We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,900
Open access books available

185,000
International authors and editors

200M
Downloads

Our authors are among the

154
Countries delivered to

TOP 1%
most cited scientists

12.2%
Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com



Chapter 8

Minimally Invasive Sutureless Day Case Vitrectomy Surgery for Retinal Detachments, Floaters, Macular Holes and Epiretinal Membranes – An Experience from London, Windsor and Reading

Lik Thai Lim and Ahmed El-Amir

Additional information is available at the end of the chapter

http://dx.doi.org/10.5772/62081

Abstract

This chapter takes an ophthalmologist through vitreo-retinal (VR) surgery from the beginning to the end, using a case-based approach to highlight the skills required, lessons learnt from and pit-falls to avoid in VR surgery. This is especially useful to those who are new and intermediate VR surgeons.

The case represents the common conditions requiring VR surgery, so that the reader can get exposure from the common cases, ranging from hot cases like retinal detachment, to cold cases like macular hole surgery and epiretinal membrane peel, and important cases like diabetic VR cases and trauma cases.

Keywords: Vitreo-retinal, surgery, retina, vitreous

1. Introduction

Vitreoretinal (VR) surgery is an ever-changing speciality with newer and more effective instruments and equipments being introduced constantly over time. Long gone were the days when 20 gauge vitrectomy was first introduced. We now have 23, 25 and 27 gauge systems with improved duty cycles and cut rates aiding the safety and results for patients [1, 2, 3]. Although the instruments maybe updated from time to time, certain basic VR surgical techniques remain core to any VR operation.

This chapter is aimed at taking the reader from the basics in learning and performing VR surgery, touching on the main basic principles and building on with surgical pearls, some of

INTECH
open science | open minds

© 2016 The Author(s). Licensee InTech. This chapter is distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/3.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

which are not found in standard VR textbooks. Whenever possible, there will be a link provided to access short video clips to reiterate the techniques and concepts discussed, making this an interactive chapter. As such, the beginner and the intermediate-level surgeons will benefit from this chapter, with points for the advanced surgeon.

As there are many different models and types of vitrectomy machines, the discussion in this chapter will will focus on the concepts and techniques and parameters common to all machines. It is expected that the reader is familiar with the commonly used instruments for VR surgery.

This chapter is not meant to substitute a standard VR surgery textbook but merely an informative supplementary chapter focussing on practical techniques. The chapter is arranged in a gradual way of introducing VR surgery starting from simple cases through to more complex cases, with clinical pearls and discussion of techniques and learning points for each case. The approach to this chapter shall be case based. It is assumed that the readers would be familiar and well versed in the basic anatomy, physiology, and pathology of the eye. However, relevant consideration in basic sciences will be reiterated to highlighting surgical principles and concepts in a more memorable way. Each case is presented with learning points and is itemised for easier read and revision.

It is hoped that the techniques and approach to VR surgery discussed in this chapter will allow the reader to adopt a flexible and appropriate combination of techniques and approaches to meet the individual surgical requirements that each case merits, in a safe and controlled manner, given that VR can be an unforgiving subspecialty if not performed expertly.

2. General considerations for the new VR surgeons

It is important to ensure that the patient is comfortable and the cornea is parallel with the floor. The surgeons position should also be comfortable.

Please note that the anterior vitreous base is 1 mm in front of the recti insertion, and the posterior vitreous base is 3–5 mm behind the recti insertion. The ora is at the insertion line of all the recti except for the superior rectus, which is 1 mm in front of the superior rectus insertion.

Setting up of the three port pars plana vitrectomy (PPV) is a crucial start of the surgery, and each step needs to be meticulously performed. The positions of the three trocars are in the inferotemporal quadrant, superotemporal quadrant, and superonasal quadrant. Each trocar should be placed at an appropriate distance from the limbus, with 4 mm away from the limbus if the patient is phakic and 3.5 mm away for pseudophakic patients.

Since most centres have moved towards small gauge ports [4, 5, 6], with many surgeons preferring the sutureless transconjunctival sclerostomies, the technique to perform the sclerostomies needs to be mentioned here. The trocar needs to be inserted obliquely (approximately 45°) till midscleral depth, before the trocar is reposition perpendicular to the sclera to complete the sclerostomy incision [7, 8]. This will result in a shelved wound for better self-

http://dx.doi.org/10.5772/62081

sealing (similar idea as the main phacoemulsification corneal stepped incision for self-sealing effect). Recent evidence from endosurgical imaging techniques presented at the American Academy of Ophthalmology meeting 2015 shows that a 2-step insertion technique can cause trauma and 'stretch' to the pars plana possibly increasing a risk of an entry-site tear or haemorrhage. Therefore some experts recommend a 1-step insertion technique. Clinical experience suggests that this risk is low (1 in 300 cases).

The infusion line needs to be checked and allowed to flow before insertion to allow air bubbles to be expelled before connecting to the inferotemporal trocar. Before switching on the infusion, check to make sure that the infusion cannula is in the vitreous cavity and not anywhere else, pointing towards the centre of the vitreous cavity. Then the infusion is switched on.Remember to switch on the inverter on the operating microscope to facilitate the correct view of the retina. Some systems such as the Carl Zeiss system do this automatically. Others will invert manually by a hand switch or a foot switch.

There are also many different types of binocular indirect ophthalmic microscope viewing system (BIOM system) for viewing the retina for VR surgery. Regardless of the system used, the basic principle for retinal surgical work (apart from macula work) requires a wide view. In this situation, the microscope is zoomed out to the maximum, and the BIOM lens is adjusted until a clear focus is obtained. Then the microscope is lowered until a wide clear view is obtained which involves the BIOM lens being a few millimetres away from the cornea.

The general principle of vitrectomy is to surgically remove most of the vitreous, to allow the surgeon to do whatever retinal work that is required. With the vitreous cavity illuminated (either with handheld light pipe or chandelier light), the vitrector is introduced into one of the trocars, and core vitrectomy is performed at the centre of the vitreous cavity. Then posterior vitreous detachment (PVD) is checked. If it is absent, then a PVD should be induced. If PVD is present, then peripheral shave of the vitreous should be performed after core vitrectomy. The peripheral shave is a dynamic process requiring constant eye–hand–feet coordination (moving the X–Y shift of the microscope foot pedal), moving around the vitreous base as the vitrectomy is going on. This will allow for optimal visualisation of the area being vitrectomised.

The technique to get a good thin shave of the vitreous is to tilt the eye as much as possible towards the vitrector with the vitrector being placed at the edge of the optimal peripheral retinal view. The peripheral shave is performed systematically. The vitrector is placed at the edge of the fundal view in order to get as close a shave as possible, with the vitrector being placed at a clock hour for approximately 10–15 seconds to ensure a good shave before moving on to the next clock hour. Especially for phakic eyes, it is important to not cross the midline to avoid lenticular touch. Ensure the port of the vitrector is always facing away from the retina to avoid retinal incarceration.

