

## Commentary: Anterior capsule polishing: The present perspective

Anterior capsule polishing after an uneventful phacoemulsification surgery has remained a hot topic of debate among cataract surgeons across the world over the last two decades. Evidence-based medicine is uncharacteristically divided with published literature both in support of and against the procedure.<sup>[1-4]</sup> As the authors once again bring this controversial topic on the forefront with an added dimension of femtosecond laser capsulotomy coming into play,<sup>[5]</sup> let us take a look at what is already known in the literature.

The science behind anterior capsule polishing:

As modern cataract surgery gradually moves into the field of refractive surgery, more and more emphasis is being laid on prevention rather than treatment of cataract surgery's most common and seemingly inevitable long-term complication, posterior capsule opacification (PCO). PCO is classically divided into two types:<sup>[6]</sup>

- Fibrotic type – caused by migration and transdifferentiation of the anterior lens epithelial cells (LEC) present on the inner surface of the peripheral anterior capsule, which is responsible for anterior capsule opacification (ACO) and thick fibrotic PCO
- Regenerative type – caused by the proliferation of the equatorial LECs present in the germinative zone of the capsular bag. These migrate centrally over a period of months to years, gradually forming a pattern of growth on the posterior capsule.

Over the years, these LECs have been targeted by various techniques such as pharmacological,<sup>[7]</sup> immunological,<sup>[8]</sup> and mechanical with the hope that the formation of PCO could be inhibited. However, most of the techniques have failed to gain popularity, and manual anterior capsular polishing remains the most acceptable procedure.

Menapace *et al.* from Austria conducted a landmark randomized double-masked study in 2005 on 108 eyes of 54 consecutive patients and after 3 years of follow-up reported that even though the incidence of fibrotic opacification was reduced, paradoxically, the rate of regenerative PCO went

up, and significant number of subject eyes required Nd: YAG capsulotomy as compared to the contralateral control eyes without polishing.<sup>[1]</sup>

They have explained this finding with a very elegant theory: When the anterior LECs come in contact with the optic of an intraocular lens (IOL), they undergo myofibroblastic transdifferentiation. The posterior edge of the IOL prevents posterior migration of the cells, and a resultant strong circumferential barrier is formed with the fusion of the anterior and posterior capsular margins. Over a period of months to years, the second wave of cell growth is observed from the equatorial LECs. These cells are usually halted by the fibrous barrier but they may exert enough proliferative pressure to overcome the fusion if sufficient fibrosis is not present. This may have been caused by the removal of the anterior LECs, which paradoxically increases the rate of visually disabling PCO needing capsulotomy, as evidenced by their study.

Another very compelling evidence is presented by Liu and coworkers in their *ex vivo* study from China in 2010 on cadaver eyes, where they observed residual LEC proliferation directly under the microscope.<sup>[2]</sup> They noted that even 360° capsular polishing could not remove all equatorial LECs comprehensively. And once again, the polished capsules showed a more robust residual cell proliferation *in vitro* as compared to the control eyes with no capsular polishing.

On the other hand, the proponents of anterior capsular polishing have repeatedly found better postoperative results with this procedure. Bolz *et al.* from Austria have conducted a randomized double-masked trial, and they have published the longest follow-up data of 5 years.<sup>[3]</sup> In their study, the rate of ACO formation was significantly less in the polished group, and the rate of regenerative PCO formation was not significantly higher than the control group. They have countered findings by Menapace *et al.* saying the rate of increased PCO formation and loss of barrier effect in their study could be attributed to the use of round-edged silicone IOLs. This barrier effect was not decreased when Bolz *et al.* used a sharp-edged silicone IOL in their study.

The matter was further tested by Han *et al.* in their meta-analysis in 2019, and after analyzing one randomized controlled trial (RCT) and four observational cohort studies, they concluded that eyes with anterior capsular polishing had

better uncorrected distant visual acuity (UCVA) and lower rates of PCO over a period of 6 months to 3 years.<sup>[4]</sup>

Moreover, it was seen that the vast differences in the results and conclusions can often be attributed to the different material and design of the optic and haptic of the IOL, as well as the technique and instrument used for anterior capsule polishing.

