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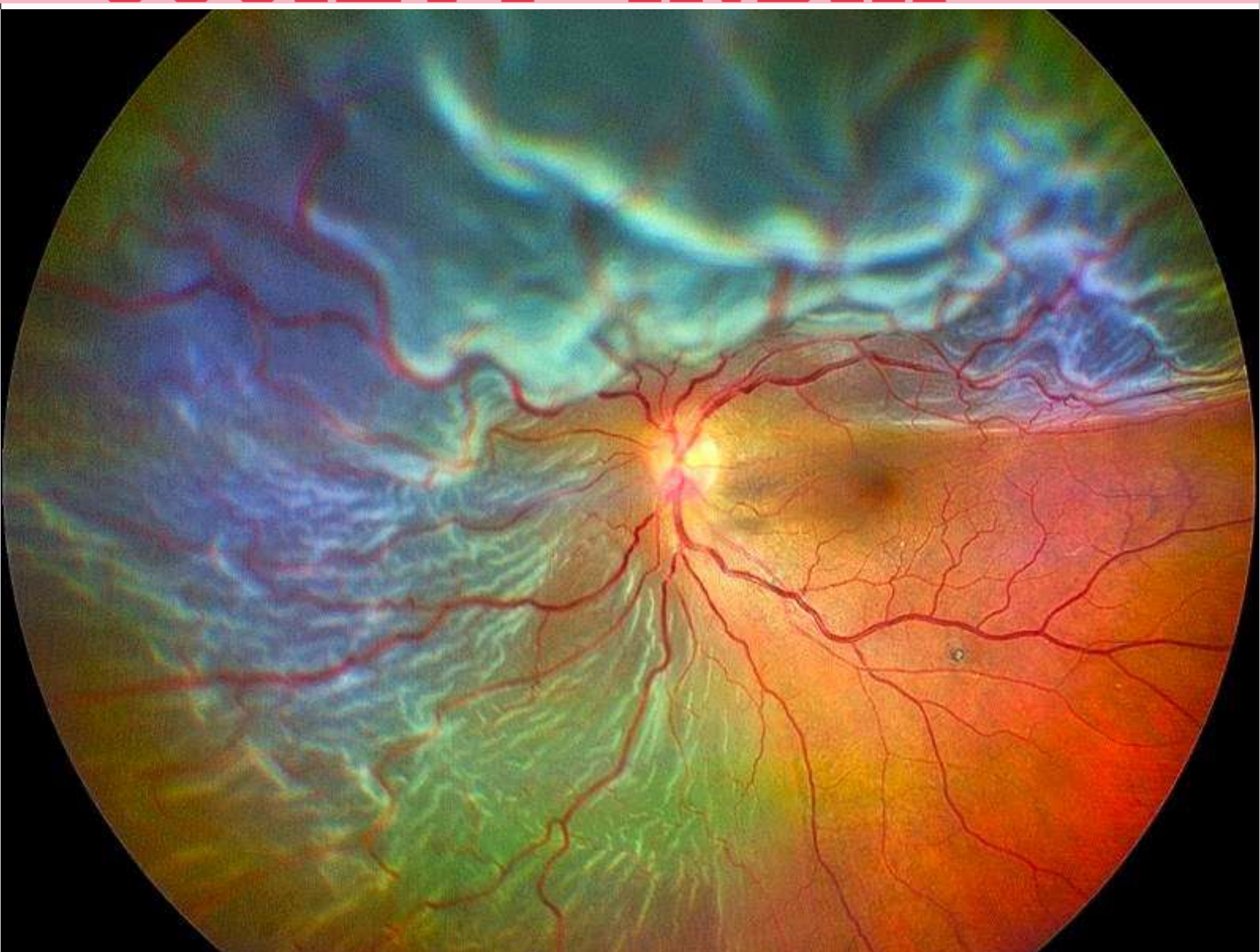

TABLE OF CONTENTS

COVER PAGE IMAGE

Dr. Aditya Kelkar, Dr. Harsh Jain, Dr. Sahl Wagh

National Institute of Ophthalmology, Pune

A 70-year-old female presented to the outpatient department with a complaint of sudden diminution of vision in her left eye persisting for four days. Fundus photograph captured on Clarus 500 showed rhegmatogenous retinal detachment in the left eye

GUIDELINES:
MANUSCRIPT SUBMISSION FOR VRSI NEWSLETTER

Original Articles :

These include randomized controlled trials, interventional studies, studies of screening and diagnostic test, outcome studies, cost effectiveness analyses case-control series, and surveys with high response rate. The text of original articles amounting to up to 3000 works (excluding Abstract, References and Tables) should be divided into sections with the headings: Abstract, Key-words, Introduction, Material and Methods, Results, Discussion, References, Tables and Figure legends.

Case Reports / Challenging Case / Innovations / Instruments / Techniques:

New, interesting, challenging, rare cases, innovations, instruments and techniques can be reported. They should be unique and providing learning point for the readers. Manuscripts with clinical significance or implications will be given priority. These communications could be of up to 1000 words (excluding Abstract and References) and should have the following headings : Abstract (unstructured), Key-words, Introduction, Case, Discussion, Reference, Tables and Legends in that order. The manuscript could be supported with up to 10 references. Case Reports could be authored by up to four authors.

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EDITORIAL: DO NOT FORGET THE ART OF SCLERAL BUCKLING

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Scleral buckling surgery, a technique with a history spanning over six decades, is considered an art.[1] It demands the surgeon's indirect ophthalmoscopic skills, hand-eye coordination and analytical acumen particularly in executing tasks such as localization, cryotherapy and precise placement of the buckle. The procedure is physically demanding, as the weight of the indirect ophthalmoscope strains the neck, and assuming various postures test the core muscle strength. Additionally, surgeon has to stand up from the usual sitting position during surgery for steps like cryotherapy and localization, unless a chandelier-assisted approach is preferred.

In contrast, vitrectomy can be comfortably performed while seated throughout the procedure, without the need for precise localization of the retinal break.

Younger surgeons are increasingly veering away from mastering scleral buckling due to several reasons, including insufficient training, the perceived superior outcomes of vitrectomy techniques, and the convenience of performing surgery without leaving the surgeon's chair. Unlike scleral buckling, vitrectomy does not mandate a thorough pre-operative fundus examination and drawing.[1,2]

Despite waning interest and perceived drawbacks, scleral buckling offers unparalleled advantages over vitrectomy in specific scenarios:

1. In cases of retinal detachment in young patients with attached vitreous, inducing posterior vitreous detachment (PVD) and its complete removal can be challenging and carry the risk of iatrogenic retinal breaks, particularly in syndromic detachments like Stickler's syndrome. Scleral buckling circumvents this risk. In these eyes with formed vitreous, if the retinal detachment is due to atrophic holes, indenting the sclera will allow the vitreous to plug the break.

2. For eyes with long-standing retinal detachment and subretinal gliosis (SRG), scleral buckling often yields comparable or superior anatomical results to vitrectomy, particularly if the SRG is not beneath the macula. Subretinal fluid drainage is safe during scleral buckling in such cases as one can drain the fluid close to SRG with very low risk of retinal incarceration. Scleral buckling obviates the need for large/ multiple retinotomies to remove the subretinal bands and reduces the subsequent risk of preretinal proliferative vitreoretinopathy.

3. Scleral buckling allows for earlier rehabilitation compared to vitrectomy, as the tamponade agent used following vitrectomy induces significant refractive changes that

hinder the vision. The vision would be poor until the absorption of gas or silicone oil removal. Scleral buckling obviates the need for strict post operative positioning in contrast to vitreous surgery or pneumatic retinopexy, where prolonged post-operative positioning is required.

4. Vitrectomy and tamponade induce early development of cataract. Though cataract can be managed by a second surgery, it poses significant challenges particularly in young myopic patients. Cataract surgery with intraocular lens implantation results in emmetropia. In a myopic patient, this results in anisometropia with a refractive error in the other eye, making it a challenge to overcome. In some situations, the cataract surgeon opts for a residual myopia to decrease the anisometropia, or the patient has to wear contact lenses for rehabilitation or undergo refractive cataract surgery in the other eye, which increases the risk of retinal detachment in these predisposed eyes.

5. Studies suggest that vitrectomy may lead to increased metamorphopsia compared to pneumatic retinopexy, attributed to the forceful reattachment of the retina.[3] The authors have suggested that spontaneous reabsorption of the SRF as that happens with pneumatic retinopexy allows better alignment of the photoreceptors, thereby decreasing the risk of metamorphopsia. Non-drainage or partial drainage scleral buckling surgery can achieve the same results but with the advantage of earlier rehabilitation of the patient.[4]

In conclusion, scleral buckling remains relevant in the management of uncomplicated rhegmatogenous retinal detachment, especially in specific scenarios such as young patients, formed vitreous, atrophic retinal breaks, and subretinal gliosis. Despite

challenges, the art of scleral buckling can be preserved and adapted with novel techniques,[5] ensuring its continued significance in ophthalmic surgery.

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TIPS FOR SUCCESSFUL SCLERAL BUCKLING

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Introduction:

Scleral buckling (SB) has been used either as the primary or as an adjunctive treatment for rhegmatogenous retinal detachment (RRD) repair for over 60 years.[1] The following article intends to share the important tips for successful scleral buckling to the young vitreo-retina surgeons so that they keep this art alive for ages to come.

Tips:

Proper selection of case:

SB should be considered as the primary modality of management in following situations:

- Young patients
- Phakic eyes
- High myopia
- Absence of PVD
- Absence of advanced proliferative vitreoretinopathy (PVR) changes (upto grade C1)
- RRD secondary to breaks anterior to equator
- RRD secondary to retinal dialysis[2]

Pre-operative examination:

- Scleral buckling warrants a thorough dynamic indirect ophthalmoscopy with 360 degree scleral indentation to identify all the lesions prior to surgery.
- Wide field imaging should never be considered as a substitute for fundoscopy in this regard.

Choice of anaesthesia:

- General anaesthesia helps the surgeon to perform the surgery in an unhindered manner, especially in young patients, although SB can be done under local anaesthesia as well.

- Additional local anaesthetics infiltration is a prudent choice to avoid oculocardiac reflex while manipulating the extraocular muscles.[3]

Conjunctival peritomy:

- The 360-degree circumferential peritomy can be performed either at the limbus or 2 to 3 mm away from it providing good scleral access with reduced post-operative scarring as well as avoiding disruption to the limbal stem-cell array.

- Two radial incisions should be given (most commonly at 3 and 9'o clock) to prevent the conjunctiva from tearing while retracting it to achieve adequate exposure.

Recti muscles tagging:

- Great care should be taken while tagging the four recti to avoid splitting a muscle, slinging an oblique or stripping the muscle capsule all of which increase the risks of restrictive diplopia post-surgery.

- Partial tagging of the muscles can be avoided by re- checking whether the whole width of the muscle has been tagged or not after initial passage of the suture-threads.

- The heart rate should constantly be monitored while pulling the recti as it can trigger the oculocardiac reflex, leading to bradycardia. Any fall in the heart rate warrants immediate muscle release and intravenous atropine if bradycardia persists.[3]

Quadrant check:

- All four quadrants should be inspected for the presence of any areas of scleral thinning or anomalous vortex veins.

- Areas of scleral thinning have to be avoided while passing the anchor sutures, or else the needle might cause a full thickness perforation.

Localization of retinal break:

- It is the single most crucial step to achieve success in buckle surgery. The closed tip of the forceps should be used to depress the ora serrata in the meridian of the break and then gently eased posteriorly toward the break, under indirect ophthalmoscopic visualization. Just as the first inward indent is seen under the break, the overlying sclera is pushed perpendicularly with the tip of forceps leaving a mark over the scleral surface.

- With this “anterior to posterior” approach, parallax error while localizing breaks in eyes with bullous retinal detachments, can be avoided.

- Choroidal pigments and/or chorioretinal atrophy patches can also be tracked as these can lead us to the site of the breaks in case of bullous detachments where precise localization of break is quite difficult.

- Peyman et al. proposed that prior SRF drainage, can make break localization easier in bullous RD cases. However, pigment release and hemorrhage due to hypotony associated with SRF drainage may lead to media haze, which may preclude visualization. This can be countered by simultaneous injection of air or fluid into the vitreous cavity to make up the volume lost by SRF drainage. This technique is called as D-ACE sequence (Drainage-Air, Cryo, Explant).[4]

Treatment of retinal breaks:

- The cryo-spots should be given contiguously all around the retinal break(s).

- The surgeon must ensure that the indentation produced around the break is by the cryoprobe tip and not the shaft, as improper technique can lead to inadvertent posterior freeze.

- The probe must be shifted from one point over the sclera to another with great care to avoid damaging the vortex veins.[5, 6]

Choosing the correct buckle size and extent:

- Buckle size is decided depending on the distance between the posterior-most break and the ora serrata. Explants should extend 30 degrees or 1 clock hour on either side of the break and 1 or 2 mm beyond the posterior margin of the posterior-most break. Hence localization of the posterior-most break is one of the keys to success in buckle surgery.

- The extent of buckle depends on the number and extent of the breaks. It is imperative to support all lesions [e.g. holes, horse-shoe tears (HST), open lattices etc.] present within the detached retina adequately by the buckle indent.

- Additional localized buckle effect can be achieved for a single localised lesion by placing a curated piece of buckle material or a meridional segment on top of the existing one.

Placement of anchor scleral sutures:

- Adequate exposure of the scleral surface is absolutely necessary for placing the anchor sutures. This is achieved by pulling the traction sutures attached to the adjacent recti at an obtuse angle as well as retracting the conjunctiva.

- In case of RD with HSTs where posterior vitreous detachment (PVD) is usually present, the posterior bites of the anchor suture should be wider than the anterior ones as it results into higher buckle indent which is intended, in order to provide good support to the breaks in such cases, whereas in cases where PVD is absent such as in patients with retinal dialysis a shallower buckle indent is wished for, as a higher indent would result in greater mismatch between the arc length and the chord length of the globe, and therefore leading to lack of proper support at the site of the lesion.

- Sutures can be tied at the ora (near the insertion of recti) or over the buckle itself.

SRF drainage:

The various indications for SRF drainage include bullous and chronic RD, high myopia, aphakia, inferior retinal break(s), old patients with poor RPE function, inability to localize any retinal break, and intolerance to high IOP (glaucoma). The following points should be kept in mind while selecting the site for drainage:

- Select the point where SRF is highest.

- Avoid vertical meridian to avoid damaging the vortex veins

- Prefer location at or slightly anterior to the equator to reduce the chances of choroidal bleed as the choroid is less vascular in this region

- Preferably chose a location under the explant as any inadvertent retinal break gets supported

- Avoid area treated with cryotherapy to prevent choroidal hemorrhage secondary to the choroidal congestion

- Prefer the nasal quadrant as any accidental subretinal bleed is less likely to track under the macula.
- Avoid areas with a large break to prevent vitreous loss

There are two major techniques for drainage:

1. *The traditional Cut-down technique (Figure 1)*

This technique has the risk of

- Incomplete drainage, if the scleral fibres are not completely dissected to allow prolapse of the choroidal knuckle
- Incarceration of retina and vitreous due to the large unprotected area of exposure
- Bleeding if choroidal vessels are pierced
- Sudden hypotony due to copious drainage.[7]

However the advantage is direct visualization of the choroidal vessels and it is easy to monitor the out-flow of subretinal flow thereby giving the surgeon, the ability to titrate the amount of SRF drainage

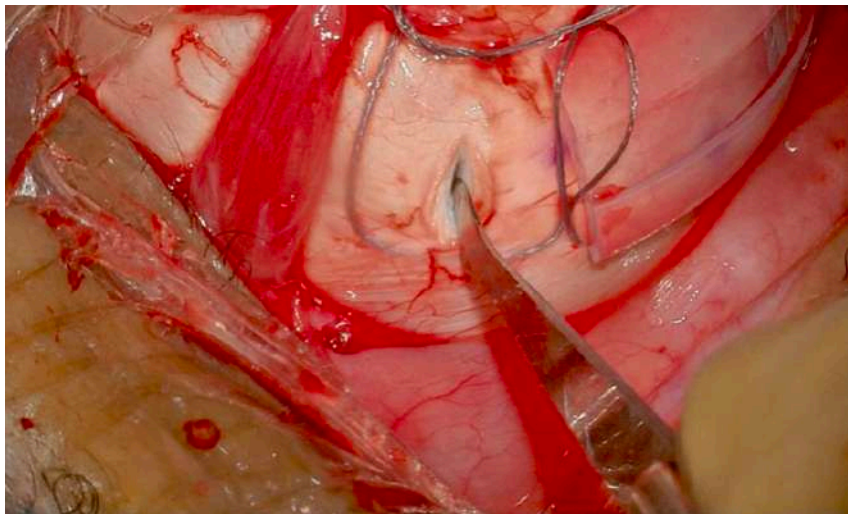
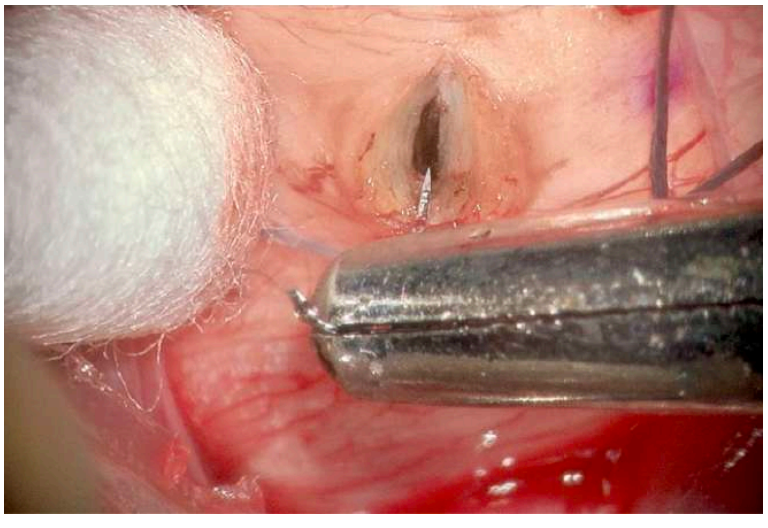


Figure 1: Scleral cut down



Direct choroidal perforation with needle

2. Trans-scleral needle (23 G) drainage technique

- Advantage of the needle is that the entry site is small making the risk of hemorrhage and incarceration negligible.[8, 9]
- However it is a blind procedure and will depend on precise localisation of the height of subretinal fluid safe for drainage
- The sclera should be held taut by holding tightly on to the muscle tags immediately after the drainage and then form the globe with intravitreal injection of saline or air.

