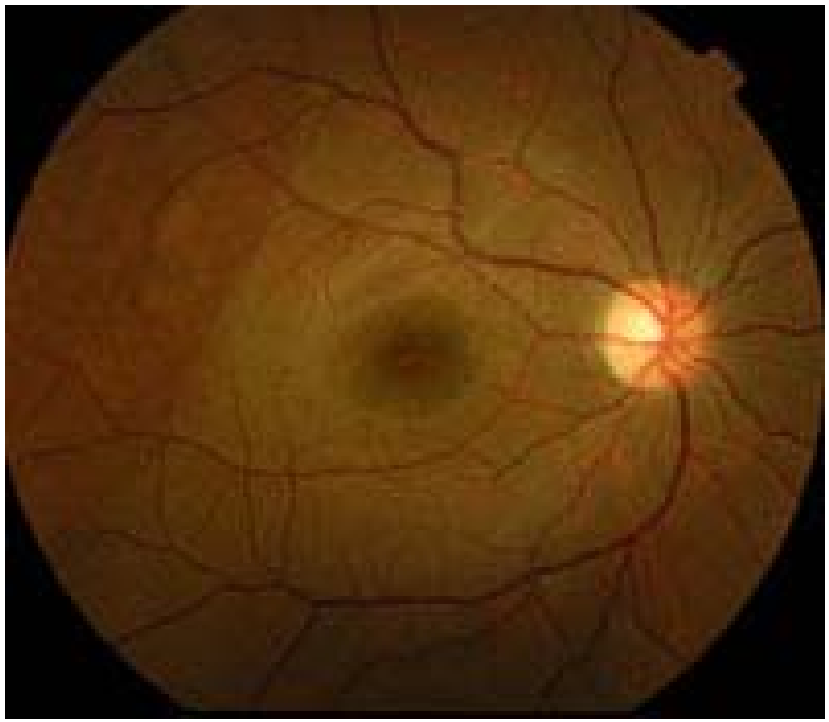
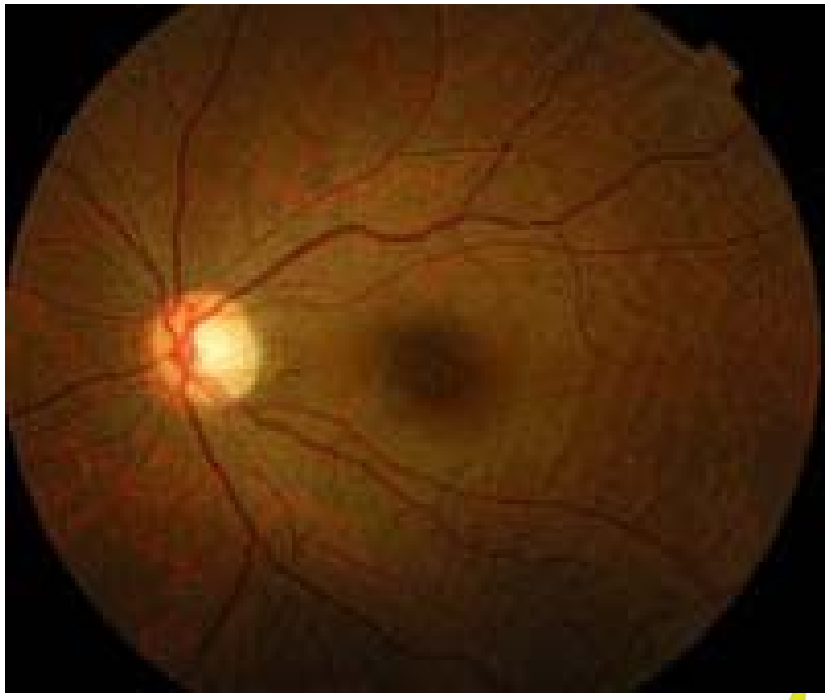
Putting 'EYE' before 'I'

Ref No:- 23998

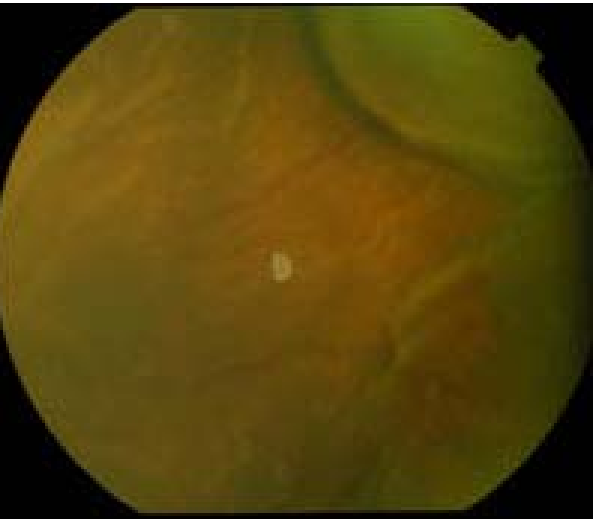
POST OP 20-08-05

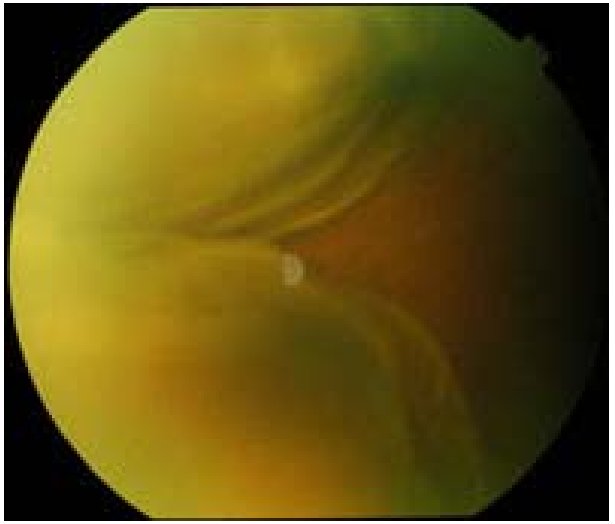




Ref No:- 23688

PRE OP 25-03-05 Retinal Detachment with Choroidal detachment





POST OP 09-01-06 Attached Retina

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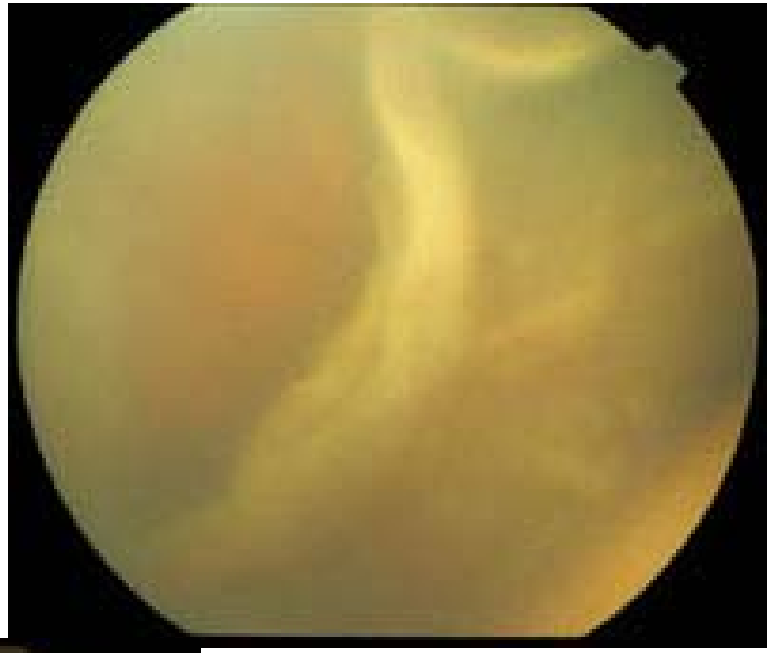
Putting 'EYE' before 'I'

