Acta Scientific Ophthalmology (ISSN: 2582-3191)

Volume 8 Issue 2 February 2025

Review Article

Tips and Tricks for Pars Plana Vitrectomy in Rhegmatogenous Retinal Detachment for Beginners

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Received: January 30, 2025

Published: February 03, 2025

Abstract

This article is directed towards the fresh vitreo-retina surgeons to help them achieve better anatomical outcome in a pars plana vitrectomy for Rhegmatogenous retinal detachment and to reduce the chances of post operative complications and prevent re-detachment of retina by keeping basic tips and tricks in mind.

Keywords: Rhegmatogenous Retinal Detachment (RRD); Pars Plana Vitrectomy (PPV); Proliferative Vitreoretinopathy (PVR)

Introduction

As a beginner or someone who has started practicing independently immediately after training, it is important to have good surgical outcomes initially, not only for the patients' benefit, but also for the development of surgeons' confidence.

Getting good anatomical result in complicated retinal detachment surgeries naturally comes with time and experience, but a fresher should be able to do relatively less complicated cases with minimum complications and up to his full potential by keeping basics in mind.

The article is directed towards the fresh vitreo-retina surgeons to help them achieve better anatomical outcome in a pars plana vitrectomy for Rhegmatogenous retinal detachment (RRD) and to reduce the chances of post operative complications and prevent re-detachment of retina by keeping basic tips and tricks in mind.

Pre-operative considerations

Before performing Pars plana vitrectomy (PPV), thorough evaluation is essential. Assess the extent of the retinal detachment, location of the retinal breaks, presence of proliferative vitreoretinopathy (PVR), and any associated ocular comorbidities. This information will help in planning the surgical approach and optimizing outcomes.

Encircling band

For a beginner, it is advisable to pass an encircling band (240 band) prior to PPV, as primary vitrectomy in combination with scleral buckling has led to a marked decrease of primary failure rate and improvement of functional results in retinal detachment surgery [1].

An encircling scleral belt helps to ease the traction caused by anterior PVR changes and also widens the view for peripheral vitrectomy. At times, it gives support to small unnoticed/missed anterior break.

While passing the band, after making 360-degree conjunctival peritomy, it is mandatory to separate tenon thoroughly as it will help to bridle the rectus muscles easily and let the band pass through under the rectus muscles with ease.

Passing a sutureless band is preferred over sutured one [2], as the risk of perforation are relatively less; however, it is more of a personal choice and depends on how one has been trained.

One must check the caliper reading before measuring distance as we may accidently rotate the measurement knob leading to unequal and unwanted distance from limbus or from rectus muscle insertion.

A low to moderate indent is desirable. It is better to avoid giving high indent before PPV as one can always increase the indentation, if required at end of the surgery.

Also in high indentation, there are chances of fish mouthing of large retinal breaks if the break lies on the edge of the indent.

Sclerotomy ports

After conjunctival displacement, a biplanar sclerotomy incision instead of stab incision is preferred as it reduces the chances of wound leak, hypotony and gas leak and also helps in self-sealing of ports if sutureless surgery is planned [3].

When globe is too soft, it is better to use microvitreoretinal (MVR) blade before entering sclerotomy ports.

A 6 mm infusion cannula can be placed if required in case of bullous retinal detachment or associated choroidal detachment to avoid inadvertent placement of cannula sub-retinal.