Adjustment of the buckle height:

- The anchor sutures are tightened to achieve an adequate buckle height. The knots can be rotated posteriorly to prevent conjunctival erosions.
- Excessive tightening of the buckle or encircling band should be avoided as this can lead to “fish-mouthing” especially in case of large posteriorly placed breaks.
- To manage a case of “fish-mouthing”, air / saline water is injected into the vitreous at first, if the IOP is too low. Thereafter, belt-buckle is loosened followed by attempts to decrease the scleral-buckle height. In case the fish-mouthing persists, Intravitreal C3F8/ SF6 (100%) can be injected to keep the fish mouthed break in apposition with the RPE for a longer period of time.

Final fundus examination:

- Fundus should be examined to check the optic disc perfusion, the buckle height, the retinal breaks, and the site of SRF drainage.

- A pale disc or arterial pulsations warrant anterior chamber paracentesis to reduce the intraocular pressure.

Closure of tenon and conjunctival openings:

- It is better to suture them in two different layers (the tenons and the conjunctiva). A complete closure prevents complications like buckle exposure and buckle infection.

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RATIONALE AND TOP TEN TIPS AND TRICKS FOR SUCCESSFUL PNEUMATIC RETINOPEXY

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Over the past few years, our research has taught us that pneumatic retinopexy offers several advantages over procedures such as vitrectomy. Pneumatic retinopexy is associated with improved integrity of retinal reattachment. Specifically, prospective clinical trial data has demonstrated that pneumatic retinopexy is associated with a lower risk of retinal displacement (low integrity retinal attachment-LIRA), outer retinal folds, and discontinuity of the outer retinal bands (ellipsoid zone and external limiting membrane). This provides a compelling anatomic rationale for the superior functional outcomes following pneumatic retinopexy compared to pars plana vitrectomy. Over the past century, the focus has always been on primary anatomic reattachment rate as a marker of success. However, we are now in a new era informed by imaging that tells us that there is much more to success than primary anatomic reattachment rate. We have learned that large gas bubbles and forcefully/rapidly reattaching the retina are harmful and should be avoided as much as possible to allow the retina to reattach in the most natural way possible.

Pneumatic retinopexy is an elegant office-based procedure to achieve retinal reattachment. Pneumatic retinopexy offers superior long-term visual acuity results and less vertical metamorphopsia compared to other surgical approaches (Pneumatic Retinopexy Trial, PIVOT). Despite these significant benefits, there are many vitreoretinal surgical training programs that do not offer sufficient training with pneumatic retinopexy. Although the individual steps of performing pneumatic retinopexy, namely an anterior chamber paracentesis, an intravitreal injection of gas and laser retinopexy or cryopexy are relatively straightforward, there is an art to performing pneumatic retinopexy that is acquired only after performing hundreds of cases. In this article we will discuss the “Top Ten” tips and tricks to maximize outcomes with pneumatic retinopexy.

1. It’s all about the scleral depressed examination

The clinical exam is of utmost importance in pneumatic retinopexy. It is ideal if the person who performs the pneumatic retinopexy is the one who will follow the patient during the first week, although if this is not possible, a second retina specialist should be able to take over if the pathology has been described in detail. It is important to perform a careful scleral depressed examination. The surgeon needs to be aware of all the pathology in that eye not only retinal breaks, but also areas of lattice and vitreoretinal tags. The accuracy of the initial exam is most critical, although careful follow-up exams are also required to make sure there are no new or previously missed retinal breaks.

2. Maximize the anterior chamber paracentesis volume

The size of the anterior chamber paracentesis is critical as it dictates how much gas you

can inject into the vitreous cavity. If your outpatient facility has a basic microscope in a treatment room, I would recommend using it while performing the paracentesis. This provides optimal visualization and the patient lying supine is much more controlled than performing a paracentesis at the slit lamp. If a microscope is not available, I prefer to perform the paracentesis with the patient reclined under direct visualization. I use a 30-G needle on a tuberculin syringe with the plunger removed. I insert the needle inferotemporally over iris in phakic patients and over the optic from the temporal side in pseudophakic patients. I use the plunger to apply counter pressure on the nasal limbus. This creates a dome over the needle and the firm pressure will force aqueous and liquified vitreous into the needle. Most of the time 0.2-0.3 cc is removed, although not infrequently a much larger volume can be removed. I recommend removing as much as possible. The chamber is completely flat after this step and the eye is generally quite soft.

3. Use SF6 in most cases and C3F8 for the rare case

I prefer SF6 gas over C3F8 for pneumatic retinopexy in almost all cases. SF6 has favourable properties that make it ideal for pneumatic retinopexy. It reaches maximal expansion in 36 hours and dissolves in 12 days. When we perform a pneumatic retinopexy, we want the gas bubble to expand rapidly so it is large enough to tamponade the break(s), and we can then quickly determine if the pneumatic retinopexy is working over the first few days. To the contrary, with C3F8, maximal size of the gas bubble is achieved at 96 hours. This is a long time to wait before the bubble fully expands and before the clinician can make decisions regarding the success/failure of the procedure. Furthermore, C3F8 lasts in the eye for 38 days after injection. In most cases, the retina is reattached fully by day 3-5 following pneumatic retinopexy and the retinal breaks are

well lasered. 38 days of a gas bubble in a vitreous filled eye following retinal detachment repair with pneumatic retinopexy is not necessary, and it is possible that the bubble could induce other breaks. In the rare circumstance, where an anterior chamber paracentesis is not possible, then C3F8 gas makes the most sense.

4. Maximize the size of the intravitreal gas bubble injection

I recommend injecting 0.3cc more than what is removed during the anterior chamber paracentesis, but never less than 0.6cc. The larger the gas bubble, the greater the chance of success. It is not uncommon to have to perform a repeat paracentesis following the gas injection. Before performing the re-paracentesis, I usually tell the patient to be face down to possibly allow more fluid to enter the anterior chamber from the vitreous cavity. The repeat paracentesis can sometimes be challenging, as the eye is firm and the anterior chamber is shallow, but it is almost always doable. It is important to insert and remove the needle very slowly to prevent iris or less trauma and iris incarceration in the paracentesis wound.

5. The Steamroller maneuver is your friend

The steamroller maneuver is an important part of the pneumatic retinopexy procedure. I like to have patients position face down for the first 6 hours in macula-off detachments and for four hours in macula-on cases. Then, for the typical superior bullous retinal detachment, I ask the patient to raise their head by 30 degrees every hour until they are upright. By performing this maneuver, the buoyant force of the gas bubble causes subretinal fluid to be displaced through the retinal break, reducing the amount of fluid that needs to be reabsorbed by the RPE pump. I then ask them to tilt their head or lie on their side with the head elevated to tamponade the break. In some cases, the

steamroller maneuver can be used to prevent the inferior displacement of fluid in cases with an inferior retinal break/hole in attached retina. In these cases, the patient is first positioned on their side on a decline and then they gradually raise their head while on their side. This allows fluid to be displaced in a certain direction away from the inferior breaks of concern.

6. Positioning, Positioning, Positioning

The success of pneumatic retinopexy is heavily dependent on compliance with positioning. That said, when you explain positioning to patients, as we do with macular hole surgery for example, most of them are concerned about their ability to do it. Despite this, the vast majority of patients will position if their doctor stresses the importance of doing it. Patients can often misunderstand instructions. For example, in some cases they think the positioning is just while they are sleeping. In other cases, they think they can stop positioning after the laser retinopexy. I tell my patients to position 23 out of 24 hours per day for one week, and in some cases until the bubble disappears.

7. Utilize indirect laser retinopexy for most cases and cryopexy in specific situations

Although laser retinopexy is technically more challenging with gas in the eye, it is certainly a more elegant way to treat the retinal break. All retinal pathology including any lattice degeneration or retinal holes/tears should be pre-treated with laser prior to the gas bubble injection. The biggest advantage of laser retinopexy is that it causes some immediate chorioretinal adhesion as opposed to cryopexy which can take several days. Laser retinopexy therefore reduces the risk of the retina re-detaching if the patient becomes less compliant with positioning after the retinal break is lasered. That said, cryopexy is very useful in specific cases, such as small pseudophakic retinal breaks that

will be hard to see following pneumatic retinopexy, pneumatic retinopexy in children where it is unclear if they will be able to tolerate the post pneumatic retinopexy laser, aphakic patients where intracameral gas will impact the view, and other cases where visualization is limited. The view almost always is worse following the gas injection, so in certain cases with poor media, cryopexy before the gas injection is much simpler. Physicians in practices where someone else will be following the patient may also elect to perform cryopexy, so that the physician taking over will not need to treat the break in a case they are seeing for the first time. In cases where I have performed cryopexy, I may also elect to apply some laser retinopexy around the cryopexy scars and ora-ora for a few clock hours, to achieve immediate chorioretinal adhesion. I also utilize laser in some cases to mark the retinal breaks or laser the pars plana in the meridian of the retinal break to assist with subsequent localization once the gas bubble is in the eye. Laser retinopexy can be challenging, but I recommend getting used to doing it with an indirect laser and a 28D lens for optimal visualization. I generally like to laser through the gas bubble as it provides a clear minified view and in pseudophakic patients, they can be told to look straight up to the ceiling while lying supine, and the gas bubble will cover the entire pupil and lead to a panoramic view.

8. Add a second bubble when needed

In some cases, where breaks are further apart of perhaps in the inferior quadrants or a patient is not very compliant, a second gas bubble injection is required to adequately tamponade the retinal breaks. The second gas bubble injection is performed in exactly the same manner as the first gas injection with the same approach regarding the anterior chamber paracentesis and the intravitreal gas injection. Again, a minimum of 0.6cc of SF6 gas is injected. It is important to prevent intravitreal gas from coming into

the anterior chamber when performing the paracentesis. In patients at risk for this, such as sulcus fixated IOL from complicated cataract surgery, steps can be taken to minimize this risk, such as performing the tap with the head raised and with a small pupil.

9. When a pneumatic retinopexy has failed do not delay surgery

Multiple randomized trials have shown that a pneumatic failure does not jeopardize future success. First of all, it is important to be absolutely certain that the pneumatic is truly failing from an open break. In many cases there can be residual fluid that is not associated with an open break. Subsequent vitrectomy in these cases is slightly complicated because a retinotomy, will need to be made to remove the fluid, often inferiorly. It is important to assess if residual subretinal fluid after a pneumatic retinopexy is getting better, staying the same or getting worse. If there is an open break, then the fluid should be worsening, and the patient should have surgery arranged. Performing the surgery in a timely manner within a few days, will allow the patient to have an excellent outcome despite the pneumatic failure. Delaying surgery can result in proliferative vitreoretinopathy and poor anatomic and functional outcomes. I always ask patients to remain face down while waiting for surgery. This allows the macula to remain attached and in phakic patients keep the gas bubble away from the lens. It is critical to tell the phakic patient to not lie supine, even in the preoperative area and to be face down until they see you in the operating room. The patient lying on their back even for an hour on the day of surgery, can cause the view to be lost during a vitrectomy. In rescue scleral buckle cases, in some cases gas can be removed, but usually I work around it. In most cases, I try not to drain subretinal fluid externally, as when the eye is rotated the gas bubble can come to the quadrant of drainage and push on the detached retina, leading to retinal incarceration or a retinal break.

10. Use topical steroids following the procedure and subconjunctival lidocaine for laser retinopexy

Laser retinopexy following pneumatic retinopexy can be difficult for the patient particularly in the early post-pneumatic period. Without topical steroids, the eye can be quite tender on day 1 or 2 making the laser even harder. Topical steroids reduces the inflammation and allows the patient to tolerate the laser retinopexy and scleral depression better. If performing extensive laser retinopexy, especially temporally or nasally over the long ciliary nerve, a subconjunctival lidocaine injection can be very helpful.

For those surgeons who only consider primary anatomic reattachment rate as their marker of success, I would compel them to look at the number needed to treat. In the PIVOT trial which included patients with a single break or multiple breaks within one clock hour of detached retina and any pathology in attached retina, the difference in primary reattachment rate was 12%. This yields a number needed to treat of 8.33. In other words a vitrectomy first surgeon would do 8.33 vitrectomies to save one patient from needing an additional procedure. This difference is even smaller when looking at patients with a single break in detached retina and no other pathology in attached retina. Here the difference was approximately 3% with a number needed to treat of 38. In other words, in these cases a vitrectomy first surgeon would advocate for 38 primary vitrectomies to save one patient from requiring an additional procedure. At the same time, these 38 patients would be subjected to worse visual acuity, more vertical metamorphopsia, more aniseikonia with greater risk of retinal displacement, outer retinal folds and outer retinal band discontinuity, not to mention increased invasiveness and morbidity (cataract formation).