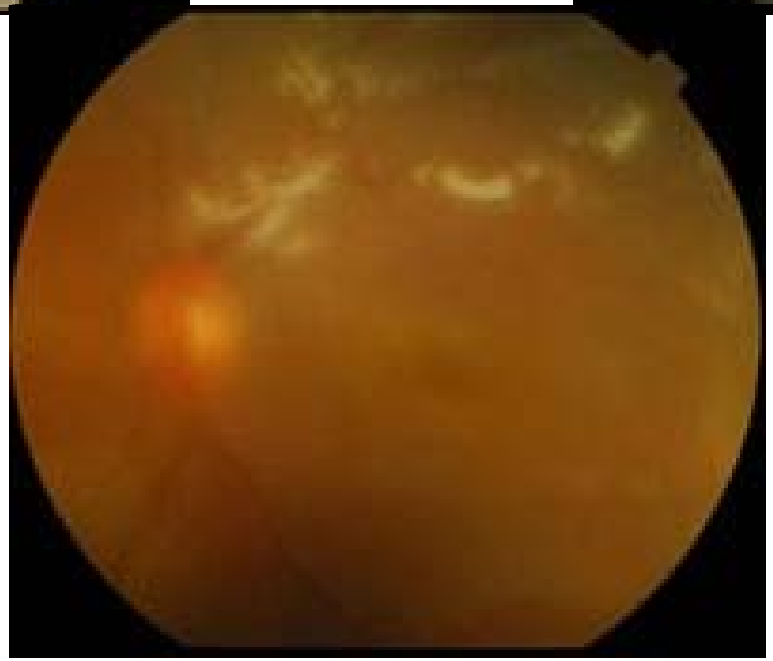
PRE OP 24-07-05

Ref No:- 23998

PRE OP 24-07-05



POST OP
12-07-06



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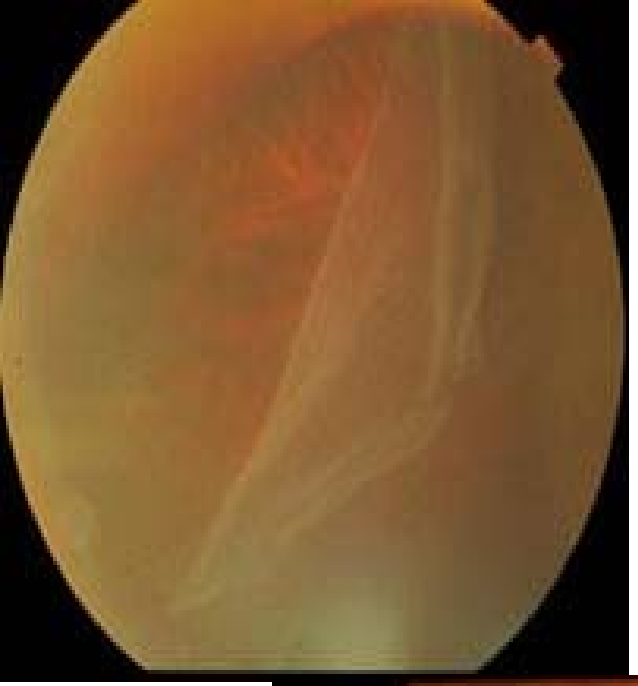
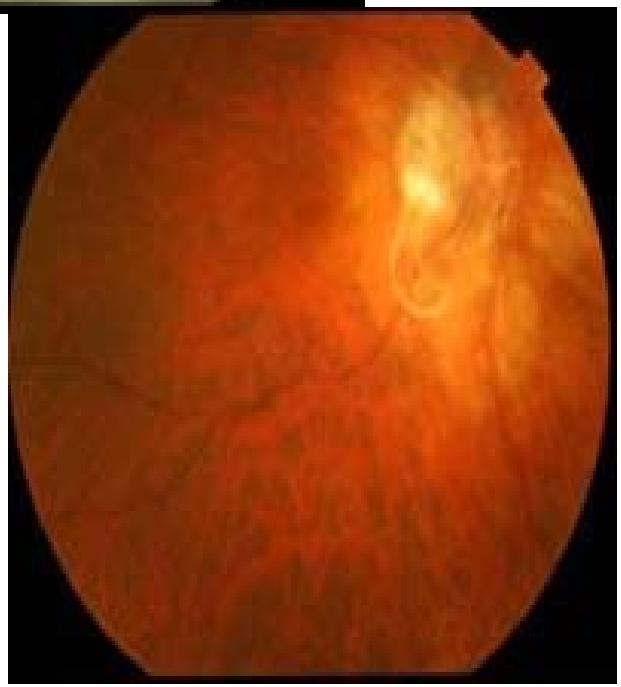
Putting 'EYE' before 'I'

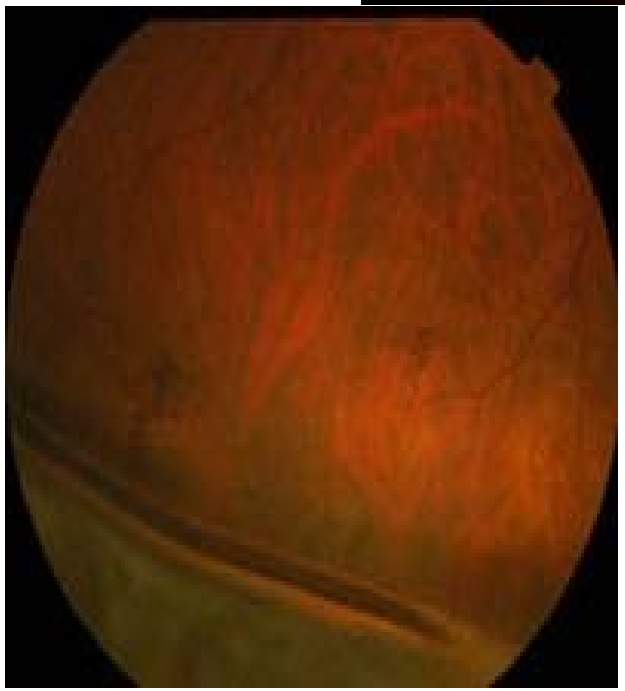
Ref No:- 26577

PRE OP 28-06-06
Giant Tear with Detachment



POST OP 15-07-06
Silicon Oil & Buckle





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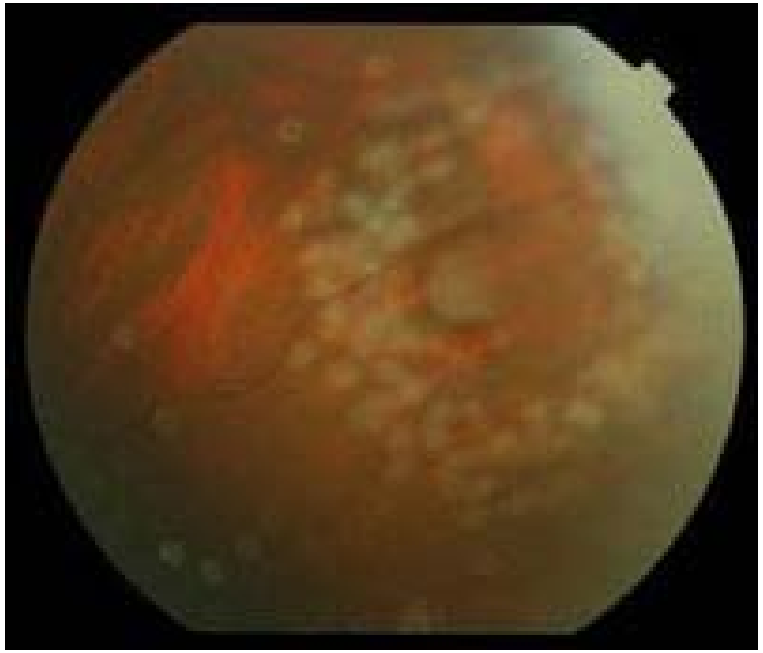
Putting 'EYE' before 'I'

Ref No:- 2022

PRE LASER 11-08-06

POST LASER 11-08-06



ALTERNATIVE PROCEDURE

- **PNEUMORETINOPEXY : Use of intravitreal gas to treat retinal detachment was described in 1938, however in 1960 use of intravitreal air was rediscovered, subsequently 2 decades later , it was suggested that intravitreal gas alone may close the break and subsequent laser or cryotherapy will reattach retina avoiding complications of scleral buckling**

PNEUMORETINOPEXY

- When retinal breaks are situated in 1 clock hours and above midline, without vitreous traction on the breaks, pneumoretinopexy can be attempted. Primary cryopexy or subsequent laser photocoagulation to the breaks can be done. Success rate varies between 63 to 83% whereas for the same group undergoing SB was 96% So, it has not picked up as a primary procedure.

