

Screening and prophylaxis of retinal degenerations prior to refractive surgery

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The need and demand for surgical correction of refractive errors, particularly myopia, has been increasing. Degenerations involving the peripheral retina are common in myopes and can result in a rhegmatogenous retinal detachment. There are no clear guidelines for retinal screening and management of asymptomatic retinal degenerations prior to refractive surgery or for follow-up of these patients. This article aims to provide a set of guidelines for the management of retinal degenerations in eyes undergoing refractive surgeries.

Key words: Posterior vitreous detachment, refractive surgery, retinal degeneration, retinal detachment

Access this article online

Website:

www.ijo.in

DOI:

10.4103/ijo.IJO_2101_20

Quick Response Code:



Uncorrected refractive errors continue to be the most common cause of moderate to severe visual impairment in young adults.^[1] Refractive errors seen in day-to-day clinical practice include myopia, hyperopia, astigmatism, and presbyopia of which, myopia is the most common.^[2] There is either a steep cornea or a longer axial length or a combination of both in myopia. Since the past several decades, surgical correction of refractive errors, particularly myopia, is on the rise. The different refractive surgical techniques used in the treatment of myopia include surface ablation techniques like photorefractive keratotomy, laser in-situ keratomileusis (LASIK), femtosecond LASIK and intraocular procedures like intrastromal corneal ring segments, phakic intraocular lens (phakic IOL) and elective refractive lens exchange.^[3-8] Other less commonly used refractive surgeries include radial keratotomy, thermal conductive keratoplasty, automated lamellar keratoplasty, and epikeratoplasty. Newer procedures like small incision lenticule extraction (SMILE) are gaining popularity for the correction of myopia.^[9]

Degenerations involving the peripheral retina are common in myopes and studies have shown a higher prevalence with increasing grades of myopia.^[10-13] Lattice degeneration, snail-track degeneration, retinal tears/holes, degenerative retinoschisis, cystic retinal tufts, and, rarely, zonular traction tufts, can result in a rhegmatogenous retinal detachment (RRD) and its associated morbidity.^[14] A posterior vitreous detachment (PVD) is also more common in myopes and present at a much younger age.^[15] During laser-assisted refractive surgeries like LASIK, there are significant ocular mechanical stressors like an increase in intraocular pressure (>65

mm Hg) during application of the microkeratome suction ring, an acoustic shock wave during the laser ablation, and a rapid lowering of intraocular pressure when the suction ring is decompressed.^[16] These have the potential to cause changes in the vitreous, retina, and macula. Many patients complain of increased floaters (PVD) after LASIK.^[17-19] Even in newer surgical techniques like the femtosecond LASIK, the incidence of PVD occurrence or progression is either higher or comparable to that seen in the microkeratome LASIK cohort of patients.^[20-22] This may be due to a longer suction time during femtosecond LASIK despite a lower suction pressure.

Small incision lenticule extraction is a relatively new refractive procedure designed to treat a range of refractive errors. In this flap-less procedure, a corneal lenticule is created using a femtosecond laser and then extracted through a small incision.^[9] It is reported to achieve similar optical effects femtosecond LASIK with excellent postoperative outcomes.^[23] In the SMILE technique, there are no fluctuations in the intraocular pressure as in LASIK. Thus, one can assume that the incidence of PVD following SMILE is less compared to LASIK or femtosecond LASIK. Irrespective of the refractive error grade or the procedure done, a PVD can lead to retinal tears and an RRD.^[24] A retinal examination of myopic eyes, both pre- and post-operative, is therefore mandatory. Prophylactic treatment of retinal degenerations which can predispose to retinal tears is advisable.^[14,25-30]

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Received: 27-Jun-2020

Revision: 19-Jul-2020

Accepted: 20-Jul-2020

Published: 23-Nov-2020

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Cite this article as: Venkatesh R, James E, Jayadev C. Screening and prophylaxis of retinal degenerations prior to refractive surgery. Indian J Ophthalmol 2020;68:2895-8.