Although there are a lot of nuances to performing pneumatic retinopexy, these can be learned with experience. There is great satisfaction that can be achieved by reattaching the retina in your office, and allowing the patient to avoid surgery with better long-term functional outcomes. Patients who had successful pneumatic retinopexy almost seem like treatment naïve eyes when they come back for follow-up, whereas patients who had scleral buckle or vitrectomy are almost never the same. Patients following pneumatic retinopexy remind me of patients who just had laser retinopexy for a retinal tear. In fact, in pneumatic retinopexy we are simply using the gas bubble to turn back the clock to when there was just a retinal tear. In the same way that we laser a retinal tear following a posterior vitreous detachment, we laser the retinal tear after reattachment, and the retinal remains attached as it most often does with a simple horseshoe tear. Enjoy the process of gaining experience with pneumatic retinopexy, it is one of the greatest satisfactions I have had in my practice

INTERESTING CASE

Dr. Harshal Bagde

Sankara Nethralaya, Chennai

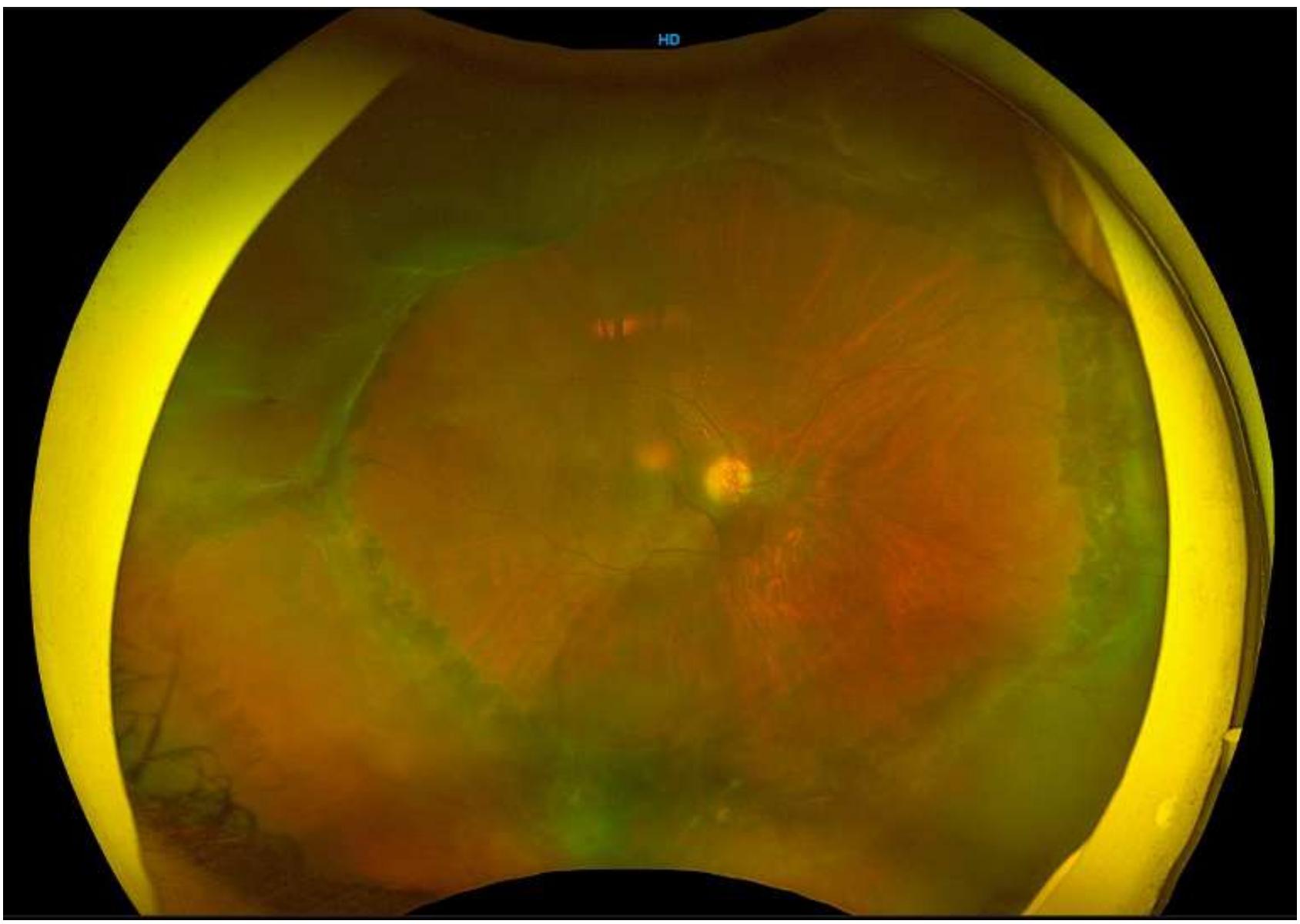
A 33 year old high myope with LASIK done in both eyes in 2009 presented with complaints of flashes and floaters in right eye along with curtain falling over the right eye since 10 days.

He reported past history of barrage laser to lattices in both the eyes in 2019, which were accidentally discovered during examination of the eyes after trauma to the right eye with a ball. Patient's mother was previously diagnosed to have retinal detachment.

The patient had developed 360 degrees peripheral retinal detachment in the right eye with attached retina posterior to the barrage laser scars. Multiple lattices and holes were noted in the detached retina. A single retinal break was noted at 6 o clock posterior to the laser scars in attached retina. Epiretinal membrane was noted at the macula as well.

Option of scleral buckle and vitrectomy was kept in mind during the surgery. However the breaks were found to be too posterior in the highly myopic eye. So the patient underwent vitrectomy +ERM removal + ILM peeling + LPFC + Relaxing Retinectomy + Endolaser + Silicone oil injection in the right eye.

INTERESTING CASE



360 degree peripheral Retinal detachment with attached posterior retina in a myopic eye

Link for the video: https://youtu.be/6x0V5TcL5u8

CHALLENGES AND TIPS IN THE MANAGEMENT OF RRD IN EYES WITH PATHOLOGICAL MYOPIA

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Introduction

Pathological myopia is defined as myopia more than -6D and/or axial length >26.5mm along with degenerative changes in the posterior pole of the eye.[1] The prevalence of myopia is continuously increasing and so are the cases of retinal detachment. Eyes with high myopia have more chances of undergoing vitrectomy due to retinal detachment, epiretinal membrane, foveal detachment and foveoschisis. Myopic vitrectomies are all the more challenging due to multiple factors which are peculiar to a myopic eye such as posterior breaks, higher axial length, lower scleral rigidity, vitreoschisis, retinoschisis, thinner retina and posterior staphyloma. Retinal detachment in young myopic patients however has better surgical outcomes owing to lesser vitreous syneresis, better pumping effect of retinal pigment epithelium and stronger reparative ability of the retina.[2]

Knowing the imminent challenges which comes with a myopic retinal detachment (RD) surgery the surgeon has to put his best foot forward to get favourable surgical outcomes. There are multiple new instrumentations available for myopic vitreoretinal surgeries like “bayonetted” and “myopic” cannulas, long-shaft forceps and extendable soft tip cannula, which make access and manoeuvrability easier. Through this article we wish to share few pearls which will help a surgeon utilize the available armamentarium to the fullest and obtain good outcomes in a myopic rhegmatogenous RD (RRD).

The choice of surgery (Scleral buckling/ Pneumatic retinopexy/ Vitrectomy) is similar to other rhegmatogenous detachments based on age, phakic status, location and number of breaks and extent of detachment.

1. Challenge- Low scleral rigidity

Tip- Choose cases wisely- buckling vs vitrectomy. In case of scleral buckling, the golden

rule is to avoid deep suture bites, avoid areas of thinning and drain subretinal fluid due to poor RPE function. The surgeon should also keep in mind the muscle insertions which may be different, for example lateral rectus- superior rectus band (LR-SR Band) degeneration wherein the lateral rectus is displaced inferiorly. In case of vitrectomy do not shy away from putting sutures for the port closure. Post operative hypotony is more common in myopic eyes due to thin sclera and chances of inadvertent intraoperative damage to ciliary body.[3]

2. Challenge – Vitreous syneresis and vitreoschisis

Tip – The key to good vitrectomy in myopic eyes is chromovitrectomy.[4] Triamcinolone is cheap, works well in identifying syneresis and stains the sheets of schitic vitreous efficiently. The video (https://youtu.be/gt5-bw8AUZg) shows the usage of chromovitrectomy in high myopia where not only the syneresis is a challenge but poor contrast is also a big challenge. Triamcinolone acetonide offers good visualisation even in poor contrast background allowing good vitreous base shaving as well as meticulous clearing of cortical vitreous from posterior pole. Other dyes which can be used are trypan blue, indocyanine green and brilliant blue.[4]

3. Challenge- longer Axial length.

Tip-Reaching the posterior pole is a challenge in high myopia and staphyloma tends to worsen it. Some pre operative tips like assessing the staphyloma on B scan and measuring the axial length will be useful. Placing the active port closer to the horizontal and 4 mm from the limbus will allow more space for manoeuvring without the fingers coming in contact with the viewing system lens. This access will also reduce the undue pressure on eyeball and distortion of cornea due to attempts of the surgeon to go more

vertical in order to reach the posterior pole. There are special instruments like "bayonette" cannula or "myopic" forceps or curved instruments which are specially designed for myopic eyes.[5] In case of non-availability of these instruments a simple alternative is to remove the trocar and enter directly with the 25/27G instruments allowing one to achieve few extra millimetres which will aid the surgeon to reach the posterior pole. Another alternative is to use a 23G trocar and a 25G cutter. This allows the sleeve at the base of the cutter to pass through the trocar allowing few extra millimetres access or using 23 G which has no stiffening sleeve. Using a contact lens to access the posterior pole is another way of avoiding instruments touching the wide angle lens.

4. Challenge-Irregular contour

Tip- The irregular contour affects choice of tamponade agent. On account of irregular contour, silicon oil is a slightly inferior tamponading agent which has also been shown is multiple studies.[6,7] Our preferred tamponading agent is C3F8 / SF6 as it follows the contour of the eye as compared to the silicon oil bubble which leaves room for peri-silicone oil fluid and hence increases the subsequent risk of PVR. Silicone oil is associated with glaucoma more so in a patient with high myopia.[8,9] However long term tamponade would require use of silicone oil.

5. Challenge – Peripheral vitreous shaving

Tip- Usage of 23G/ 25G instruments- which are stiffer and placement of sclerotomy 4 mm from limbus irrespective of phakic status of the eye is a key to good base shaving. Triamcinolone staining along with good indentation helps to clear the vitreous maximally. One should keep in mind posterior insertion of vitreous base, lattice

degeneration, thin sclera and incomplete PVD which might require patient base shaving and/or additional scleral buckling to further support the vitreous base.[10]

6. Challenge – Multiple posterior breaks

Tip- Retinal detachment in high myopia is frequently associated with multiple breaks some can be seen along the blood vessels and sometimes breaks can occur in areas/ edges of chorioretinal atrophy. The retina should be diligently examined to avoid missing these breaks.

CONCLUSION:

Myopic eyes are a challenge for every vitreoretinal surgeon and through this article, we would like to encourage surgeons to use the available armamentarium to the fullest to achieve desirable surgical outcomes not withholding the fact that with advancement in technology the special instruments available for myopic eyes have made surgeries more comfortable for the surgeons.

In this paper we have not dealt with myopic foveoschisis, foveal detachment and macular buckles which requires separate attention and has totally different set of indications.

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INTERESTING IMAGE

LATE ONSET RRD IN TREATED ROP EYE

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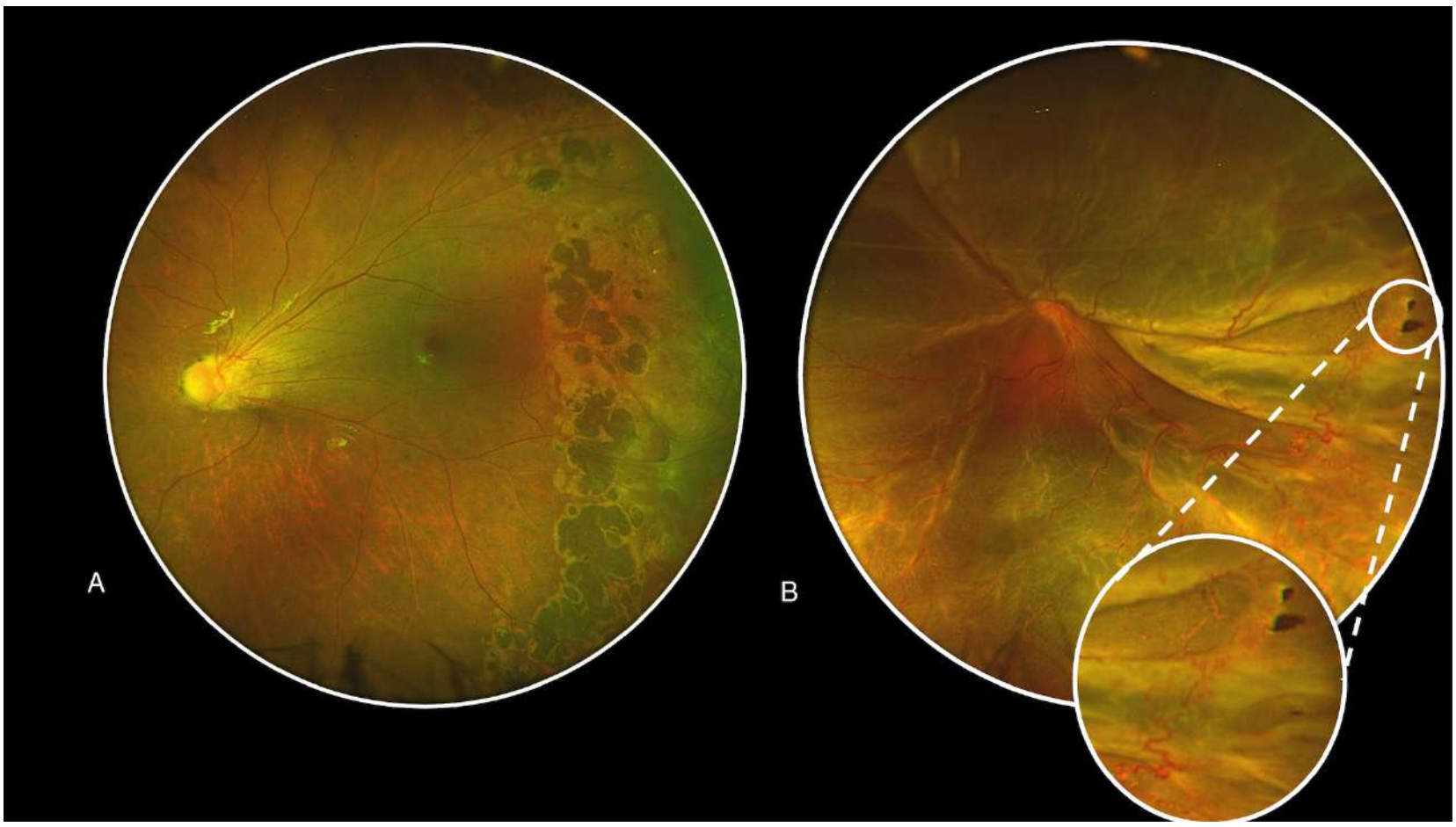

A 4-year old boy presented with sudden onset decrease in vision in his left eye for 2 days. Past history was notable for prematurity and laser photocoagulation for stage 4A ROP (Image A). Right eye had progressed to stage 5C ROP and left eye was the only functional eye. On examination, he had a visual acuity of light perception and esotropia. Posterior segment examination revealed total rhegmatogenous retinal detachment with temporal breaks (Image B). Late onset rhegmatogenous retinal detachment is a rare complication of previously treated ROP. These are challenging cases due to adherent hyaloid, peripheral fibrosis, ROP sequelae, retinal folds and peripheral neovascularization.

CHALLENGES AND TIPS IN THE MANAGEMENT OF PEDIATRIC RHEGMATOGENOUS RETINAL DETACHMENTS

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Introduction

Taking care of babies and young children with retinal diseases is a matter of great joy- they grow into amazing human beings. They are fighters, who want to live and see against all odds and having an eye specialist in their life at the appropriate time of their growth provides the vision and direction to their upcoming life and whole life of the family, the extended family, and the global aspiration of sustainable development goals. Retinopathy of prematurity is the most common vision threatening condition (there are many others too especially infections of the cornea, lens, and retina) that can severely disrupt this dream life. Other retinal diseases in early life have similar consequences and are mentioned later in the article.

Though pediatric rhegmatogenous retinal detachment (PRRD) is an uncommon occurrence with incidence rates reported to be from 0.38 – 0.69/100,000 population, which in turn comprises of 3-12% of all retinal detachments,[1,2] yet impact of these is huge! PRRD is like a fire that can destroy the pristine eye and eyeball in a few days to weeks to couple of months. It is always a critical emergency, and we are at the frontline of fighting this dreadful fire. Building our skills, our competency, and a team with access to resources and referrals beyond our limited spheres, to deliver the best possible care is critical to the successful outcome of our care.

As compared to adults, pediatric retinal detachments are so commonly asymptomatic, have worse presenting visual acuity, more proliferative vitreoretinopathy, chronic duration, and higher proportion of macula off detachment[1] besides more likelihood of various ocular, genetic and syndromic associations leading to complex and combined forms of retinal detachments. Due to the various complex etiologies, clinical features, and multiple associated pathologies, pediatric RRD poses a challenge for ophthalmologists in critically planning the management and predicting prognosis.

Common symptoms that parents and doctors need to be educated about in the context of a possible PRRD are (Figure 1), squint, smaller looking eye, change in child's visual behaviour, change in refraction (towards hyperopia), change in red glow, reduced intraocular pressure manifested by a soft eyeball or a smaller looking or less prominence in a previous 'big-beautiful -looking eye, change in colour of the eye (due to hyphema/ NVI/ectropion/inflammation/posterior synechiae, leucocoria, xanthocoria etc), onset of an eye -poking behaviour etc.