INTRAVITREAL GAS

Gas	half life of gas	intraocular expansion of gas
SF6	5 days	2.5 times
C2F6	10days	3.3 times
C3F6	35days	4 times

Nonexpansile Concentration 18% for SF6

Nonexpansile Concentration 12%for C3F8

OTHER ALTERNATIVE PROCEDURES

- **Lincoff Inflatable Balloon**
- **Delimiting laser or cryotherapy for periferal retinal detachement**

SPECIAL CIRCUMSTANCES

- **UNSEEN RETINAL BREAKS:- Rule out other causes of retinal detachment, media opacity or small peripheral breaks , end to end buckle and cryo posterior to ora all around, drainage is the procedure, vitrectomy may help to find out breaks**

MACULAR BREAKS

- **Macular hole with retinal detachment with peripheral break, treat like regular detachment**
- **Macular hole alone with retinal detachment: myopic, aphakic or blunt trauma . Pneumoretinopexy or vitrectomy with gas , silicone oil or endolaser to macular hole may be required.**

GIANT RETINAL TEAR

- Surgical approach to GTR varies:
- GTR with no retinal detachment, laser
- GTR with shallow rd, Pneumoretinopexy or SB
- GTR with rolled edge, rd : Vit, pfcl, gas, or oil or buckle
- Success rate up to 95%

PVR

- 10% of all detachments fail due to PVR, anterior or posterior PVR, Precipitating factors: multiple breaks, cryopexy, Choroidal detachment, Vitreous hemorrhage, postop. hypotony, preop inflammation, previous vitrectomy operation
- TREATMENT:- revitrectomy, membrane removal, retinectomy, silicone oil injection

COMPLICATIONS

- **Intraoperative:- scleral perforation, retinal incarceration, retinal break, vitreous , subretinal hemorrhage, Choroidal detachment, central retinal artery occlusion,**
- **Postoperative:- squint, buckle infection, angle closure glaucoma, secondary glaucoma, macular pucker, redetachment, Endophthalmitis, CME, myopic shift**

PROGNOSIS

- Anatomic success is usually 90%
- Almost 100% success in patients with dialysis or small atrophic holes with lattice degeneration in phakic eyes.
- Horse shoe flap tears fare slightly worse with 90 to 95% success rate.
- AC IOL have 60 to 70% ,compared to PC IOL > 80% reattachement rate

PROGNOSIS

- PVR brings down success rate to 50 to 75% with SB ,although it continues to improve
- Giant retinal tear without PVR ,success rate is 90 to 95 %. With PVR ,it reduces.
- Preoperative choroidal detachment , reduces success to 50 % with primary buckling procedure.

PROGNOSIS

- **Functional Success:- depends on the preoperative visual acuity and age of the patient.**
- **85 to 90% of patients with preop. Vision of 20/30 or better will retain 20/30 or better vision postoperatively.**
- **Macular detachment is a major determinant of post op vision.**

PROGNOSIS

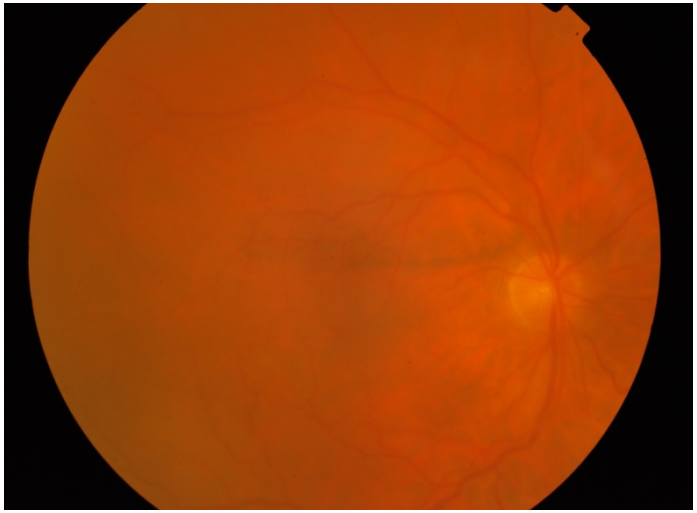
- **Macular detachment of even 1 day results in reduced visual acuity.**
- **If retina is reattached in 2 days of macular detachment, chances of recovery of good visual acuity are high**

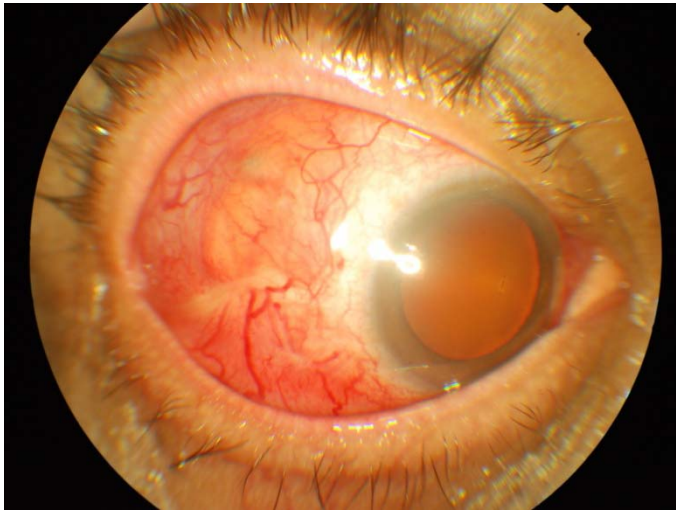
CONCLUSIONS

- From incurable disease a century earlier, retinal detachment has been largely a treatable condition, thanks to Gonin's ignipuncture , diathermy to scleral resection techniques which led to scleral buckling surgeries in 1950 . It raised success from 50 % to 80%. Today, various microsurgical advances and vitreous surgery techniques has added results to > 90 %

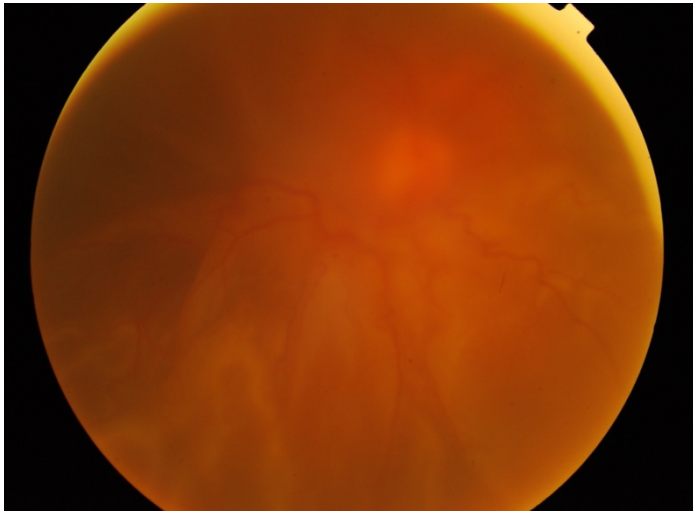
Ref no. 20.2009

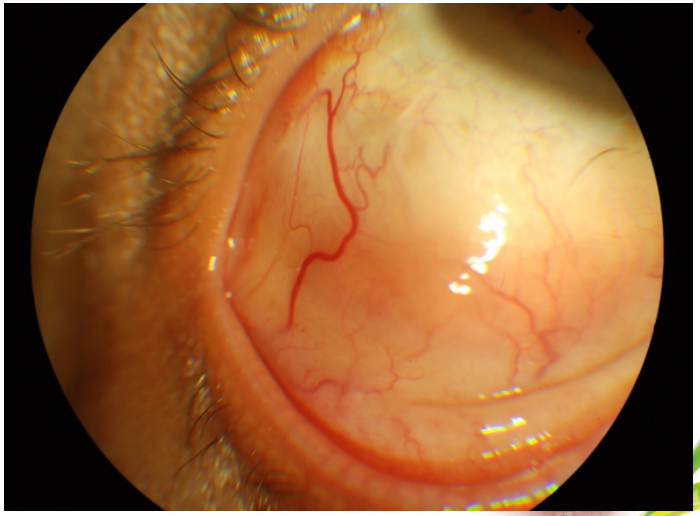
03-01-2009 infected Buckle with Attached Retina





