from the editor

The thick and thin of LASIK flaps

Approximately 3 years ago, we began using the Amadeus microkeratome (AMO). Because of the relative paucity of data regarding the flap thicknesses it produced, we performed intraoperative pachymetry in all eyes operated on with the unit. Our and others' experience with the Hansatome® microkeratome (Bausch & Lomb Surgical) suggested that the flaps tended to be thinner than the plate designation. Astonishingly, we found that the new device's 180 μm plate produced flap thicknesses ranging from 198 to 258 μm and the 160 μm plate produced flaps as thick as 220 μm.[1] Subsequently, the manufacturer produced a 140 μm plate, and our experience, now confirmed by Solomon et al. in their major study of flap thicknesses (pages 964–977), showed that this plate produces mean flap thicknesses that are in an ideal range.

Three recent studies (2 in this issue) highlight the advances and lingering limitations of microkeratome technology. In particular, Solomon et al.'s study, as well as a study by Giledi et al. (pages 1031–1037) of the Hansatome and an earlier study by Binder[2] on the IntraLase femtosecond laser, indicates that there is still excessive variability in the dimensions of LASIK flaps made by devices tested.

In Solomon et al.'s article, the lowest standard deviations (SDs) were 13.5 μm for the 145 μm plate of the Nidek MK2000 microkeratome and 15.5 μm for the 140 μm plate of the Amadeus microkeratome. In Giledi et al.'s retrospective study of the Hansatome, SDs were slightly less than 20 μm for the 160 μm and 180 μm plates of the Hansatome. In Binder's study of the IntraLase, the SDs for flap thicknesses ranged from 12.0 to 18.5 μm.

Furthermore, all studies show large ranges of values. For example, Solomon et al. report a flap thickness of well over 200 μm for 7 of the 12 microkeratome–plate combinations tested. The range of flap thicknesses in Binder's IntraLase study was 80 to 158 μm. The mean flap thicknesses often differed dramatically from the labeling of the plate. Thus, in Solomon et al.'s study, the Nidek 145 μm plate produced a mean flap thickness of 103 μm, whereas the Moria CB 130 μm plate produced a mean thickness of 198 μm. Surprisingly, in Binder's study, the mean flap thicknesses were 125.0 μm, 122.4 μm, 128.7 μm, and 132.5 μm for intended thicknesses of 110 μm, 120 μm, 130 μm, and 140 μm, respectively.

How should we respond?

1. As suggested here before,[3,4] we should consider measuring flap thickness intraoperatively in all patients. This serves several purposes: It ensures that one does not ablate too deeply into the posterior stroma, enables the surgeon to determine whether the patient can have retreatment surgery in the future, and educates the surgeon about the performance of the microkeratome.
2. We should reconsider the manner in which microkeratome plates are labeled. A single number clearly is inadequate and inaccurate. Solomon et al. suggest labeling plates with the mean thickness ± 2 SDs so surgeons could at least estimate the range of flap thickness for 95% of cases. Perhaps we should consider something slightly more drastic, which would be to label plates according to published ranges of flap thicknesses. Therefore, the Amadeus 140 μm plate might henceforth be known as the 80–195 μm plate. This dispels any illusions that clinicians might have regarding the actual flap thickness in any given eye.
3. We should continue to work with industry to develop and validate even better microkeratomes.

Obviously, several other aspects of microkeratome technology must also be addressed as these devices evolve. These include safety, flap contour (eg, edge configuration and uniformity of flap thickness), optical aspects of various flap configurations, and the ease with

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which flaps can be relifted for retreatment surgery, or, conversely, are susceptible to traumatic dislocation.

We congratulate the authors of these excellent recent studies for greatly adding to our knowledge of this critical surgical step, and we also applaud the ASCRS (American Society of Cataract and Refractive Surgery) Foundation for funding the Solomon study.

Douglas D. Koch, MD

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