The present study has added a new dimension of femtosecond laser capsulotomy which ensures the creation of a uniform capsular opening with adequate capsular IOL overlap.<sup>[5]</sup> Even though their 1-year results did not show any statistically significant difference in visually significant PCO and contrast sensitivity, it would be interesting to see what the long-term results reveal.

In conclusion, even though anterior capsule polishing promised to be the solution for the prevention of the old nemesis PCO, its results have been inconsistent to date. While rates of ACO, capsular contraction, capsular stability, and effective lens position have been better in eyes with polishing, the rates of PCO have not been reduced; in fact, paradoxically in some series, they have increased. Therefore, till the time more conclusive evidence is found, this procedure may be recommended only for eyes at a higher risk of anterior capsular contraction such as myotonic dystrophy and high myopia, and for those in whom postoperative visualization of the peripheral retina is imperative.

**Partha Biswas, Sneha Batra**

B B Eye Foundation, Kolkata, West Bengal, India


Correspondence to: Dr. Partha Biswas,  
B B Eye Foundation, Sukhsagar, 2/5 Sarat Bose Road, Minto Park,  
Kolkata - 700 020, West Bengal, India.  
E-mail: drpartha\_biswas07@yahoo.co.in

## References

1. Menapace R, Wirtitsch M, Findl O, Buehl W, Kriechbaum K, Sacu S. Effect of anterior capsule polishing on posterior capsule opacification and neodymium: YAG capsulotomy rates: Three-year randomized trial. *J Cataract Refract Surg* 2005;31:2067-75.
2. Liu X, Cheng B, Zheng D, Liu Y, Liu Y. Role of anterior capsule polishing in residual lens epithelial cell proliferation. *J Cataract Refract Surg* 2010;36:208-14.
3. Bolz M, Menapace R, Findl O, Sacu S, Buehl W, Wirtitsch M, et al. Effect of anterior capsule polishing on the posterior capsule opacification-inhibiting properties of a sharp-edged, 3-piece, silicone intraocular lens: Three-and 5-year results of a randomized trial. *J Cataract Refract Surg* 2006;32:1513-20.
4. Han MY, Yu AH, Yuan J, Cai XJ, Ren JB. Effect of anterior capsule polish on visual function: A meta-analysis. *PLoS One* 2019;14:e0210205.
5. Sachdev GS, Soundarya B, Ramamurthy S, Lakshmi C, Dandapani R. Impact of anterior capsular polishing on capsule opacification rate in eyes undergoing femtosecond laser-assisted cataract surgery. *Indian J Ophthalmol* 2020;68:780-5.
6. Menapace RM. Prevention of posterior capsule opacification. In: Kohnen T, Koch DD, editors. *Cataract and Refractive Surgery (Essentials In Ophthalmology)*. Berlin, New York, NY: Springer; 2005. p. 101-22.
7. You YS, Lim SJ, Chung HS, Lee YG, Kim CY, Hong YJ. The effective concentration and exposure time of mitomycin-C for the inhibition of lens epithelial cell proliferation in rabbit eyes. *Yonsei Med J* 2000;41:185-9.
8. Hueber A, Eichholtz CD, Kociok N, Esser JM, Esser PJ. Lens epithelial cells express CD95 and CD95 ligand treatment induces cell death and DNA fragmentation *in vitro*. *Eur J Ophthalmol* 2003;13:241-5.

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Quick Response Code:	Website:
	www.ijo.in
	DOI: 10.4103/ijo.IJO_2088_19

**Cite this article as:** Biswas P, Batra S. Commentary: Anterior capsule polishing: The present perspective. *Indian J Ophthalmol* 2020;68:785-6.