RETINAL DETACHMENT
**Introduction**

**Definition:**
Retinal detachment is the separation of the neurosensory retina (NSR) from the retinal pigment epithelium (RPE); results in the accumulation of subretinal fluid (SRF) in the potential space between the NSR and RPE.
1. **Rhegmatogenous Retinal detachment**: Full thickness defect in the sensory retina (break)

2. **Exudative Retinal detachment**: Secondary to Tumour, Inflammation or a Systemic disease

3. **Tractional Retinal detachment**: Occurs vitreoretinal adhesions mechanically pull away retina from the Retinal pigment epithelium
RHEGMA TOGENOUS RETINAL DETACHMENT

- Separation of sensory retina from Retinal pigment epithelium
- Fluid accumulation in potential space between them
- Essential pre-requisites for Retinal detachment
  - Vitreous liquefaction
  - Presence of retinal break (Tear, Hole or Dialysis)
Retinal breaks

- Any full thickness defect in the retina
- Retinal tear: produced by traction on the retina
- Retinal holes: due to gradual thinning of the retina
**EPIDEMIOLOGY**

- Phakic, Non-traumatic Retinal detachment: 1 in 10,000 per year
- Following cataract surgery: 1-3%
- Vitreous loss during cataract surgery: upto 10%
- Fellow eye: upto 15%
- Patients with high myopia: 5%
- Age: 10-90 yrs, commonly 40-80yrs
- Sex: Male predominance
RISK FACTORS

- Myopia
- Lattice degeneration, Snailtrack degeneration & degenerative retinoschisis
- Diffuse choroidal atrophy
- White-with-pressure & white-without-pressure
- Cataract surgery
- Trauma
- History of Retinal detachment in other eye
- Family history of Retinal detachment
RISK FACTORS- MYOPIA

- >50% Non-traumatic detachments occur in myopes
- -1 to -3D: risk 4 times more than emmetropes
- >-3D: risk 10 times greater
- Increased risk if other eye has had an Retinal detachment
Lattice degeneration

- Lattice degeneration with snow flakes
- Holes within lattice degeneration
Snailtrack degeneration

- Sharply demarcated bands of tightly packed ‘snow-flakes’, which give the peripheral retina a white frost like appearance.
- They are usually longer than the islands of lattice. No Vitreous traction, so usually rare of tears.

- Snail track degeneration with retinal holes
Degenerative Retinoschisis

- Inner layer showing snow flakes and silver wiring of blood vessels
- Microcystoid degeneration and degenerative retinoschisis in the infero temporal and superotemporal quadrants
Diagnosis

Ultrasound
- Usually, Rhegmatogenous retinal detachment has a characteristic undulating motion after a sudden saccade, whereas a thickened posterior hyaloid moves in a brisker manner but with less excursion

Optical coherence tomography (OCT)
- Reveal subfoveal fluid

Visual field
- Defect is an inverted image of the retinal detachment
Symptoms
✓ Flashing lights (photopsia)
✓ Vitreous floaters
✓ Peripheral visual field defect which may progress to involve central vision

Signs
• Marcus Gunn pupil
• Lower Intra ocular pressure
• Cornea- Decement’s membrane folds
• Iritis: Cells and flare may be seen in the anterior chamber
• Pigment cells in the anterior vitreous (tobacco dusting or a Shaffer’s sign)
• Grey reflex on Direct ophthalmoscopy
FRESH RETINAL DETACHMENT

- Convex configuration
- Slightly opaque
- Corrugated appearance
- Intraretinal oedema
- Loss of underlying choroidal pattern
- Retinal blood vessels appear darker
- Sub-retinal fluid extends up to the ora serrata
LONG-STANDING RETINAL DETACHMENT

- Main features of long-standing Rhegmatogenous retinal detachment
  - Retinal thinning
  - Secondary intraretinal cysts
  - Sub-retinal demarcation lines
PROLIFERATIVE VITREO-RETINOPATHY

- Caused by Epiretinal and subretinal formation

- Occurs following surgery for rhegmatogenous retinal detachment or penetrating injury

- Grade A, B, C, D
GRADE A
- vitreous haze
- pigment clumps

GRADE B
- wrinkling of inner retinal surface
- Rolled out edge of retinal break
- Retinal stiffness
GRADE C