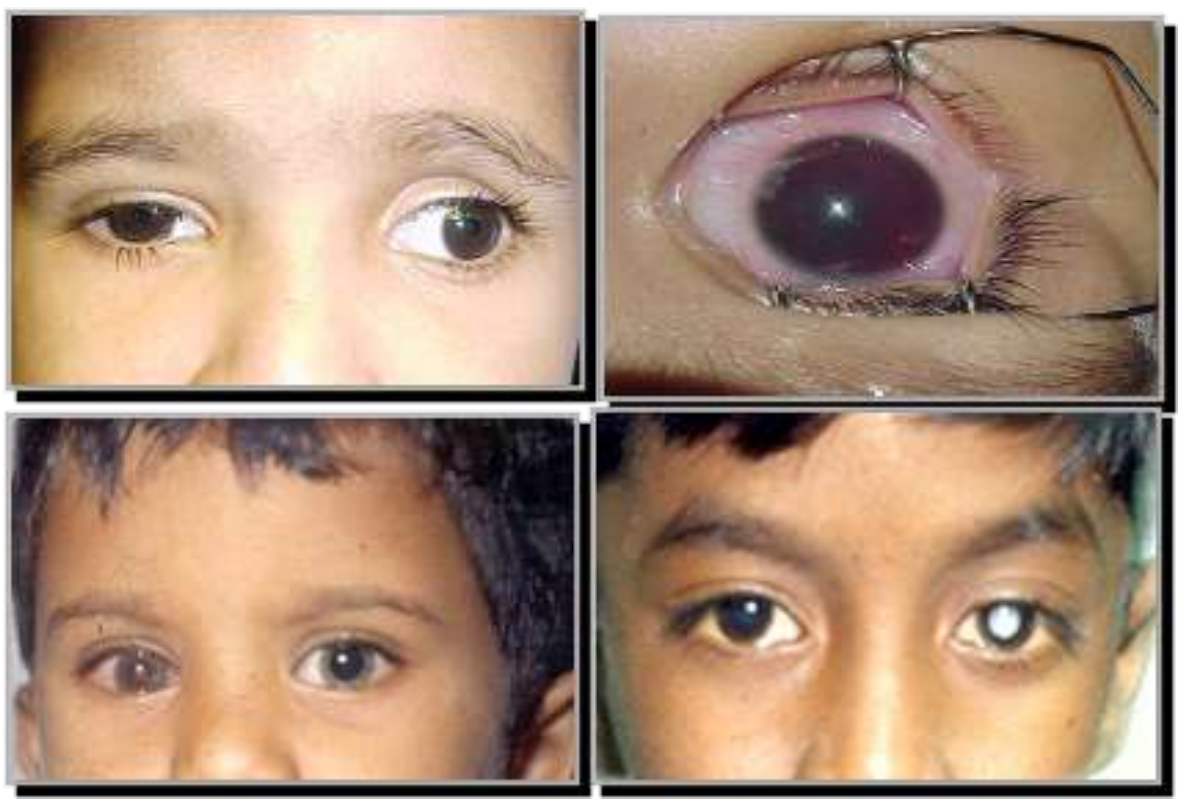


Figure 1. Paediatric RD can present as squint, hyphema, heterochromia and leucocoria due to complicated cataract

Etiology

Depending on the age, etiologies include premature birth, trauma, myopia, congenital or developmental anomalies and previous intraocular surgery. Our large database study from South India,[3] of 40,341 children with retinal diseases (excluding cancers) showed 60 percent to be males and 70 percent had bilateral disease. The most common conditions were ROP (30.5%, detected in infancy, toddler, and early childhood), retinal dystrophy, including retinitis pigmentosa (RP) (19.5%, detected in early childhood and later years), and non-ROP retinal detachment (n=11,360; 16.4%, detected in all age

groups due to a variety of causes). Rhegmatogenous (73.9%; n=8398), tractional (21.2%; n=2409) and exudative (4.8%; n =553) RDs were seen. The most common etiology were primary rhegmatogenous detachment including high myopia (n=5922, 52.1%), familial exudative vitreo-retinopathy (n =510, 4.49%), trauma (n=432, 3.8%) and coloboma related detachment (n=405,3.56%). In the cohort, one in 10 children needed surgery (n=5960, 8.6%). Success rates of pediatric RRD surgeries are shown to be lower than those of adult RRD surgeries.[1,2,4,5]

Anomalies associated with PRRD include Stickler syndrome, Marfan syndrome, Ehler-Danlos syndrome, non-traumatic retinal dialysis, familial exudative vitreo-retinopathy (FEVR), choroidal coloboma, X-linked retinoschisis, acute phase and cicatricial ROP, Morning Glory syndrome, persistent fetal vasculature (PFV), post-intraocular surgery and TORCH infections related detachments in our country. Other geographic areas may have, for example, sickle cell retinopathy or non-accidental injuries (NAI-previously called battered baby syndrome) etc. Retinoblastoma needs to be actively excluded in all eyes in pediatric retinal detachments especially in younger children and this should be documented in all case notes.

Tips for pre-operative assessment and evaluation

Proper detailed history of birth and other events before presentation are critically important and are often ignored by treating physicians in the clinical records. A thorough history and especially asking for onset of subtle symptoms of PRRD mentioned above, cannot be over-emphasized. OPD based Indirect ophthalmoscopy is not a very good approach for retinal detachments in the pediatric population. Better approaches include B-Scan ultrasonography, including immersion scan, and Fundus photography, especially those with wide field and fast image acquisition systems. The luxury of OCT for pediatric

cases is rapidly reaching our clinics and is a useful tool to detect detachments and vitreoretinal interface changes. It is my practice to do B scan and fundus photography in the clinic every 4-6 months for high-risk patients like those with syndromes, mentally challenged, congenital globe malformations, post congenital glaucoma and other intraocular surgeries. Systemic examination with special attention to extremities, head size, facies, dentition, joints etc. and proper family history and family retinal screening are particularly important in PRRD, both in clinching the diagnosis as well as help in discussion of prognosis and clinical course.

Examination of the parents and siblings is particularly important in familial exudative vitreoretinopathy, oculo-arthropathies, retinoschisis, myopia etc. Genetic evaluation and counselling are an essential part of management and have helped us in many unusual cases.

Precise assessment of visual acuity at each visit and especially both preoperative and post-operative is difficult in the very young hence observation of a child's visually-guided behavior must be done by the physician when child interacts with the parents or toys both illuminated and non-illuminated ones and these should be documented at each visit. Formal visual acuity measurement with Teller-Visual acuity cards (TAC) and Lea Symbols are routine in our clinic and are very useful. Evaluation by a pediatrician is also helpful to diagnose other associated problems, common ones being cardiac, neurological, hearing and others.

These investigations, should be followed by detailed EUA (Examination Under Anesthesia always dilated evaluation of both eyes), documentation, that includes the following:

External evaluation (facial features, dentition, dermatologic changes example Incontinentia pigmenti, etc.); adnexa, especially the lacrimal sac; intraocular pressure (IOP) measurement and when indicated gonioscopy; anterior segment examination with

hand-held slit lamp biomicroscope/ operating Microscope including horizontal corneal diameter, everted eyelids, conjunctiva, corneal layers, lens status and AC details; extended indirect ophthalmoscopy with peripheral scleral depression, WF- color digital fundus imaging and when indicated fundus fluorescein angiography (FFA); OCT scan, B-Scan ultrasonography, A-scan biometry and hand-held keratometry & UBM are performed as indicated. One should not hesitate to repeat some of the imaging under anesthesia, as poor cooperation of say a toddler may lead to missed imaging findings in an OPD setting. This is especially when we want to be sure of not having missed a retinoblastoma or a foreign body in a child.

It is only after completion of all examination, should one formulate the final plan and discuss with the family the detailed plan of treatment, surgery, optical correction, rehabilitation, course of each eye expected and final prognosis and long-term eye care needs and systemic disease management. Various options are discussed and informed written consent is taken before proceeding for surgery and other managements. Counselling parents is an art that needs to be learnt.[6] Poor prognosis and risks involved need to be conveyed realistically and with tenderness that helps and empowers the family to ask questions, and team up with the doctor in a challenging situation. The discussion should not end up in despair, anger, or helplessness but can be approached so that it continues with hope and partnership to proceed together on the difficult journey, keeping the best interest of the child at the center of the situation.[6]

Surgical approach and management tips

Prophylaxis against PRRD includes timely and proper screening for retinal pathology, laser therapy in ROP, FEVR, Uveal coloboma, lattice degeneration, and also cryopexy of traumatic retinal dialysis and peripheral retinal examination of high-risk eyes for any

treatable lesions. Contemporary surgeries are capable of successfully repairing the PRRD and complex retinal detachment. Depending on the selected case - scleral buckle, lens sparing vitrectomy, lensectomy with vitrectomy procedures, oil or gas tamponade or fibrin-glue assisted surgery, scleral imbrication with or without a buckle; open -sky vitrectomy, endoscopic vitrectomy (example in microphthalmic eyes, eyes with compromised cornea, traction membrane behind the clear lens) or combined approach can be taken.

Earliest referral and surgery are the key as cases with ROP or FEVR retinal detachments can worsen each day and are to be operated within 24 hours in many cases. While referring to a tertiary center, ensure a hemoglobin of at least 10.00 gm percent including blood transfusion if needed, treatment of any cough-cold, and do laser therapy of attached retina if visible while arranging referral. Impress upon the parents to carry all records of ante-natal, post-natal, discharge summary from NICU, previous investigations etc.

It is often preferable to repair PRRDs by doing scleral buckle alone but the addition of tractional pathology to the detachment may require a scleral imbrication technique with or without a buckle, and rarely a subsequent vitreous surgery or even a combined scleral buckle and vitrectomy as initial surgery.

Lens is always tried to be spared in treatment of PRRD but not at the expense of retinal attachment. The visual outcome dramatically changes for the worse whenever lens is removed especially in children of less than 10 years of age, particularly in infants. Herein comes the importance of newborn retinal screening and close follow up and early referral of all high-risk babies so that surgery can be done without needing to remove the lens.

In case of vitrectomy, silicone oil is the tamponade of choice for most of the PRRDs

repaired by primary or repeat vitrectomy, with or without scleral buckle. Alternatively, in some cases we used gas/ air/ fibrin glue approach. Though the complications of silicone oil in children are same as those seen in adult patients such as intraocular pressure elevation, band shaped keratopathy, oil emulsification-hyperoleon, and cataract formation, the management and outcomes are much more challenging. Problems include missing IOP recording, managing contact lens wear, onset of esotropia/exotropia very rapidly and rapid changes in refraction due to eye growth in early life compounded by inability to do precise objective and subjective refraction. In infants, I prefer to remove the oil in 2-3 weeks and in children usually within 6-8 weeks of surgery to manage amblyopia and avoid early cataract.

Technical aspects of actual surgery are beyond the scope of this short communication.

Like all other health conditions, the new doctors coming into the field should make best use of time, technology, treasure, and tenderness with their head, hands, and heart! To achieve these, learn from masters, keep up knowledge by attending CME, reading updates, be curious and ask stupid questions to keep up research, take hands-on skill development courses and be agile and reach out to build resources for complete comprehensive eye care of pediatric retinal problems. The rewards come in the form of not only monetary, but inclusive of lively children and families for whom you become the family eye doctor too! Your help in enhancing and preserving their vision makes them fly into their dreamworld!

Summary

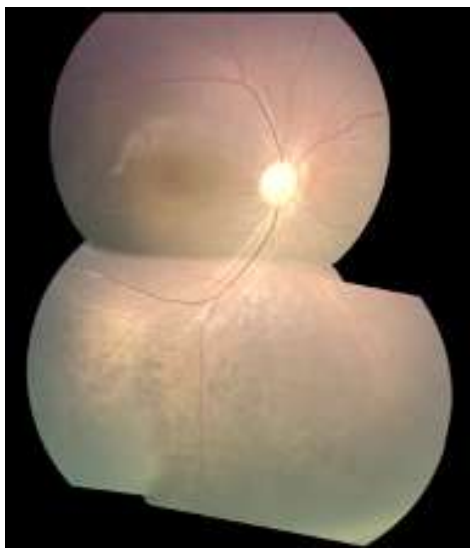
1. PRRD, though not common, are a substantial cause of irreversible, bilateral blindness in children. Symptoms are very different from adult and parents/doctors need to be educated about these.
2. PRRDs can be repaired successfully with present day vitreoretinal surgical

techniques, especially if taken-up early. More than one surgical procedure may be needed.

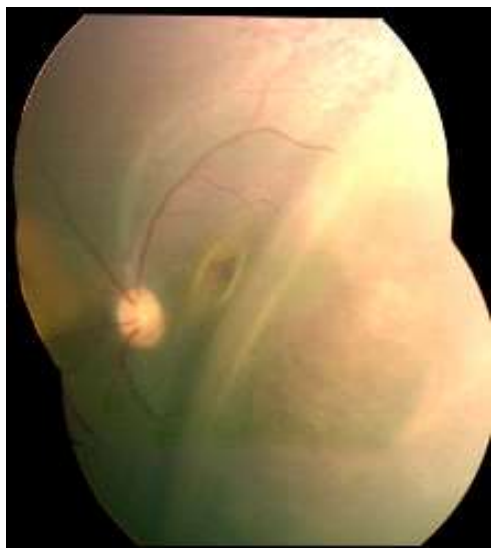
3. The fellow eye must be thoroughly examined, and promptly treated if any lesions are noted and keep parents and doctors vigilant about involvement of other eye sequentially and also protection from trauma by using protective eye wear, for the unaffected eye.
4. Parental counselling and family screening are an essential component of clinical care.
5. Ocular Geneticist/ pediatrician-neontaologist/ pediatric anaesthetist, neonatal nurses, pediatric ophthalmologists, contact lens specialists, multidisciplinary rehabilitation and low vision specialists and pediatric optical care need to team up for comprehensive best-outcome care.

Pictorial representation of some challenging case scenarios

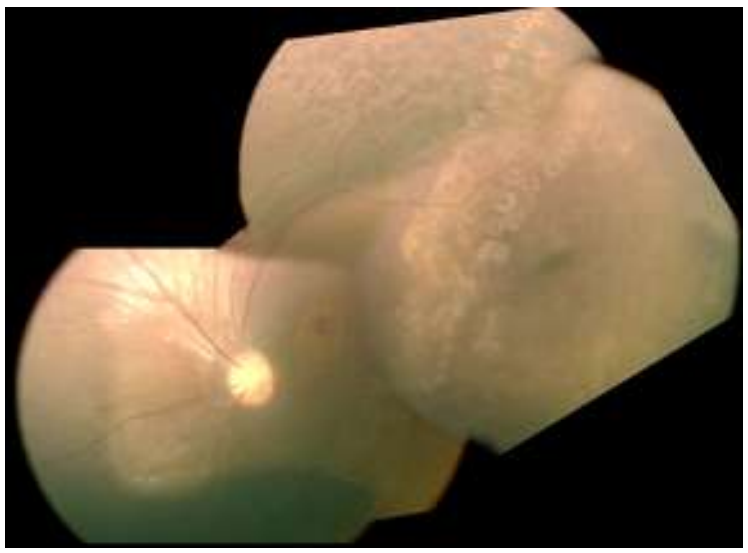
Case 1. Bilateral retinoschisis. Right eye retinoschisis. Left eye, Rhegmatogenous retinal detachment and unusual exudation, treated successfully by cryopexy and scleral buckle with encirclage.



Right eye

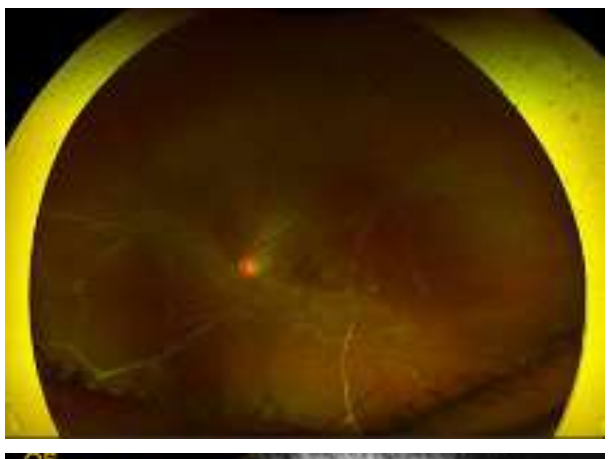


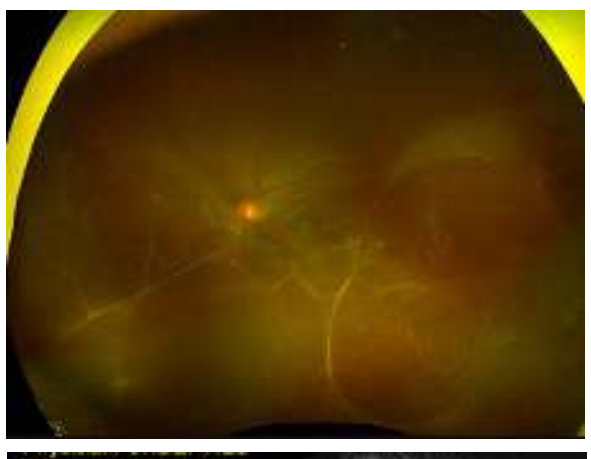
Left eye pre-op

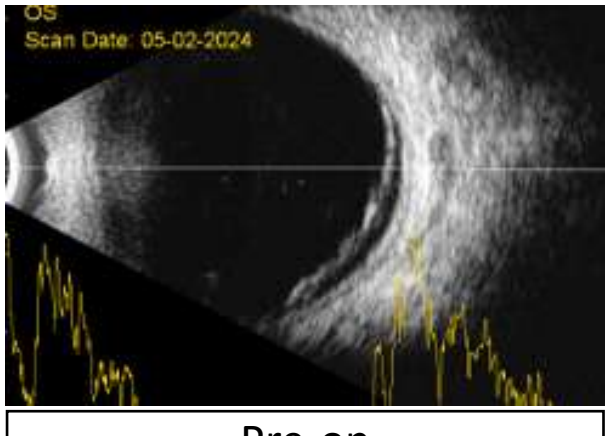


Left eye post-op

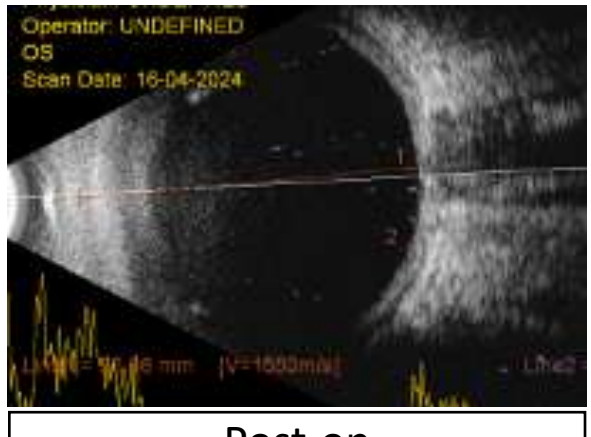
Case 2: Bilateral retinoschisis: Right eye attached retina, with left eye retinal detachment in a 9 month infant presenting with left esotropia of one week duration. Lens sparing vitrectomy, endolaser and silicone oil tamponade reattached the retina. Four weeks after surgery silicone oil was removed. Child maintained orthotropia and attached retina postoperatively. Final visual acuity was 20/80 left eye at 15 years of age.