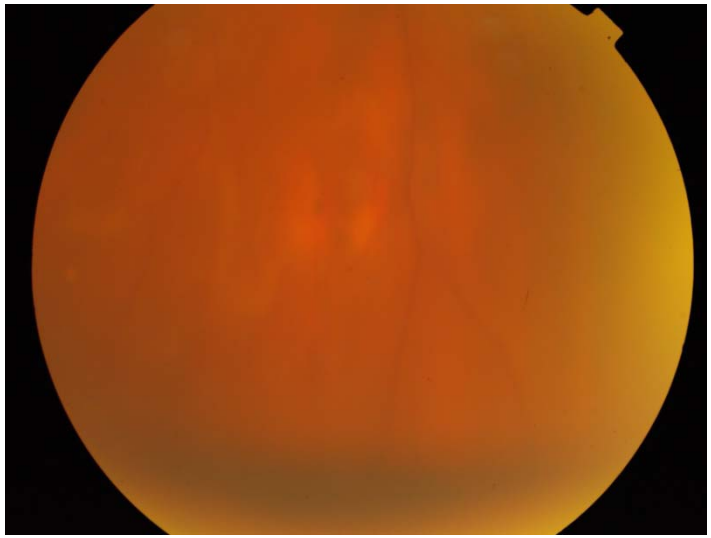
02-02-2009 Recurrent detachment with PVR following Buckle Removal



