

Versatile Laser Heralds New Approach to Refractive Surgery

The VisuMax femtosecond laser enables surgeons to treat a wider range of patients gently and with predictable outcomes

During a brief holiday in Abu Dhabi, UAE, Louisiana ophthalmologist Wyche T. Coleman III, MD, was invited to observe a new refractive surgery procedure, which was not yet available in the U.S. After watching a surgeon perform small-incision lenticule extraction (SMILE) and then examining those postsurgical corneas, Dr. Coleman immediately called his partner and announced, “We have GOT to get this laser!”

Christopher L. Shelby, MD, Dr. Coleman’s partner at WK Eye Institute in Shreveport, remembers that phone call well. “Dr. Coleman and I discussed the procedure and the potential benefits to our practice, and we had a VisuMax® femtosecond laser on order before he even got home. We wanted to be able to offer the SMILE procedure to our patients the minute it was approved by the FDA.”

In the few months before that approval was announced, Drs. Coleman and Shelby began using the VisuMax laser for creating LASIK flaps and realized that the ability to perform the minimally invasive SMILE procedure — the main reason they acquired the laser — isn’t its only advantage.

Flap Creation Advantages

Drs. Coleman and Shelby expected to use the VisuMax laser only occasionally prior to SMILE approval, while relying on their other femtosecond laser for most of their LASIK surgeries. Instead, they found that creating flaps with the VisuMax laser, which uses less suction and lower energy than other systems, made a second femtosecond laser unnecessary.

“After using the VisuMax about a dozen times, I realized there was never going to be a reason for me to use another femtosecond laser to create a LASIK flap,” Dr. Shelby says. “The VisuMax creates corneal rather than scleral suction, enabling us to use a much lower vacuum setting. That translates to a much more comfortable experience for patients.”

The gentle suction also means that patients are better able to maintain fixation, which helps the surgeon center the flap on the visual axis.

“With older platforms, the pressure generated to create suction would occlude the retinal artery, causing vision to go

black,” Dr. Coleman says. “When this happened, patients would become nervous, squeeze their eyes tightly, and roll away, breaking suction. The VisuMax laser doesn’t occlude the retinal artery; patients can see the fixation light and are less likely to become anxious and move. Since I’ve been using the VisuMax laser, no one has broken suction during a procedure.”

In addition, Dr. Coleman notes, the lower vacuum virtually eliminates postsurgical subconjunctival hemorrhages, which, although benign, can be distressing for patients. “Flaps created with the VisuMax laser look as good on day 1 as flaps created with our old system at 1 month,” he says. “It’s a far superior machine for creating flaps.”

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— Christopher L. Shelby, MD, partner, WK Eye Institute

Dr. Shelby also appreciates that the VisuMax, which has a laser pulse frequency of 500 kHz and creates flaps in about 10 seconds, produces improved flap interfaces.

“Our cataract surgery patients are getting younger and younger, and the demand for excellent visual outcomes is getting higher and higher,” Dr. Shelby says. “We perform many LASIK procedures post cataract surgery, particularly for patients who have multifocal lenses. Before we had the VisuMax laser, I would consider different types of procedures to enhance visual acuity, because creating a flap on a post-cataract surgery eye can be difficult, and outcomes aren’t always optimal. With the VisuMax laser — and this is one of the things I love most about it — I can create a flap on an 80-year-old cornea and a 25-year-old cornea, and both corneal beds look exactly the same. I’m getting the same ‘Wow!’ factor after LASIK performed on post-cataract patients as with patients in their 20s and 30s.”

SMILE: A New Refractive Option

In September 2016, the U.S. FDA approved the ReLEx® SMILE procedure, performed with the VisuMax femtosecond laser, for the correction of myopia with minimal or no astigmatism.* During SMILE, the surgeon uses the laser to create a thin, disc-shaped lenticule within the cornea. The lenticule is then removed through a small corneal incision, also created by the laser. The outer corneal layer remains largely intact, contributing to the eye's biomechanical and refractive stability and facilitating fast visual recovery.

"SMILE has opened up the possibility of laser vision correction to a whole new pool of patients who are not ideal candidates for LASIK," Dr. Shelby says. "This includes patients with up to 8 diopters of myopia."

Dr. Coleman says SMILE is now his refractive procedure of choice to correct spherical myopia. "In my experience, patients experience less postoperative dry eye, and their visual recovery is comparable to LASIK," he says. "Several clinical trial investigators feel that there is less variability of outcomes in high myopes treated with the SMILE technique, and I have found that to be true. I can treat higher myopia with greater confidence that I will hit my refractive target with SMILE as opposed to LASIK. I have treated up to 8 diopters of myopia, and the results were exactly as predicted."

This predictability may be because the laser portion of the SMILE procedure is completed while the VisuMax is docked to the eye, eliminating some atmospheric and biologic variables, explains Dr. Coleman.

"When we're shooting a laser beam through air, as we do with the excimer laser for LASIK, minor variations in temperature and humidity can affect how much tissue we remove versus what we predicted," he says. "Differences in corneal hydration also can lead to over- or undercorrection."

According to Dr. Shelby, ectasia is a serious concern for any refractive surgery patient, but particularly for those with high myopia and thin corneas. "Because SMILE is a minimally invasive 'flapless' procedure, the collagen fibers of the cornea aren't disrupted as much as they are with LASIK. That's one of the reasons why we can perform this procedure for patients who have much higher myopia."

Ease of Comanagement

The path to a successful refractive surgery case doesn't end in the OR, as appropriate referrals and postoperative care are important aspects of every case. According to Drs. Coleman and Shelby, optometrists have found that comanaging SMILE cases is similar to comanaging LASIK cases, with one exception.

"The possible complications with SMILE are less than with LASIK because there is no flap," Dr. Shelby says. "The

Minimizing Postoperative Dry Eye

"Dry eye syndrome is a common post-LASIK complication," Dr. Shelby says. "Tearing is a nerve reflex, and when we cut a flap, we're cutting through the densely innervated cornea, causing sensitivity and dry eye."

"Because of the technique used to cut the lenticule during the SMILE procedure, we avoid most of the sensory nerves in the cornea," Dr. Shelby says. "This is another major benefit of SMILE."

optometrists with whom we work have been pleased with the SMILE procedure, because we're able to minimize some complications that they've seen after LASIK, such as nighttime glare."

A Reason to SMILE

According to Dr. Shelby, SMILE has rekindled the public's interest in refractive surgery.

"Simply put, the fact that we have the VisuMax laser and can perform the SMILE procedure has resulted in an increase in our refractive procedures in general, not just for SMILE, but also for LASIK, PRK, and refractive lens exchanges," he says. "It gets people to pick up the phone and call, and from a business standpoint, that's the most important thing you can do." ■

* The SMILE procedure performed with the VisuMax femtosecond laser is indicated for the reduction or elimination of myopia -1.00 D to -8.00 D, with ≤ 0.50 D cylinder and MRSE -8.25 D in the eye to be treated in patients who are 22 years of age or older with documentation of stable manifest refraction over the past year.

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