The induction of PVD requires certain basic consideration, although there are different approaches (varying among surgeons). As the vitreous is attached at its strongest point in the ora serrata and the optic disc, and the induction of PVD is done near the optic disc, the vitrector should be switched to aspiration only and directed towards the optic disc. By increasing the aspiration rate, the vitrector cutter orifice is swirled hovering above the optic disc in a slow

methodical manner to capture the bulk of vitreous body before it is pulled tangentially away to the midperiphery of the retina, avoiding the macula and major arcades. Once reaching midperiphery, then the surgeon can switch to cut to release the tip of the vitrector from vitreous. The process is repeated until a definite PVD is obtained. Once PVD is induced, then the surgeon can continue with the peripheral shave as described above.

Now that we have reviewed the basic steps of vitrectomy, we are now going to discuss more techniques and methods tried and tested for a more effective and safer VR surgery through a case based discussion format.

3. VR cases for further practical learning points

Case 1: Macula-off retinal detachment (RD) with multiple holes in 3–4 quadrants in a phakic patient, with posterior vitreous detachment (PVD) positive

In this first case of RD, we take the reader through the steps in RD repair (although there may be slight variations among different surgeons). Subsequent points will just highlight learning points for that particular case, with the assumption that the reader would have been familiar with the surgical steps in VR surgery, as discussed in the introduction section.

1. Three port pars plana vitrectomy (PPV)

2. Core vitrectomy followed by the induction of PVD if not present. Otherwise, continue with core vitrectomy followed by peripheral vitreous shave.

3. Do not cross midline to avoid lenticular touch in phakic eyes.

4. Careful vitrectomy is done near to the retinal break with minimal vacuum and vitrector cut rate to relieve traction while minimising iatrogenic breaks or widening the existing break. This can be done by increasing the cut rate and reducing the aspiration rate when vitrectomising near the break.

5. After the vitrectomy is performed, assess if the retinal break causing the RD is vital. By touching the retina break area, the surgeon can then assess for vitreous traction.

6. Steps 5 and 6 can be repeated until all traction is relieved.

7. Then indent the sclera (e.g., by using a squint hook) to check for other breaks all round, after the irrigation pressure is reduced (e.g., 10 mmHg).

8. Cryotherapy of the break/s can be done in either saline (as long as detached retina layer can be indented by the cryoprobe to be in opposition with the choroid layer) or air (with or without diathermy marking). Diathermy around the area of break/s especially small breaks will make it easier for the surgeon to identify break/s for cryoretinopexy. Care needs to be taken so that the area of lesion will not be over treated with cryotherapy. This can lead to thinning of sclera, sclera necrosis, and scleritis. In our practice, a definite whitening of the area being cryoed is considered as adequate cryoreaction.

http://dx.doi.org/10.5772/62081

9. Backflush (flute) is used to drain subretinal fluid (SRF) from near the break in an accessible area. The flute cannula should be placed in a position hovering above the break so that the SRF can be drained, and at the same time not catching on the retina, being a passive aspiration instrument.

10. Heavy liquid (HL) (e.g., perfluorodecalin) is used to flatten retina. The advantages of this are multifold. First, it helps stabilise the retina for better vitreous shave. Second, it can be used indirectly to ascertain if the retina can be fully flatten, failure of which may suggest proliferative vitreoretinopathy (PVR), which then guide the surgeon with on the table surgical decision making. It can also serve as an indirect method to assess if the PVR membrane peel is adequate, as an inadequate membrane peel may still result in an unflattened retina under HL. Third, in rare cases, it can also be used as a temporising measure of retinal tamponade in complex VR cases requiring multiple VR surgery to complete the process.

11. In view of multiple breaks involving many quadrants, 360° very peripheral endolaser (with segmentation to prophylactically contain any imminent RD) is a sensible approach to reduce risk of a second operation for redetachment.

12. Then HL is aspirated through fluid–air exchange (FAX) at 40–60 mmHg initially (the higher the pressure, the faster it will drain). As the HL bubble gets smaller, the infusion pressure (of air) is reduced (to around 20 mmHg) to facilitate smoother HL bubble removal with the flute. The reason here is because as the bubble of HL gets smaller, the higher pressure will press on it and make the bubble flatter, and this will make removal of HL with the flute more challenging. The lesser pressure will result in a more spherical bubble of HL for easier removal with the flute. The usual pressure for air infusion is accepted at 20–30 mmHg, in preparation for air–gas exchange.

13. For this case, C3F8 14% gas was used for longer lasting tamponade. It is important to bear in mind the major gases used in VR surgery, including their vital characteristics. The table below will give some useful gas characteristics:

Characteristics	SF6	C2F6	C3F8
Expansion delay	1 day	1.5 days	3 days
Effective tamponade time	7 days	15 days	30 days
Presence of gas	15 days	30 days	60 days
Concentration of nonexpansile gas	20%	16%	12%
Rate of expansion	3	3.3	4

Table 1. Adapted from www.arcadophta.com/prod-gases_EN.html [9].

14. The intraocular pressure (IOP) should be checked as it is desirable to leave the high with a reasonable IOP (e.g., 20–25 mmHg).

15. The three-port sclerostomy sites are closed with 8 'O' vicryl sutures. The first two port sclerotomies are closed up with the 8 'O' vicryl suture first.

16. The third port (with the infusion line) is used to inject in the C3F8 14% gas. A 27G needle is used to release the air as C3F8 gas is being injected into the globe. It is important to continuously assess the IOP of the eye as the gas is being injected, to avoid an over-inflated eye.

17. Here, it is important to check the gas concentration and composition with the scrub nurse. Furthermore, as the retinal gas used is of a heavy molecule compared to air, it behaves like an 'invisible liquid', and as such, when connecting the gas containing syringe to the infusion cannula (through the three-way tap), it has to be done with the syringe orifice faced up. If the syringe orifice is tilted downwards as it is connected with the infusion cannula, this may result in some lost of the gas, making the gas diluted and rendering it less effective for the job it is intended to do in the globe.

18. Further gas top up intravitreally may be required after closing all three sclerostomy sites.

19. In our opinion, we prefer all three sclerostomy sites to be firmly secured with the sutures discussed above, to minimise any gas leak, which may make the surgical result less optimum.

20. Subconjunctival cefuroxime is our preferred choice of immediate post-operative antibiotics.

Further learning points:

1. Both C3F8 and silicone oil are shown to reduce rate of PVR.

2. It is important to note that retina must always be left flat after RD repair vitrectomy surgery in inferior break RD (as inferior detachment is a risk factor for redetachment and PVR), PVR, giant retinal tears (GRTs), and silicone oil cases.

3. Trocars nearer to 3 and 9 o'clock position will enable the surgeon to can get better access to 6 o'clock position especially in a big eye.