- Full thickness fixed retinal folds
- C-1 one quadrant
- C-2 two quadrants
- C-3 three quadrants
GRADE D

- Fixed folds in all 4 quadrants
- D-1 wide funnel
- D-2 narrow funnel
- D-3 closed funnel
Clinical Examination

- Detailed indirect ophthalmoscopy
- Meticulous drawing
- Helps to plan surgery
- Key to success
SCLERAL DEPRESSION

- Requires patience
- Co-operative patients
- Localize primary break
- As well as other breaks
- 50% have more than 1 break
EXAMINATION OF MACULA

- Done with 90D or 78D
- Macular detachment has poorer prognosis
- Bullous detachment may overhang macula
- Cystic changes often mistaken for macular hole
Localization of breaks

- Assess extent, location and configuration of Retinal detachment
- Apply Lincoff’s rules
- Always look for additional breaks
**SIMPLE RETINAL DETACHMENT**

- Good visibility of the fundus
- Single, anterior breaks
- Multiple breaks in same anterior location
- Absence of advanced Proliferative vitreo-retinopathy
COMPLEX RETINAL DETACHMENT

- Giant retinal tear
- Posterior break macular hole
- Large tears, multiple tears
- Media opacities, choroidal detachment, viral retinitis
- Retinoschisis, coloboma
- Complicated by Proliferative vitreo-retinopathy
Exudative Retinal detachment

- Characterized by accumulation of Sub-retinal fluid in the absence of retinal breaks or traction

**Causes**

- Choroidal tumours
- Inflammation
- Bullous central serous retinopathy
- Choroidal neovascularization
- Hypertensive retinopathy
- Idiopathic
SYMPTOMS

✓ Photopsia is absent – because there is no vitreoretinal traction
✓ Floaters may be present if there is associated vitritis
✓ Visual field defect may develop suddenly or rapidly

SIGNs

✓ Retinal detachment has a convex configuration
✓ Detached retina is very mobile and exhibits the phenomenon of ‘shifting fluid’
✓ Leopard spot’s consisting of scattered areas of subretinal clumping may be seen

Treatment

• Depends on the cause
Tractional Retinal detachment

Causes

• Proliferative vitreo-retinopathy

✓ Diabetic retinopathy
✓ Retinopathy of prematurity

• Penetrating posterior segment trauma
Diabetic tractional Retinal detachment

Pathogenesis of Posterior vitreous detachment (PVD)

• PVD - Separation of the cortical vitreous gel from the retinal surface

• Tractional Retinal detachment is caused by progressive contraction of fibrovascular membranes over large areas of vitreoretinal adhesion
Vitreous liquefaction and detachment

- Ageing
- Myopia
- Surgical and Non surgical trauma
- Intraocular inflammation
- Others

↓ Hyaluronic acid concentration
↓ support to collagen fibers
Aggregation of collagen
Cavities of liquefied Vitreous cortex
Hole in thin vitreous cortex

Liquefied vitreous into Retro hyaloid space

PVD
3 main steps of static vitreoretinal traction

- **Tangential** – caused by contraction of epiretinal fibrovascular membranes
- **Antero-posterior** – caused by contraction of epiretinal fibrovascular membranes extending from posterior retina
- **Bridging** – caused by contraction of epiretinal fibrovascular membranes which stretch from one part of the posterior retina to another
Figure 2b: Macroscopic view of an eye with vitreous traction on the retina that has not produced a retinal hole. White arrow: vitreous traction strand; black arrow: point of adhesion of vitreous to retina; *, retinal vessel (source: Prof. Peter Meyer, Kantonsspital Basel, Switzerland).
TRAUMATIC TRACTIONAL RETINAL DETACHMENT

- Result from vitreous incarceration in the wound and bleeding within vitreous gel

- Retinal break may develop several weeks later leading to sudden extension of Subretinal fluid and visual loss
SYMPTOMS

✅ Photopsia and floaters are usually absent—because vitreoretinal traction develops insidiously and is not associated with Posterior vitreous detachment

✅ Visual field defect progresses slowly and may become stationary for months or years

SIGNS

✅ Concave configuration and breaks are absent

✅ Retinal mobility is severely reduced and shifting fluid is absent
The principles of surgery for retinal detachment are the following:

