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Optical coherence tomography studies of clear corneal incision wound architecture

I would like to congratulate Can et al.[1] on their comparative study of the optical coherence tomography (OCT) appearance of clear corneal incisions (CCIs) in cataract surgery, particularly their demonstration of the detrimental effects of enlarging the wound at the end of surgery. It has been suggested that CCIs are most vulnerable in the immediate postoperative period, when they are susceptible to microleaks causing a decrease in intraocular pressure (IOP).[2,3] However, Can et al.[1] did not measure the IOP until day 1, by which time IOP would have begun to normalize. Therefore, the eyes in the study with low IOP and endothelial gaping may have been the result of lower IOP in the immediate postoperative period.

Can et al.[1] correctly demonstrate how incision length decreases with time after surgery as the corneal stromal edema resolves because of simple trigonometry.[4] To standardize their OCT image-capture technique, they asked the patient to fixate straight ahead with the other eye. However, this technique can create an "end on" aberration effect in which the OCT beam is reflected obliquely off the cornea so the wound profile appears artificially distorted. To achieve a true OCT image, the scanning beam should be perpendicular to the corneal surface overlying the incision, which can be achieved by asking the patient to look toward the other eye for a temporal incision or downward for a superior incision.

Can et al.[1] stated that the curved-down profile of their incisions on day 1 "became linear with time" by day 30. However, this could have happened only if these incisions were linear to begin with and became curved down during surgery. A possible explanation is the corneal stromal edema effect, in which a greater amount of edema occurs in the roof of the incision toward the endothelial side. This displaces the distal half of the incision downward by a progressively greater distance toward the endothelial side so the wound takes on a curved-down profile. If a CCI has been created with a genuine multiplane profile by using specially designed blades and techniques such as those of Fine et al.[5] and Calladine et al.,[2] a multiplane profile will still be present on day 30.

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REPLY: We appreciate Calladine's careful analysis of our article and the opportunity to clarify some points. Theoretically, one of the most important factors in postoperative incision closure is the negative pressure formation inside the incision. For this to occur, total closure in the epithelial side of the incision and activation of the endothelial pump function in the endothelial side are prerequisites. The suction that will occur in the incision tunnel brings the 2 sides of the incision closer. However, the surgical trauma suppresses the endothelial pump function on the first postoperative day; therefore, mechanical support for incision closure becomes very important in this early period. Stromal hydration of the wound lips to bring them together, leaving the eye with a slightly high IOP to cause the distal lower lid to appose the upper proximal lip, is beneficial for incision closure and for preventing incision leaks in the early postoperative period. Having said that, we want to reiterate that stromal hydration was performed in all our cases.

Endothelial gaps and Descemet membrane detachments are 2 of the most common complications related to incision closure and can be diagnosed with anterior segment OCT. When evaluating the reasons for these complications, we determined there was a significant difference in the 24th-hour IOPs in cases with and without the complications. As an example, the mean IOP was 13.80 mm Hg and 17.47 mm Hg ($P = .006$) in eyes with and eyes without Descemet membrane detachment, respectively, and 11.42 mm Hg and 16.31 mm Hg ($P \leq .001$) in eyes with and without endothelial gap, respectively (Table 5 in the article). The most important point is that in all our cases, regardless of complication, the IOP was within normal ranges. Therefore, we cannot discuss a hypotony, but based on these findings, we can comment on the preventive effect of a slightly high IOP on wound closure complications in the early postoperative period.

Calladine's concern about the cases with lower IOPs is remarkable, which makes us consider probable microleaks resulting in hypotony in the early postoperative period that might have normalized in the 24-hour period. No doubt this is also an important probability. However, it does not change the results in this study, which showed the benefits of ending the surgery with a slightly stiff eye and the contribution of stromal hydration to wound closure.

Calladine reveals his concerns about the probable measurement errors in our study by stating, "they asked the patients to fixate straight ahead with their other eye." However, we explained our measurement technique in "Patients and Methods" as follows: "During the process, the patients were asked to look straight ahead to the opposite of the corneal incisions [underline added]." In saying this, we were indicating that the OCT beam was perpendicular to the incision site during the measurements. We did not mention that our patients fixated with their other eye. However, it appears that the sentence we used was not clear or was susceptible to misunderstanding. It might have been clearer had we said that during the process, patients were asked to look at the opposite site of the corneal incisions. We appreciate Calladine's comments for clarifying our statements, but our image capture technique is the same as his recommendation. Otherwise, it would not have been possible to make a correlation between quantitative measurements.

Calladine claims that a curved-down configuration in the early postoperative period could be explained by the greater amount of edema at the roof of the incision toward the distal end, which might be the cause of endothelial misalignment. We disagree with this point because if Figures 2, *A*, 3, A, 4, and 5 are looked at carefully, it can be seen that the edema was more prominent in the middle stromal area of the proximal lower lid. Obviously, this creates the dome-shaped arcuate pattern that can be seen in the figures. Otherwise, we would have seen the "lying-S" shape. Perhaps this situation can be explained by the stromal edema, with the phaco tip facing down and creating a more traumatic effect on the lower wound lid during surgery.

Finally, the blades used in our study were steel blades, angled in the microcoaxial group and straight in the biaxial group. We do not doubt the positive impact of multiplanar knives on incision architecture; however, the blades used in our study are among the most commonly used knives by microincisional phacoemulsification surgeons today. Because of this fact, we believed it was important to present the outcomes with these instruments.—*İzzet Can, MD, Hasan Ali Bayhan, MD, Hale Çelik, MD, Başak Bostancı Ceran, MD*

Preventing posterior capsule opacification

In his recent editorial,[1] Kohnen nicely surveys the myriad attempts to prevent posterior capsule opacification. However, he does not mention one of the most recent innovations, the use of the intraocular neodymium:YAG laser (A.R.C. Laser GmbH) to eliminate the lens epithelial cells (LECs), including those in the capsular fornix. The laser beam travels down a fiberoptic bundle in the handpiece and strikes a titanium plate, creating a plasma and shock wave that emits from the tip. Thus, the laser beam does not encounter eye tissues, but the shockwave dislodges the LECs, most likely including those in the capsular fornix that are the proliferative cells, and removes the attachment molecules of fibronectin and laminin.[2]

This technique has been used clinically in proof of concept and is presently in use in surgical practices in Europe and the United States.[3]

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