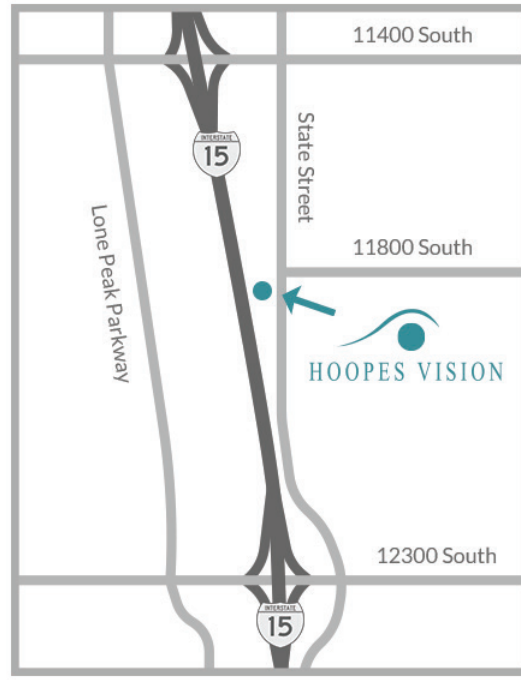
## Dedication

This book is dedicated to our patients, for their trust and faith; and to those employees who have worked so hard and remained loyal.




## DIRECTIONS TO HOOPES VISION

Take I-15 to exit 292 (11400 South) and proceed east to State Street. At State Street, turn south (right). Proceed to the intersection of 11800 South. Hoopes Vision is on the right at the south-west corner of the intersection. The main entrance in on the east side of the building, facing State Street.

www.hoopesvision.com

801.568.0200 • 877.30.LASIK

11820 S. State Street, Draper, Utah 84020



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# Foreword

It is estimated nearly seven hundred thousand laser vision correction procedures were performed in the United States in the year 2012. There are over 1500 excimer laser systems currently operating in this country. While these figures may seem high, the number of people who have had laser vision correction surgery account for less than seven percent of the vision care population. It is expected the number of patients seeking laser vision correction will continue to grow and expand as techniques are refined and expanded, lasers upgraded and made more accessible to patients, safety and outcomes improve, and the economy recovers. The result will be a happier and more satisfied patient, who will spread the word to friends and acquaintances. This *wow* factor is the main driving force fueling the present refractive surgery growth.

The current acceptance and growth of laser vision correction surgery, or LASIK (LASer In-situ Keratomileusis) has created heated competition for patients and revenue. For example, competition among laser companies has resulted in better, safer lasers with the ability to correct a wider range of refractive errors – clearly a good thing. However, the growing popularity of LASIK has also led to a proliferation of laser surgery providers – everything from general ophthalmologists who offer LASIK as just one of many services; to surgery centers specializing in LASIK and other vision correction procedures; to corporate chains, usually run by non-physicians, treating eye surgery as a commodity rather than a medical procedure. It has led to a situation where, [due to the continual advancement of technology over nearly two decades, and the varying value that surgeons place upon their own services], there is a wide range of prices in the LASIK market. Much of the price confusion resulted from the advent of discount surgery centers fifteen years ago. Most discount laser centers no longer exist and their patients never paid the cheap advertised prices. Discount centers don't use the newest and safest technologies such as IntraLase™, and their surgeons usually have little experience. A prospective patient, looking into LASIK for the first time, might ask, "It's all-laser eye surgery, why does one place cost more than the other? What's the difference? LASIK is LASIK, right?" In reality there is a big difference between laser centers and the technology used.

The biggest decision a patient faces when deciding on vision correction surgery is choosing the right surgeon. With multiple providers offering LASIK, today's patient seeking vision correction has more options than ever before when considering whom to trust with their hard-earned money and, more importantly, their vision. Vision correction surgery is an area where a person often has only one chance to *get it right*. Your vision is far too precious to entrust it to someone merely because they offer the cheapest price. A surgeon's experience and abilities are worth the extra cost. Another important factor, beyond finding a surgeon with good technique and skill is finding one who genuinely cares about you and is willing to put your health and well-being first. Many surgeons can perform LASIK surgery well but may not respond to you as an individual. Of course, the bottom line is there are many options out there. The most important considerations are your safety and your vision. If you

find the place where you feel most comfortable, a little more money may be worth it. Conversely, an inexpensive place may not be worth any price.

A conscientious patient is likely to do thorough research before making such a life-changing decision, using such resources as friends and family, their own optometrist, and the internet. This book, featuring the knowledge of pioneers in the field of laser vision correction, and the ongoing experience of a high volume LASIK practice, is intended to be an additional resource in that research.

In this book, we will explain what LASIK is, its history, and its progression into the safe, predictable procedure it is today. We will explain the techniques and technology used in LASIK and how those have been improved and refined over the years. We will walk step-by-step through a typical patient's process of determining their candidacy for laser eye surgery, through the day of surgery itself, and the postoperative recovery process. We will explain some of the things that differentiate a skilled LASIK surgeon using the most up-to-date technology, from a discount surgery center whose main driving goal is to offer surgery at the lowest possible price, and how those differences can spell markedly different results for the patient. It is our hope in reading this book, you will find most of your questions about LASIK surgery answered; and that it will be a useful tool in helping you make a well-informed decision about your own vision correction.

Phillip C. Hoopes, Sr., MD
Phillip C. Hoopes, Jr., MD
Michael J. Bradley, MD
O. Claron Alldredge, Jr., MD
Majid Moshirfar, MD
Benjamin Buckner, MD
Steven H. Linn, OD
Renee McIntosh, OD
Weston T. Barney, OD
Thomas P. R. Dutson, OD
David M. Parkinson, OD
Michele R. Avila, OD
Kirk B. Drennan, OD
Tim F. Melton, OD

## Chapter 1

# MIKE REID


Mike Reid was one of the top professional golfers in the country. Graduating from Brigham Young University in 1976, he turned professional the same year. Nicknamed “Radar” for his amazing accuracy off the tee, he won his first PGA Tour title at the 1987 Seiko Tucson Open and the following year won the prestigious NEC World Series of Golf. He maintained the lead in the 1989 Masters Tournament until very near the end and narrowly lost the lead in the PGA Championship in the final holes. He claimed his third PGA Championship at the 1990 Casio World Open in Japan.

Mike became eligible to play the Senior Champions Tour in 2004, and in 2005, with his new and recently improved vision from LASIK, claimed his first senior title in dramatic come-from-behind fashion at the Senior PGA Championship.

Mike joined the long list of athletes, celebrities, and working professionals who have had LASIK vision correction to help enhance their performance and vision. Many of these gifted and intelligent people had been patiently watching the development and advancement of refractive surgery over the years and had become convinced laser vision correction was now the way to go. This growing list now includes golfers Tiger Woods, Tom Kite, Fred Funk, Bruce Smith, Rocky Thompson, Tom Byrum, Vijay Singh, Cory Pavin, Scott Simpson, Bob Tway, Hale Irwin, Hal Sutton, Rich Beem, Brent Geiberger, Laura Davis, Se Ri Pak, and Patty Hurst; football players Troy Aikman, Rodney Peete, Tony Dorsett, Mel Renfro, Drew Henson, Gus Frerotte, Ray Brown; retired Kansas City Chiefs star quarterback, Len Dawson, and coach Herm Edwards; baseball players Greg Maddux, Wade Boggs, Wally Joyner, Mark Gubicza, Bernie Williams, Mike Lansing, Jeff Bagwell, Jose Cruz, and Al Martin; basketball players LeBron James, Emanual Davis, Kurt Rambis, Patrick Ewing; hockey players Jason Prokopetz and Brent Severgn; NASCAR race car driver Kevin Harvick and team owner Richard Childress. Other celebrities who have had laser vision correction include Nicole Kidman, Cindy Crawford, Jessica Simpson, Kenny G., Michael Bolton, Courtney Cox, Brad Pitt, Dennis Quaid, John Goodman, Drew Carey, Dr. Phil, John Tesh, Lynda Carter, Lorenzo Lamas, Al Yankovic, Jim McKay, Tony Curtis, Fleetwood Mac singer Stevie Nicks, Ursula Andress, Mimi Rogers, and Barry Manilow.