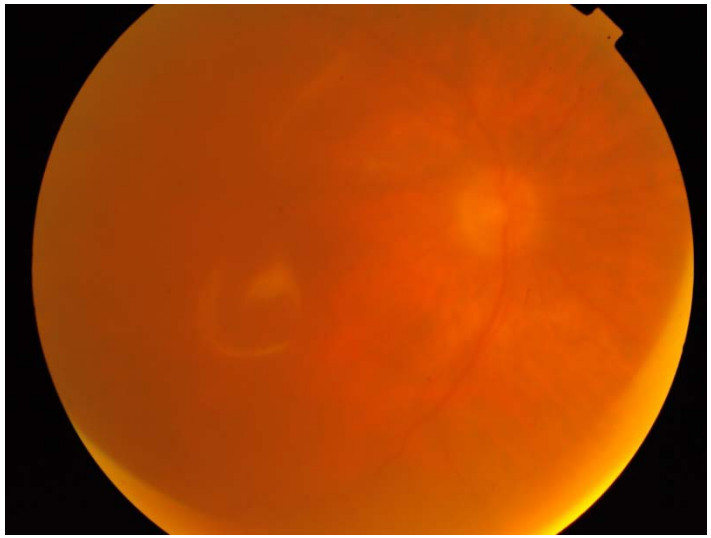


Ref no. 20.2009

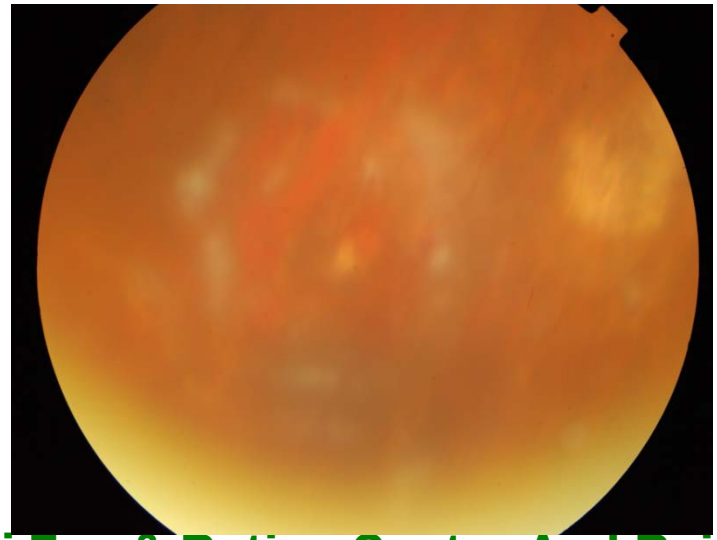
Post op Attached Retina



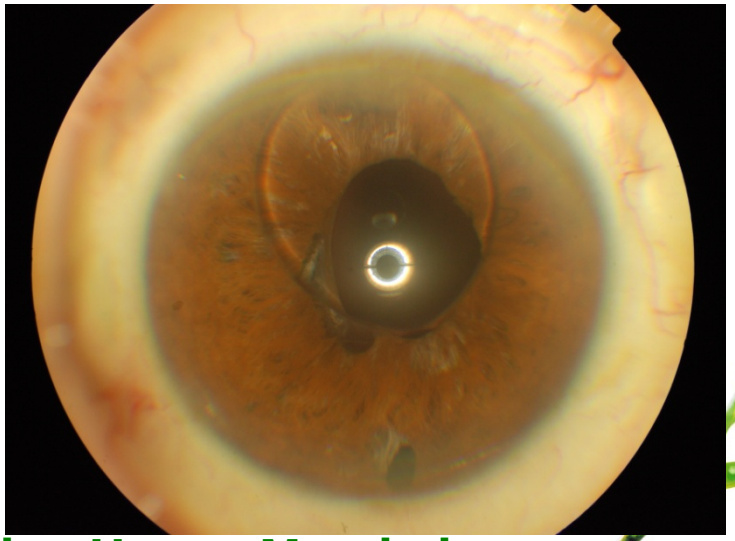
17-2-09



31-3-09

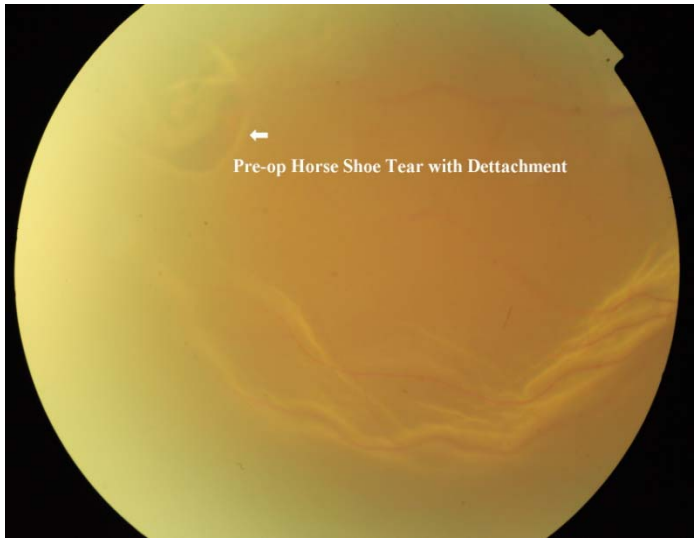


09-07-09



Reg no. 1856.2009

12-11-09



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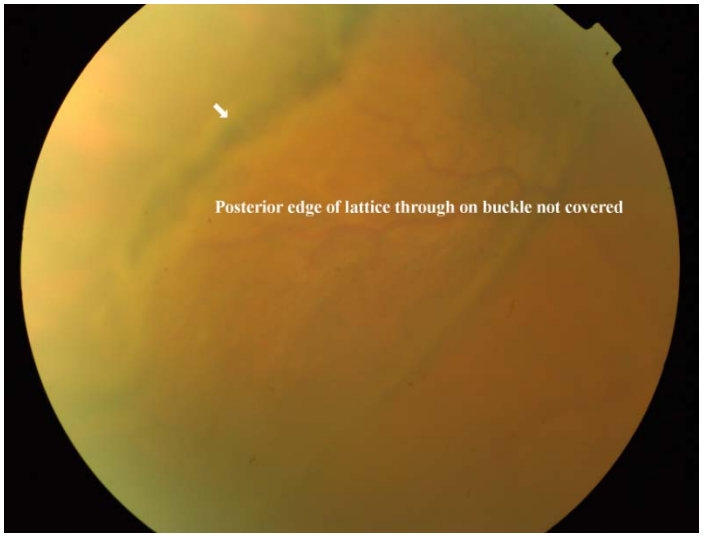
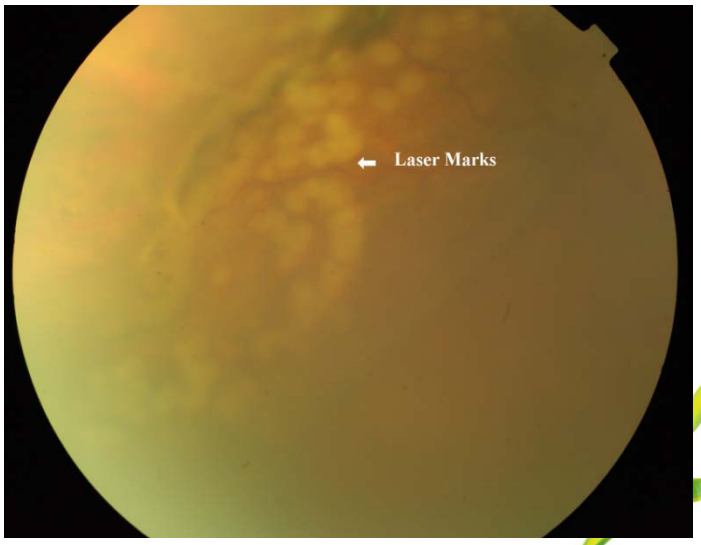


12-11-09

12-11-09



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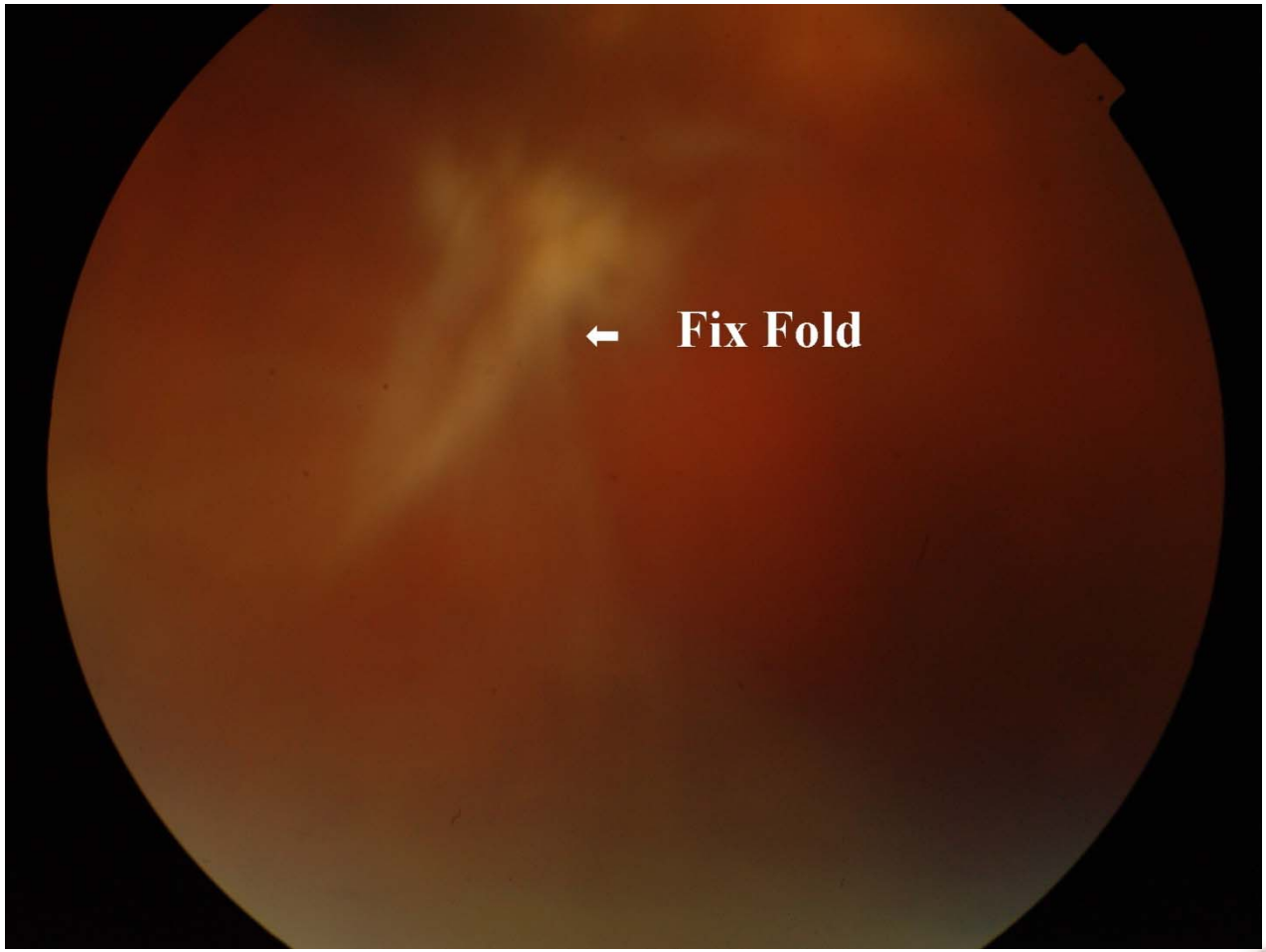