Case 2: Macula-on slowly progressing inferior RD with two small inferior retinal holes in the absence of PVD

This case was treated with indirect cryotherapy and sclera buckle.

1. Good clinical examination and drawing of the exact RD map utilising retinal vessel landmarks is necessary for a successful sclera buckle, which is preferably done under general anaesthesia (GA).

2. A 270° peritomy was performed, and the medial rectus (MR), lateral rectus (LR), and inferior rectus (IR) muscles were exposed and slung. The slinging of the recti muscles can be done by using 4 'O' silk. This is important for the manoeuvring of the globe in various positions to facilitate the indirect cryotherapy (cryo) and sclera buckling.

3. Although the RD may have been meticulously mapped out at the planning stage of the sclera buckle, it is always prudent to check for other breaks on the operating table, using the indirect ophthalmoscopy.

http://dx.doi.org/10.5772/62081

4. Indentation is then performed to see if the detached retina can be opposed on pressure for cryoreaction. If this is possible, then there is no need to drain the SRF using external approach. If this is not possible, then draining of the SRF may be considered. Cryo will inadvertently soften the eye.

5. It has been reported that retinal pigment epithelium (RPE) can still work in chronic detached retina.

6. A 5 'O' Ethibond-spatulated needle was used as anchor sutures for the buckle.

7. Buckle 277 is a broad buckle commonly used. It is 7 mm wide. Sutures are placed to anchor the buckle and are preplaced 9 mm wide allowing for tightening later and securing of the buckle.

8. It is important to check central retina artery (CRA) perfusion after the buckle has been secured. If the CRA is pulsating significantly, then paracentesis of the anterior chamber (AC) should be considered to lower the IOP.

Case 3: Superotemporal macula-off RD with superotemporal (S-T) breaks in the presence of PVD

1. This case was managed by three-port pars plana vitrecomy; the basic steps and considerations were discussed as above.

2. One of the aims of vitrectomy here is to release the tension of vitreous traction on the retina tear, especially the anterior lips of the retinal break. The approach to this is to do vitrectomy from the periphery moving slowly towards the anterior lips of the break, clearing the vitreous and thereby releasing the traction, from one end to the other end of the anterior lips of the break. The vitrector probe (once made inactive) can also be used to access if the break is cleared of all vitreous traction by touching on the borders of the break. If it is freely mobile without resistance, this suggests that there is no traction.

3. The vitrector can also be used to drain SRF through the retinal break as the vitrectomy surgery progresses.

4. After performing step 2, the retina may be flattened at this stage with HL.

5. HL (e.g., perfluorodecalin) can be used to fill up to the posterior aspect of the break to flatten and splint the retina for easier vitrectomy work near the retina and to achieve a thinner, more complete shave.

6. A 360° indentation is then performed to check for other breaks.

7. Then cryo of all the breaks are then done under saline (or under air which is the other option). Some surgeons prefer to use endodiathermy to highlight/mark the area of breaks for convenient identification for cryo.

8. FAX is then performed, with the backflush being held just above the break to drain the SRF so that the retina will flatten as the FAX is completed.

9. Removal of heavy liquid using the backflush or vitrector is then performed.

10. If there is a water tide/mark crease on the macula, this needs to be flattened or ironed out to avoid metamorphopsia. One option is to reintroduce heavy liquid from one side to the other to iron the retina flat, if this was discovered after FAX. The second option is for longer acting gas (e.g., C3F8 14%) and do face down posture for a day.

11. The pitfall here is to be able to distinguish pseudowater tide/mark crease from true crease. A water tide/mark could be actually the junction between oedematous detached retina, which had just been reattached and healthy retina (pseudocrease), and not a real crease as such. Therefore, this sign needs to be assessed carefully to decide if it is a true crease.

12. Gas injection and close up is standard procedure as described in Case 1.

Further learning points:

1. In cases where the RD is not bullous (i.e., shallow), HL may not be required, as macula folds is less likely, and any residual SRF can be absorbed by the RPE. Face down posture with gas-filled eye may be beneficial in such cases.

2. It can take 20 minutes for crystalline lens to get cloudy (depending on the degree of cataract present prior to surgery) with FAX air in vitreous cavity.

3. Longer acting gas means less PVR rate especially in Inferior RD cases.

Case 4: A 5-day history of inferior RD macula-off with a horse shoe tear of moderate size at 7 o'clock position with PVD present

1. This case required vitrectomy (basic steps and considerations as discussed previously).

2. In inferior RD, inferior vitreous needs to be very closely shaved to minimise tangential and sideway traction, which can lead to future redetachment and PVR.

3. With a horse shoe tear (anterior) flap, it is best to retinectomise the flap to make easier access of the break during SRF drainage by backflush. Furthermore, it may serve as a more effective and convenient way to relieve traction (since the flap can be considered as the anterior lip which is subjected to vitreous traction which caused the tear in the first place).

4. The break on this occasion is quite near the ora serrata. If backflush is blocked, then try to squeeze on the nozzle to try release any blockages. Reasons for a blocked backflush include thick vitreous catching on the probe (requiring further shaving) and the probe catching on the edge of the break when draining the SRF (requiring the probe to be placed higher and aim central to the break).

5. When draining SRF with backflush during FAX, the probe needs to be very steadily placed centrally in relation to the break as visualisation of the fundus is poor. If not observed, this may lead to an ineffective FAX, resulting in persistent SRF with the break still open.

6. Occasionally, it may not be possible to flatten retina due to extensive bullous RD. Then options include the following:

a. Use long-acting C3F8 14% gas with utilising the steam roller technique of posturing to milk out the SRF. An example is that if in the left eye, after RD repair, before closing up, there were

http://dx.doi.org/10.5772/62081

still some SRF temporal to the macula, with a break temporal (2 o'clock position), the steam roller technique will require the patient to lie on the left cheek to pillow (so that the gas bubble will be exerting nasally) for half an hour, after which the patient will lie face down for another half hour (this will move the maximal exertion of the gas bubble from nasal to middle (macula) area of the retina. Then finally, the patient will lie with right cheek to pillow. This will result in the gas bubble having maximal exertion in the temporal region. In effect, this entire manoeuvre will slowly move the bubble maximal exertion point from nasal to middle to temporal, resulting in the milking effect of the SRF to expel through the temporal side opening). This effect is akin to a steam roller concept and hence the name of this manoeuvre.

b. Use HL (under air or saline) and redrain the SRF before introducing C3F8 14% gas.

c. Make a retinotomy at the most superior point (highest point) accessible for draining the SRF and then cryo to the retinotomy site.

These options are not exhaustive and merely highlight the versatility of VR surgery, whereby decision making on the table is crucial, and is dictated on a case by case basis.