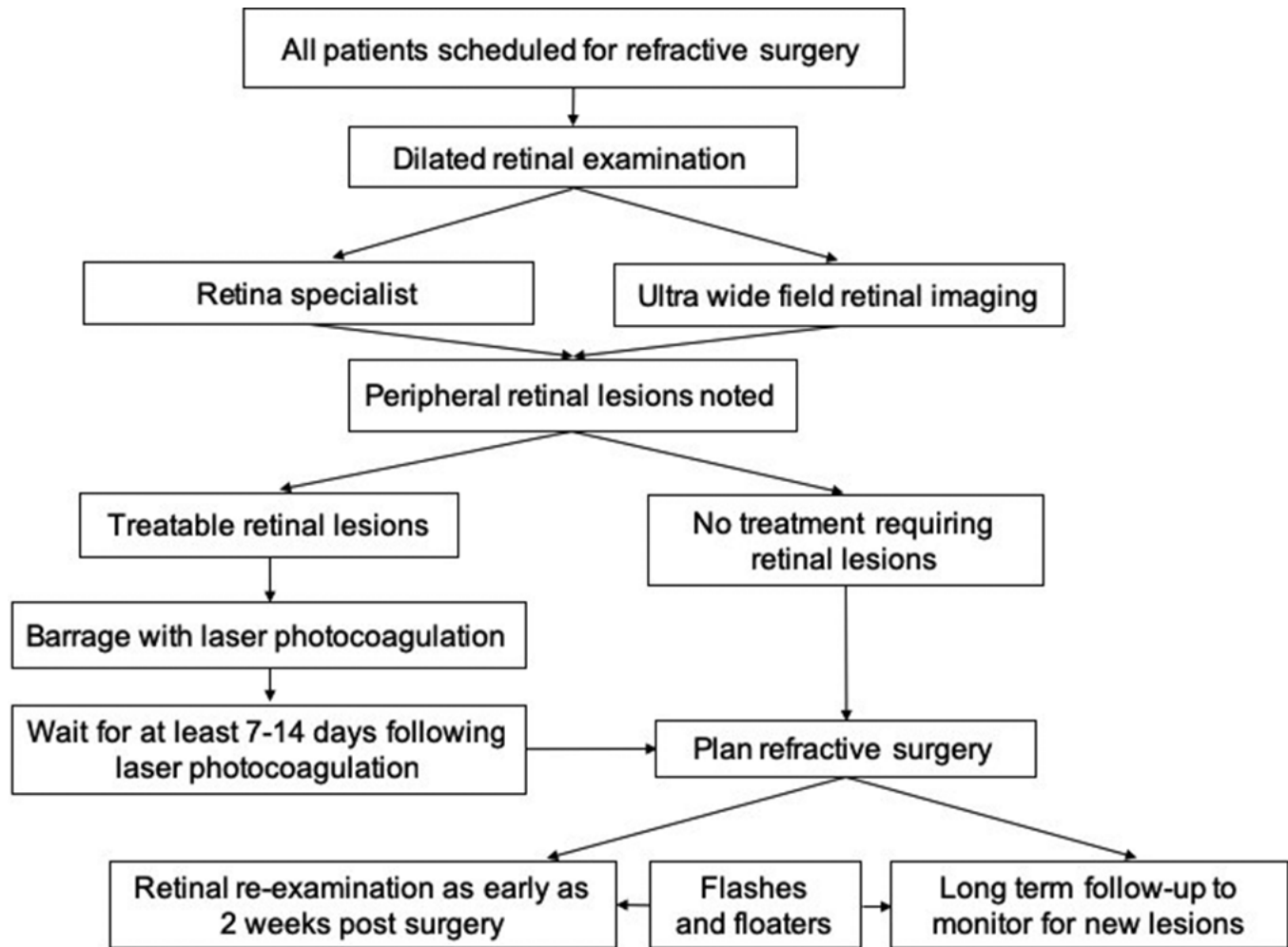


Figure 1: Guidelines for dilated retinal examination prior to refractive surgery

Table 1: Treatment recommendations for patients with peripheral retinal degenerations undergoing refractive surgery

	Recommendation
1) All symptomatic and asymptomatic horse-shoe tears, operculated holes, lattice degeneration with retinal holes, atrophic holes	Treat promptly
2) All symptomatic lattice degenerations without retinal holes and atrophic holes	Treatment is usually recommended
3) All asymptomatic lattice degeneration without retinal holes, pigmented lattice degeneration, and atrophic holes	Can be observed
4) Eyes with atrophic holes or lattice degeneration where the fellow eye has already developed retinal detachment	Can be considered for treatment