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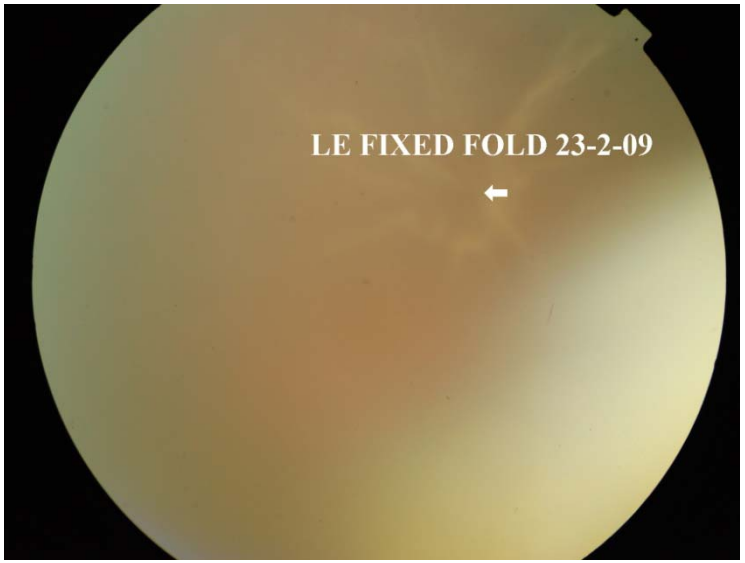
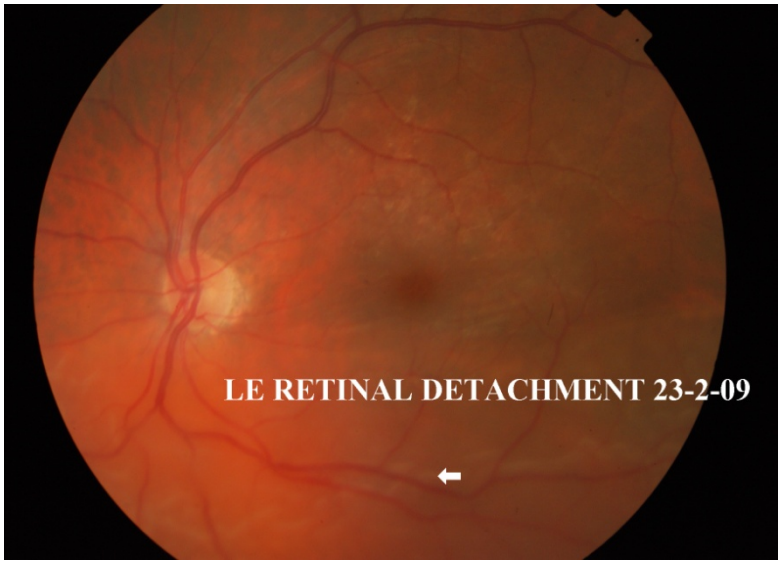
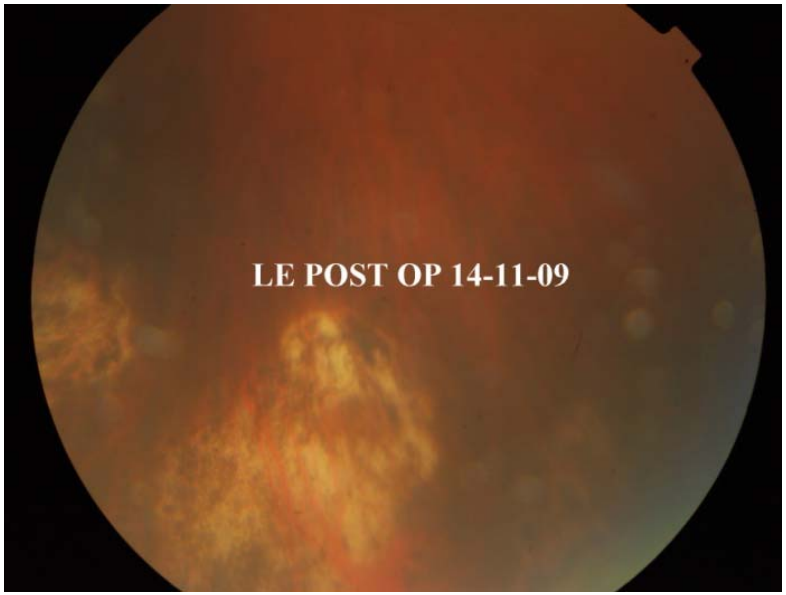
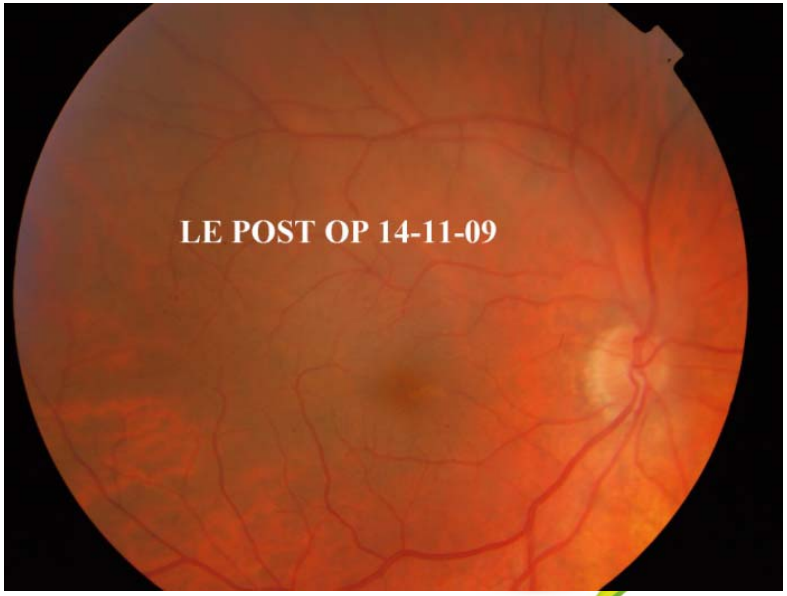


23-2-09



14-11-09





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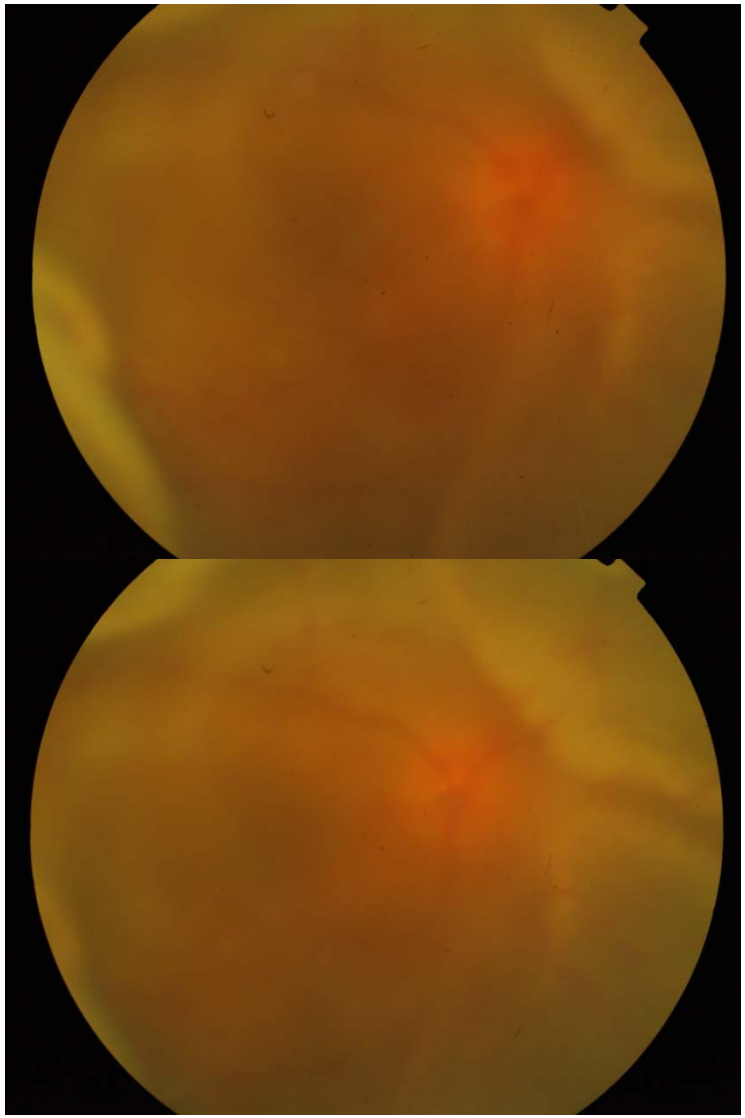
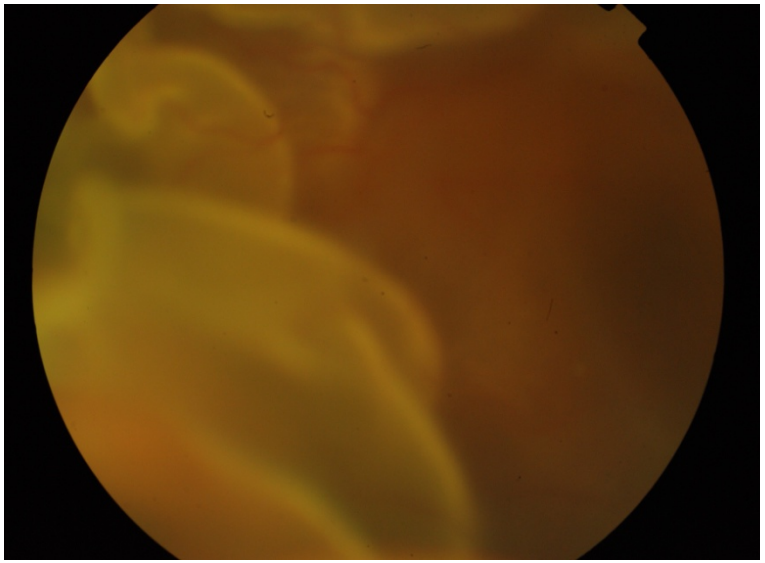
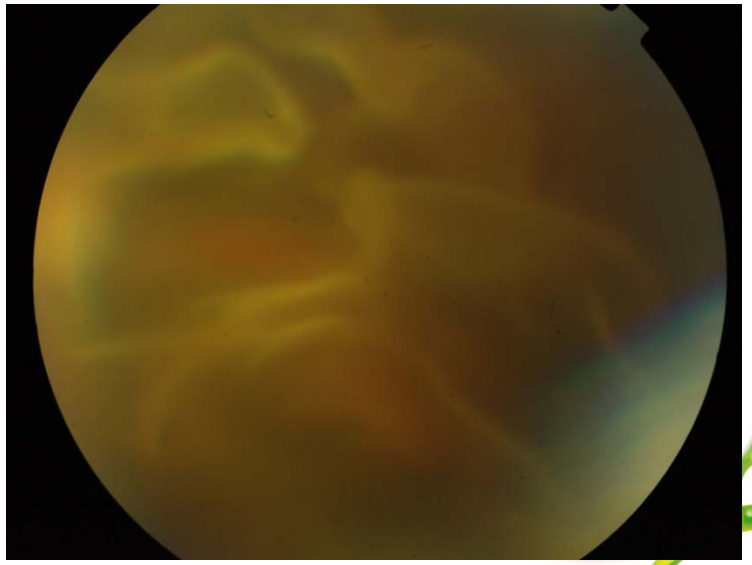
Putting 'EYE' before 'I'