Further learning points:

1. After 1 week of inferior RD usually PVR will start.

2. The prognosis of macula-off RD of less than 1 week will have a better prognosis than after 1 week RD.

3. In general, studies had shown that the major risk factors for increased risk of retinal redetachment include inferior break RD and PVR. Therefore, the decision on the appropriate approach to manage inferior RD needs to take into consideration multiple factors, as the surgeon and patient will have to live with the decision made. The factors taken into consideration will depend on the visual potential, macula-on or macula-off RD, presence or absence of PVR, and position of RD. If, for example, the case is an inferior RD with break at 6 o'clock position, with macula-off and PVR that could not be flatten with HL despite removal of some PVR membranes, then we can consider retinectomy, peripheral endolaser, and silicone oil and cryo at each end of the retinectomy site. For the retinectomy to work, this should be performed for 180° with retinectomy relieving incisions at each end. The relieving incisions at each end will reduce the risk of further PVR progression as it limits the expansion of PVR membranes. If there is more visual potential with macula-on inferior RD, then we will consider cryo, gas, and buckle. The buckle here will serve as an enhanced indentation site against which the retinal break can be firmly opposed while allowing for the cryoreaction to take place in 5–7 days. In fresh inferior breaks, buckle may not be necessary. The reason to avoid silicone oil in an inferior RD with good visual potential is that it can actually cause issues like IOP and macula toxicity leading to reduced vision.

4. If there are multiple inferior breaks RD, depending on severity, there are several management options, although the list below is not exhaustive and aim at stimulating the decision-making process of the new VR surgeons.

5. Possible options depending on severity are as follows (increasing severity of inferior RD):

a. Vitrectomy, cryo gas

b. Vitrectomy, cryo, gas, buckle (e.g., 277 buckle), e.g., two breaks and difficulty trimming the vitreous gel at the edge of the breaks.

c. Vitrectomy, cryo, oil—e.g., PVR grades B/C

d. Vitrectomy, cryo, oil, and buckle—e.g., macula reasonable prognosis

e. Vitrectomy, cryo/retinectomy and oil—e.g., PVR grades B/C with peeling of star membrane. This is appropriate for cases of poor prognosis of visual acuity less than 6/36 Snellen.

Note: SRF drainage through an accessible break can be with or without heavy liquid, in saline or in air.

Case 5: A patient with PVD positive and an almost total RD with inferior breaks ×2

No PVR was found.

After the basic vitrectomy, the technique used here is by filling HL up to the two inferior breaks (which is very periphery) to fill the entire vitreous cavity, thus pushing most of the SRF away. Now the retina will be flat, and the breaks can then be treated with cryo or laser retinopexy. Then FAX is switched on. This means that at this point, the vitreous cavity has three interface systems, namely, air, fluid, and HL. During the FAX, the backflush or aspirating vitrector is placed at the fluid level (which is in between the air and the HL layer), to drain all the fluid making it a two interface system (Air and HL). Then the infusion cannula is removed from the trocar to drain out infusion fluid and HL, which may be contained in the infusion line through the FAX mode. If this step is not done, there is a theoretical risk that some fluid and HL may be present, and continuing with the FAX may result in some fluid and/or HL being reinserted into the vitreous cavity. This in turn may get through the retinal break causing an SRF accumulation, which is not ideal. Then the infusion cannula is reinserted into the trocar. Next, with FAX mode, HL–air exchange is done. As there is no fluid on top of the heavy liquid, it was not mandatory to put backflush near the break to drain. After FAX, air–gas exchange is performed, prior to closing up.

Case 6: A young man with traumatic macula hole and chronic macula-off almost total RD

It is postulated that PVR was not present despite chronicity due to non-PVD and the firm vitreous is keeping pigments away.

After the standard vitrectomy, the following steps were taken:

1. Inducing PVD in a young patient can be challenging. One method is to activate continuous suction with circular motion outwardly for two rounds before lifting up the vitreous body. The light pipe can be used to shine on the shadow of the vitreous body to confirm PVD induction. This method can be repeated until PVD obtained. Membrane blue and triamcinolone can be used to highlight vitreous body. Central PVD in this case does not necessarily mean peripheral PVD in the young, which need to be carefully induced, to avoid retina capture on vitrector orifice, which should be pointed 180° away from the retina surface.

http://dx.doi.org/10.5772/62081

2. Internal limiting membrane (ILM) in traumatic cases and in the young can be VERY challenging as it is very sticky and difficult to peel. For macula work, the surgeon must ensure appropriate readjustment of depth perception for the higher magnified macula lens, to avoid retinal touch.

To peel in this case, the force of the forceps should be concentrated sideways along the surface of the retina before lifting up to ensure a significant amount of membrane can be peeled off at any one time, which can be another challenge in view of the mobile retina.

3. If macula hole is too small, consider superior accessible retinotomy site (above the equator) for drainage of SRF.

4. Since this case had no PVR, and the retina can be flattened, long-acting gas (C3F8 14% is used prior to closing up.

Case 7: Inferior RD with early PVR, and with a history of previous RD repair surgery and removal of silicone oil procedure

1. In this case, the approach is inferior retinectomy 180° with relaxing retinectomy. The role of radial relaxing retinectomy (which can be made in several locations as the condition dictates) is to help flatten PVR retina and reduce risk of future PVR formation.

2. After retinectomy, heavy liquid can be used to flatten retina before application of peripheral laser retinopexy. Then FAX followed by silicone oil insertion. When silicone oil is filled, there may be some residual fluid trapped between the silicone oil and the iris lens diaphragm. This can be aspirated with backflush after removal of the infusion line, which may contain more fluid/heavy liquid. If the infusion line is not removed prior to aspiration of residual fluid, this may result in reintroduction of residual fluid into the vitreous cavity when the infusion line is finally removed.

Further learning points:

1. Retinectomy can cause haemorrhage if retinal or choroid vessels are involved. As the choroid is the most vascularised tissue in the body, the haemorrhage with the involvement of choroidal vessels can be very significant.

2. When performing retinectomy with the vitrector, it is prudent to ensure that the cutter is held just on the layer of the retina being retinectomised as any deeper will invariably shear the choroidal vessels leading to significant haemorrhage. Bottle height can go up to 80 mmHg to tamponade the haemorrhage, if this was to happen.

3. A small strand of retina connecting the anterior and posterior aspect of the retinectomy site left behind in retinectomy for PVR can cause further PVR and retinal detachment. As such, there is a need to make sure that all retina in the path of retinectomy be completely removed.

Case 8: Proliferative diabetic retinopathy (PDR) with vitreous haemorrhage with previous pan-retinal photocoagulation (PRP)

1. PVD induction in such cases can be very challenging. The following approach can be used based on the level of difficulty in inducing PVD (in ascending order of difficulty) as follows:

-Persistent and repeated circular motion in aspiration using the vitrector (with cutter mode off) around the vitreous body near to the optic disc is performed. Always aim the vitrector away from the macula and work around the disc. Disc area-induced PVD is considered complete PVD. For this reason, the need to ascertain anatomy of macula and disc is of paramount importance and can be challenging with suboptimal view in vitreous haemorrhage cases. Working away from macula sweeping around the disc with the vitrector, pulling towards the midperipheral retina before lifting the hyaloid face, is one suggested approach. It has to be noted that these steps need to be repeated until a full PVD is achieved, failure of which may result in further fibrosis with possible tractional RD (TRD) and recurrent vitreous haemorrhage.

