Chapter 14
Complications of Refractive Lens Exchange

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Core Messages

- This chapter approaches retinal complications, in particular retinal detachment after lens surgery in high-myopic patients.
- The incidence of retinal detachment in high-myopic patients corrected by intraocular surgery is reported based on the experience of the authors and on a review of published reports.
- The cumulative risk of retinal detachment development in high-myopic patients after intraocular refractive surgical procedures (whether lens exchange or phakic intraocular lenses) is reported.
- Various options for the treatment of retinal detachment in high-myopic patients after ocular refractive surgery is outlined.

14.1 Retinal Detachment
José Mª Ruiz-Moreno, Jorge L. Alió, and Mohamed H. Shabayek

14.1.1 Introduction
There is some controversy regarding the risk of retinal complications after refractive surgical procedures. Before approaching retinal complications after refractive surgery, an
important issue is to determine whether refractive surgery leads to an increase in the development of retinal complications. Retinal complications especially in myopic patients after refractive surgery is mainly due to two possible causes: higher incidence of predisposing retinal lesions in myopic eyes compared with general population and the hypothesis that refractive surgery might induce several iatrogenic factors that will increase the incidence of such pathology.

Several factors may contribute to induce iatrogenic retinal detachment after refractive surgery. They depend mainly on the type of refractive surgical procedure: corneal (as in photorefractive keratectomy [PRK] or laser in situ keratomileusis [LASIK]) or intraocular (as in phakic intraocular lens implantation [PIOL] or clear lens extraction [CLE]). Such procedures might influence the retina, especially in high-myopic patients, due to the pressure induced by the microkeratome suction ring, the impact of laser pulses during PRK or LASIK, the hypotension or other intraoperative factors that can be induced during PIOL/CLE, and the postoperative inflammatory reaction.

The main point addressed in this chapter is whether the incidence of retinal detachment in high-myopic patients increases after keratorefractive surgery, PIOL implantation, CLE, or uneventful cataract surgery. An understanding of the preexisting risk factors in high myopia is necessary before we can attribute an increase of the rate of retinal detachment (RD) by ocular refractive surgery.

14.1.2 Retinal Detachment in Highly Myopic Eyes

Previous studies reported a higher incidence of RD in unoperated-on highly myopic eyes compared with non-myopic eyes (whether emmetropic or hypermetropic) [31, 48]. These studies reported risk that ranged between 0.71 and 3.2% [31, 48]. These previous published reports studied high myopic eyes with spherical equivalent (SE) greater than –6.00 D and included 1,000 eyes [48]. The annual incidence was 0.015% in eyes with myopia ≤ 4.75D, 0.07% in myopic eyes ranging between –5.00 D and –9.75 D, and 0.075% in eyes with myopia greater than 10 D [34]. While in high-myopic patients more than –15 D, the risk of developing RD increases from 15-fold up to 110-fold when compared with general population. Burton [13] reported that high-myopic patients greater than –5.00 D with degeneration are prone to extraordinary risk of developing RD, especially with long-life expectancy, and in such patients the risk of developing RD during the second, third, or fourth decade of life is very high, which is mainly due to trophic retinal holes. However, in this report he did not provide results on severe myopia with high axial length.

Also, in low-to-moderate myopia, early posterior vitreous detachment in patients with peripheral retinal degeneration can be a predisposing factor for retinal detachment development between the fourth and sixth decade.

14.1.3 Incidence of Retinal Detachment in High-Myopic Patients Corrected by Refractive Surgery

Surgical correction of high myopia, on intraocular basis, can be achieved by PIOL by anterior or posterior chamber, or by lens surgery (clear or cataractous) and implantation of a posterior chamber pseudophakic IOL.

RD after PIOL implantation has been reported by several authors [2, 46, 38, 23, 39, 58]. In 1993, Alió et al. [2] were the first to report retinal detachment after PIOL implantation for correcting high myopia. Fechner [23] reported RD in one case out of 125 myopic patients corrected with PIOLs. The incidence rate reported by other studies varied from 0.8 to 5.26% (Pesando [39], Zaldivar [58], and Panozzo [38]). We reported eight cases of RD in a series of 168 eyes (4.8%) [46]. An analysis of 12 eyes that developed RD out of 294 (4.08%) consecutive high myopic eyes after PIOL implantation followed [45]. Due to the variation in incidence rates, the survival rate was studied to avoid errors in the estimated real incidence. Kaplan-Maier analysis showed a cumulative risk of RD after PIOL implantation of 1.36% at 5 months, 2.6% at 17 months, 3.61% at 27 months, and 5.63% at 52 months [45].

We conducted a retrospective study to evaluate RD development in 522 consecutive highly myopic eyes after PIOL implantation [47]. In this case series, we reported on 15 eyes that developed RD with an incidence of 2.87%. We further estimated the cumulative risk of RD with time using Kaplan-Maier analysis. A cumulative risk of 0.57% at 3 months, 1.64% at 12 months, 2.73% at 36 months, and 4.06% at 92–145 months was observed [47]. However, both studies [45, 47] included highly, if not severe, myopic eyes (with mean SE of –18.5 D in the first study [45], and –18.1 D in the second [47]). Therefore, comparing the risk of RD in these studies to unoperated myopic eyes, with different degrees of myopia, would not be clinically valid.

The time interval (laps time) between PIOL implantation and the development of RD ranged between 1 and 52 months in the first study [45], (four eyes with laps time less than 6 months) compared to a range of 1–92 months in the second study [47]. Therefore, the relationship between PIOL implantation and RD development is not clear. A large case-control study with the same degree of myopia and with longer follow-up is needed to validate such a relationship.

Comparing the annual incidence of RD of unoperated high myopia –10 D (0.075%) [34] to our results after PIOL implantation, we observe a higher incidence after PIOL (2.87%) and almost similar to those of severe myopic patients (3.2%), but with higher annual risk; therefore, it is considered that the development RD is higher in our study of myopic eyes corrected with PIOL than in unoperated-on high-myopic population, and that further follow-up for these patients with a longer period might even reveal a greater incidence of RD. However, and keeping in consideration that the SE of our study, –18 D is significantly higher than –10 D is (higher degree of myopia), which can be a