Reg no. 1353.2008

18-06-08 Detachment with Choroidal Detachment







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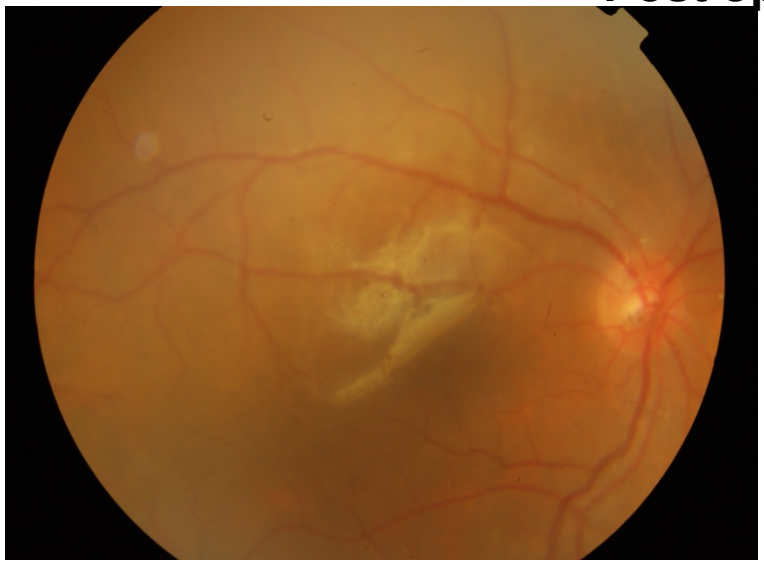
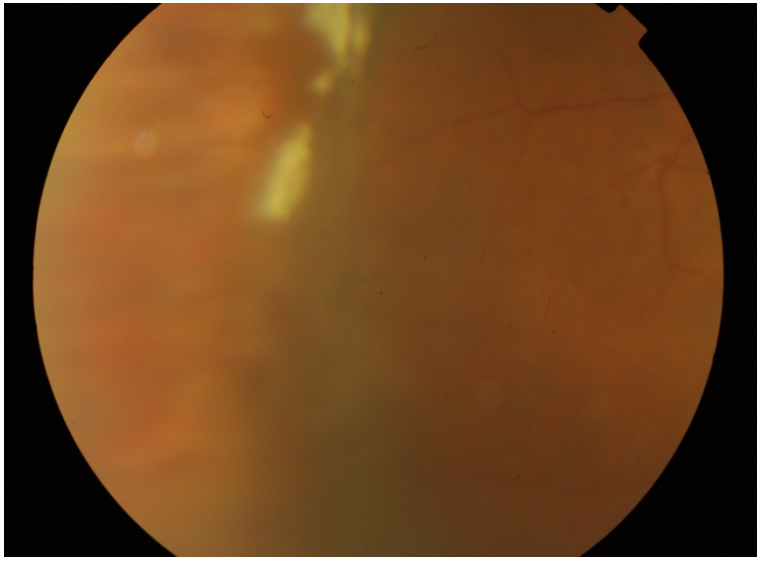
Putting 'EYE' before 'I'