Pre-op



Post-op

Case 3: Shallow chronic detachment with multiple subretinal bands, is best treated with segmental buckling with or without encircling band. Pre and post buckle photo and corresponding B scan. Note prominent tenting of subretinal bands after retina reattached.

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INTERESTING IMAGE

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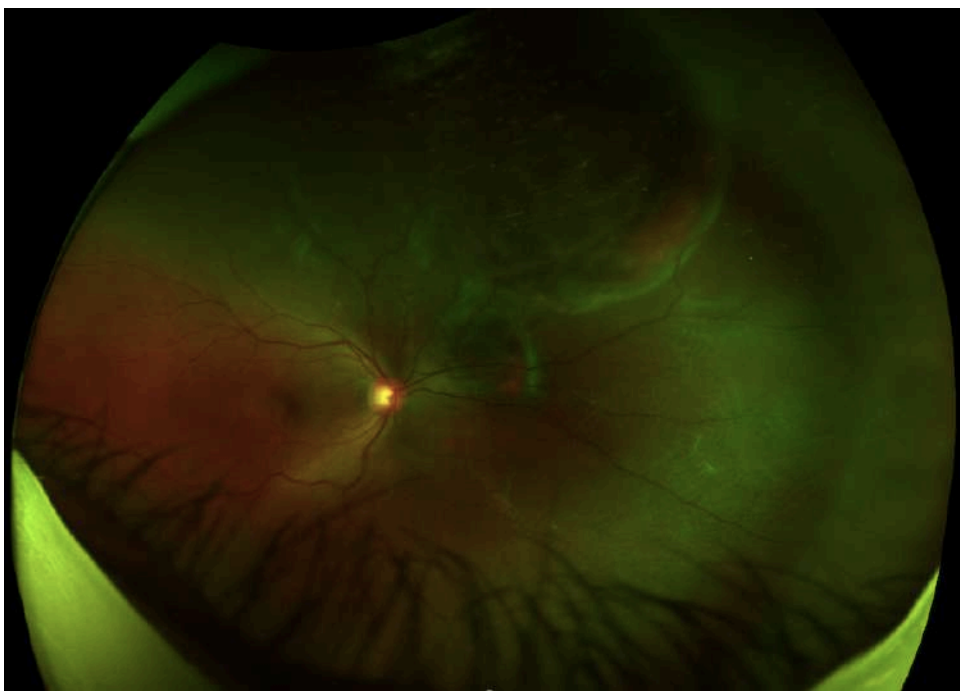

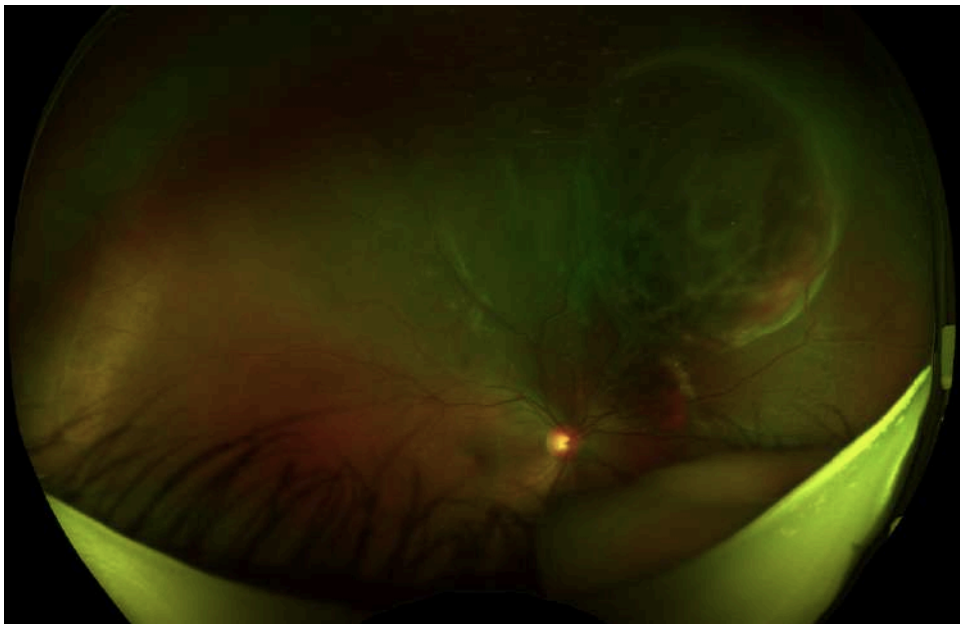

This was a case of 27 year old gentleman who visited our clinic with acute onset defective vision in right eye since 3 weeks. Following examination and multimodal imaging, he was diagnosed to have rhegmatogenous retinal detachment with intra retinal hemorrhagic macro cyst. We initially managed him with scleral buckle with SRF drainage. Due to the huge cyst, retina did not settle superiorly. Later we did vitrectomy with silicone oil tamponade. The patient is doing well with retina well attached and vision improving to 6/9.

CHALLENGES AND TIPS IN THE MANAGEMENT OF RRD WITH CHOROIDAL DETACHMENT

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Introduction

Rhegmatogenous retinal detachment (RRD) with choroidal detachment (CD) presents complex challenges, with pathogenesis involving retinal breaks leading to subretinal fluid accumulation and concurrent CD due to fluid accumulation between the choroid and sclera. This condition constitutes 2% to 5% of RRD cases. RRD-CD is associated with factors like age, myopia, prior surgery, and specific retinal characteristics such as multiple retinal breaks, posterior breaks, giant retinal tears (GRT), and macular holes (MH).[1,2,3] The anatomical and functional success in these eyes is poorer, thus making its management more challenging.[4]

Pathophysiology

The pathophysiological causes of CD in the context of RRD are choroidal arteriolar dilatation, ciliary body edema, and uveal detachment leading to a decrease or cessation of aqueous humour production and breakdown of the blood-retinal barrier.[5,6]

Challenges

Certainly, here are the challenges associated with the management of RRD-CD :

1. Delayed diagnosis and differentiation: Choroidal detachment may not be promptly recognised, particularly when it coincides with RRD. This delay in diagnosis can lead to more extensive detachment and worse visual outcomes. Differentiating CD can be challenging from other infectious, neoplastic or inflammatory causes. The differential diagnoses include post-surgical hypotony, choroidal melanoma, choroidal metastasis, uveal effusion syndrome and posterior scleritis. Proper examination may not be possible due to intraocular inflammation, non-dilating pupil, posterior synechiae and media opacity.

2. Surgical complexity due to varied complex associations: Addressing retinal and choroidal detachments concurrently adds complexity to surgical intervention. In addition to CD, hypotony and proliferative vitreoretinopathy (PVR), these eyes have been associated with high myopia, MH, multiple tears and GRT. They need additional surgical planning, longer surgery time and variable choice of tamponade.

3. High incidence of PVR: Breakdown in the blood-retinal barrier leads to transudation of pro-inflammatory and growth factors leading to retinal pigment epithelial cells migration and proliferation, resulting in PVR. Strategies to mitigate PVR development in the setting of CD are limited and often challenging. Delay in diagnosis and differentiation further

leads to more PVR.

4. No definite surgical approach: In these eyes, the surgical approach is not clear due to the presence of so many above variables. Preoperative or intraoperative steroids through various routes have been used as pharmacological agents with variable success. They help in the resolution of CD and the prevention of PVR.[2,7] There is a lack of consensus due to the paucity of randomised trials. Recently methotrexate has also been used successfully to tackle PVR in these eyes.[8]

5. Regarding the surgical approach, scleral buckling (SB) and pars plana vitrectomy (PPV) ± SB have been shown to work in these cases. PPV has been shown to have better outcomes.[2] Intraoperative drainage of serous suprachoroidal fluid has been shown successful. Regarding the choice of tamponade, there is no clear consensus. Silicon oil has been used in most published studies with good outcomes.[2] Recently PFCL has been shown to be useful in these eyes in a two-stage surgery.[9]

6. Visual prognosis and rehabilitation: RRD-CD is associated with poorer visual outcomes compared to RRD without CD.[4] The above complex factors need to be discussed preoperatively to properly manage patient expectations and the potential need for additional surgeries. The status of other eye and the high incidence of fellow eye pathology requires the attention of both patient and surgeon.

Practical tips for managing RRD-CD

1. Prompt diagnosis: Very poor visual acuity and low hypotony are important clues to identifying RRD-CD. We should conduct a thorough evaluation of the patient's ocular status, including visual acuity assessment, intraocular pressure measurement, slit-lamp examination, and dilated fundus examination to assess the extent and severity of CD and

RRD.

2. Diagnostic imaging: In case of poor media, meticulous B-scan ultrasonography (USG), and ultrasound biomicroscopy (UBM), if needed, should be done to differentiate from other neoplastic and inflammatory differentials.

3. Pre-surgical management – Surgery should not be delayed as this may lead to an increase in PVR. Patients should be told about the long duration of surgery. Plan for the anaesthesia carefully based on the time of surgery. Talking to the patient and his relatives regarding the prognosis of this eye and fellow eye is very important.

4. Preoperative steroids - Regarding pharmacological agents, intravitreal steroids have been shown to significantly increase surgical success in these eyes.[2] We should plan to operate at the earliest, 3-7 days of preoperative steroids before surgery are sufficient. In case of limited CD, these may not be required.

5. Management of cataract – Phacoemulsification with intraocular lens implantation can be done simultaneously with PPV, if needed.

6. Type of surgery – Perform PPV in these eyes, as it has been shown to have better outcomes due to better identification of the breaks, endo-treatment of breaks and ability to remove inflammatory factors. Initial steps in surgery should aim to increase IOP either with an intravitreal injection of BSS, anterior chamber maintainer, or placement of infusion cannula. A 6mm long infusion cannula may be very useful in these situations.

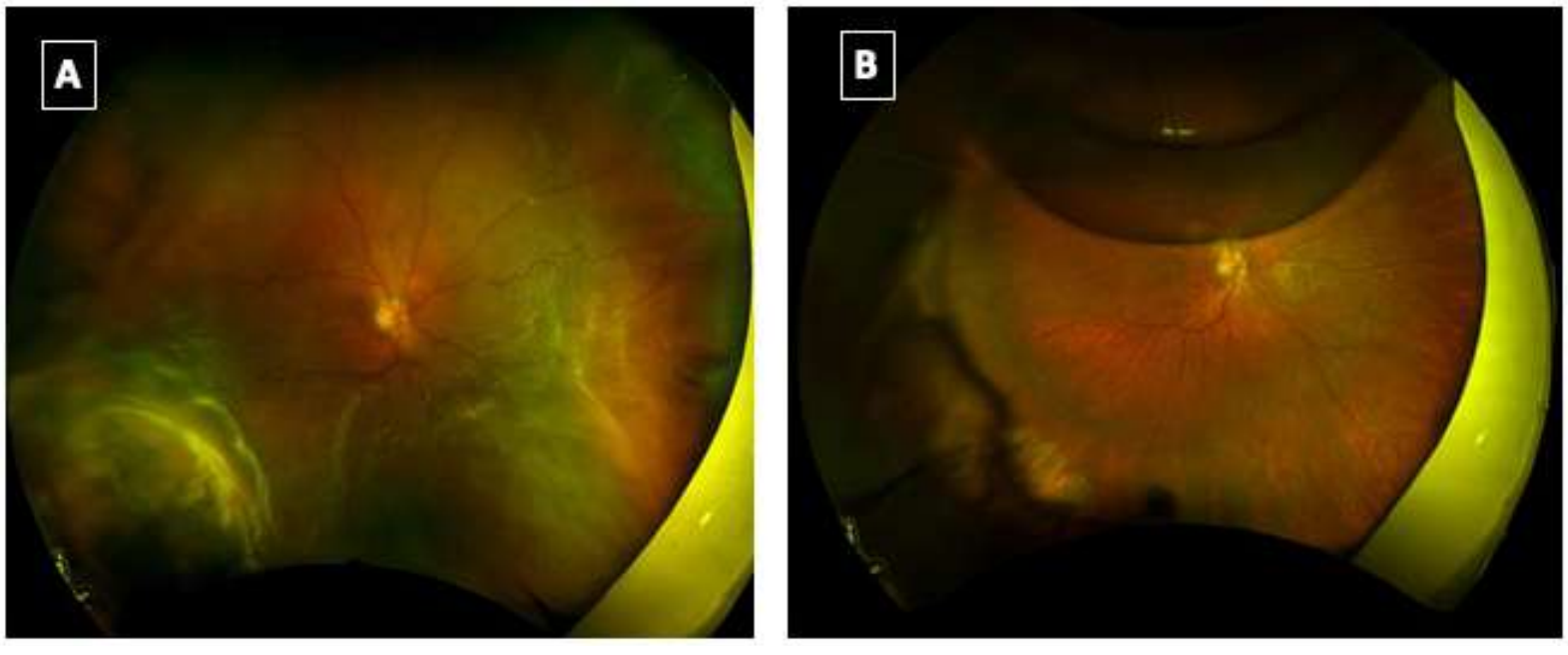
7. Drainage of suprachoroidal fluid: During surgery, drainage of suprachoroidal fluid can be done if necessary. This allows adequate intraocular tamponade to promote reattachment of the choroid and retina. External drainage of CD can be done with the help of a 25G trocar cannula as shown in the video (https://youtu.be/mMwCmE-lwNY),

or the cut-down method in the area of maximum height, can be done. Complete drainage need not be done, as the residual choroidal will resolve once the primary etiology is taken care of.

8. Scleral band – A 240 band can be a helpful adjunct to increase surgical success, especially in eyes with inferior breaks and in phakic eyes.

9. Choice of tamponade – Both gas and oil have been used in literature.[2] Silicon oil has been used commonly in literature owing to more prevalence of CD in myopes, GRT, and multiple breaks with good outcomes. The tip is to choose your tamponade depending on your personal experience.

10. Postoperative management: Emphasize meticulous postoperative care, including monitoring of IOP, assessment of retinal and choroidal reattachment, adherence to specific positioning instructions and postoperative depot or oral steroids, to optimize surgical outcomes.



Widefield fundus photo of a case of retinal detachment accompanied by choroidal detachment in the inferotemporal and inferonasal quadrant (A); No steroids were given in this case in view of limited choroidal. Post-operative widefield fundus photo of the same case who underwent PPV + SB with gas tamponade (B).

By integrating these tips into clinical practice and tailoring management strategies to the individual patient's presentation, clinicians can optimise outcomes in managing CD with concurrent RRD, aiming for successful reattachment of both the choroid and retina and preservation of visual function.

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CHALLENGES AND TIPS IN MANAGEMENT OF RRD IN EYES WITH OPEN GLOBE INJURY

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Retinal Detachment (RD) is a significant complication of open globe injuries and is reported to occur in 29% of eyes.[1] In 72% of these eyes with RD, the retina is detached within 1 month of injury and 27% of eyes develop RD within 24 hours. Though the prognosis of these eyes is not favourable, with a prompt and proper management it is possible to improve vision in many eyes.[2,3] The various challenges while managing RD in open globe injuries and tips to overcome them are listed in the following table.