Notable local patients such as KUTV news anchor Mary Nickles, KSL co-anchor Mike Headrick, Good Things Utah co-hosts Nicea DeGering and Marti Skold, attorney and President/CEO of NuSkin, Inc. Truman Hunt, founder and CEO of Overstock.com Patrick Byrne, New York Times bestselling author Richard Paul Evans, professional basketball players Devin Durrant and Natalie Williams, Utah Jazz mascot the Bear, Major League Baseball player Vance Law, speed skating world record holder Nate DiPalma, professional football players Kirk Chambers and Derrick Shelby, former professional football player and University of Utah coach Jay Hill, former University of Utah quarterback Lance Rice, US Ski team members Adam Cole, Heather McPhie and Landon Gardner, Jamaican bobsled team driver Winston Watts, Real Salt Lake's former Assistant Coach Robin Fraser, Real Salt Lake soccer player Cody Arnoux, and professional golfers Mike Weir, Clay Ogden, Bruce, Boyd and Daniel Summerhays, had all been investigating and looking into LASIK surgery for several years. They came to Hoopes Vision for their laser eye surgery. In November of 1998, Dr. Hoopes, Sr. also elected to have LASIK performed on his right eye. Dr. Hoopes, Jr., had LASIK performed by his father in 2002, and Dr. Michael Bradley had PRK performed by Dr. Hoopes, Sr. prior to joining Hoopes Vision in 2010.

We were honored to have Mike Reid select our center for his LASIK surgery. Mike was a typical refractive surgery patient. He was tired of the hassles of dealing with his glasses. His vision with glasses was never as good as he knew it could be. They constantly slipped when playing golf and were uncomfortable to wear. In addition, there were tissues associated with traveling and keeping them clean in bad weather.

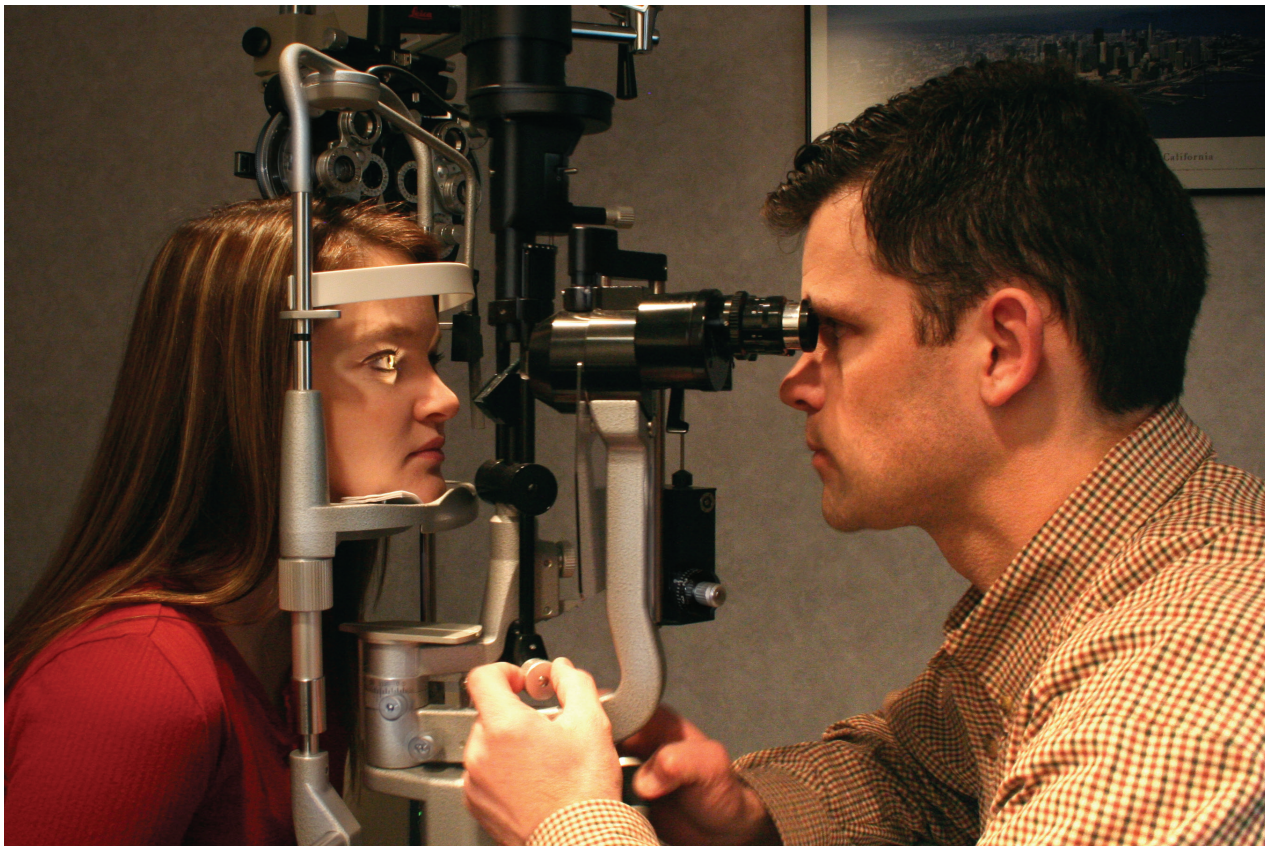
Only those who must rely on glasses or contacts to see clearly can really understand what a handicap poor, uncorrected vision is, and the problems associated with glasses and contacts. Have you ever dreamed of waking up in the morning and seeing the time on your alarm clock without fumbling for your glasses? Imagine being able to swim, ski, golf, or play tennis without worrying about losing a

contact! It is estimated there are nearly 90 million Americans who suffer from poor vision and need glasses or contact lenses. Although most people have no trouble wearing their glasses and contacts, many do. Not everyone will qualify or be good candidates for laser vision correction, but those who do rarely regret their decision. After successful LASIK surgery, there is a certain sense of freedom and self-confidence one feels by being able to see clearly in the distance; and with the ultimate reward of finally being able to pass the drivers license test without corrective eyewear! This sense of personal accomplishment, freedom, and independence can be yours.

Mike, like many patients, became interested in laser vision surgery after several good friends and fellow professional golfers had their vision successfully corrected. Once he made the decision to have the surgery, he first needed to find out if he was a good candidate.

## Chapter 2

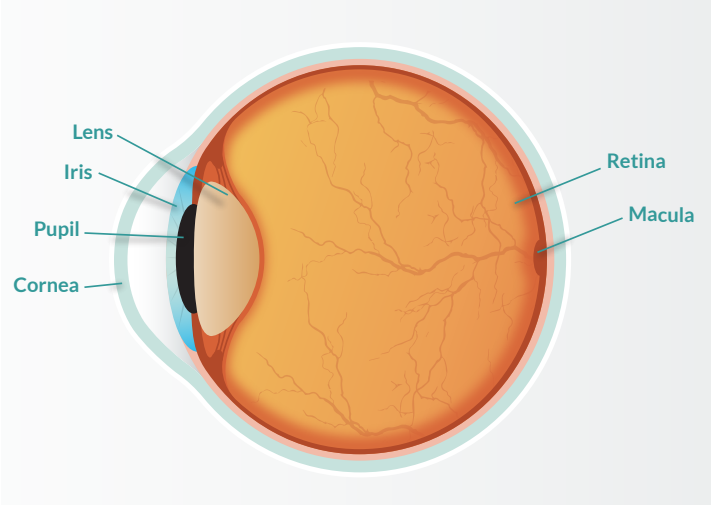
# THE EYE EXAM



Mike's visit to his eye doctor was an important step in his quest for visual freedom. The purpose of this exam was to find out if he was a good candidate for laser vision treatment and whether or not he had any eye problems that might exclude him from the surgery. The most important information determined during this examination was the type and severity of his refractive error. A refractive error is an optical condition where light cannot focus clearly on the retina in the back of the eye. The most common forms of refractive error are myopia (commonly called nearsightedness), hyperopia (farsightedness), and astigmatism, which often accompanies the other two conditions.

