

# RISK FACTORS FOR POSTERIOR CAPSULAR RUPTURE



Identifying risk factors in the European Registry of Quality Outcomes for Cataract and Refractive Surgery.

BY MOR M. DICKMAN, MD, PHD, AND MAARTJE H.M. SEGERS, MD

**P**osterior capsular rupture (PCR) is one of the most feared complications of cataract surgery, although its occurrence has become less frequent with modern technology. PCR increases the possibility of vitreous flow into the anterior chamber, which can lead to further complications, such as a dropped nucleus, vitreoretinal traction, and secondary glaucoma. PCR can also compromise support for the IOL.

PCR can be caused by inadequate surgical maneuvers and predisposing factors that make the capsule more fragile. Identifying these risk factors can help surgeons to prevent and manage this complication and to counsel patients. The infrequency of PCR, however, has made the identification of risk factors challenging. Analyzing data from the European Registry of Quality Outcomes for Cataract and Refractive Surgery (EUREQUO) may help.

## TRENDS IN PCR

The EUREQUO is a multinational registry under the auspices of the ESCRS that was created with the aim of quality improvement and benchmarking.<sup>1</sup> Participating centers and surgeons can monitor their results and anonymously compare them with those of other clinics or countries.

The EUREQUO contains a large dataset of almost 3 million cataract surgeries. Together with the steering

## THE RISK FACTORS

According to trends identified in data from the European Registry of Quality Outcomes for Cataract and Refractive Surgery, the following preoperative conditions are associated with an increased risk for posterior capsular rupture:

- ▶ Corneal opacities
- ▶ Diabetic retinopathy
- ▶ Poor preoperative visual acuity

group of the EUREQUO, we analyzed 2,853,376 surgeries in the EUREQUO performed between 2008 and 2018.<sup>2</sup> The PCR rate decreased significantly during that time period from 1.44% in 2008 to 0.60% in 2018. Improvements in phaco equipment and techniques and a trend toward surgery on younger and healthier patients may be contributing factors. Similarly, a recent study that analyzed data from the Swedish National Cataract Register suggested that an increase in the proportion of experienced, high-volume surgeons between 2007 and 2016 might have contributed to a decreased rate of capsular complications during that period.<sup>3</sup>

## THE RISK FACTORS

In our study,<sup>2</sup> corneal opacities, diabetic retinopathy, and poor preoperative visual acuity increased the probability of a PCR with an odds ratio of 3.21, 2.74, and 1.98, respectively.

Reduced visibility during surgery in patients with corneal opacities increases the risk of PCR. Diabetic retinopathy may also be a risk factor because it can be associated with a rigid pupil, advanced cataract, and previous intravitreal injections.<sup>4</sup>

Another important risk factor in our analysis was patient age. The probability of PCR increased by only 0.007 with each additional year. The cumulative effect with age, however, was significant. For example, the probability of a PCR's occurring in an 80-year-old patient was 20% higher than for a 55-year-old patient. With age, the posterior capsule thins, the crystalline lens thickens and becomes denser, and zonular strength and stability decrease. Moreover, the positioning of older patients may be more difficult, and they may not be able to lie still because of back or neck problems, making surgery more challenging. The best age at which to

undergo cataract surgery remains an open question.

Our study also found a lower risk of PCR in female patients (odds ratio, 0.88). One possible explanation is that the incidence of intraoperative floppy iris syndrome (IFIS) is higher in men.<sup>5</sup> Previous studies have found a higher incidence of PCR in patients with IFIS compared to patients without IFIS (6.9% vs 3.7%).<sup>6</sup>

### DETERMINING RISK PREOPERATIVELY IS ESSENTIAL

Determining patients' risk profiles before they undergo cataract surgery can improve the quality of preoperative education as well as surgical planning and safety. For example, it is prudent to schedule an 80-year-old man with a dense cataract, diabetic retinopathy, and poor preoperative visual acuity for surgery

by an experienced surgeon who has the equipment necessary for managing complications available in the OR. Studies in the United Kingdom and New Zealand have demonstrated the value of risk stratification systems that allocate low- and high-risk patients to trainees and experienced surgeons, respectively.<sup>7,8</sup> For example, applying the New Zealand Risk Stratification scoring system reduced the PCR rate from 2.6% at baseline to 0.6% in one study.<sup>7</sup> The risk factors identified in our study can be used in such systems. ■

1. Lundstrom M, Barry P, Brocato L, et al. European Registry for Quality Improvement in Cataract Surgery. *Int J Health Care Qual Assur*. 2014;27:140-151.
2. Segers MHM, Behndig A, van den Biggelaar FJHM, et al. Risk factors for posterior capsule rupture in cataract surgery as reflected in the European Registry of Quality Outcomes for Cataract and Refractive Surgery. *J Cataract Refract Surg*. Published online June 1, 2021. doi:10.1097/j.jcrs.0000000000000708
3. Zetterberg M, Montan P, Kugelberg M, Nilsson I, Lundstrom M, Behndig A. Cataract surgery volumes and complications per surgeon and clinical unit: data from the Swedish National Cataract Register 2007 to 2016. *Ophthalmology*. 2020;127(3):305-314.
4. Chancellor J, Soliman MK, Shoultz CC, et al. Intraoperative complications and visual outcomes of cataract surgery in diabetes mellitus: a multicenter database study. *Am J Ophthalmol*. 2021;225:47-56.

study. *Am J Ophthalmol*. 2021;225:47-56.

5. Chang DF, Campbell JR. Intraoperative floppy iris syndrome associated with tamsulosin. *J Cataract Refract Surg*. 2005;31:664-673.

6. Vollman DE, Gonzalez-Gonzalez LA, Chomsky A, Daly MK, Baze E, Lawrence M. Intraoperative floppy iris and prevalence of intraoperative complications: results from ophthalmic surgery outcomes database. *Am J Ophthalmol*. 2014;157:1130-1135.e1.

7. Han JV, Patel DV, Wallace HB, Kim BZ, Sherwin T, McGhee CNJ. Auckland Cataract Study III: refining preoperative assessment with cataract risk stratification to reduce intraoperative complications. *Am J Ophthalmol*. 2019;197:114-120.

8. Muhtaseb M, Kalhor A, Ionides A. A system for preoperative stratification of cataract patients according to risk of intraoperative complications: a prospective analysis of 1441 cases. *Br J Ophthalmol*. 2004;88(10):1242-1246.

### MOR M. DICKMAN, MD, PHD

- University Eye Clinic, Maastricht University Medical Center+, Maastricht, Netherlands
- mor.dickman@mumc.nl
- Financial disclosure: None

### MAARTJE H.M. SEGERS, MD

- University Eye Clinic, Maastricht University Medical Center+, Maastricht, Netherlands
- maartje.segers@mumc.nl
- Financial disclosure: None