

Laser Arcuate Relaxing Incisions After PKP

Creating the incisions with the laser offers many advantages over the manual technique.

BY DAVID R. HARDTEN, MD

Femtosecond laser-created arcuate relaxing incisions can be useful for patients with mild to moderate corneal toricity who would benefit from a change in the shape of their corneas. In these cases, the femtosecond laser is used to create relaxing incisions in the corneal periphery to achieve this shape change.

Incisions made with a laser have several advantages over those made with a blade. For example, surgeons can set a diamond blade to a certain depth and control the depth and location of the incision. We can also make the incision shorter or longer, but we cannot control the angle of the blade's entry. Additionally, we cannot see the tissue that is directly underneath the blade, so it is difficult to visualize the corneal tissue that will be cut next.

BENEFITS OF A LASER

With the femtosecond laser, we now have the ability to look on a screen and set the incisions exactly where we want in relation to the pupil and the limbus. We can create incisions vertical to the corneal surface, angle them in or out, and still control parameters like length and optical zone or distance from the center of the pupil. The result is more tailored or customized incisions.

We can also control depth more accurately with the laser. Setting a diamond blade depends on how hard the surgeon pushes down or how hard the eye is. In contrast, with a laser, we designate a certain number of microns and titrate the incision to achieve the desired effect.

Lasers can also be used to create intrastromal incisions, a benefit of which is that they do not penetrate the epithelium, thus minimizing the chance of infection.

CASE REPORT

I recently saw a 53-year-old woman who had undergone penetrating keratoplasty in 2007 for a corneal

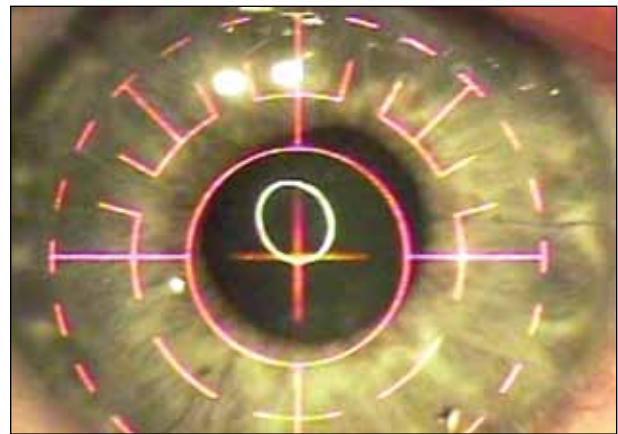


Figure 1. Intraoperatively, from the ring light of the Visx Star S4 IR, the high astigmatism with a steep axis at 40° and a flat axis at 130° can be seen.

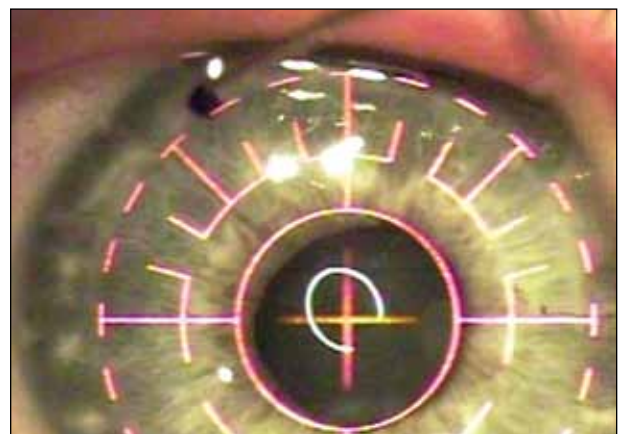


Figure 2. The flat axis was marked for proper alignment of the laser incisions.

scar after an infectious keratitis related to a contact lens infection. After all sutures were removed, she had a refraction of $-3.25 +8.50 \times 40$ with a BCVA of 20/50.