A complete eye exam begins with a careful medical and ocular history. It is important to bring your last several pairs of glasses or prescriptions, as well as any contact lens information. If you wear contacts, you will be asked about your contact lens wearing history and how many hours a day you wear your lenses. Bring all your medications or at least a detailed list. Because certain eye diseases

tend to run in families, it is important for you to know your family health and vision history. You will also be asked to divulge any drug allergies or reactions. Be prepared to tell your doctor what your visual needs and requirements are and if you have ever had any eye problems such as infections or trauma. Your personal health will also be explored, as certain medical problems and conditions can affect results.



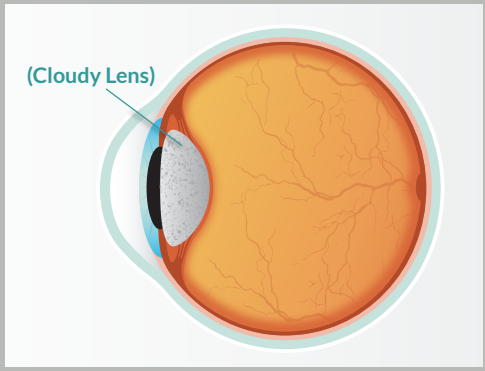

Some existing medical problems are contraindications for refractive eye surgery and patients need to be questioned and examined for their existence. The presence of eye disorders such as cataracts, advanced glaucoma, keratoconus, surface diseases, severe dry eye and certain past and current infections make it necessary to avoid LASIK surgery.

Patients with a history of severe and serious eye infections such as herpes keratoconjunctivitis are poor candidates, as the laser can disturb or reactivate this troublesome virus.

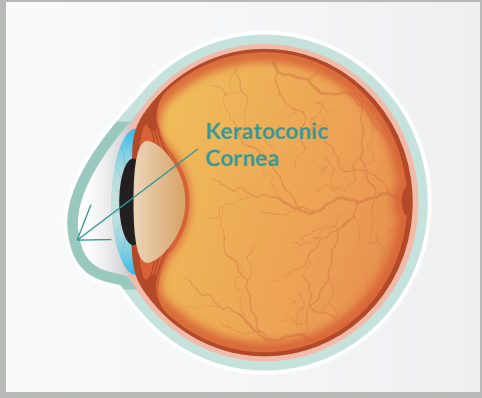
In order to correctly determine if you are a good surgery candidate and to obtain the most accurate measurements, it is critical your contact lenses be taken out for five to seven days for soft lenses and three weeks for every decade for hard and gas-permeable lenses prior to your eye exam. Contact

## Contraindications for Refractive Eye Surgery

Cataracts are a clouding of the normally clear lens of the eye that can be corrected by surgically removing the lens and implanting an artificial lens. During this procedure, most refractive problems can be reduced or eliminated with the techniques of modern “refractive” cataract surgery.




A thinning or bowing of the central cornea called keratoconus can be made worse with refractive surgery and can lead to highly unpredictable results.



There are other pre-existing medical conditions that would not be conducive to surgery. One of these is diabetes, which can cause abnormal wound healing. Generally speaking, diabetes does not affect the success of the LASIK procedure and most well-controlled diabetics can undergo LASIK with excellent results. However, in poorly controlled insulin-dependent patients, there can be problems such as fluctuating vision and poor wound healing. Pre-existing corneal scars from trauma, infections, severe dry eyes, or previous eye surgery may reduce results. Certain collagen-vascular dis-orders such as lupus and rheumatoid arthritis can potentially cause serious corneal changes after surgery. Certain medications can cause severe drying or corneal scarring such as Accutane and Cordarone. Finally, pregnancy with its varying levels of hormones can alter vision and healing. It may also be necessary to prescribe medications during the post-operative LASIK period for infection, pain, or inflammation; and because drugs and medications should not be administered during pregnancy or while breast-feeding if avoidable, many physicians advise waiting up to six months after delivery and breast feeding before having laser surgery. Pregnancy, by itself, does not make your vision worse and women do not have to postpone LASIK until after they are through having children.

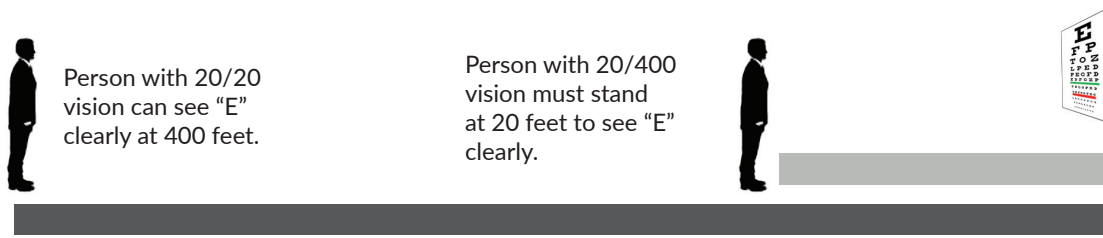
lenses tend to flatten the cornea, and it is not unusual to find a slightly different prescription after the lenses are discontinued. Usually, a patient will end up with more astigmatism when hard contacts have been out for several weeks. This phenomenon is often referred to as corneal warpage. Therefore, to ensure an excellent result, you should adhere to this requirement and not wear your contacts prior to your initial surgical refraction!

Snellen Eye Chart

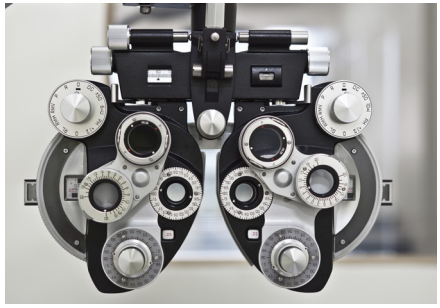
Your exam will test the severity of your prescription. It usually begins by determining how well or poorly you can see on the eye chart without corrective eyewear. Some patients can see most of the eye chart without correction, while others see nothing and can only count fingers held up in front of them. Almost everyone has heard the term “20/20 vision,” but few know exactly what that means. In reality, there is no perfect way to quantify someone’s visual acuity. The standard eye chart, called the Snellen Chart, is used by most doctors and is calibrated to read at a distance of 20 feet. In the 20/20 equation, the numerator is used as the 20-foot reference and the bottom number changes according to how well you are able to see. The comparison is actually a statistical average of the smallest letters people with good or excellent vision see. A person with 20/20 vision means they are able to see the smallest lines on the eye chart at 20 feet. Reference is often made to 20/40 because vision this level or better is required to drive without glasses or contacts. Because of this, many doctors and patients feel surgery is successful if this level of uncorrected vision is achieved postoperatively. Unfortunately, some patients are not happy unless they see 20/20 or better after surgery.

Some patients can only see the large “E” on the eye chart,

and this equates to 20/400 vision. This means a patient with good vision can stand back 400 feet and still see the same large "E" at the top of the chart as the 20/400 visual acuity patient sees at 20 feet. If a patient sees 20/200 or worse while wearing full correction, this is usually accepted as legal blindness.