Given the high incidence of refractive errors (123.7 million) worldwide, and with over 13 million LASIK procedures having been performed in the United States alone, the numbers seeking refractive surgery are only going to increase.^[31,32] While there are guidelines for the treatment of symptomatic and asymptomatic retinal breaks and lattice degeneration,^[33]

there are no clear guidelines for retinal screening and management of asymptomatic retinal degenerations prior to refractive surgery or for follow-up of these patients. With this background, this article aims to provide a set of guidelines for the management of retinal degenerations in eyes undergoing refractive surgeries.

Recommendations for Retinal Screening and Prophylaxis of Retinal Degenerations Prior to Refractive Surgery

Need for retinal examination prior to refractive surgery

Predisposing factors for retinal detachment in patients undergoing refractive surgery are the presence of pre-existing retinal tears or holes, new retinal breaks secondary to PVD in pre-existing peripheral retinal degenerations and rarely, development of new retinal breaks post-surgery.^[34] Despite the lower suction pressure during femtosecond LASIK, the longer duration is shown to increase the risk of PVD post-surgery.^[20-22] A higher incidence of PVD and subsequently retinal tear and RRD is noted in patients who have undergone phakic intraocular lens surgery or refractive clear lens exchange.^[35,36] Thus, a complete dilated retinal examination with indentation is necessary to identify lesions that need treatment prior to any refractive surgery.

How can the retinal examination be done?

Ideally, the dilated retinal examination should be done by a trained retinal specialist to screen for retinal degeneration and PVD status. Alternatively, one can use a non-mydratric, ultra-widefield fundus camera to image the retinal periphery.^[37,38] Ultrawide field imaging has high specificity (>99%) and moderate sensitivity (\approx 57%) for identifying and documenting peripheral retinal lesions.^[38] It also helps as an educative tool to sensitize the patient of the risks involved.^[37-39] If need be, a PVD can also be confirmed by an ocular ultrasound.^[22]

Prophylaxis for retinal breaks before refractive surgery

Prophylactic laser photocoagulation is recommended for treating predisposing retinal lesions prior to refractive surgery.^[40] The guidelines are based on Wilkinson CP recommendations for the treatment for asymptomatic retinal breaks and lattice degenerations to prevent retinal detachment.^[33] Table 1.

Time interval between the laser photocoagulation and refractive surgery

Laser photocoagulation produces a strong adhesive bond between the neurosensory retina and retinal pigment epithelium. After laser photocoagulation of the intact retina, the adhesive force reduces by 50% at 8 hours but increases beyond normal (\approx 140%) by 24 hours and remains twice normal between 3 days and 4 weeks.^[41,42] Hence, a refractive surgery is recommended after at least a 7-day interval following laser photocoagulation.

Follow-up retinal examination schedule after refractive surgery

Following microtome-assisted LASIK or femtosecond-assisted LASIK, a PVD can occur as early two days post-surgery in 16% of cases and in up to 85% within a month.^[20,22] Patients with increased floaters and/or flashes should be evaluated by a retinal specialist at the earliest to check for the development of PVD, retinal tears, or retinal detachment. Despite a low incidence of retinal detachment after postrefractive surgery, it occurs across a broad spectrum of time interval.^[40,43] When PVD is partial, retinal tears and RRDs can arise in formerly healthy areas as posterior vitreous separation occurs, necessitating periodic retinal examinations.^[44] Since myopic patients are at a risk for vision-threatening macular complications like progressive thinning and atrophy, choroidal neovascular membranes, retinoschisis, macular hole, pigment epithelial detachments, and foveal detachments, a long term follow up is mandatory after refractive surgery [Fig. 1].

Conclusion

In conclusion, patients undergoing refractive surgery need a thorough retinal examination to look for peripheral lesions. Prophylactic barrage laser photocoagulation needs to be done for predisposing degenerative retinal lesions at least a week before surgery. Retinal examination should be done at regular intervals for a long term to check for the development or progression of PVD, retinal tears, retinal detachment, and macular pathologies.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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