Challenges	**Tips**
Initial Evaluation is difficult	Detailed history gives clues regarding nature and extent of injury
	A sharp object generally results in lacerations whereas blunt objects result in globe ruptures at weakest points of eye which include the muscle insertions in phakic eyes and limbal incisions in pseudophakic or aphakic eyes.

Open Wound Suspected	Visual acuity, pupillary reactions and indirect ophthalmoscopy
	Avoid tests which cause indentation or pressure on eye e.g. tonometry, gonioscopy, scleral depression and b-scan ultrasonography
	Avoid eye drops if obvious laceration/rupture seen
	Complete assessment after primary repair
Fundus not visible	Important risk factors for RD in OGI include 1. Visual acuity of hand movements or less 2. 2. Zone III injury 3. 3. Presence of vitreous hemorrhage
	X-Ray or CT Scan Orbit to rule out IOFB ultrasonography
	B-scan USG for any RD , IOFB or Choroidal hemorrhage/detachment
	MRI scan to be avoided if IOFB suspected
Timing of Vitrectomy	7-14 days after primary repair
	Early in the presence of IOFB/Endophthalmitis
	Can be delayed for a week in the presence of supra-choroidal hemorrhage
Scleral buckling	Adjuvant scleral buckle is usually indicated
	Can avoid if large retinectomies are planned

Sclerotomy	Needs to be planned depending upon the site of Injury
	Can have straight entry instead of bevelled ones
Infusion cannula	Can start using an AC maintainer (video 1) (https://youtu.be/tyG_Xr8eAtU)
	Can use 6 mm cannula instead of usual 4 mm
Corneal wounds	Wide field viewing systems are helpful
	Can use contact lens systems to avoid curvature aberrations
Lensectomy	Needs to be done if any significant cataract/subluxation is seen
	Clear lens may need to be removed in the presence of anterior PVR/ anterior IOFB
Vitrectomy: PVD is usually absent	If media clear-try to induce PVD at disc
	If media hazy - remove superficial haemorrhage, then slowly remove layer by layer till you see retina in a limited area, try to induce a mini PVD and proceed further (video 1) (https://youtu.be/tyG_Xr8eAtU).
	Keep port of the cutter away from retina at all times
Vitreous Incarceration may be seen	Cut all around incarceration. Don't remove the vitreous plug in incarceration site
	Can do a chorio-retinectomy around the incarceration site (video 2) (https://youtu.be/uu3TpyJnHls)

IOFB	Settle the posterior pole with PFCL
	Separate the IOFB from vitreous adhesions
	Remove using active suction/intraocular magnet
	Limbal route in aphakic and pars plana in phakic/pseudophakic Eyes
Presence of PVR	Use of adjuvant Scleral buckle
	Large retinectomies (video 1) (https://youtu.be/tyG_Xr8eAtU)
	Use of Silicon Oil as tamponade
Increased chances of recurrent RD	Complete vitrectomy with shaving of vitreous base
	360 degree prophylactic Laser

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INTERESTING IMAGE

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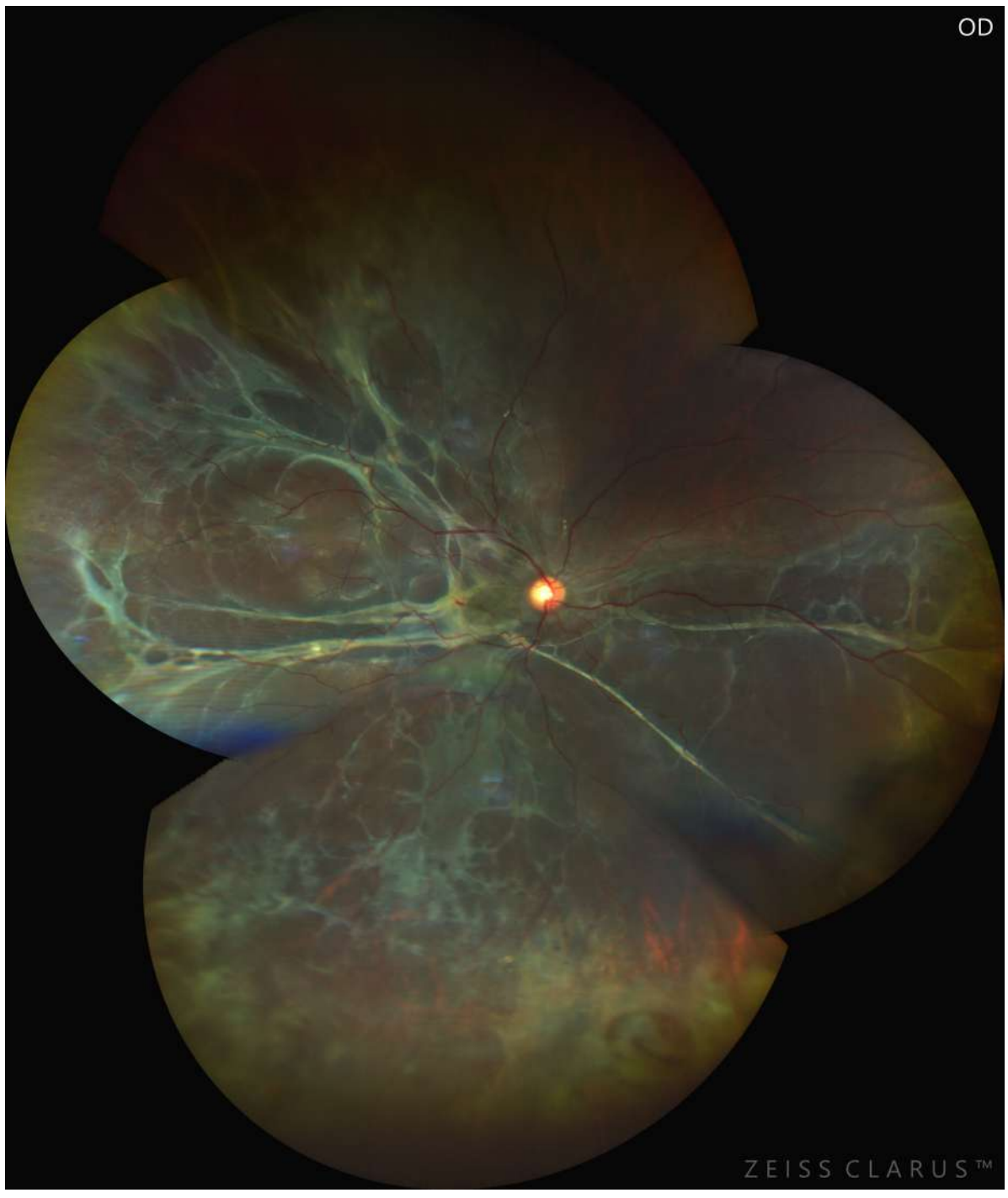

Right eye fundus examination showing subtotal RRD with a large atrophic hole at 5'o clock with extensive sub retinal gliosis extending from posterior pole to periphery.

PREVENTION OF POST- OPERATIVE PROLIFERATIVE VITREO-RETINOPATHY

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Proliferative vitreoretinopathy (PVR) is caused by a complex cellular reaction incited by the vitreoretinal wound healing response. The hallmark of this process is formation of contractile fibrous membranes at the vitreoretinal interface and intra-retinal fibrosis.[1]

Risk factors for the development of PVR

- Cases with multiple retinal breaks, giant retinal tears, long duration of detachment, presence of choroidal detachment, aphakia, vitreous hemorrhage, penetrating or perforating injuries, and presence of uveitis have a higher propensity to develop PVR.[2]
- The risk of PVR is increased in conditions such as Wagner, Stickler, Marfan syndrome, and familial exudative vitreoretinopathy.[3]

Pre-operative measures:

- Duration of RRD
    - Surgical intervention must be carried out without delay as longer time interval leads to more release of RPE cells and thus leading to progression of PVR.

- Complicated cataract surgery
    - Cataract surgery by itself hastens the process of PVD induction. If there is a posterior capsular rupture with anterior hyaloid disruption or vitreous loss; it ultimately increases the risk of RRD and PVR formation depending on the extent of inflammation induced by the manipulation.
    - PC defect and IOL stability may pose intraoperative challenges and risk of post operative oil/gas migration in to the anterior chamber.
- Pharmacotherapy for the prevention of PVR
    - Various drugs are being tested for their effectiveness in the prevention of PVR such as corticosteroids, methotrexate, Fluoropyrimidines like 5-fluorouracil, Daunorubicin, Retinoids, Heparin, and Low molecular weight Heparin[4].
    - A meta-analysis by Xu et al investigated the role of steroids as an adjunct in the surgical management of RRD. They found that adjuvant use of steroids did not reduce the recurrence rate of PVR in RRD patients. However, they found a lower incidence of macular edema and a significantly low rate of surgery for macular pucker/ ERM in cases with steroid treatment.[5]
    - A placebo-controlled double-blind clinical trial by Jonas et al showed that 0.5 ml sub-conjunctival dexamethasone administered 6 hours before surgery was found to decrease laser-induced flare measurements at 1week post-op. Steroid priming may be beneficial in certain subset of cases such as RD with CD.

Intra-operative measures

- **Pneumoretinopexy – 'a double-edged sword'**
    - Following pneumatic retinopexy with steam rolling, the sub-retinal fluid migrates into the vitreous cavity and leads to a significant cell migration which may in turn lead to proliferative membranes. The expanding gases also induce biochemical and structural changes to the vitreous.[8]
    - So, a word of caution for Pneumoretinopexy - patient selection, ability to maintain the position and frequent follow up is the key in identifying and treating complications.

- **Scleral Buckling**
    - Minimal/adequate cryo application (https://youtu.be/rgZ2kYE1ylU) will induce less inflammation and hence lesser risk of PVR. SRF drainage might help as the presence of SRF may require more amount of cryo application.
    - Laser photocoagulation of breaks in the attached retina.[7]
    - The use of air or gas in scleral buckling procedures has a higher risk of developing PVR.[3]
    - During scleral buckling, the sub-retinal fluid should not be drained in one go; the globe should be formed with air/ saline intermittently, adjunct to SRF drainage to prevent hypotony and subretinal hemorrhage which can lead to failure/PVR formation. The drainage site should be away from the location of the break.

- **Vitrectomy**
  - Staining with triamcinolone acetate helps in the identification of remnant posterior cortical vitreous and vitreoschisis.[9] (https://youtu.be/5ea9F2gXO5w)
  - One must ensure maximum removal of the vitreous with meticulous removal of schitic membranes (https://youtu.be/gYmRQb5jYiE).
  - Vitreoschisis is the liquefaction with cavitation in the posterior vitreous but persistent adherence of the posterior vitreous cortex to the internal limiting membrane.[10]
  - Anteriorly, the vitreous base must be trimmed as much as safely possible. Smaller gauge instrumentation along with wide field viewing system are helpful in achieving this.
    - Use of valved cannulas –provides stable fluidics. Bullous retina can be stabilized with PFCL.
- Surgical techniques of PVD induction
  - In bullous detachments, one may use PFCL to secure the posterior pole while attempting to extend the PVD anteriorly. This may have a downfall if there are remnant membranes that may get confined under PFCL.
  - In bullous detachments; a fluid-fluid exchange (https://youtu.be/541AD29a7cY) can be performed before initiation of chromo vitrectomy with Triamcinolone acetate and Brilliant blue-G (BBG).
- Role of ILM peeling

- ILM peeling in all cases is an overkill. If the ILM stains uniformly with BBG, then peeling is not advocated.
- Patchy staining with BBG indicating the presence of an epiretinal membrane/ vitreous cortex (https://youtu.be/ptPAW2GkfXM), a fovea-sparing ILM peel is recommended to not cause inadvertent deroofing of the thinned-out fovea.[11]
- ILM peeling over a detached retina may be surgically challenging and may be attempted under PFCL or with repeated fluid-fluid exchange to flatten the detached retina.

- RD with PVR
  - Meticulous search and removal of PVR membranes is necessary to prevent re-proliferation.
  - In cases with extensive PVR or anterior PVR, or where we anticipate a challenge for the thorough removal of PVR membranes or PVD induction; a decision for belt- buckle placement should be made.
  - Tightly adherent schitic or PVR membranes which are difficult to peel should be fractured or in-roads can be made within them with a retinal pick/ 24G needle/ 25G MVR blade to disrupt their continuity (https://youtu.be/8VGmGS_OX5Q).
  - All retinal breaks must be identified and should be completely relieved of traction.

- Hemostasis
  - Management of intra-operative bleeds is also of key importance in the

prevention of PVR. There must be adequate hemostasis at the margins of the break before the introduction of the tamponade agent into the vitreous cavity.

- Inadvertent contact with the choroid must be avoided during SRF drainage and removal of SRG membranes during vitrectomy.

- Laser photocoagulation
  - Extensive laser may lead to inflammation and thus in return cause PVR.
  - 360-degree laser photocoagulation has to be avoided unless it is warranted. Laser burns are preferably applied posterior to the remnant vitreous near the vitreous base.
  - Extensive cryotherapy is known to be a major incriminating factor in developing PVR.

- Tamponade
  - Aim at an adequate fill of the tamponading agent. Underfill of silicone oil leads to accumulation of inflammatory mediators in sub oil compartment leading to posterior pole PVR or inferior PVR below the oil interface owing to the usual supine position of the patients.

- Special cases:
  - Giant retinal tears- Schitic membranes are identified and removed and the retina is rolled out under PFCL and relatively dense laser burns are applied to obtain a temporary chorioretinal adhesion.
  - The margins should be cauterized adequately to avoid sub-oil bleeds.

- Choroidal detachment – pre-operative steroid usage might help in reducing the CD and allow better surgical approach which may decrease the risk of PVR risk to some extent.

Good pre-operative evaluation and planning of the surgery, minimizing the inflammation, surgical trauma, removal of vitreous and its elements as much as possible and usage of steroids pre and postoperatively help to minimize the PVR formation.

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INTERESTING VIDEO: COLOSSAL RIVE

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Background: Giant Retina Tear (GRT) is a full-thickness retinal break which extend circumferentially for more than or equal to 3 clock hours (≥90°). GRT is further classified based on its association with the Retinal Detachment (RD). These cases are managed by pars plana vitrectomy (PPV) and silicone oil tamponade with or without the scleral buckle. We have discussed about the tips of the surgical steps in GRT with RD.

Purpose: We present an interesting case of a young high myopic male who presented with GRT of more than 180 degree and RD with rolled posterior flap. The patient underwent pars plana vitrectomy, endolaser and silicone oil tamponade followed by silicone oil removal (SOR) after 2 months. Post SOR the retina was well attached with a good anatomical and visual outcome.

Synopsis: The video contains the case description and surgical management of GRT of more than 180 degree and RD with rolled posterior flap. We have shown the steps of perfluorocarbon liquid (PFCL) injection and direct perfluorocarbon liquid silicone oil exchange.

Highlights: The video highlights a different surgical approach to manage GRT of more than 180 degree and RD with rolled posterior flap. The most common post operative complication is recurrent RD. There was no significant difference in the incidence of recurrent RD between PPV combined with scleral buckling and PPV alone. A direct PFCL

silicone oil exchange facilitates the detached retina to hold back in its primary position and avoid sagging, decreases the risk of intra operative RD and gives a better silicone oil tamponade. This was followed by silicon oil removal with better visual recovery. Timely management and meticulous surgical technique will result in successful anatomical and surgical outcome.

Link for the video: https://youtu.be/XoOplZhhBCY

CHALLENGES AND TIPS IN THE MANAGEMENT OF RRD WITH PVR

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Dr Ayushi Gupta

Agrawal Hospital , Jaipur

Dr Neha Mohan

New Delhi

Introduction:

Rhegmatogenous retinal detachment (RRD) accompanied by proliferative vitreoretinopathy (PVR) presents a formidable challenge in terms of treatment and management. Owing to its intricate nature and potential for vision-threatening complications it necessitates a nuanced understanding of the disease process and meticulous surgical technique. PVR is characterized by the proliferation of cellular and fibrotic membranes on the retinal surface, which complicates the surgical management of RRD, often leading to unfavourable anatomical and functional outcomes. With the advent of advanced technologies, there have been significant improvements in the management of complex PVR cases. The availability of wide-angle viewing systems and small-gauge vitrector with high-speed cut rates reduce traction and avoid incarceration of the retina.[1] Incorporating 4 port PPV using fibre-optic chandelier illumination, bimanual forceps, and scissors has significantly enhanced the success rate in handling complex PVRs. These innovations have revolutionised the management of complex PVR cases, resulting in a noteworthy improvement in patient outcomes.

This article aims to delve into the challenges encountered in managing RRD with PVR and provide valuable tips to enhance surgical success and optimize visual outcomes.