-The vitrector aspiration rate can be increased further in more adherent hyaloids face cases.

-In cases where hyaloids face is not readily visible, membrane blue can be considered, as this will stain the hyaloids face enough for visualisation, to ensure complete separation from the retina both centrally and in the midperiphery.

-The use of triamcinolone is another alternative to membrane blue for visualisation of the hyaloids face.

-Physical manual separation of posterior vitreous face with MVR (micro vitreoretinal) blade, ILM forceps, scissors (20G) which can be right angle or curved.

The listed approaches above can be used repeatedly and in combination in very difficult cases until PVD is achieved.

If vitreous gel is left behind in the posterior pole/macula region, then rhegmatogenous RD and/or TRD will eventually ensue.

2. Organised haemorrhage near the retina can technically be removed using backflush, again pulling away from the macula. If one end of the organised haemorrhage is not budging, then the surgeon can try removing the complex from another end.

3. Haemorrhage can be tamponade by increasing bottle height or increasing infusion pressure. If source of bleeding can be found, the surgeon can consider endocautery.

4. Macula lens can be used to increase magnification for close work around the macula or in difficult to induced PVD.

Further points to consider:

1. Do not pull to induce PVD at the retinal blood vessels arcades.

2. If peripheral shave is done but PVD is not yet induced at the posterior pole, this will lead to rhegmatogenous RD if left alone. If PVD is induced at this stage (after peripheral vitreous shave is done), it will spring up to the ora serrata, and the whole process of peripheral shave needs to be started again. Therefore, it is crucial to induce PVD in such cases at the posterior pole for a subsequent complete core and peripheral vitrectomy in a time efficient manner.

3. Ala-Sil (Altomed) can be used in place of balanced salt solution (BSS) in vitrectomy/delamination cases, which have significant active vitreous haemorrhage, as this infusion

http://dx.doi.org/10.5772/62081

material will not mix with blood and let the blood stay in a loculated place as the surgeon continues with vitrectomy work without making the view hazy from the haemorrhage.

4. Bucket-handle technique: In cases where parts of the posterior pole are affected by TRD, core vitrectomy should be followed by relieving traction at the TRD site (with delamination as required) and then followed by the PVD induction in the posterior pole. If core vitrectomy and peripheral vitrectomy shave are performed without posterior pole PVD, this may result in fibrovascular TRD flattening, as the anteroposterior tractional force had been relieved from the core and peripheral shave vitrectomy. This will lead to insufficient vitreous body left for engaging with the vitrector to continue with the process of vitrectomy/delamination work. Furthermore, it will be more difficult to perform delamination of the fibrovascular attachments in a flattened TRD complex. This principle is known as the bucket-handle technique as the 'handle' represents the fibrovascular traction bands.

Case 9: Temporal GRT with PVD positive and macula-off

Learning points:

-GRT is defined at a peripheral retinal break of 3 or more clock hours.

-Such cases require good peripheral shave and relieving traction, just as any case of rhegmatogenous RD.

-HL is used to flatten the retina, followed by endolaser of the GRT. For places hard to reach at either end of the GRT, cryo can be used to join the endolaser to the ora serrata.

-GRT is a recognised risk of the development of PVR, and hence silicone oil should be considered, even in macula-on cases.

For this particular case, when FAX was done to remove heavy liquid, the retina ballooned out, and retina slippage occurred. In this case, FAX was stopped, and heavy liquid was reintroduced. This flattened the retina. Backflush was used to aspirate the remaining SRF, the position of the backflush being as near to the posterior lip (near where the endolaser marks were). This action can also facilitate the retina to reposition from the slippage position to its original position but should not be done forcefully.

Variation of techniques to inject silicone oil: One option is for heavy liquid–air–oil exchange (with hand 1 holding the light pipe and hand 2 holding the backflush). This technique can pose a higher risk of retinal slippage. Another option is using chandelier light in the fourth (30G) port, with hand 1 holding the backflush and hand 2 holding the silicon oil infusion cannula and the three-way tap on the main infusion line connected to one of the three trocars is switched off at the same time.

One method of minimising catching on the retinal edge of break while aspirating using backflush is to close the aspirating hole of the backflush until it is aligned out of the way of the retina break edges, before reopening to aspirate further.

Therefore, it is important to pay close attention to the retina position in such cases to observe for any retina slippage during FAX. With experience, one can tell the difference between oedematous retina and crinkling of retina.

Furthermore, in such cases, it is prudent to consider a direct silicone oil–heavy liquid direct exchange. Since the normal infusion tube (which connects from the three-way tap to the trocar) is not strong enough to withstand the pressure from the silicone oil injector (which can be as high as 30lbs/sq inch, equivalent to 1500 mmHg), a special silicone oil tubing is used to substitute the original infusion tube. This will allow for both hands of the surgeon to work on the retina.

NB: Decision making during surgery is crucial and one has to think of few steps ahead.

Case 10: Total RD with PVD positive in a phakic patient

In this case, it was a chronic RD. However, only two small peripheral holes were seen, one at 1 o'clock and another at 8 o'clock. The detached retina was still mobile. Since the holes were small, it was postulated that the pigment cells would be difficult to make their way to the vitreous cavity, which explained why there were no PVR.

-In the presence of PVD, when doing vitrectomy, in view of the mobile retina, we can consider HL to splint the retina for a more stable vitrectomy shave.

-Small holes are difficult to visualise, so such breaks are preferably cryoed in saline. The other alternative is to endocautery mark the breaks and cryo under air.

-In phakic eyes, decision sometimes need to be made, when the lens get cloudy. In this case, options are (1) to perform cataract surgery and lens implant and continue with the retinal work with a better fundal view and (2) consider after cryo/laser to the area/s of break/s, to fill in with silicone oil. The rationale behind this is that under silicone oil, small breaks that may have been missed may remain stable. If the cataract developed further over the course of several months, then the surgeon can perform combined cataract extraction and lens implant (phaco+IOL) and removal of silicone oil (ROSO) and at that stage reexamine the retina and treat any breaks found.

Case 11: Right macula-off temporal bullous RD with multiple small peripheral breaks

In bullous RD cases, the aim is as follows:

-Core and peripheral vitrectomy

-Vitrectomising near the major breaks (while being cautious about vacuum (low) and cut rate (high)) in order to remove any traction and allowing SRF to come through in order to flatten the retina thereby stabilising and controlling the retinal position. Care must be taken to avoid iatrogenic retinal breaks.

-PVD is then induced (if PVD not present).

-The surgeon will aim to achieve as thin a peripheral shave as possible.

