

Measure stromal bed to ensure proper flap thickness

A study found slightly more variation in thickness with the Hansatome than with the Moria microkeratome.

By Bob Kronemyer

LOS ANGELES — In cases of high refractive error with corneas of borderline or average thickness, accurate flap thickness may be crucial when performing laser in situ keratomileusis (LASIK). However, the microkeratome's labelled flap thickness is rarely the actual thickness produced, according to a study performed here.

In such cases, measuring the stromal bed intraoperatively can help avoid leaving a stromal bed that is too thin, and the risk of corneal ectasia.

"It is well known that the keratome head, which is supposed to determine flap thickness, rarely produces the stated flap thickness," said James J. Salz, MD, a clinical professor of ophthalmology at the University of Southern California here. "Most of the time, the flap thickness is thinner. The rule of thumb is that you want to leave 250 μm in the stromal bed to have a safe cornea, so you don't develop ectasia."

To more accurately measure corneal flap thickness, Dr. Salz uses an ultrasonic pachymeter manufactured by Sonogage (Cleveland, Ohio).

"This pachymeter is particularly good at measuring. You simply touch it to the cornea, and, in a split second, it gives you a reading, without having to wet the cornea," he said. "Some of the past pachymeters wouldn't give you a reading unless the cornea was sort of moist. With this new pachymeter, you don't need to hydrate the stroma." Another problem with previous pachymeters is that "they were unable to accurately measure less than about 330 μm ," Dr. Salz said.

Study compares three blades



---**Scar in Bowman's layer** seen 1 week after creation of a 55- μm LASIK flap.

Dr. Salz was principal investigator of a study that compared the two heads (180 μm and 160 μm) of the Hansatome (Bausch & Lomb Surgical, Claremont, Calif.) microkeratome with the 130- μm head of the Moria (Doylestown, Pa.) Carriazo-Barraquer microkeratome.

"These are two systems that I use all the time," Dr. Salz said. "Moria tells us that the 130- μm head is supposed to provide us with about a 150- μm flap." Co-investigators were Jane Ge, MD, and Ray Oyakawa, MD.

The study comprised 281 eyes (183 eyes for the Hansatome-180, 47 for the Hansatome-160 and 51 for the Carriazo-Barraquer-130). Preoperative keratometry readings were based on EyeSys topography, and LASIK was carried out in the usual fashion. Flap thickness was calculated by subtracting stromal bed thickness from corneal thickness.

“Basically, we found that, with the Hansatome 180- μm head, our average flap thickness was 139 μm . But, the range was 55 μm all the way up to 207 μm , with a standard deviation of 28 μm ,” Dr. Salz said. The Hansatome-160 produced a mean of 110 μm , with a similar range of 57 to 157 μm and a standard deviation of 28 μm .

On the other hand, the Carriazo-Barraquer-130 microkeratome had a mean of 152 μm , with a range of 107 to 203 μm and a standard deviation of only 21 μm . “We had no super-thin flaps with this unit,” Dr. Salz said.

Thin flap

---**Stromal bed thickness** can be measured intraoperatively with a Sonogage pachymeter.

“We think that the flap thickness measurements are accurate because in the case that had a measured flap of 55 μm , one would have expected to see a buttonhole. There was no buttonhole evident at the time of surgery, so the ablation was performed; however, at 1 week, the outline of a buttonhole was found at slit lamp examination, indicating that the flap partially cut Bowman’s membrane,” Dr. Salz said. (See figure.)



“Results with any of these three heads can still be okay, depending on what parameters you wish to achieve,” said Dr. Salz, co-director of refractive surgery research at Cedars-Sinai Medical Center in Los Angeles. “We’ve learned from the study, though, that if I want to have a thin flap for a high correction, then I use the Hansatome microkeratome with the 160- μm flap. Of the three heads, the 160- μm head has the best chance of producing a thin flap. But because there is such a wide range, it does not guarantee that I’ll end up with a thin flap. After all, we had one flap that measured 200 μm with the 160- μm head. This would have definitely been a problem if I was seeking a 120- μm flap, because I would not have as much tissue to ablate.” One also could get the 110 head of the Carriazo-Barraquer cutting 130 μm .

On average, the Hansatome-160 produces a corneal flap that is 30 μm thinner than the Hansatome-180. “Most people agree that the best flap thickness is 150 μm , but we sometimes do not desire a 150- μm flap because then we don’t have as much tissue to ablate,” Dr. Salz said.

Ring sizes



---The **Moria Carriazo-Barraquer** microkeratome uses blades set for a 130- μ m flap.

The Hansatome microkeratome comes in two ring sizes: 8.5 mm and 9.5 mm. “This does not allow you to adjust for changes in corneal curvature,” Dr. Salz said. “You use the same basic ring whether you have a flat cornea or a steep cornea.” In contrast, the Carriazo-Barraquer microkeratome has five separate rings; therefore, “if you have an unusually flat cornea, you can select a ring that is more likely to provide you with an adequate flap,” Dr. Salz said. The ring size of the Carriazo-Barraquer is also slightly smaller than the ring size of the Hansatome, “so in eyes that have tight lids or deep-set eyes, we feel the ring is easier to place in the eye.”

Correlation between flap, thickness

---The **Bausch & Lomb Hansatome** microkeratome can use 160- μ m or 180- μ m blades.



The study found that there is no significant correlation between flap thickness and keratometry. “Our flap thickness did not vary in any predictable way,” Dr. Salz said. However, “there was a weak statistical correlation between flap thickness and corneal thickness. Thicker corneas tended to produce slightly thicker flaps, and thinner corneas tended to produce thinner flaps. But there were exceptions, so it is not a strong correlation.”

In conclusion, “we found both the Hansatome and the Carriazo-Barraquer microkeratome to be reliable. We didn’t experience major flap problems with either microkeratome,” Dr. Salz said. In addition, both microkeratomes “produce superiorly hinged flaps.” Still, there were “a small number of abrasions with both.”

More important than the individual microkeratome, however, “is knowing what results that particular keratome will give you in your hands, despite what the manufacturer

says,” Dr. Salz said. “If a surgeon is going to invest in anything, he or she should invest in a good ultrasonic pachymeter.”

Comparison of microkeratomes for flap thickness			
Microkeratome	Moria Carriazo-Barraquer 130- μ m head	Hansatome 180- μ m head	Hansatome 160- μ m head
Mean flap thickness (μ m)	152	139	110
Standard deviation (μ m)	21	28	28
Range (μ m)	107-203	55-207	57-157

For Your Information:

- James J. Salz, MD, can be reached at 8635 West Third St., Ste. 390 W., Los Angeles, CA 90048; (310) 652-1133; fax: (310) 657-1719; e-mail: jjsalzeye@aol.com. Dr. Salz Web Site www.drsalz.com/

Sonogage Inc. can be reached at 26650 Renaissance Pkwy, Suite 3, Cleveland, OH 44128; (800) 798-1119; (216) 464-1119; fax: (219) 831-3444; e-mail: sonogage@prodigy.net; Web: www.sonogage.com.