Vision is then tested with your glasses on to determine your *corrected* visual acuity. This is usually followed by the actual performance of a refractive examination where you look through either a computerized autorefractor or phoropter. Through these instruments, various lenses are viewed and you are usually asked to decide which is sharper, one or two? Your prescription is based mainly on the accuracy of your responses. The doctor relies on your answers to write the correct prescription. Since refractive laser surgery is permanent, it is critical this refraction is performed accurately! In order to make sure the prescription is accurate, two measurements are taken. The first refraction is the manifest refraction and is both subjective and objective. The second refraction is a cycloplegic refraction and is performed a half-hour after strong dilating or cycloplegic drops are placed in each eye. This drop relaxes the internal eye muscle and diminishes the effects of involuntary focusing or accommodation on the part of the younger patient. Usually, the lowest degree of correction that produces the best vision is programmed into the laser. The doctor will usually compare this new refraction to the prescription in your glasses to make sure there is stability in your correction.



**Phoropter**

Several other tests then follow and include a measurement of your intraocular pressure (to screen for glaucoma), dry eye testing, and an inspection of your eyelids to determine if there will be enough room between your eyelids to place surgical instruments at the time of surgery.

Measuring pupil size

Another very important measurement is to

determine the size of the patient's pupils in normal and dim light conditions. This is important because large pupils were once thought to lead to problems with night-time glare and halos if the laser treatment area or optical zone is smaller than the size of the patient's pupil at night. We have seen night-time pupil size vary anywhere from 3 millimeters to 9 millimeters. Many of the older lasers can only treat an optical zone area of 6.5 to 7.5 millimeters. The newer lasers now have the capability to create a larger and smoother ablation area. Current modern thinking and science show glare at night is really caused by an increase in certain spherical aberrations caused by some of the older lasers.

Doctor performing slit lamp examination

A microscopic or slit lamp exam is performed on the anterior surface of the eye and cornea to determine if there are scars, infections, or keratoconus. The thickness of the center of your cornea is determined in order to make sure there is adequate tissue available for your given refraction and surgery. Special instruments (Pentacam, ORBSCAN and OCT) are used to map the shape, thickness, and contour of the cornea. These sophisticated instruments are used in laser surgery and help pick up subtleties that might be missed on a slit lamp examination. They are particularly valuable in characterizing and quantifying astigmatism and its location. Following surgery, these maps of the surface of the eye clearly demonstrate the intended laser flattening or steepening of the cornea.


Measuring higher-order aberration

With the recent approval of wavefront custom and optimized ablations, it is important the patient has a screening with a wavefront aberrometer, which will map out higher-order aberrations (HOAs) or distortions in the visual system. Hoopes Vision was, at one time, home to four unique, sophisticated wavefront aberrometers including: WaveLight's Allegro® Analyzer, the Alcon LADARWave®, Bausch & Lomb's Zywave® II, and the VISX WaveScan wavefront aberrometers. If present in significant numbers, the surgeon will need to perform a customized ablation in order to reduce or maintain the current level of aberrations to produce better vision.

After the patient's eyes are fully dilated, the doctor carefully checks the inside of the eye and specifically the retina, optic nerve, and blood vessels. Myopic eyes are usually large; therefore, the inside lining or retina is often thin and susceptible to tears or degeneration. Any tears or holes that might be found will need to be treated prior to any consideration of refractive surgery. An inspection of the optic nerve can reveal the presence of glaucoma damage and some neurologic conditions.

After a thorough eye exam, the doctor and staff will spend time with you answering your questions and concerns. Sometimes this is performed with the aid of educational videos or

written handouts. Some offices will have you take a written quiz to help determine your level of understanding of what will happen before, during, and after your surgical procedure. You will be told whether or not you are a good candidate for the surgery and if your refraction is within the range the laser can correct. This informed consent process should also include an idea of what vision you can expect after surgery and what your chances are of needing an enhancement or touch-up.

After Mike's eye examination was complete, his questions and concerns addressed, and answered to his satisfaction, arrangements were made for him to meet the surgeon and schedule a time for surgery.

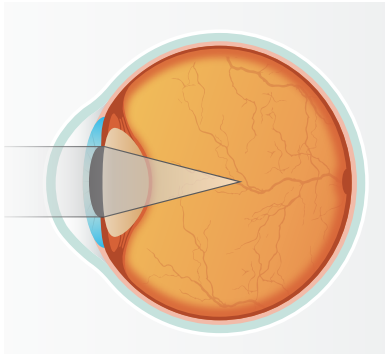

Hoopes Vision is located at 11820 S. State Street, Draper, UT

Chapter 3

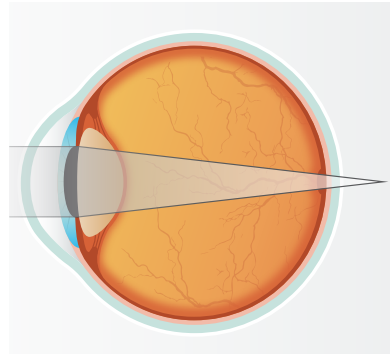
# WHICH VISION PROBLEMS ARE CORRECTABLE?

There are five different errors of refraction: myopia (nearsightedness), hyperopia (farsightedness), astigmatism, higher order aberrations, and presbyopia. To better understand the different types of vision problems and refractive errors that can affect the human eye, it is helpful to have an understanding of optics and eye anatomy.

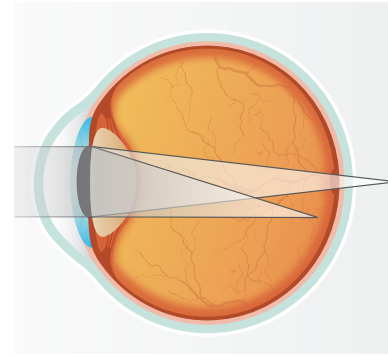
The eye is often compared to a camera. However, the eye actually possesses two lenses: the cornea and natural lens. The cornea is often compared to a clear watch crystal and covers the front of the eye. The human lens lies behind the iris or colored part of the eye. The cornea and lens are primarily responsible for focusing rays of light back onto the retina. The light image formed on the retina is transmitted to the brain by the optic nerve.



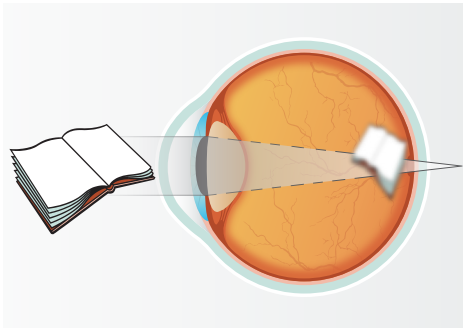
**MYOPIA** or nearsightedness occurs when the eye is too large and long, or the front curvature of the cornea is too steep. Often, myopia is a combination of these two problems. Light rays entering a myopic eye come to a focus in front of the retina and need to be diverted or refracted back onto the retina in order to see clearly. Myopic corrective lenses are usually concave (minus lenses -), where the center of the lens is thin and the edges thicker. These patients are characterized by their ability to see well close-up without glasses but quite poorly in the distance. Surgical correction for myopia is accomplished by flattening the central cornea, allowing light rays to pass parallel and in focus to the back of the eye onto the retina.



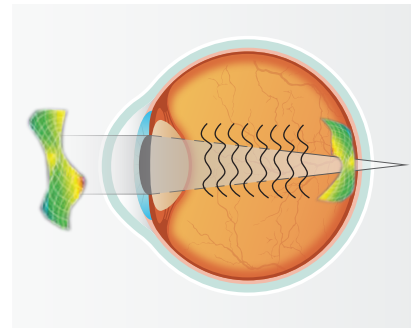
**HYPEROPIA** or farsightedness exists when the eye is too short or the cornea is too flat, and light rays come to focus behind the retina and eye. Corrective lenses (plus lenses +) converge these light rays to focus on the retina. These lenses are thick in the center and thin on the edges, like a magnifying lens. Patients who are farsighted usually have difficulty seeing well at both near and in the distance. This is different from the reading problem that develops when one reaches their mid-forties and beyond called **presbyopia** which will be discussed later. Surgery to correct farsightedness concentrates on steepening the cornea with LASIK or PRK, or removing the human lens and replacing it with a high, plus powered implant.