Understanding the pathophysiology

PVR is a multifactorial and complex disorder, whose pathogenesis is associated with the presence of several different cells [retinal pigment epithelial cells (RPE), glial cells, macrophages] and cytokines exerting pro-inflammatory and profibrotic activity.[2] The pathogenesis relies on numerous interactions and inflammation is an important initial step in PVR. Retinal detachment leads to ischemia and cell death, which results in the

breakdown of the blood-retinal barrier.

Various cell types such as glial cells, RPE, inflammatory cells, fibroblasts, and growth factors are involved.[3] Cytokines induce migration and proliferation of the resident retinal pigment epithelial cells, a major cell type involved in the pathogenesis of PVR. The RPE cells adhere to the retina, undergo transformation into mesenchymal cells, and form proliferative fibro-cellular membranes which acquire contractile abilities that can lead to complex rhegmatogenous and tractional retinal detachments.[4,5] Cell death pathways, including apoptosis and programmed necrosis, have also been found to be involved in retinal photoreceptor degeneration and cell death. These processes may play an important role in the development of proliferative vitreoretinopathy and provide clues to the imbalance in fibrosis formation during wound healing.[3] The inferior retina is affected more due to the gravity-based deposition of RPE cells in most of the cases of PVR.

The challenges and tips for management

PVR can range from mild cellular proliferation to extensive fibrotic membranes causing tractional forces on the retina. The complexity of PVR dictates the surgical approach and influences the likelihood of successful reattachment. It is crucial to ensure the identification and removal of all membranes, enabling the retina to regain adequate mobility.

In cases of long-standing PVR, subretinal bands are found that prevent the retina from flattening completely even after the removal of all preretinal and retinal surface membranes. This necessitates the use of forceps to assist in the removal of these bands

through a small retinotomy. If the retina still fails to flatten despite the removal of all subretinal bands due to severe contraction or shortening caused by chronicity or long-standing contraction, a relaxing retinectomy is required to achieve retinal flattening.[1]

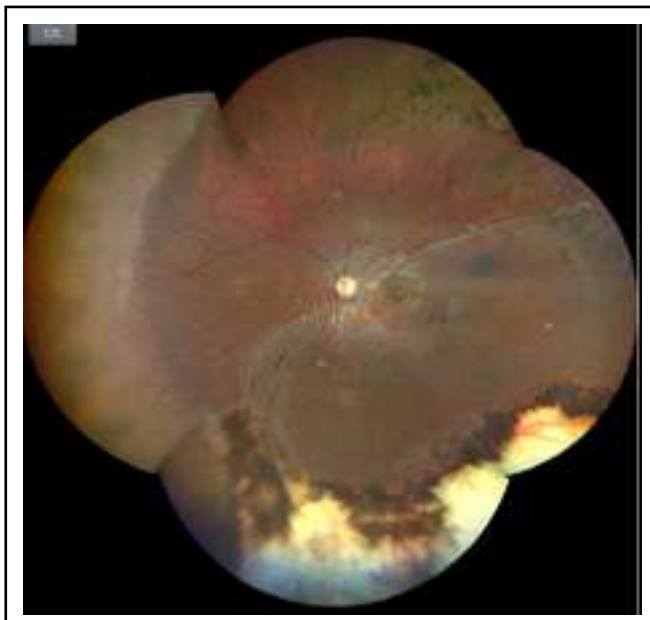

Figure 1: Post scleral Buckling in young patient with subretinal gliosis and demarcation line. Scleral buckling is the preferred surgical technique in pediatric age group as the hyaloid is very adherent in these cases.

Tips in the management of Retinal Detachment with PVR

Tip 1- Management of PVR is complex and even after a successful retinal attachment complications can occur. Patients and their relatives should be informed preoperatively about the possible complications and written informed consent should be obtained.

Tip 2- A meticulous preoperative evaluation is crucial for accurate diagnosis and surgical planning

Tip 3- Remember, patience is your greatest ally. These are long surgeries and shortcuts to meticulous dissection can lead to failures.

Tip 4- The basic approach begins with first ensuring that the vitreous is completely removed. During the surgery, meticulous removal of the vitreous is essential, along with the removal of the posterior hyaloid. Intravitreal injection of triamcinolone acetonide can be used to identify the vitreous, thus preventing remnant vitreous and posterior hyaloid. In addition, adequate base shaving is of paramount importance to relieve

anterior traction.

Tip 5- Prioritize meticulous membrane peeling. Intraoperative dyes are used to enhance the visualization of PVR membranes. Trypan Blue and Brilliant blue dye (BBG) are useful tools in staining these membranes to facilitate their removal using forceps or a cutter, as needed. Complete removal of fibrotic membranes reduces the tractional forces exerted on the retina, decreasing the risk of retinal tears and recurrence of detachment. A particularly helpful technique is peeling the membranes inside out from the disc to minimize iatrogenic breaks.

Tip 6- Attention must be paid to prevent the entry of perfluorocarbon liquid (PFCL) into the subretinal space through open breaks or tears preventing complete retina flattening. Always lower the intraocular pressure and use valved trocars while injecting PFCL as this minimizes the turbulence, ensuring the stability of the retina and minimizing the risk of retained PFCL droplets.

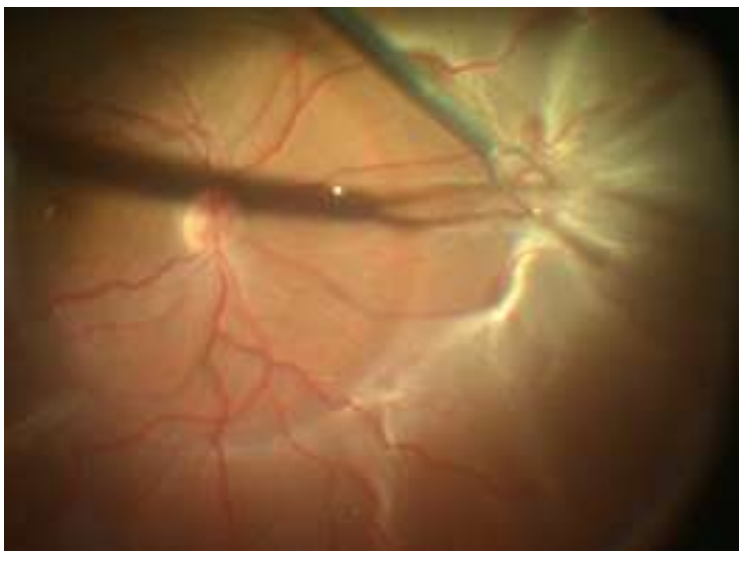

Figure 2: Intraoperative photograph showing fixed fold removal under PFCL which is used to stabilize the posterior pole. PFCL should not be over filled as pre-retinal PVR cannot be visualized properly under PFCL.

Tip 7 - Maintain a clear field of view by applying light diathermy selectively to bleeding retinal vessels.

Tip 8 – It is always preferable to sacrifice the lens and do a Pars Plana Lensectomy in cases of extensive anterior PVR

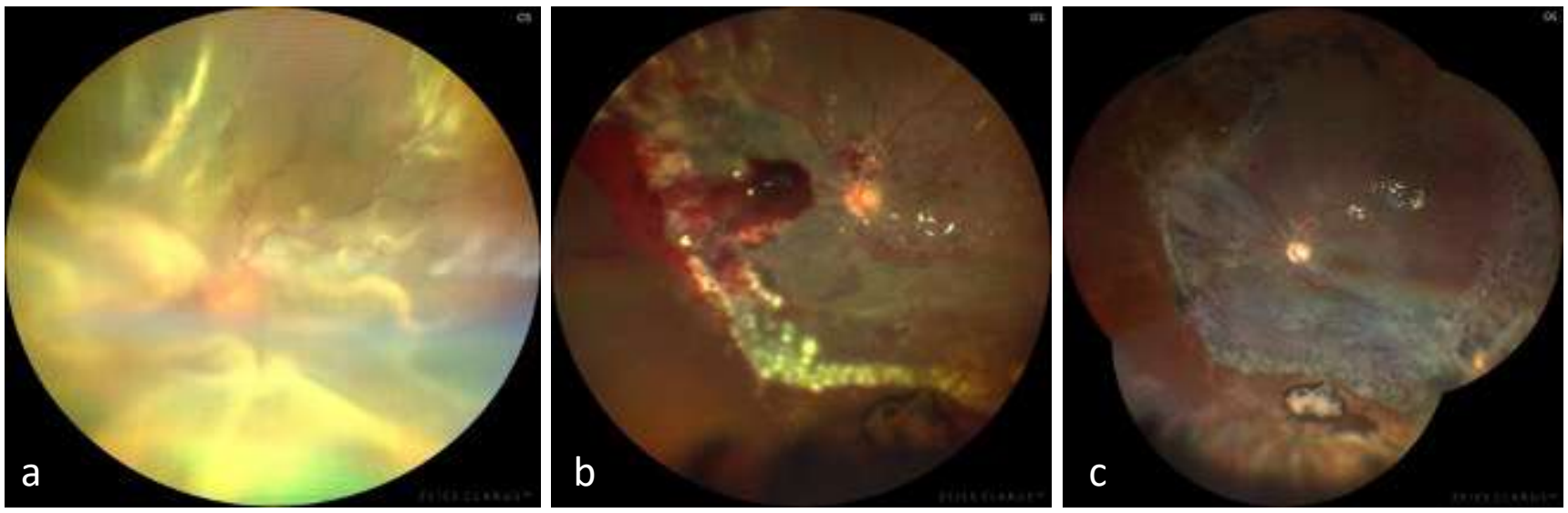

Figure 3 – (a) In long standing cases of paediatric Retinal detachment with extensive anterior PVR. Pars plana lensectomy +vitrectomy was performed. Relaxing retinectomy was required to achieve retinal flattening. (b) 10 days post operative wide field color fundus photograph showing bare choroid inferiorly with attached retina and well lasered retinectomy margins and chorioretinal apposition. (c) 4 weeks post operative montage color photograph.

Tip 9 - Excessive and heavy laser burns should be avoided as they may act as a precursor of recurrence of PVR and detachment. The inability to achieve visible laser burns signifies that retinal flattening is still not achieved

Tip 10- Do not overfill or underfill. Adequate silicone oil must be filled to achieve sufficient intraocular tamponade.

Tip 11 - Postoperative extended prone positioning is advised to aid in egress of any residual subretinal fluid by retinal pigment epithelium pump mechanism and promote chorioretinal adhesion leading to retinal scar formation at the laser site.

Adjunctive treatment options

Due to unsatisfactory anatomical and functional outcomes, various adjunctive treatment options have been investigated for the management of PVR in preclinical models and

some in clinical studies.[2]

Among them, steroids in various delivery systems - intravitreal triamcinolone, [6] intraoperative dexamethasone 0.7 mg implant,[7] oral prednisolone,[8] methotrexate,[9] and other anti-proliferative agents such as Daunomycin,[10] low molecular weight heparin (LMWH), mitomycin C,[11] have been employed in some clinical trials. Due to the presence of contradictory results in terms of clinical efficacy and the small, non-randomized nature of the majority of these studies, no consistent evidence can be drawn with the current data.[11]

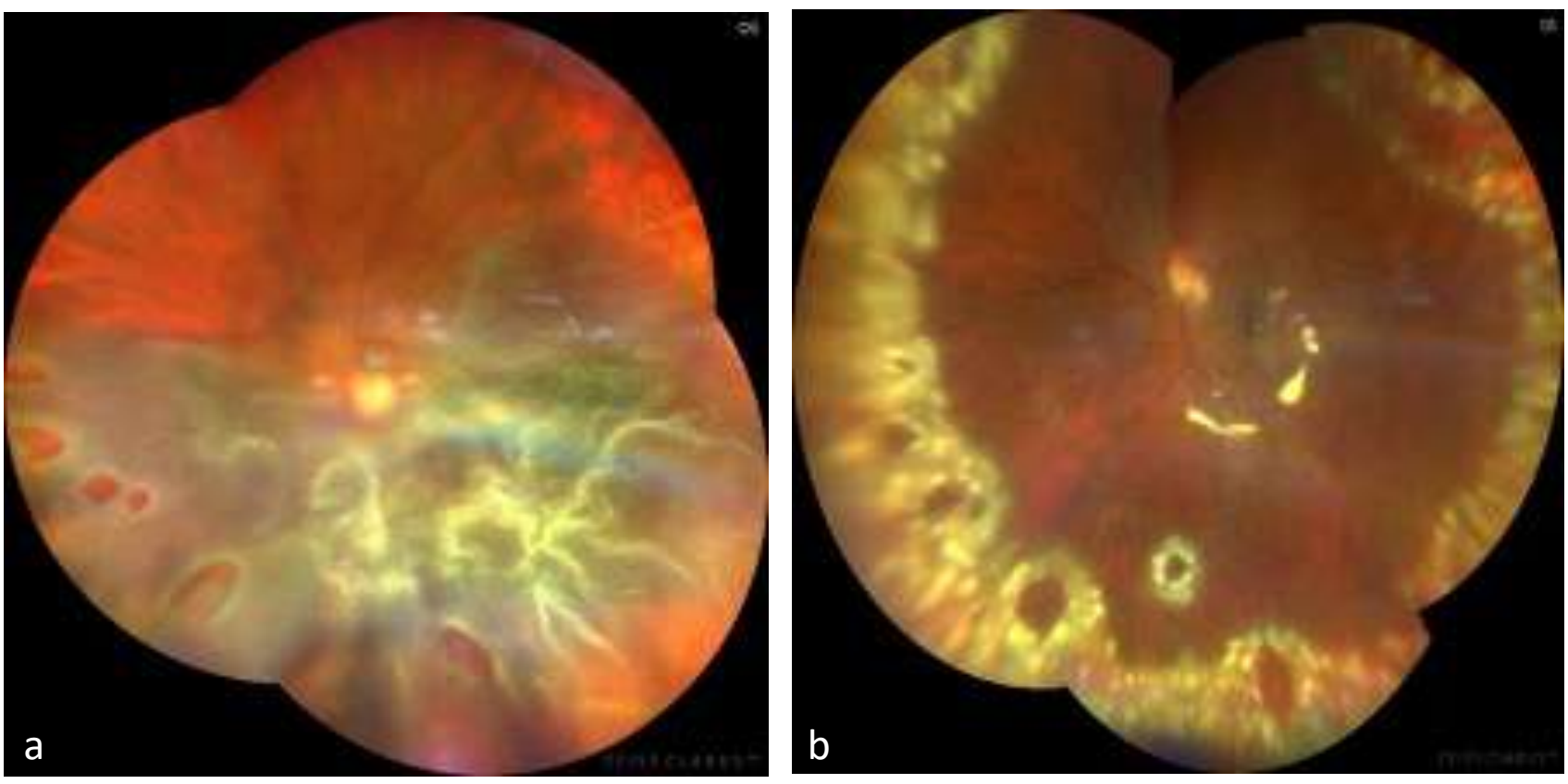

Figure 4- (a) Preoperative montage color photograph showing Rhegmatogenous retinal detachment with PVR and multiple retinal breaks. (b) Post operative color photograph showing a well attached retina under silicon oil tamponade with 360 degree endolaser barrage and laser around the breaks.