Reg no. 1353.2008

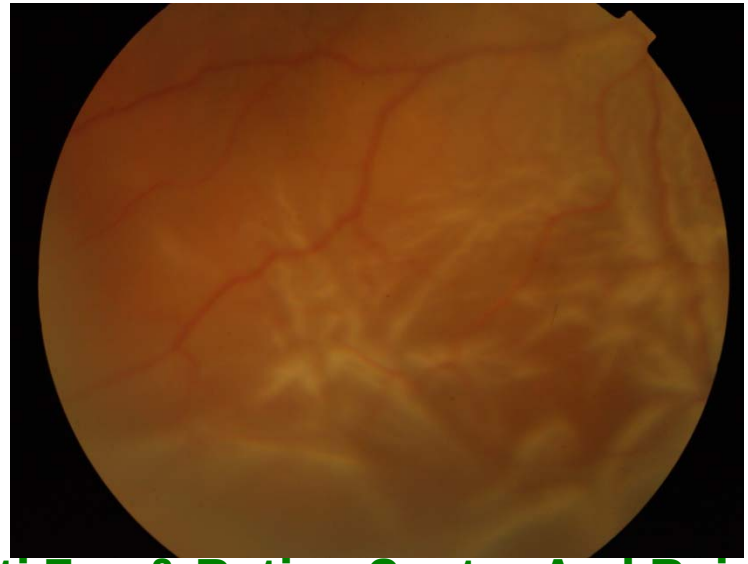
23-06-08

Post op Attached Retina

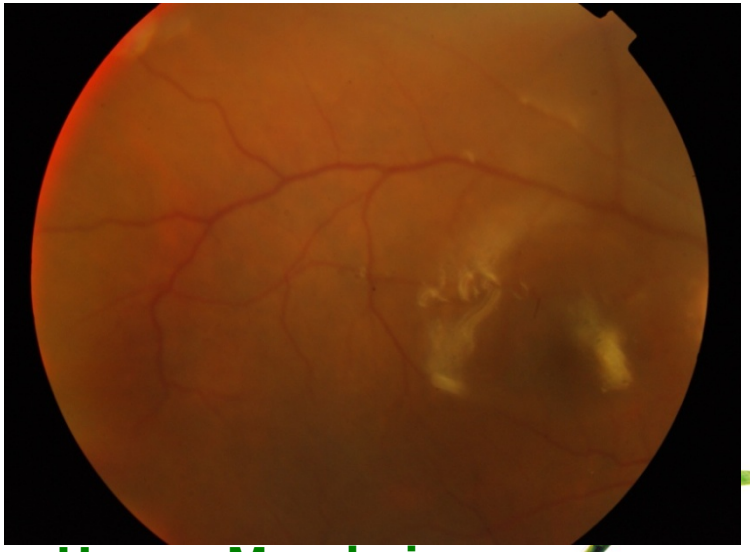




Recurrent Detachment 14-07-2008



Reattached with one more surgery



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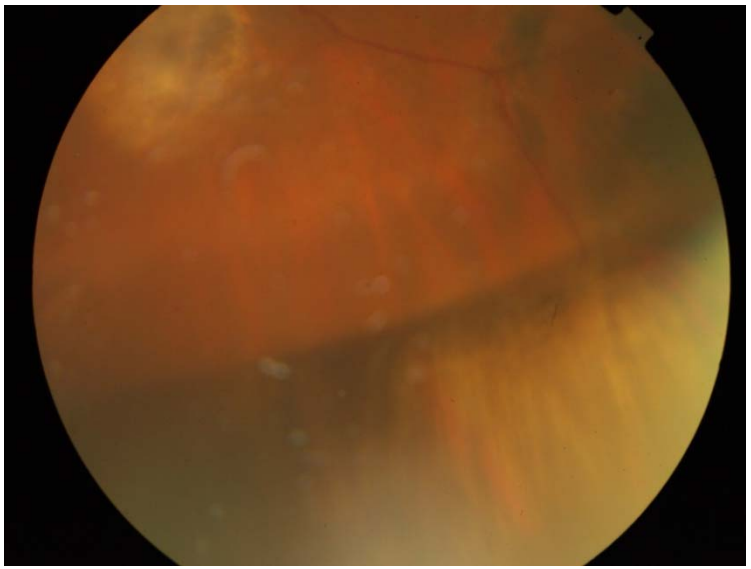
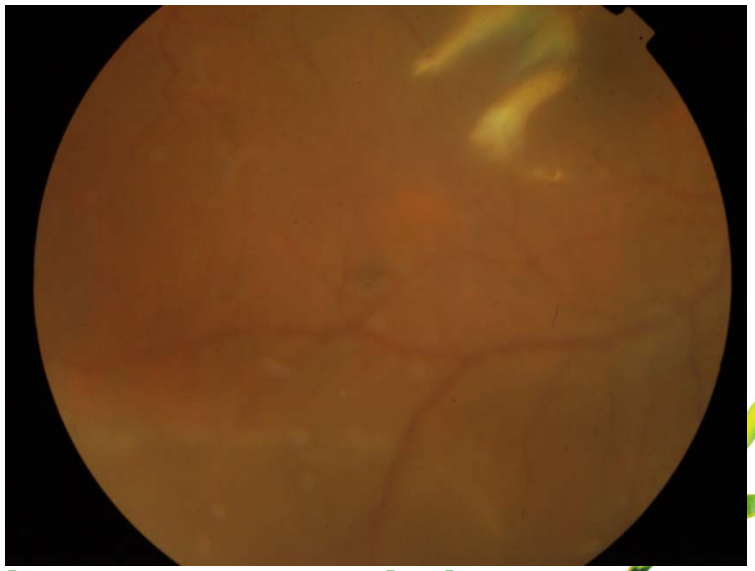
Putting 'EYE' before 'I'

Reg no. 1353.2008

08-09-08 Attached Retina

12-02-2009 Shallow Recurrent Retinal detachment





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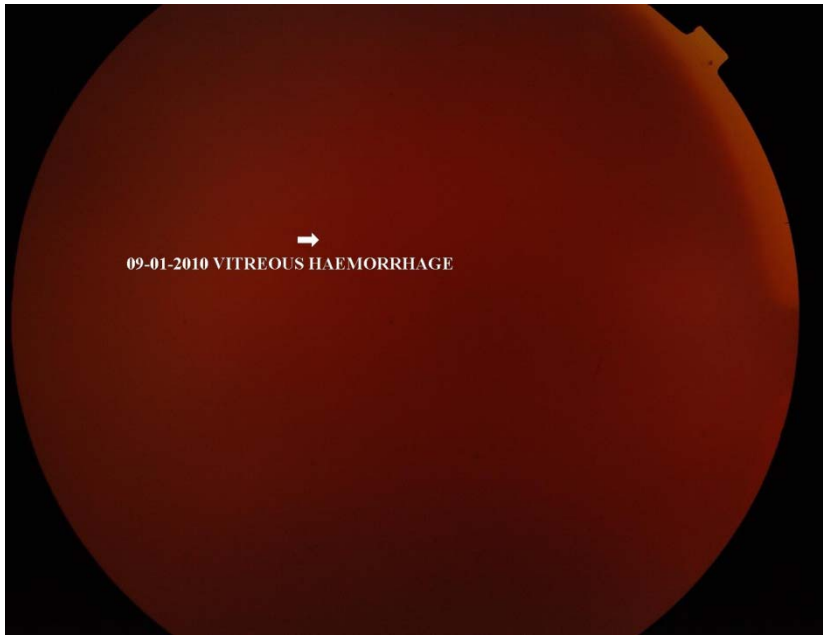
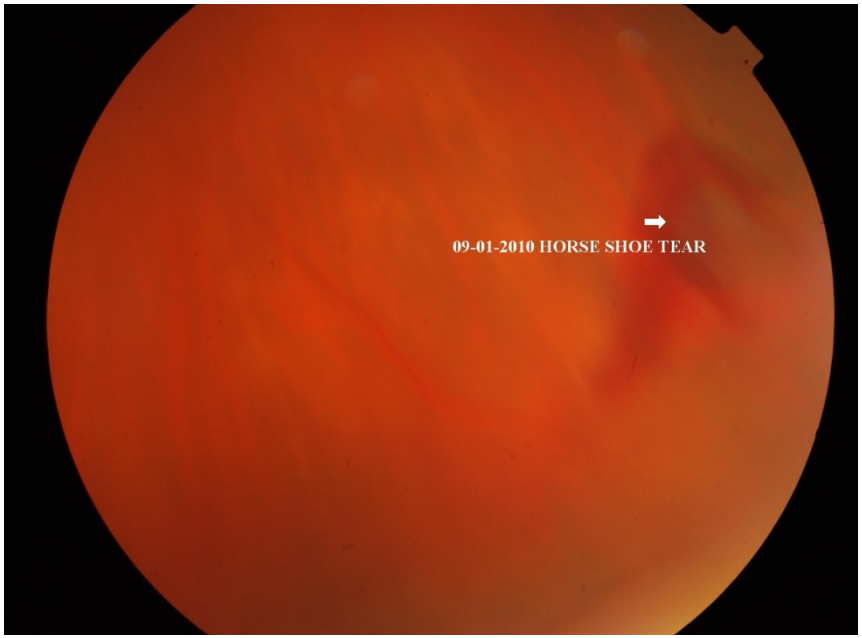
Putting 'EYE' before 'I'

Ref no: 64.2010 9-1-2010

Vitreous Hamorrhage



Horse Shoe Tear in lower quadrant



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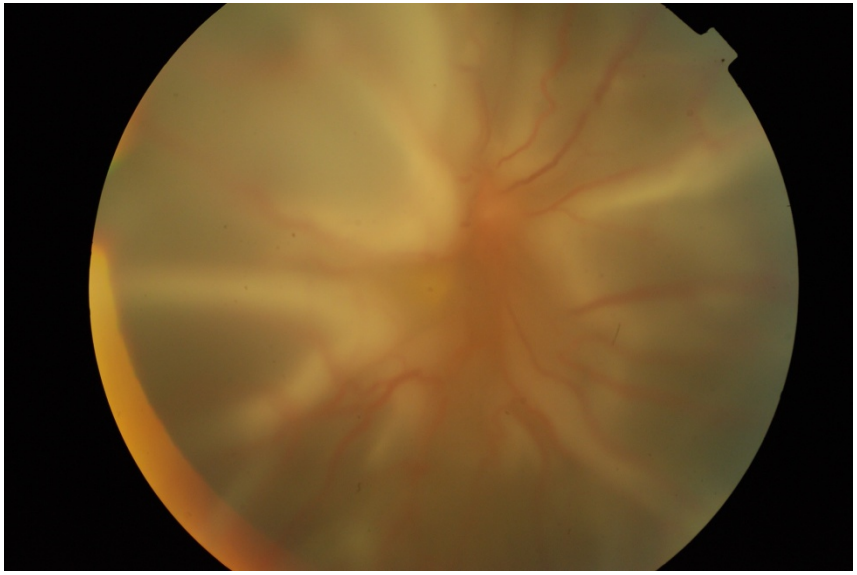
06-02-2010 Pre op PVR D3



06-03-2010 Almost Attached retina post Vit

Thank You