**ASTIGMATISM** means the cornea or surface of the eye is not perfectly round, but rather misshaped or oval like a football or the back of a spoon. An astigmatic cornea is curved more steeply in one direction and flatter in the other causing rays of light to focus at different planes in the back of the eye. The result is shadowing or crookedness of objects. Correction in glasses for astigmatism consists of grinding a cylinder on the back of the lens. Hard contacts correct astigmatism by smoothing the cornea as it changes shape to conform to the shape of the contact lens. Fortunately, most lasers are now capable of correcting mild to moderate amounts of astigmatism at the same time they are correcting the myopia or hyperopia.



**PRESBYOPIA** begins in one's early to mid-forties. As we age, the human lens thickens and loses elasticity and the ability to change focus making reading (near vision) difficult. Correction of presbyopia includes the use of reading glasses, bifocals, or trifocals. Contact lens wearers may opt to have one eye corrected for distance and the other eye for reading (**monovision** or **blended vision**), which can also be created via laser vision correction. Monovision works for most visual requirements, but people may still require reading glasses for fine print. Multifocal lens implants can improve distance and near vision when implanted during cataract surgery.



**HIGHER-ORDER ABERRATIONS (HOAs)** are present to some degree in every eye. Higher-order aberrations are a range of mathematically defined distortions that describe how certain areas of vision are more distorted than surrounding areas. For most patients, HOAs account for somewhere between 1% to 20% of the total refractive error. They may be responsible for a lack of crispness to vision, or may cause halo and glare for some patients, especially at night. Aberrations are measured with wavefront scanning devices and can be reduced or prevented with wavefront-guided and wavefront-optimized (custom) LASIK procedures.

To understand what level of refractive errors the lasers are capable of correcting, you need to be able to understand the optical unit of measurement, or diopter. This is a measure of the power required to focus light behind a lens. A one-diopter lens focuses light 1 meter behind the lens. A stronger five-diopter lens focuses light closer to the lens at 1/5 of a meter. The larger the diopter power, the thicker the glasses.

As of 2010, laser treatment has been approved in the United States for patients 18 years of age and over for the following refractive errors:

1. Myopia up to -11 diopters.
2. Astigmatism up to 6 diopters.
3. Hyperopia up to +6 diopters.

These limits may not apply to everyone. There is only so much change an individual cornea can safely undergo. A patient who has a thin cornea and/or a high prescription might not be able to obtain the full amount of correction. Your doctor will study each prescription before deciding which treatment plan will be best and safest for you.

Fortunately, Mike's prescription fell well within the approved range. He had myopia with significant astigmatism. Knowing his prescription qualified for LASIK, it was then up to his doctors to determine whether or not he would be a good candidate for surgery.

## Chapter 4

# ARE YOU A GOOD CANDIDATE?

Mike was relieved to find out his refractive error was not too severe for laser vision correction. Now it was up to his doctors to find out what his expectations were and whether he had a good understanding of laser treatments and their limitations. It was understandable he would have questions and some concerns since his career and livelihood depend a great deal on having exceptionally clear, sharp vision. He needed to understand the risks and complications that could happen, as well as what results to expect. After watching an informative video about LASIK and its potential problems, his remaining concerns and questions were answered. The doctor explained what results he could expect based on our previous surgical results within his range of refraction. For Mike, he could expect a 99%+ chance of seeing at least 20/40 or better. He had about a 98% chance of 20/20 or better outcome. We also informed him there was about a 2% chance he might need additional or touch up (enhancement) surgery to achieve the best results.

Results from laser surgery are partially dependent upon the severity of the patient's prescription. At Hoopes Vision, we track our patients' outcomes on a constant, ongoing basis. At the time of this book's printing, 97.2% of nearsighted patients demonstrated 20/20 vision or better at three months from the day of surgery, and 99.7% had vision of at least 20/40 (which is the level of visual acuity needed in order to drive a car without corrective lenses).

One of the most difficult concepts for patients to understand is how the laser can affect their near vision while correcting their distance vision. As already discussed, presbyopia is a change beginning in the early to mid 40s where the eye loses the ability to adjust focus. Nearsighted patients experiencing this problem can compensate by simply taking off their glasses - as the focal point of their vision is set for near. However, as the laser corrects one's nearsightedness, the focal point changes to distance. If the patient is in their forties, they most likely will not have the ability to focus at near without additional help from reading glasses. Essentially, eliminating those patients' nearsightedness makes them like people who were born with good distance vision naturally – and who will need help with near vision in their forties and beyond. Therefore, it is important for the patient aged forty and over to decide whether they would prefer to have their vision clear most of the time at far or near. If a nearsighted patient spends most of their day reading and doing detailed fine work, they can often accomplish this comfortably merely by removing their glasses. Patients under the age of forty should not experience any difficulty with near vision until later, when they reach their mid-forties, at which point there are other types of procedures that can help.

As previously discussed, monovision or blended vision is where the non-dominant eye is corrected for close-up or reading and the dominant eye is corrected for distance. We recommend this treatment for most patients affected by presbyopia. The under-correction is usually mild in order to minimize any visual disparity between the eyes, but provides enough near vision for most daily activities. However, adjusting to this can take weeks or even months. This level of monovision usually allows for the ability to read newspaper-size print. The ability to read smaller or fine print will most likely require reading glasses. If a patient cannot adjust to this type of vision and later desires to see well at distance with both eyes, the under-corrected eye can usually be further fine-tuned for distance with additional laser treatment or enhancement.

When Dr. Hoopes elected to have his own vision corrected, he opted to have monovision, and he is very comfortable with the outcome. He is able to function most of the time without glasses but needs half-frame reading glasses to read very fine print or tie a fish hook (which isn't as often as he would like!).

Doctors love to take care of well-informed patients who have realistic expectations. These patients understand most doctors are trying to do their best and are not going to intentionally harm them. They also understand the limitations of the technology and that anything can happen when it comes to surgery. They trust the doctor will use their best efforts, skills, and judgment in taking care of any problem that might be encountered. They also accept the fact that everyone is unique and can respond and heal differently as well. As high-tech and computerized as laser surgery is, it is still impossible to deliver perfect results 100 percent of the time.

In selecting your surgeon or laser center, be aware of promises or guarantees of perfect vision. Laser refractive surgery is meant to improve your current vision and reduce your need for correction, but may not always eliminate it completely. Results of your surgery can vary. The only fair comparison should be what your vision was like before surgery without glasses compared to after surgery without glasses. Patients often expect their vision to be as good after surgery as it was when they were fully corrected wearing glasses or contacts. Although many patients achieve this level of vision or better, many factors can influence the final outcome. Also, realize sometimes it might take more than just one surgery to completely correct your particular problem and it might still be necessary to wear glasses or contacts after surgery, particularly for reading or near work if you are in your mid-forties or older. If you do end up requiring glasses, it will usually only be part time and the lenses will be thin.

If you are seeking improvement with your surgery you will be happy. If you are after a perfect visual outcome, you might be disappointed with your results. Be patient and realistic. This is an exciting time to be alive and to be able to take advantage of such modern and miraculous technology now available for vision correction.

After discussing Mike's expectations, visual requirements, problems and possible complications, it was evident he would make an excellent surgical candidate. His surgery was then scheduled to fit into his busy schedule as he was preparing for a tournament in Pebble Beach.


Checking in at Hoopes Vision's reception desk.

Chapter 5

# A BRIEF HISTORY OF REFRACTIVE SURGERY

Historically, attempts at correcting vision refractive problems date back centuries. However, modern refractive surgery in the United States began with the introduction from Russia of radial keratotomy, (RK) in 1978. In this procedure, tiny spoke-like incisions are made into the peripheral cornea in a radial fashion causing central flattening. The history of RK, its importation to this country, and its lack of universal acceptance, is fascinating. The procedure was actually accidentally discovered in the early 1970's when an astute Russian ophthalmologist, Svyatoslav Fyodorov, observed a change in refraction on a young patient who had experienced eye trauma from broken glasses. The lacerations on his patient's cornea were fortuitously arranged in a radial fashion and, after healing, caused a

marked reduction in the existing myopia. Dr. Leo Bores from Detroit, Michigan, visited Dr. Fyodorov several times at his Russian clinic before beginning the procedure in the United States in 1978.