Vitrectomy

- Port site vitrectomy should be done prior to entering instruments to reduce the chances of vitreous dragging by the instruments.
- Vacuum should be set low (e.g., 200 mmHg) in a case of RRD as there are very high chances of formation of accidental iatrogenic break in detached retina in high vacuum settings.
- One should never shy away from using chandelier light as it helps a lot in absence of good assistant to indent. With the help of chandelier light surgeon can do indentation himself which will ease up the process of peripheral vitrectomy and vitreous shaving. Chandelier can be commonly placed inferiorly at 6'o clock or superiorly at 12'o clock, or it can be placed opposite to the causative retinal break.
- Once posterior vitreous detachment (PVD) is induced, one can inject per-fluoro carbon liquid (PFCL) to secure the posterior pole as it helps to decrease the tremulousness of the retina during peripheral vitrectomy. In some cases, injecting PFCL can provide information about the location of the unidentified peripheral breaks if subretinal fluid drainage is observed through breaks other than the identified retinal breaks [4].
- Do a thorough vitrectomy especially around vitreous base as one of the major cause of retinal re-detachment is anterior PVR [5]. It is very important to localize the causative break. Sometimes, small or micro retinal breaks are not visible. In such case one should look for the break according to the configuration of the detachment as per the Lincoff's rule, however, Lincoff's rules are not followed in retinal detachment with posterior breaks and attached cortical vitreous [6].
- Extra precaution should be taken in phakic patient as there are very high chances of lens touch, incidence being 3.7% while doing vitreous shaving from vitreous base [7]. Any lens touch or damage to posterior lens capsule will result in media opacity intraoperatively and can hamper fundus examination on follow-up visits. Any damage to lens can lead to formation of intumescent cataract, for that patient might have to undergo cataract surgery earlier than planned.
- After fluid-fluid exchange and before fluid-air exchange, it is advisable to indent 360 degrees peripheral retina to look for any small unnoticed retinal break. This examination should be thorough as there are high chances of missing a small break which may lead to later detachment under oil or after silicone oil removal.

Membrane peeling

Identify and peel epiretinal membranes (ERM) that may contribute to retinal tractions. Peeling of Internal limiting membrane (ILM) is a personal choice; however, it is advisable in chronic RD or cases with extensive PVR changes in order to prevent formation of ERM over macula. This step is crucial for achieving complete retinal reattachment. Any sub-retinal band must be removed, if unable to remove completely then at least its continuity should be broken.

Drainage Retinotomy

The peripheral drainage retinotomy can be used if the retinal break is not in a dependent location for drainage [8].

Preferred site of drainage retinotomy is supero-nasal to the optic disc, around one and half to two-disc diameter away from the disc margin, but it can be made anywhere as per the configuration of the retinal detachment in the dependent area outside the major arterial arcade.

Drainage retinotomy should be made in avascular retinal area to avoid involvement of any blood vessel. Try to make it exactly in between the two vessels as retinotomy diameter tends to extend during fluid-fluid exchange.

Care should be taken while making a drainage retinotomy that it should not be too wide and should not be far away from posterior pole as it has to be in a dependent area.

Avoid taking out the flute or soft tip cannula suddenly while performing fluid-fluid exchange as it tends to enlarge the retinotomy up to a large extent.

Endolaser

At least 3-4 rows of level 2 burns of laser should be applied to retinal break and drainage retinotomy. Try to avoid level 3 burns or high intensity laser as they can cause laser induced retinal holes, which can lead to retinal detachment post silicon oil removal [9].

A 360-degree laser barrage is preferred in case of multiple small retinal holes at multiple sites anteriorly, as one might miss small retinal breaks in extreme periphery other than obvious large causative breaks. 360-degree laser helps to prevent retinal re-detachment under oil or after silicone oil removal.

Silicone oil

It is preferable to plan silicone oil removal along with cataract surgery if there is significant cataract formation post vitrectomy as in case of re-detachment of retina post silicone oil removal, surgeon will get a clearer view.

Better to avoid long term retention of silicone oil as chances of ERM formation and ocular hypertension are high. The silicone oil should not be kept longer than 6 months after its injection, and the best timing to remove the oil is 2 to 3 months [10]. Heavy oil (5000 cs) can be used in chronic RD's or RD with extensive PVR changes or in paediatric RD and can be kept longer as emulsification process takes longer in heavy silicone oil in comparison to 1000 cs oil.

Postoperative care and follow-up

Ensure appropriate postoperative care, including proper positioning, medications administration and regular follow-ups. Educate the patient about the importance of prone or head down position. Regularly monitor for any signs of infection, elevated intraocular pressure, or recurrent retinal detachment.

Conclusion

As my mentor wisely put it, "Vitrectomy is not merely the science of cutting the vitreous with a cutter; it is also the art of mastering endoillumination".

This statement encapsulates the delicate balance between precision and finesse required in vitreoretinal surgery. Beyond the mechanical act of dissecting the vitreous, true surgical mastery lies in illuminating the posterior segment with skill, ensuring optimal visualization while preserving delicate structures.

Mastering PPV in RRD requires practice, experience, and continuously honing your skills. By implementing the tips and tricks outlined in this article, beginners can enhance their surgical technique and improve patient outcomes. Remember, patience, attention to detail, and a commitment to continued learning are key factors for success in this complex procedure.

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