- Find all breaks
- Create a chorio-retinal adhesion around each break
- Bring the retina and choroid into contact for sufficient time to produce a chorio retinal adhesion to permanently wall off the subretinal space
MANAGEMENT

- Laser
- Pneumatic retinopexy
- Scleral buckling
- Pars plana vitrectomy
LASER PHOTOCOAGULATION

• Select a spot size of 200mm & set the duration to 0.1 or 0.2 seconds

• Insert triple mirror contact lens or one of the wide field lenses

• Surround the lesion with two rows of confluent burns of moderate intensity

• After treatment the patient should avoid strenuous physical exertion for about 7 days until an adequate has formed and the lesion is securely sealed
Pneumatic retinopexy

- A gas bubble is injected into the vitreous cavity, and the patient is positioned so that the bubble closes the retinal break(s), allowing absorption of the subretinal fluid.

- Cryotherapy or laser photocoagulation is applied around the retinal break(s) to form a permanent seal.

- Gases used are:
  - Sulphur hexafluoride (SF6)
  - Perfluro-propane (C3F8)
SCLERAL BUCKLING

Indications

- Rhegmatogenous retinal detachment
- Detachments due to dialysis
- Complex retinal detachments

Contraindications

- Breaks significantly posterior to the equator
- Opaque media
Scleral buckling

- Sclera pushed inward
- Reapposes Retinal pigment epithelium to break
- Break supported by buckle
- Various size buckles
- Precise external localization
Steps of sleral buckling

- Localization of break
- Chorioretinal adhesion – cryotherapy
- Suturing buckle to sclera
- Sub-retinal fluid drainage
(A) Conjunctival incision; (B) insertion of bridle suture; (C) cryotherapy; (D) Scleral mattress suture in place; (E) suture is tied over the sponge; (F) appearance of indentation – in this case the buckle is too anterior in relation to the tear and must be repositioned.
1. Localization of break

- Most important step
- Indirect ophthalmoscopy localizes the break
- Scleral depression
- Mark location on sclera
2. Chorioretinal adhesion

- Cryotherapy
- Freeze along borders of tear
- Anteriorly upto Ora
- End point – choroidal and retinal whitening
3. Suturing buckle

- Buckle + encircling band
- Sutured to sclera
- Buckle supports area of retinal break
- Band supports vitreous base all around
4. Sub-retinal fluid drainage

- Not indicated in all cases

**Indications**
- Bullous Retinal detachment
- Long standing Retinal detachment
- Inferior Retinal detachment
- No definite break
- Elderly patient
- High myopes
Complications of scleral buckling

- Postoperative glaucoma
- Anterior segment ischemia
- Infection of the buckle
- Choroidal detachments
- Cystoid macular edema
- Strabismus
VITRECTOMY

- Preserved for complicated retinal detachments, such as
  - Giant retinal tears
  - Proliferative vitreo-retinopathy

Advantages of vitrectomy

- Ability to remove intraocular media opacities and vitreous traction
- Improved visualization
- Ability to internally drain and visualize retinal reattachment
- Ease of laser/cryotherapy application regardless of location
Indications:

- Non resolving vitreous opacities
- Proliferative vitreo-retinopathy
- Giant retinal tears
- Posterior breaks and macular holes
- Combined rhegmatogenous and tractional Retinal detachments
- Trauma
- Macular holes
Intra operative complications

- Corneal edema
- Miosis
- Damage to the lens
- Choroidal and vitreous hemorrhage
- Vascular occlusion due to high infusion pressure
Post operative complications:

- Raised intraocular pressure
- Silicone-oil associated glaucoma
- Ghost cell glaucoma
- Cataract
- Delayed cataract formation
Causes of failure of Retinal detachment surgeries:

- Missed breaks
- Buckle failure
- Proliferative vitreo-retinopathy
- Reopening of a retinal break
Management of Fellow eye

- As important as Retinal detachment eye
- Prophylactic treatment for breaks and lattice
- Laser or cryotherapy
CONCLUSIONS

- Meticulous pre-op examination
- Careful planning
- Appropriate surgery
- Prophylactic treatment of fellow eye
- Basis of successful Retinal detachment surgery
Thank you