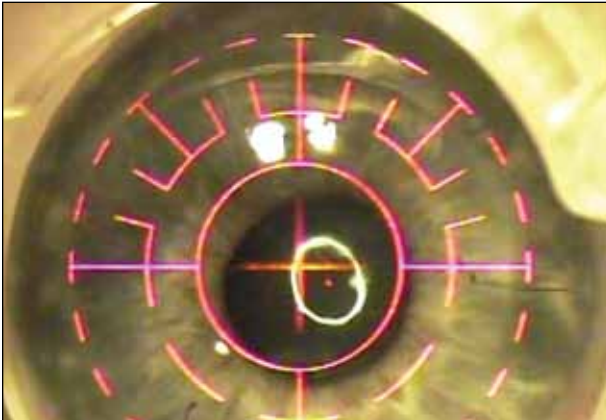


Figure 3. The suction ring for the iFS femtosecond laser was placed.

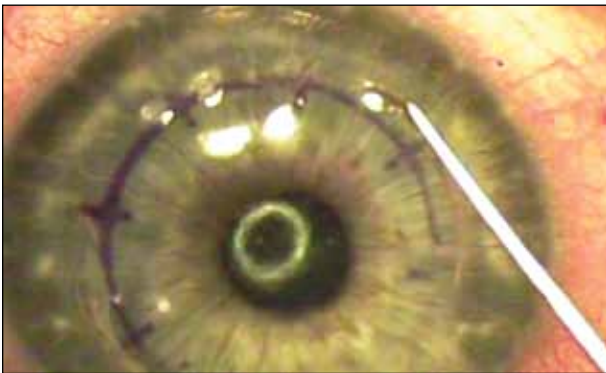


Figure 4. Each arcuate incision is opened partially for 45° with a Sinskey hook.

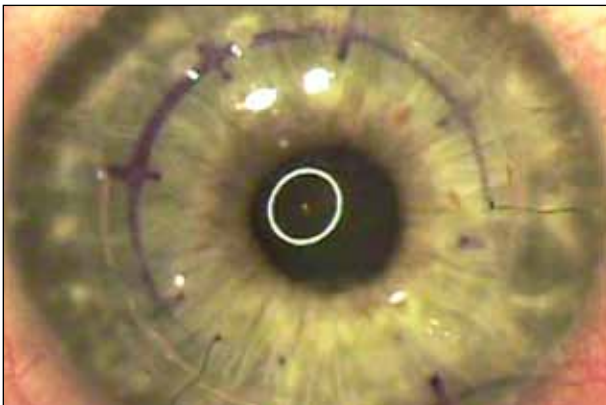


Figure 5. Significant improvement in the corneal shape, with a slight overcorrection noted in the ring light.

She wore glasses and contact lenses for the next 18 months but did not tolerate the latter well.

I discussed with the patient her options for further surgical correction, and we decided to proceed with

“I noted an improvement, but remaining undercorrection, in the preferred corneal shape after creating the sub-Bowman incisions. Using a Sinskey hook, I partially opened each arcuate incision for 45°, which significantly improved the corneal shape.”

laser arcuate relaxing incisions. Intraoperatively, from the ring light of the Visx Star S4 IR (Abbott Medical Optics Inc.), I could see the high astigmatism with a steep axis at 40° and a flat axis at 130° (Figure 1). I marked the flat axis for proper alignment during the creation of the laser incisions (Figure 2). I placed the suction ring for the iFS femtosecond laser (Abbott Medical Optics Inc.) (Figure 3) and made sub-Bowman membrane arcuate cuts with 90° of tissue incised at an 8-mm optical zone at the 40° and 220° meridians. I used a depth in glass of -60 μm to cut just below Bowman membrane and used a side-cut angle of 75°.

I noted an improvement, but remaining undercorrection, in the preferred corneal shape after creating the sub-Bowman incisions. Using a Sinskey hook, I partially opened each arcuate incision for 45° (Figure 4), which significantly improved the corneal shape. I noted a slight overcorrection in the ring light (Figure 5).

Three months postoperatively, the patient had experienced an improvement in her refraction (-0.75 + 2.00 × 44°) and BCVA (20/25). She was able to tolerate glasses well.

CONCLUSION

This case shows the usefulness of the femtosecond laser for creating corneal arcuate incisions in a patient with problems related to corneal shape. This patient achieved improved function after the procedure.

Corneal relaxing incisions have become a useful part of corneal surgery, especially owing to the increased accuracy, safety, and titratability afforded by the femtosecond laser. ■

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