-While doing vitrectomy in such cases, one can expect bullous retina coming and going depending on the position of the eye and vitrector. This is due to the dynamic fluid movement depending on the position of the vitrector. One can consider using HL to stabilise the retina in such cases.

http://dx.doi.org/10.5772/62081

-The small breaks can be cryoed (or lasered) under saline or air (surgeon dependent)

-Then FAX is started, with drainage through the main small break being performed using the vitrector initially and revert to backflush, for a more refined and controlled aspiration of the residual fluid in the vitreous cavity. Once the fluid level during the FAX dropped below the retina break being drained, the backflush can then be moved to the area just above the optic disc to complete the FAX.

-If one should refill the vitreous cavity with BSS after FAX especially in the myopic eye (for any technical reasons, e.g., retinal folds near macula), one must be aware not to put too much vacuum on the vitrector initially, as there will be a lag of air in the infusion line before BSS comes through, creating vacuum to cause 'kissing retina'. During the beginning of this process, instruments need to be held high up in the vitreous cavity, as the sudden 'kissing retina' effect may damage the retina, on sudden forceful contact with the instruments if those were at the base of the posterior pole.

-Should FAX result in reformation of bullous retina, then this may suggest that fluid has reentered the break, possibly from suboptimal drainage technique, or original break is too small to effectively drain through or a loculated SRF collection, and the options for further procedure are as follows:

a. Refill vitreous cavity with BSS and perform an accessible retinotomy, and perform FAX and drained through the new retinotomy site. Then contiguous cryo on the multiple small breaks under air performed (may consider diathermy to mark, or draw map of breaks) (applicable to loculated SRF collection and/or treated small breaks, pertaining to this case).

b. HL to flatten retina and 360° laser retinopexy. (This can be an option in situation with RD but no breaks found.)

Further learning points to consider:

There are many cryotherapy machines for VR work. Occasionally, the cryo probe is not responsive. Therefore, the surgeon needs to be aware of basic troubleshooting. This includes the following: (a) check to see if the probe itself is working by testing first, (b) check for leaking probe, and (c) check to see if the cylinder is empty.

Case 12: Inferior break developing during ROSO requiring cryo and refill with silicone oil

The decision on how to proceed in such case depends upon the presence or absence of PVR and the assessment of individual patient's circumstances, e.g., requiring more ops, etc. Possible options include the following:

-Cryo and/or laser and long-acting gas with positioning in the absence of PVR.

-Cryo and/or laser and refill with silicone oil if no PVR.

-Laser and retinectomy with silicone oil if PVR.

-May require PVR membrane removal.

Case 13: Inferior macula-off RD with previous RD repair vitrectomy surgery over 5 years ago

Learning points:

-Retinal break can still be adjacent to the cryoed area.

-Main reason of RD in this case is due to inadequate vitreous shave during the first RD repair. Thick base of vitreous left behind from the initial surgery can still have the potential to undergo peripheral PVD leading to new retinal breaks.

-Redo in this case involved a much thinner shave especially at the area of break.

-In this case, the break was impossible to find on cursory indentation. The subretinal ILM blue chimney smoke method was used after heavy liquid insertion, to avoid ILM blue to go under the macula. The ILM blue dye was injected with a 40G needle in the subretinal layer of the RD. Then gentle indentation and milking to look for the leaking dye, which shall be the area of small break where it leaked dye. Subretinal dye should ideally drained out once it served its purpose, and in this case, retinotomy was done before draining out the dye, since 40G hole is too small to effectively drain the dye, after the identification and treatment of the break.

-Since there were no PVR, long-acting gas and posturing face down for 3 days was the decision made in this case.

-With PVR, the surgeon may be required to perform a 180° retinectomy and relieving retinotomy and enolaser and silicone oil.

Case 14: Inferior RD with macula involvement, but multiple holes in all quadrants in a 38-year-old man

-PVD induction can be tricky in the younger patients who had not naturally developed PVD. In detached retina, PVD induction is done by pulling vitreous body towards area of detachment to the periphery before pulling up. If PVD induction is only concentrated on the centre, this will only achieve partial PVD and, hence, the motion of going from central to peripheral before pulling up the vitreous body to induce a complete PVD.

-Multiple breaks will require 360° laser retinopexy. Since no PVR in this case, long-acting gas was used (instead of silicone oil).

-During FAX to remove heavy liquid and fluid, the surgeon must also go near the break to drain SRF as well, to aim to achieve a flat retina. In this case, there was a sequestered SRF pocket near the macula. Retinotomy was done to drain the SRF to achieve a flat retina. The retinotomy site in this case was not near the periphery, and hence laser retinopexy (and not cryo—since the cryo probe could not reach the retinotomy site due to its location) was used.

Case 15: Redo inferior retinal detachment in a 40-year-old man

In this case, the issue was that of an inadequately treated (cryo) break. This break was cryoed, and since there was no PVR, long-acting gas was put in place. The learning point here is to ensure that adequate cryo is applied to the break in the primary surgery through meticulous observation.

http://dx.doi.org/10.5772/62081

Case 16: Redo inferior RD in a 70-year-old lady

In this case, there were signs of PVR grade B. There were no collagenous membranes to peel.

Even in Grade B PVR, there can be radial shortening of the retina, in that after retinectomy was done, the shortening can be very significant. In this case, the retina contracted centrally with its new retinectomised border settled near to the major retinal vessel arcades.

In this case, silicone oil was used, after air/heavy liquid exchange. The silicone oil was injected separately from hand 2 with hand 1 holding the light pipe (this procedure was previously discussed above).

Case 17: Diabetic retinopathy fibrovascular traction requiring delamination

Bucket-handle technique utilised here. This means no full vitrectomy in this case, with only enough vitrectomy to get at the posterior hyaloid face (PHF), as full vitrectomy will release traction and hence flatten the traction area, making it difficult to release and remove more membranes.

The approach to delamination can be performed by using the 20G curve scissors (although a curved 23G scissors can also be used) and go underneath the PHF and with the scissors opened, lift up the PHF and cut, so as to minimise the chances of cutting the retina creating a tear. This will create a surgical plane for lifting the membrane complex en bloc. When the scissors are closed, they can be used as a pick to tease up the PHF.

Sometimes despite the best efforts, retina break/hole cannot be avoided. Usually, this happens in the areas just near the arcades and sometimes near the temporal macula region. This is best treated with laser retinopexy. The closer it is to the macula, the lighter the laser should be applied. In the unlikely anatomy position of papillomacular bundle tear/break, this is best left alone. In any case, expansile gas is used and face down posture adopted for 1–2 days.

The objective in TRD is to relieve the traction at the strongest adhesion point/s via delamination. Thereafter, once complete PVD is induced, then we can continue straight to complete the vitrectomy.