RK Incisions

Because RK was introduced into this country without the usual and proper scientific testing from academic medical centers, it was largely ignored. However, it did work and eventually drew the attention of both patients and doctors. It became a very popular procedure from 1984 to 1994 with millions having the surgery. One main problem with RK was a lack of precise predictability from one doctor to the next. There certainly was a skill and art level with this surgery. Also, it was later found that a certain percentage of RK patients showed additional correction over time that eventually led to farsightedness. This *progressive hyperopia* was seen mainly with surgeons who used more and deeper incisions.

AK Incisions

Another technique similar to RK was later developed to correct and reduce astigmatism. This procedure is called astigmatic keratotomy or AK. With AK, parallel and paired incisions are made in the steep axis of the existing astigmatism. The length and depth of the incisions depend on the amount of correction desired. The popularity of RK soon waned as both surgeons and patients waited for FDA approval of the excimer laser in 1995.

The history of laser vision surgery begins with the development and testing of lasers in general and the excimer laser specifically. The term *laser* is an acronym for Light Amplication by Stimulated Emission of Radiation. The word *excimer* is derived from *excited dimer*, which is a small molecular particle that creates ultraviolet light and energy when it breaks down. IBM developed excimer laser technology in 1976 for etching computer chips. Later in 1982, Dr. R. Srinivasan tested the laser on different materials, including biological tissues such as bone and cartilage. The laser was remarkable in its ability to etch or cut precise and smooth grooves. The excimer laser used in eye surgery uses a combination of argon and fluorine gases to produce a

## Timeline of Modern Refractive Surgery

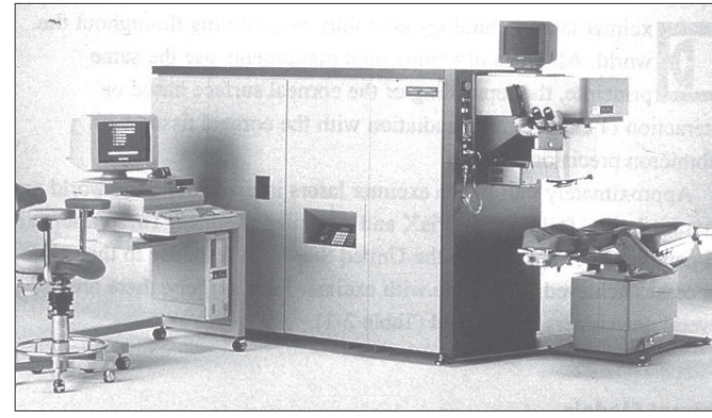
| 1976 | 1978 | 1988 |
|---|---|---|
| Excimer laser developed by IBM | RK discovered by accident by Russian ophthalmologist | First PRK procedure performed on a normally-sighted eye |

beam of invisible, ultraviolet light. The laser light is focused by a series of lenses and mirrors to produce a smooth and even beam. The unique property of this laser is that it produces a *cool* beam that causes very little heat damage to surrounding tissues.

**Summit excimer laser**

Dr. Stephen Trokel at Columbia University in New York City, first used this laser on corneal tissue and was impressed with the results and possibilities. The first excimer laser patient procedure was performed in Germany in 1985 by Dr. Theo Seiler. He attempted to make incisions into the cornea in a fashion similar to RK. It was later discovered this laser would work better by removing tissue centrally on the cornea, which would create flattening. This laser removal of tissue is referred to as photoablation, wherein molecular bonds are broken and tissue literally disintegrates. Applying excimer laser photoablation directly to the central surface of the cornea became known as *photorefractive keratectomy* or PRK and became widely used around the world to correct nearsightedness. The first PRK procedure was performed on a blind-eyed patient in 1987, at Columbia University. In 1988, Dr. Marguerite McDonald at Louisiana State University performed the first PRK on a normally-sighted eye and the rest is history.

The popularity of PRK, however, was slow to catch on. Many of the companies involved in laser vision correction saw their stock prices fall dramatically early on. It wasn't until the introduction of, and routine use of, laser in-situ keratomileusis (LASIK) for vision correction that popularity soared. With LASIK, patients experience little, if any, pain and see well quickly. They are usually amazed with their results and tend to share their experience enthusiastically.



**Original VISX 20/20 excimer laser**

First excimer laser FDA approved for PRK

**1995**

First excimer laser FDA approved for LASIK

**1998**

All Laser LASIK available with FDA approval of IntraLase

**2002**

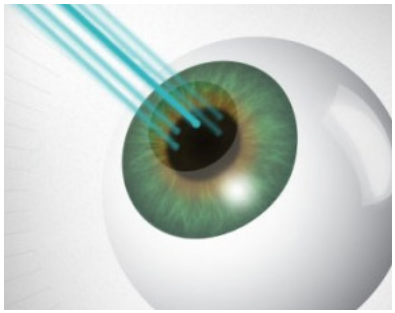
The different companies who produce lasers in the United States have had to seek FDA approval for their individual lasers and models. Dr. Hoopes was fortunate to have participated in many of the early clinical trials for laser approval, as well as, other refractive surgical techniques. The first laser (Summit Technologies) was approved for general use for PRK on October 19, 1995, and the first approved laser treatment in the United States was performed shortly afterwards at Dr. Hoopes' practice in Kansas City by Dr. Dan Durrie. Approximately 6 months later, Visx, Inc., also received FDA approval. Since then, several other lasers have also received FDA approval (Alcon Autonomous LADARVision®, Nidek®, Bausch & Lomb Technolas®, the Allegretto Wave®, the Zeiss MEL 80™, and most recently the Wavelight EX-500 laser).

The older lasers are often referred to as first and second generation lasers and consist of the older type of broad beam laser technology. The newest lasers utilize flying or scanning spot technology and are capable of a wider range of treatments. They are able to produce a smoother surface and larger optical zone, thereby reducing nighttime glare and halos. The experience gained as a participant in many of the FDA clinical trials for the various laser companies gave us the insight to choose these newer lasers when we opened our new laser center. Despite this added expense, we were fortunate to have been able to offer these newer technologies to patients in Utah several years before other centers finally upgraded their older laser systems. We continue to maintain our commitment to provide the best and safest new technology available for our patients.

Chapter 6

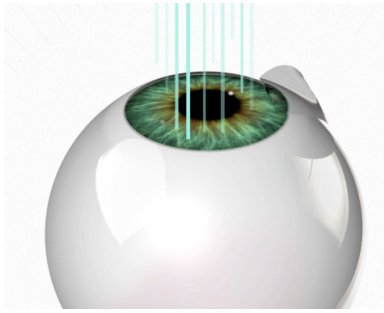
# WHAT IS LASIK/PRK LASER VISION SURGERY?

There are two types of laser vision correction available for patients today: PRK and LASIK. Photorefractive keratectomy (PRK) is performed by the laser treating the surface of the cornea directly. As stated earlier, the cornea is the clear front of the eye that acts like a window or watch crystal. It is an amazing, resilient tissue, as its transparency allows for the passage of light to the retina at the back of the eye. The cornea is approximately 12 millimeters in diameter and has an average thickness of half a millimeter. The surface of the cornea is covered by the epithelium, which contains many fine nerve endings and accounts for about 50 microns of the thickness of the cornea. Underneath the epithelium is the stroma, which is comprised of collagen and makes up the majority of the cornea. Before PRK can be performed, most of the epithelium has to be removed. There is actually no pain involved because



PRK

the eye receives anesthetic or numbing drops prior to surgery. However, after surgery the eye can feel as if it has experienced a scrape or abrasion. To minimize discomfort, a soft "bandage" contact lens is placed on the eye for 4 to 5 days to smooth and cover the surface until the epithelium has healed underneath. Vision is usually a little blurry at first, but improves after the epithelium or surface has healed. Studies have shown that after 3 weeks, visual acuity of PRK patients generally matches that of LASIK patients. However, healing and improvement in vision can take several months. Rarely after healing, a cloudiness or haze can appear, but will usually go away with time. PRK is now used primarily with patients who have thin corneas, have irregularities show up on their topography scans (irregular astigmatism), or are in professions that are not allowed to have LASIK. Many higher prescription PRK candidates are now electing to undergo ICL surgery instead.