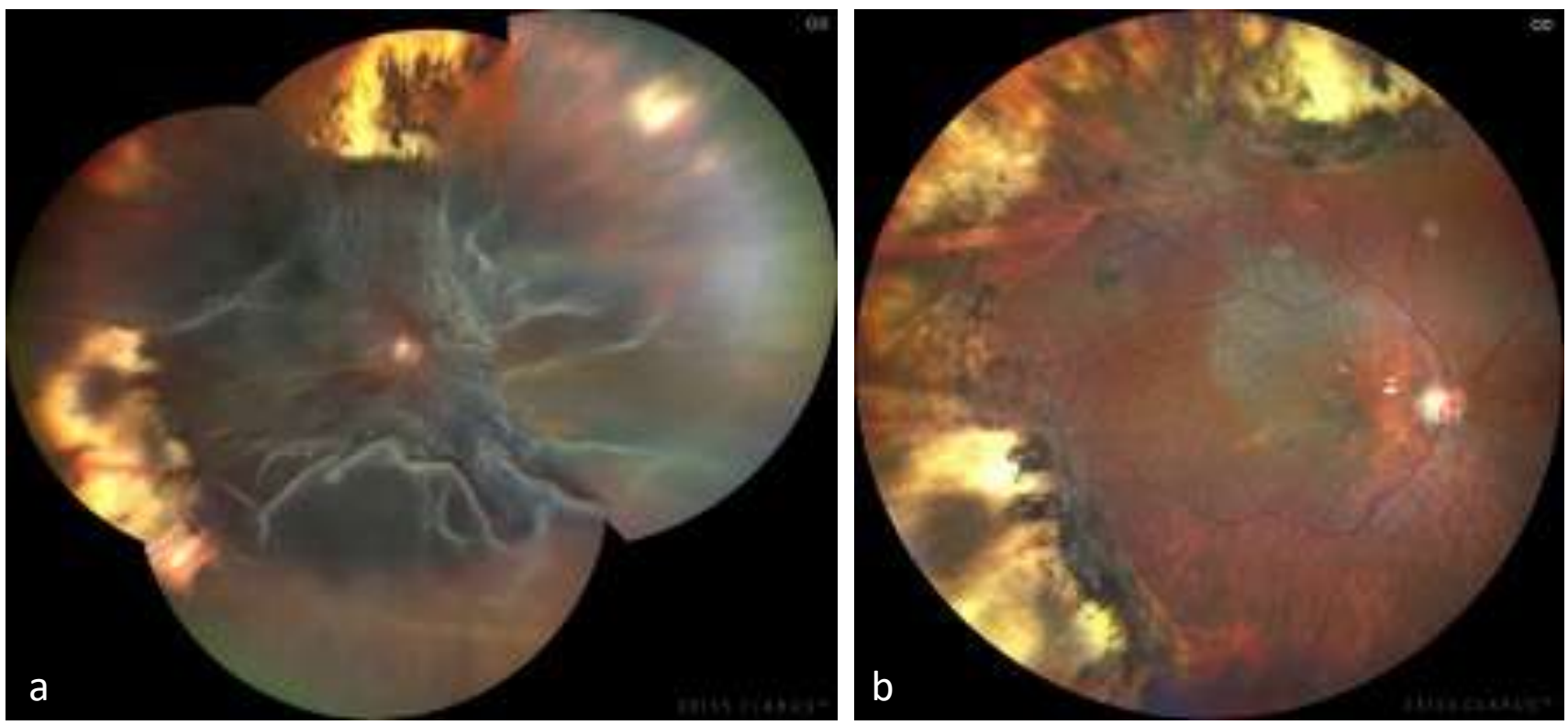

Figure 5 – Pre and post operative fundus photograph of a high myope patient showing RRD with PVR.

Conclusion

Managing RRD with PVR cases can be challenging and requires patience, perseverance, and precision. Each case has to be approached with meticulous care and one must remain adaptable to unexpected findings or complications. Thorough membrane peeling is essential for optimizing outcomes in managing RRD with PVR. Surgeons can mitigate complications, enhance retinal reattachment rates, and promote improved visual and functional outcomes by following the management tips mentioned. Close postoperative monitoring is essential to detect early signs of recurrent detachment or PVR progression. Timely intervention with additional surgical procedures or adjunctive therapies can prevent complications and improve visual recovery.

"Clinical excellence in managing complex retinal detachments lies not only in the mastery of surgical skill but in the delicate balance of meticulous membrane peeling,

where each peel holds the promise of restoring vision and transforming lives." - Dr. Steve Charles

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DEALING WITH RECURRENT RETINAL DETACHMENT

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Introduction:

Despite recent advances in surgical procedures and instruments, which have markedly reduced primary retinal detachment surgery failure rates, recurrent retinal detachment (RRD) is a reality that every retinal surgeon must face at times.

A completely reattached retina after 6 months of primary vitrectomy is considered a surgical success. A recurrence should be differentiated from a failure. When the retina fails to attach at the time of surgery it constitutes a primary failure. If it's detached subsequently in less than 6 weeks, or more than 6 weeks, it is termed early or late secondary failure respectively.

A failed detachment surgery can be post either: 1) Scleral buckling, 2) Pneumatic Retinopexy or 3) Vitrectomy +/- Buckle

The most important factor in primary surgical failure is proliferative vitreoretinopathy (PVR). Williamson et al reported a 22% drop-in success rate in the presence of PVR.(1) The higher the grade of PVR, the higher the risk of surgical failure. Other causes include ineffective closure of preexisting breaks either by improper positioning of the scleral buckle or by inadequate chorioretinal adhesion, undetected breaks or formation of new breaks, and progressive vitreoretinal traction.

Management of Recurrent RD

Retina reattachment surgery in eyes with RRD is a challenging scenario. The decision to choose the right surgical option is critical. The challenge becomes even more daunting in the presence of PVR, especially circumferential anterior PVR. The goal is to make the peripheral retina mobile enough to reattach. Various available options for the surgeon include:

1: Pneumatic retinopexy

2: Scleral buckle – addition/revision

3: Vitrectomy

Pneumatic retinopexy :

Initially prescribed by Hilton & Gizzard in 1986 as a treatment for rhegmatogenous retinal detachment with a primary cure rate between 77-91%, Pneumoretinopexy (PR) offers an alternative, quicker and less invasive way of repairing primary surgical failure in recurrent detachment cases.

The procedure is performed under an aseptic technique and local anaesthesia with the patient in the supine position. A 27-gauge needle is introduced through pars plana, and as the needle tip is seen in the vitreous cavity, 0.3 ml to 0.6ml of 100% Perfluoropropane (C3F8) or sulphur hexafluoride (SF6) respectively is injected. Green laser or cryopexy is applied to the break at the same time or later depending upon the amount of SRF, position and visibility of the break. Depending upon the location of the break and fluid, the patient is advised to position. The presence of inferior breaks that is, between 4 and 8 o'clock is a contraindication for PR as inferiorly located detachments tend to be chronic and associated with evident or subclinical PVR.

Petrushkin et al used rescue PR in surgical failures, and reported anatomical success in 90% of vitrectomized eyes and 100% of eyes with a scleral buckle at the end of 3 months.

However patient selection is critical and rescue pneumoretinopexy is rarely being done currently as most patients are taken up for a vitrectomy.

However, it remains a valuable tool in our armamentarium for selected cases.

Scleral Buckling:

If a SB was not placed during the primary surgery, the surgeon should have a low threshold for placing an encircling belt buckle at the time of re-operation if an extensive relaxing retinectomy is not planned to address the risk of residual unresolved traction.

Techniques that may be useful for reattaching the retina in recurrent RD include: 1) Adding scleral buckling material to augment the original buckle; 2) Adding an encircling band during a re vitrectomy; 4) Adding a segmental buckle element for treating inadequately closed breaks especially inferiorly located ones or a combinations of these techniques.

However in the era of vitrectomy doing a rescue or revision SB is being done rarely. In our practice, we routinely add a belt buckle of 240 type in cases with a recurrent RD undergoing re-vitrectomy, especially in phakic patients.

Vitrectomy :

In most situations with a recurrent RD, vitrectomy is the standard go-to procedure.

PVR is the most common cause of failure and is also one of the most difficult conditions to tackle. The grade of PVR is directly linked to the success rate of the surgery.

Standard membrane peeling generally works well in most cases, but in certain challenging situations a bimanual technique may be needed. This has been described to be better for handling posterior PVR by Tabandeh.[2] For anterior traction, Macino and Shalaby [3,4] reported a 90% PVR success rate with a combination of inferior retinectomy, buckling & relaxing retinotomies

Shroff et al[5] described the “Tug of War” manoeuvre for anterior circumferential traction. This involves bimanual stretching of PVR membranes holding up the retina

using two forceps. The circumferential traction is relaxed by grasping the pre retinal fibrous tissue and peeling these opposite directions till the membrane are seen to visibly separate due to stretching (https://youtu.be/CQy2jd8dmew). This helps to avoid having to perform large relaxing retinotomies and retinectomies.

The authors reported a 25% rate of small iatrogenic retinal breaks but using the 'Tug of War' manoeuvre avoids large retinectomy associated complications such as hemorrhage, sub retinal migration of PFCL and slippage of retina during fluid air exchange (FAE) in the early phase. In the late phase chronic hypotony due to a large bare area of RPE is also avoided by using this technique.

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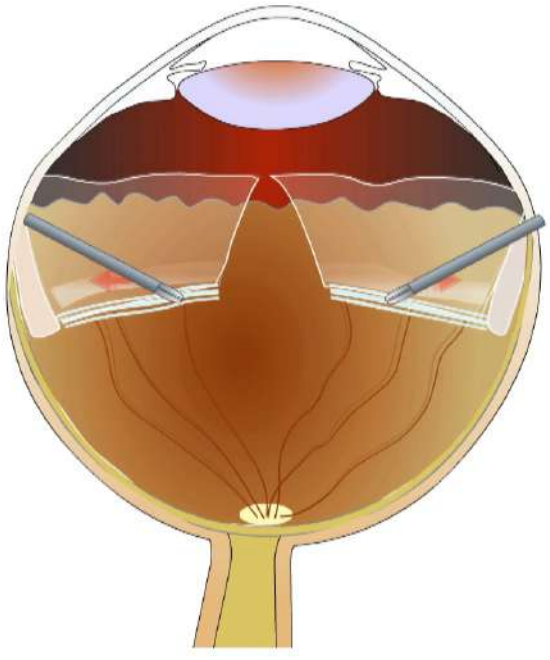

Animation depicts Tug of war with two opposing forceps to relieve anterior circumferential traction in recurrent retinal detachment

Conclusion

Recurrences after VR surgery is a scenario we must all face from time to time.

This article highlights the various options available to the vitreoretinal surgeon when faced with a recurrent retinal detachment. Optimum use of tools available to us as surgeons will ensure better anatomical and functional results for our patients.

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MANAGEMENT OF RRD IN A SCHEMATIC

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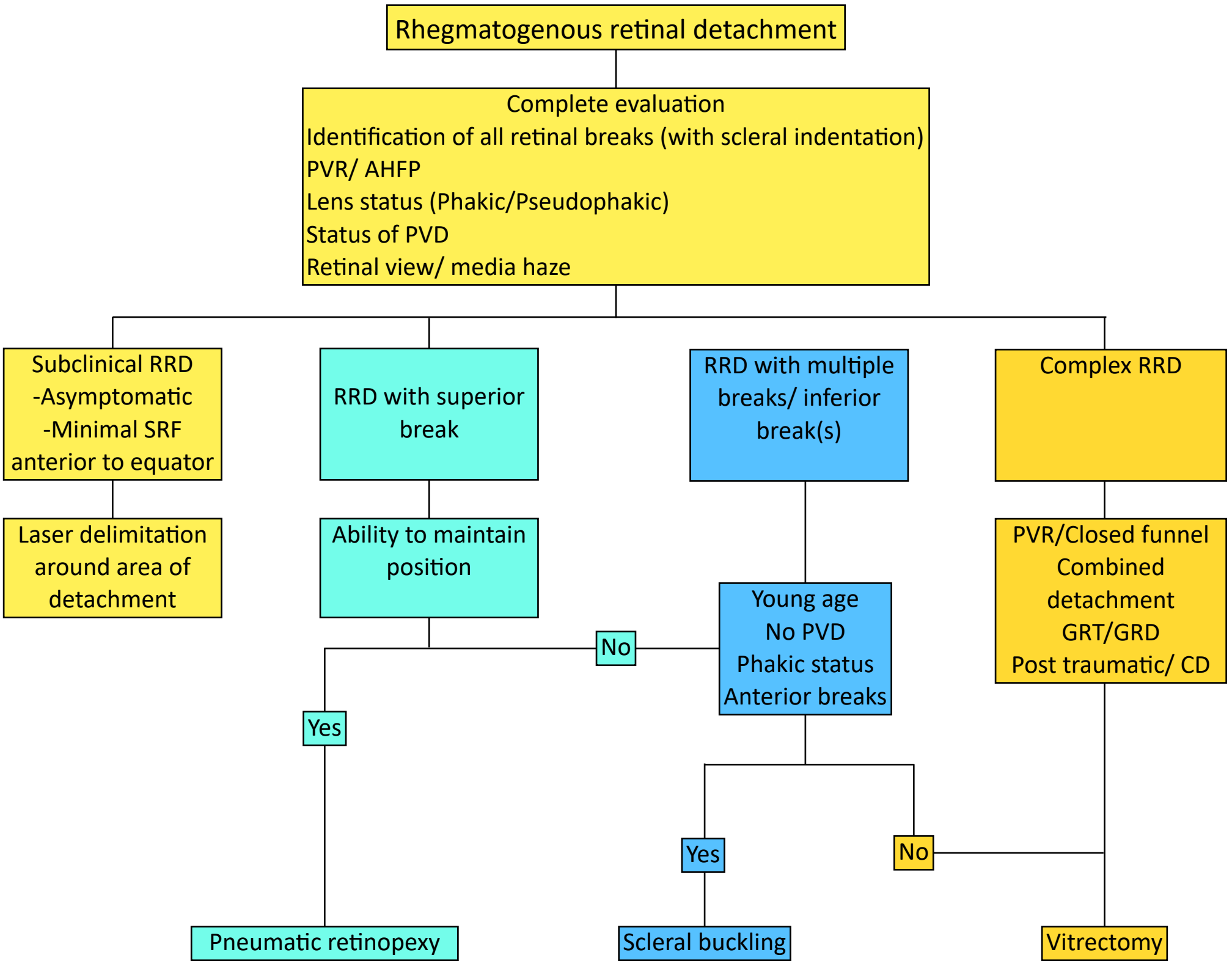
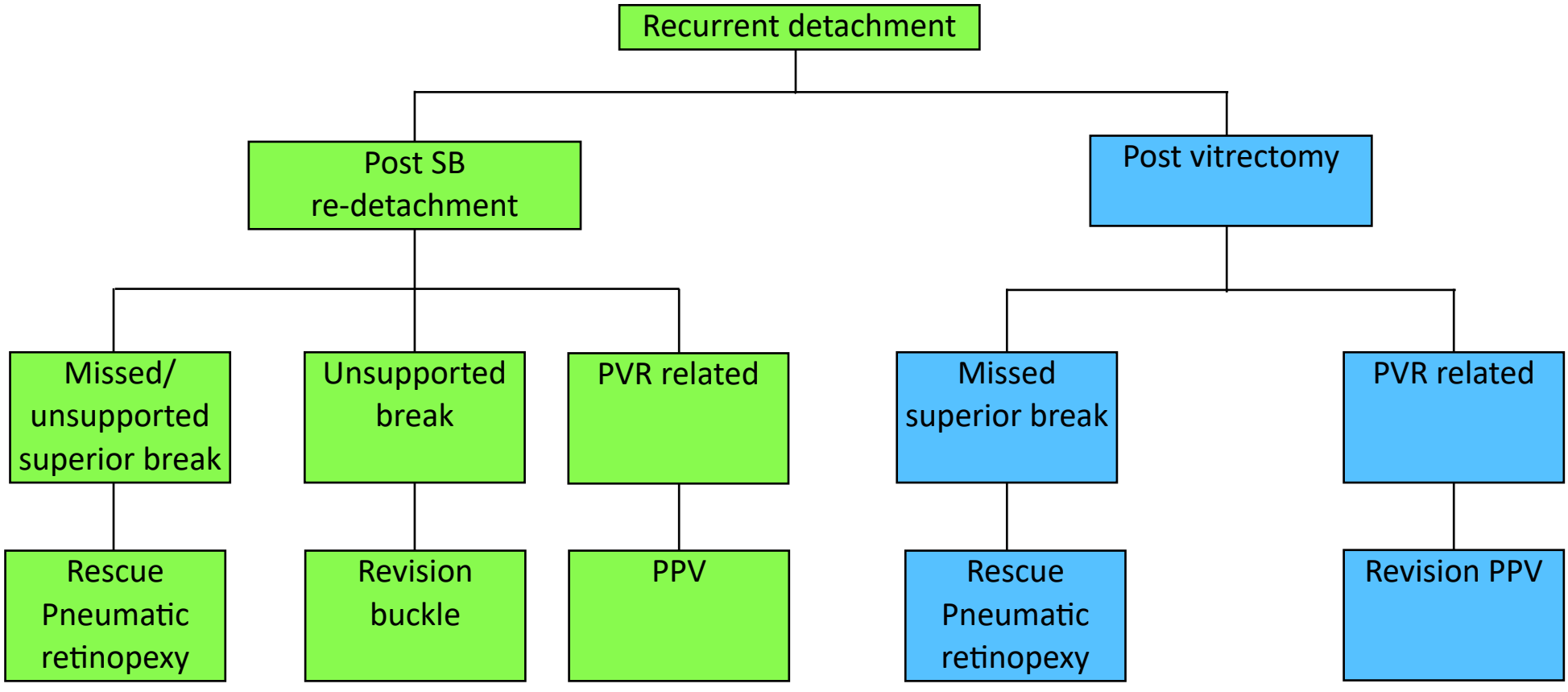


MANAGEMENT OF RRD IN A SCHEMATIC



DR SKILL TRANSFER WORKSHOPS UNDER THE AEGIS OF VRSI

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DR SKILL TRANSFER WORKSHOPS UNDER THE AEGIS OF VRSI




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