Pirouetting and moving the fundal view in opposite directions of vector of rotating the eye will increase periphery view. Cutting as close to the edge of view is recommended for a thin vitreous shave. In areas of vitreous base haemorrhage which cannot be removed, in the area of entry site, one can consider external cryo behind the site to reduce risk of entry site break.

Case 18: Superonasal bullous macula-off retinal detachment with PVD positive

Heavy liquid is key is the splinting of such cases.

Extra macula fold can still occur after FAX if the heavy liquid is not filled up to the level of just below the posterior border of the retinal break.

Technically, as long as the three interface (air, fluid, and HL) can be changed to two interface (air and HL), and no fluid getting into the break, then we should be able to avoid retinal slip and /or retinal folds (which is caused by residual fluid in the vitreous cavity.

Retinal folds post operatively usually does not cause much visual symptoms to patients unless it is a macula fold. To reoperate, one can use a 40G needle to inject BSS subretinal to create a bullous RD to extend into the macula area where the fold is. Then use HL to flatten out the retina, ironing out the macula fold at the same time. Retinotomy may be required in the periphery to drain out the SRF and finishing off with gas fill and to close up.

Case 19: Inferior retinal detachment with an inferior moderate size break, who opted to wait over the weekend prior to surgery, resulting in early membrane PVR, but macula-on

This case is rare as usually PVR cases are associated with macula-off (which means different approach to management).

Learning points:

It has been documented that certain genetics, e.g., HLA DR4 can be associated with propensity for PVR development.

In this case, even a wait of 4–5 days (as opposed to 2 days) can already result in PVR membrane formation.

In such cases while operating, one must actively look out for early PVR and assess mobility of the detached retina. Early PVR can be stiff, although it may retain limited mobility. The other feature to look out for is retinal folds that will not change shape within a relatively mobile retinal detachment. The approach to such case is to use an MVR blade (25G to enter 23G trocar) splice the membrane to unfold the retina. Another method of assessing stiffness in equivocal case is to use HL to see if this can completely flatten the retina.

The management decision for this case is as follows:

a. Inferior PVR macula-on: try to release adhesions of retinal folds by splicing PVR membranes to unfold retina. If SRF drainage can flatten the detached retina, long-acting gas and face down posture can be utilised. If retina is not properly flattened, a buckle can be added to increase success (added indentation to counter the shortened retina).

b. If this case redetached, we may then consider laser retinopexy and buckle, after getting rid of more membranes. Silicone oil should not be used in primary RD repair case in this situation due to macula toxicity (as the case is macula-on). The buckle acts to shorten the anterior vitreous base to reduce traction, and also act as a good addition to tamponade.

c. If after the above approach (a and b) but the retina redetached, we may then consider retinectomy and silicone oil (last resort).

d. However, if the macula was off (pertaining to this case), we may consider silicone oil in the first instance.

The above approaches are dependent on the state of the eye as discussed above. It serves as a prelude to the reader to utilise lateral thinking in the decision making in VR surgery.

http://dx.doi.org/10.5772/62081

Case 20: Inferior retinal detachment with two inferior breaks at 6 o'clock and PVR grade B, in a background of pseudoxanthoma elasticum (PXE), who had cataract surgery about 3 months ago

This was treated with vitrectomy, cryo, 360° laser retinopexy, and inferior buckle.

-PXE can be a predisposing factor for retinal breaks due to weaker connective tissue. In this case, there were a few superior breaks but without RD.

-It is important to recognise the PVR at an early stage, which can manifest as crinkling of the retina (blood vessels crinkling can be a good clue of early PVR). PVR can be anterior or posterior or both. In the prevalence of PVR types, posterior is more common than anterior. Anterior PVR traction forces are A-P, circumferential and anterior perpendicular traction, where posterior PVR can take more random vectors. The objective in nonsheath PVR is to release any traction and to flatten as much the retina as possible, by cutting adhesions using MVR blade. Heavy liquid can be used to stabilise the retina and at the same time test the retina to see if it flattens —if not flattened, this suggests PVR adhesions still strong and require further adhesion relief.

The European VR Society RD Study (report 2) suggested that in cases of PVR requiring vitrectomy, a supplemental buckle may not be useful. http://www.aaojournal.org/article/S0161-6420(13)00102-4/pdf

http://www.eyecalcs.com/DWAN/pages/v6/v6c058.html

-In this case, inferior buckle is also used. This serves two purposes, one being to reduce the circumference and area of the PVR region in the hope of stabilising the flattened retina in that area. The second reason is to give additional tamponade to ensure closure of the breaks is permanent. While doing buckling, the IOP should not be high. One can consider filling the eye with heavy liquid to a high point in the eye to ensure globe maintenance during buckling. This means the infusion cannula can be temporarily disengaged, to make enough room for the buckling. Once buckling is done (using 277 broad band buckle), 360° laser retinopexy (in view of multiple breaks in all quadrants) and cryo are utilised.

-NB: Cryo machine should be set up prior to it being required. This is to ensure that cryo is not only set up once it is needed, as the warming up of machine and self-calibration takes time, and can mean that when one uses the probe to indent with the view to cryo breaks found, the cryo can go 'on' as part of the calibration process, thereby throwing the probe into uncontrolled freezing in undesired area. In this case, one option is to disconnect the probe from the machine or to cut with scissors the infusion line of the probe.

Case 21: A 67-year-old man with epiretinal membrane (ERM)

He is pseudophakic with anterior capsular phimosis.

In this case, ERM peel using diamond duster scrapper could not induce a flap, as this ERM happened to be a double membrane and firmly attached (like chewing gum) whereby the diamond dusted scrapper will only make the tissue bunched up without inducing a flap. In this case, using an MVR blade to scrape away from the surgeon (so as to have a view of tissue control at all times) to induce a flap. Sometimes, inevitably partial thickness retina layer maybe

peeled of as the flap is induced. This should not cause much visual symptoms postoperative anecdotally. If the flap is friable and not able to be extended, then attempt to create another flap adjacent to it, so that the second flap can join the first flap to create a bigger flap before peeling. In this case, restaining with dual blue multiple times for better visualisation is helpful. Staining and restaining especially in double ERM layers will make each layer more discernable.

Usually, after initial staining, always look out for natural creases of the ERM which maybe prominent on primary staining. These creases can be used to create flaps and start the peel. It is better to peel off the ILM as well, if possible, to reduce the risk of ERM recurring (as ILM is the scaffold upon which the ERM proliferates).

The ERM membrane pegging to the retinal surface can be unpredictably anywhere (not neatly arranged) and peeling ERM will depend on the feel of least resistance. ILM peel on behaves more like an anterior capsulorrhexis during cataract phacoemulsification.