LASIK

Of the two types of laser corrective surgery, LASIK is by far the most popular. It has eliminated many of the inconveniences previously associated with PRK. The difference between the types of laser treatments is in LASIK, the laser is performed on the stroma underneath a cap of corneal tissue attached by a hinge, which has been folded backward. Either a laser or special instrument called a microkeratome creates this small corneal flap. For nearly ten years we have relied on IntraLase® to create the flap with a computer-guided laser. This thin flap of tissue represents about 15% to 25% of the cornea's thickness depending on how much tissue will be removed. As with PRK, there is no pain associated with the LASIK procedure. After the laser treatment is applied, the flap is repositioned and allowed to adhere back onto the surface. The surface epithelium is still intact and usually results in very little

## 3 Ways a Laser Can Reshape the Cornea During LASIK and PRK

### 1 Traditional, Standard Treatment:

Reshapes the cornea for nearsightedness, farsightedness and astigmatism (lower order aberrations) using roughly the same measurements used for glasses or contacts.

### 2 Wavefront Guided Treatment:

Treats the same problems as a traditional treatment, plus higher order aberrations. A map is made by measuring thousands of unique points of each patient's vision. This measures distortions glasses and contacts do not correct. This may reduce halo and glare in some patients and sharpen vision beyond what glasses and contacts can.

### 3 Wavefront Optimized Treatment:

Creates a treatment pattern that maintains the eye's round, natural curve and helps produce crisp, sharp vision with the possibility of less nighttime halo and glare after surgery.

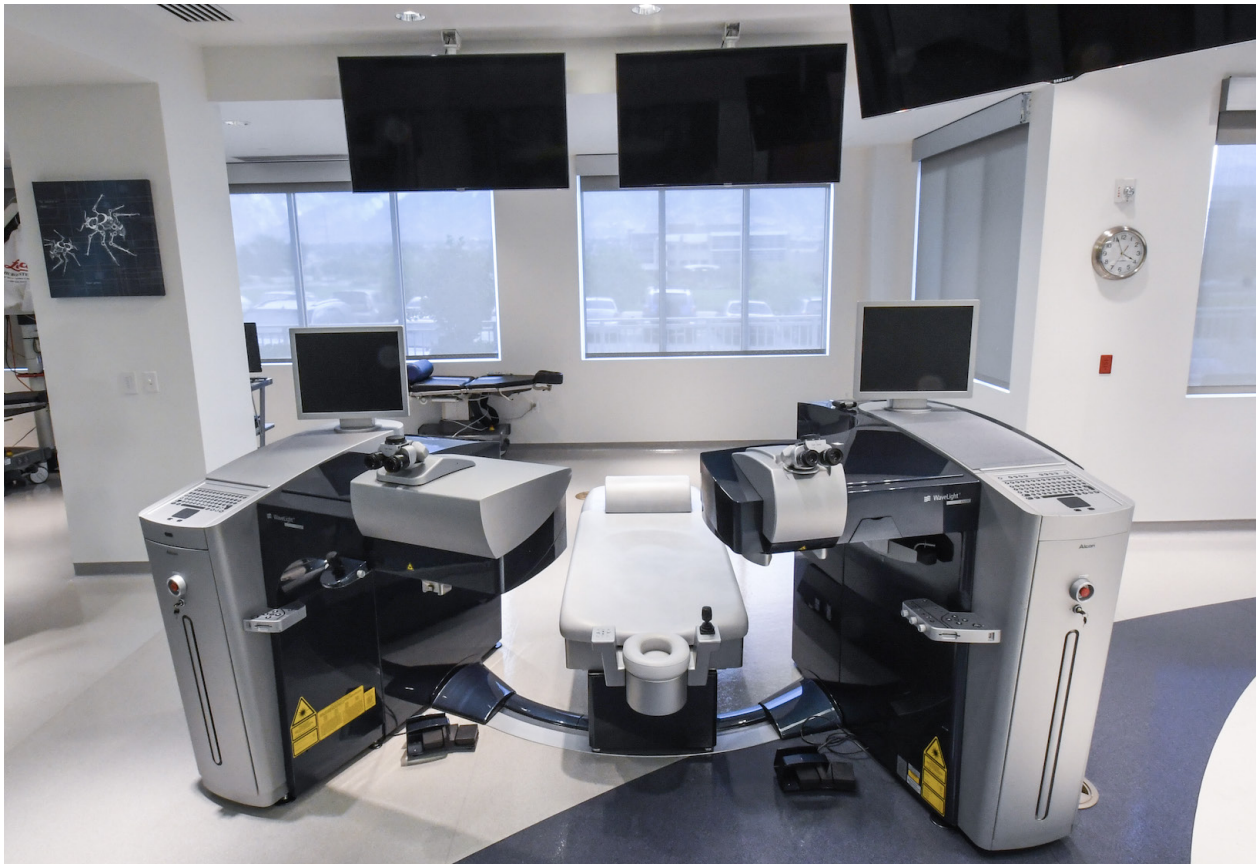
discomfort after the surgery and during the healing process. Most LASIK patients require little, if any, pain medication postoperatively. Vision recovery is rapid and most patients are seeing close to 20/40 by the time they leave the center, and very often 20/25 or better by the next day. Because of LASIK's ease, quickness, and lack of pain, most patients are able to have both eyes treated at the same time.

Like PRK, LASIK has its own disadvantages because it involves an extra surgical procedure, the creation of the flap, which is called a keratectomy. The microkeratome used to make the flap has undergone refinement and improvement over the years and is much safer than it was when it was first used. However, when using a metal blade, problems creating the flap can still occur in about 0.5% of cases and will be discussed in Chapter 8. In 2003, Hoopes Vision began performing blade-free LASIK procedures with the assistance of a femtosecond laser, making us the first practice in the Salt Lake City area to do so. These blade-free, all-laser LASIK procedures represent a significant improvement in safety and results over the traditional bladed procedure.

Another technique, LASEK (Laser Assisted Subepithelial Keratomileusis), is actually a different form of PRK where a thin flap of surface cells (epithelium) is created. Alcohol is used to loosen the surface cells and a thin flap is dissected and folded back, then replaced after laser ablation. A *bandage* soft contact lens is then put in place for about five days. Approximately half of the surface cells remain viable while the rest are naturally replaced. We have found this technique to be more uncomfortable than PRK.

Chapter 7

# HOOPES VISION'S LASER SURGERY SUITE



Since its inception, Hoopes Vision has remained at the forefront of laser vision correction technology, making sure to use only the newest, safest, and most effective lasers. Our doctors have had the rare opportunity to gain extensive experience using multiple laser platforms and have accumulated what may be the most comprehensive collection of LASIK lasers in the US. Currently, Hoopes Vision surgeons rely on newer, wavefront-optimized lasers such as the Wavelight EX-500, as well as blade-free flaps from the iFS Intralase and Wavelight FS-200. These next-generation lasers have proven to create a safer, more precise, and more accurate LASIK procedure for our patients.