Case 22: A GRT repaired with cryo and 360° laser retinopexy and silicone-filled eye over 7 months, who had an ROSO, and during the procedure, inferior RD was noted

In this case, it should be treated like an RD. The inferior RD SRF was extensive, with the break appeared to be on the previous laser retinopexy site. FAX used to drain the SRF ended up with an inferior collection of SRF (with closure of the break). Hence, a retinotomy was performed under air. Retinotomy under air is more challenging, requiring aspiration to engage the retina before cutting to make the retinotomy. By using a backflush, SRF drainage was attempted but only able to achieve partial drainage. At this point, silicone oil was refilled. Despite silicone oil refilled, the SRF was still present. At this point, the idea was to use heavy liquid under the oil. A small proportion of oil was removed using the backflush, with the infusion line attached to one of the trocars. The HL was injected under the oil which flattened the retina. Then laser retinopexy was performed. The next step will be to remove the HL as top up silicone oil was injected. An independent silicon oil cannula was connected directly into the trocar, replacing the original infusion cannula, so that the surgeon is able to use the foot pedal to control the oil injection, while one hand holding the light pipe and the other holding the backflush to drain the HL. This is one unusual scenario when direct oil-HL exchange was performed.

Case 23: A total RD with Grade B PVR, with the nasal and superior part of RD not able to be flattened by HL

The approach in this case is as follows:

-Wide angle viewing system

-High-speed cutter

-Encirclage (for grade C PVR and above) to shortened the retina

-PFCL heavy liquid to try flatten the retina

-Membrane peel

-Retinectomy and laser/cryo (please note that this is best done with inferior 180°), and it is unusual to do retinectomy as a primary RD procedure

http://dx.doi.org/10.5772/62081

-Tamponade

NB: In cases of PVR where close vitreous shave is required, one can consider the 'proportional reflux dissection' on a 25+ G cutter. This cutter can be a multifunction effect depending on the adjustment of certain parameters. With this, the sphere of influence is smaller and less likely to cause iatrogenic break, in PVR membrane peeling.

In this case, after membrane peel, a nasal retinectomy in an attempt to flatten the retina was attempted. However, there is extensive haemorrhage despite diathermy before retinectomy. In view of the poor view, surgery stopped and eye filled up to max, to revisit (as a two-stage procedure) in 24–48 hours (any longer will cause IOP increased and inflammation ++). This approach flattened the retina and settled the haemorrhage, for the surgery to be completed.

Case 24: Vitreomacular traction (VMT) with visual distortion

Vitreous can be very sticky in such cases, and even though there is a Weiss ring, vitreous can still be firmly attached to macula. The approach in inducing PVD in this situation is to pull vitreous around the macula and never work on the fovea directly.

Membrane blue or triamcinolone can be used to confirm that vitreous is removed.

Paediatrics VR consideration:

-In paediatrics VR cases, the vitrectomy is just core vitrectomy as inducing a PVD would be disastrous to the very young retina.

Even in cases of retinopathy of prematurity (ROP), releasing traction is the main aim and not to remove majority of the vitreous.

The trocar approach to paediatric VR up to 15 years old is 2.5–3 mm behind limbus.

Case 25: Previous inferior retinectomy and silicone oil and ROSO presented with a redetachment

Inferotemporal area of retinectomy is found to have PVR lifting that area creating a break for RD to develop (macula-off almost total RD).

-Heavy liquid (HL) sequestered superiorly SRF, which means no breaks in the sequestered area.

Recognising straight (and unusual retinal detachment patterns) is important. This is caused by PVR. The source of traction/pulling effect needed to be worked out and then released, so that it will resume normal break contour, after which, laser retinopexy can be considered (either under HL or oil). In this case, it was decided to do under oil. The localised haemorrhage happened as a result of removing the fibrous adhesions.

Case 26: RD repaired (temporal) with silicone oil

ROSO was then performed and 5 months later developed this patient developed macula-off RD and PVD.

Learning points:

Retinectomy joining temporal breaks can be done in the superior peripheral arches 180°.

Case 27: Diabetic TRD

If sheets of hyaloid in posterior pole are left behind, this will invariably worsen the TRD leading to blindness and phthisical eye. Therefore, it is imperative to remove all the hyaloids sheets especially within the arcade of the macula. If outside the macula arcade, small islands can be left behind if too adherent to remove, as small islands do not have the tendency to contract to cause TRD (as it is not connected or networked with other islands of posterior pole hyaloids).

When delaminating, there is a need to quickly establish a surgical plane separating hyaloids from the fibrovascular tissue. Iatrogenic breaks can be laser pexied and drained to flat if possible (under heavy liquid)—in such cases, silicone oil needs to be considered. There may be a need to try different direction of peel for a good hyaloids peel.

4. Conclusion

This chapter describes the basic skills and pitfalls to avoid in VR surgery, which we hope will be especially useful to the novice and intermediate-level VR surgeons. The advanced VR surgeons may also find this chapter useful with some innovative surgical approach.

The above cases would have represented most of the VR case mix that the average VR surgeon will encounter in their daily practice. We hope that after reading this chapter, this will serve as a platform for further reading and practice, to improve the standards of VR surgery and enhancing patient safety and surgical outcomes of the readers.

Author details

Lik Thai Lim* and Ahmed El-Amir

*Address all correspondence to: likthai@gmail.com

Dear Authors, please add affiliations, Country

References

[1] Eckardt C. Transconjunctival sutureless 23-gauge vitrectomy. Retina 2005;25:208-11.

[2] Fujii GY, De Juan E Jr., Humayun MS, et al. A new 25-gauge instrument system for transconjunctival sutureless vitrectomy surgery. Ophthalmology 2002; 109:1807-12.

[3] Ibarra MS, Hermel M, Prenner JL, Hassan TS. Longer-term outcomes of transconjunctival sutureless 25-gauge vitrectomy. Am J Ophthalmol 2005;139:831-6.

[4] Lakhanpal RR, Humayun MS, De Juan E Jr., et al. Outcomes of 140 consecutive cases of 25-gauge transconjunctival surgery for posterior segment disease. Ophthalmology 2005;112:817-24.

[5] Oshima Y, Wakabayashi T, Sato T, Ohji M, Tano Y. A 27-gauge instrument system for transconjunctival sutureless microincision vitrectomy surgery. Ophthalmology. 2010;117:93-102.

[6] Oshima Y, Wakabayashi T, Sato T, et al. 13. Oshima Y, Wakabayashi T, Sato T, et al. A 27-gauge instrument system for transconjunctival sutureless microincision vitrectomy surgery. Ophthalmology. 2010;117:93-102.

[7] Sakaguchi H, Oshima Y, Nishida K, Awh CC. A 29/30-gauge dual-chandelier illumination system for panoramic viewing during microincision vitrectomy surgery. Retina. 2011;31:1231-1233Ophthalmology. 2010;117:93-102.

[8] Sakaguchi H, Oshima Y, Nishida K, Awh CC. A 29/30-gauge dual-chandelier illumination system for panoramic viewing during microincision vitrectomy surgery. Retina. 2011;31:1231-1233

[9] www.arcadophta.com/prod-gases

IntechOpen

IntechOpen

IntechOpen