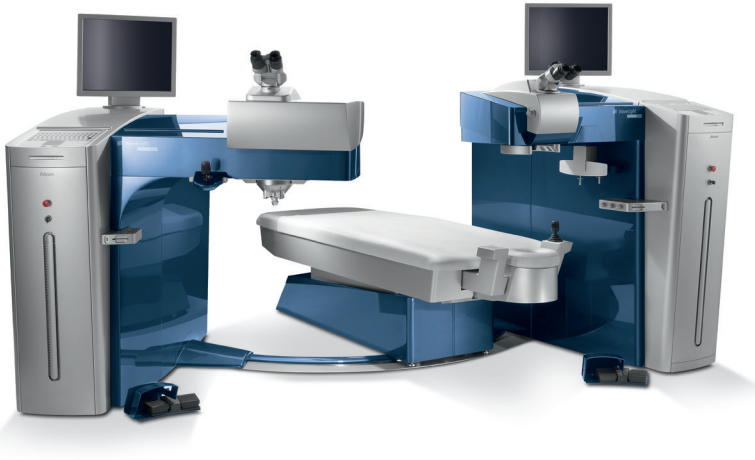
Surgical Suite Entrance


LASIK Surgery Suite

Surgical Suite

Surgical Suite

## OUR STATE-OF-THE-ART LASER SUITE INCLUDES THE FOLLOWING LASER SYSTEMS:




**THE WAVELIGHT™ REFRACTIVE SUITE** is composed of two state-of-the-art laser systems: the EX500 excimer laser for refractive correction and the FS200 femtosecond laser for bladeless flap creation. These systems are integrated by a computer linkage and a single swiveling patient bed. The Refractive Suite is the newest, fastest vision correction laser system available in the United States. It is discussed in more detail in Chapters 11 and 12.

**iFS INTRALASE™** is used in step one of the LASIK procedure, making the corneal flap. Our iFS IntraLase™ laser is the fifth generation of this device, and is the most recent upgraded version. It can now create the flap in just 14 seconds. The most significant advantage of this laser is safety. It eliminates major complications that can occur with a bladed microkeratome, such as button-hole and incomplete flaps. Eyes heal quicker and stronger and patients experience less dryness. Studies comparing this laser to the blade have demonstrated better visual acuities with IntraLase™. We were the first Salt Lake City practice to obtain IntraLase™ and have utilized it for over 13 years with over 50,000 flaps created. This laser is featured in Chapter 12.

## OTHER LASERS WE HAVE ACQUIRED AND USED


The **ZEISS VISUMAX**™ is a next-generation femtosecond laser system, capable of performing laser-assisted cornea transplants as well as refractive procedures with unprecedented speed and precision. It is the centerpiece of the innovative ReLEx® SMILE (short for small incision lenticule extraction) technique, a bladeless, flapless, all femtosecond laser refractive procedure that may revolutionize laser vision correction.

In early 2016, Hoopes Vision took delivery of one of the first Visumax systems in the United States in order to offer this innovative procedure in a clinical trial setting.


The **ZEISS MEL 80**™ laser boasts an ablation rate of 250 Hz (the second fastest laser available in the U.S. at the time of its release) resulting in a faster, more comfortable procedure. It is also one of only a few lasers designed to maintain the aspheric curve of the cornea to improve night vision in regard to halo and glare. The MEL 80™ also has an ultra-fast IR tracking system, and uses a small .7mm Gaussian laser spot resulting in an extremely smooth ablation. Hoopes Vision is proud to be the first LASIK center in the United States to have purchased this laser.

The **ALLEGRETTO WAVE® 400 EYE-Q** laser was the fastest excimer laser available in the United States for nearly a decade. We obtained our first Wavelight laser in August 2004, four years before any other Utah practice. We were also first in Utah to acquire the newer, faster 400 Eye-Q platform. It had many advantages over other laser systems including its ability to perform wavefront-optimized procedures that maintain the natural round, prolate shape of the cornea - reducing or eliminating the chance of postoperative halo and glare.

Hoopes Vision upgraded from the Allegretto Wave 400 EYE-Q to the Wavelight EX500 in July 2014.

**Our lasers are constantly maintained and updated by the laser companies' engineers and technicians to ensure they are always up to date and in perfect working condition.**

## OTHER LASERS WE HAVE ACQUIRED AND USED IN THE PAST

The **VISX STAR S4®** was the first laser to receive FDA approval to perform custom wavefront treatments for mixed astigmatism and hyperopic prescriptions. Its CustomVue® technology for wavefront procedures was based on Fourier-based wavefront algorithms. Its 3-D *iris registration* tracking mechanism tracked movement of the eye on all three planes. Although it utilized older broad beam technology, its engineers successfully redesigned its beam profile to perform better and to keep up with the newer flying spot lasers. This laser company promotes its *iLASIK*® procedure which is just their wavefront-guided procedure with iris registration with IntraLase™ making the flap. Hoopes Vision rarely used the VISX® and sold this laser before moving to our new building.

Our second purchased laser, the **ALCON LADAR-VISION AUTONOMOUS®** excimer laser was acquired in April, 2001. We were the first Utah laser center to obtain and use this laser (as we were with the B&L Technolas®, the Allegretto Wave®, and Zeiss MEL 80™ excimer lasers). It was a newer generation flying spot laser equipped with a fast and sophisticated tracking system. Designed by former NASA space engineers, this tracker worked utilizing laser radar to follow eye movement that might occur during the laser procedure. This was also the first laser to gain FDA approval to begin using wavefront or custom ablations, making it one of the most advanced lasers on the market at the time we purchased it.

The **BAUSCH & LOMB TECHNOLAS 217®** laser was the first laser we brought to Utah when we opened our center in 2000. It was one of the newer lasers and performed exceptionally well, far exceeding FDA benchmarks in clinical trials. Like the Wavelight® Refractive Suite and Zeiss MEL 80™ lasers, this is a German made laser. Dr. Hoopes' former practice in Kansas City performed some of the FDA clinical trials on this laser and knew of its superior results first hand. The laser worked to correct refractive errors by utilizing its small beam profile to flatten the cornea centrally, and then *polished* the periphery, or transition zone, to produce an extremely smooth cornea. This laser was the third laser approved for wavefront-guided treatments.

Chapter 8

# RISKS AND COMPLICATIONS: IS IT SAFE?

Mike Reid had worked very hard throughout his life to get to where he was. Fortunately, he had been blessed with exceptional athletic ability and worked hard to develop his skills. His career was heading into a new stage with the Senior Champions Tour, and he was looking forward to many more great years and victories to come. He recognized the value of good vision in helping him reach new success and achieve future goals. Understandably, he had some questions about what possible problems and complications could happen with LASIK and wanted to know the facts before proceeding.

The FDA studies on the excimer laser were lengthy, detailed, and involved thousands of

patients. The government has given its approval that this laser technique is safe and effective, which should be comforting to patients. During these studies, there were no major problems and no cases of blindness have been reported so far with LASIK. While most doctors believe this procedure is safe, like any type of surgery, problems can and do occur. However, complications are rare and usually can be handled without any permanent damage to the eye. We will attempt in this chapter, to present, an overview of the safety of LASIK and the more common problems that can occur with LASIK. It would be too lengthy to attempt a complete presentation of complications as reported and contained in the medical literature. Those wishing more information are encouraged to consult a local medical library, internet search, or discuss further specific concerns with their doctor. Be aware much of the negative information on the internet is not based on scientific evidence or fact and comes from unhappy patients who experienced less than ideal results, usually from treatments on older lasers and bladed microkeratomes.

### Possible Complications

The most common problem encountered with laser treatment is **under- or over-correction**, which accounts for most of the three percent of patients who eventually need an enhancement or additional surgery. Over-correction or under-correction is often due to individual genetically-determined healing response to the laser treatment, but humidity and temperature in the laser suite, proper laser calibration, accuracy of the patient's refraction, and the laser system used can all play a part. With an under-correction, the patient will still have some refractive error remaining. When over-correction occurs, a nearsighted person ends up slightly farsighted or vice versa.

If this occurs, patients must wait approximately three months after the initial treatment to ensure their vision is stable. Afterwards, depending on the remaining thickness of the cornea, a retreatment can usually be performed without problems.

Although LASIK usually reduces astigmatism at the same time myopia or hyperopia is treated, it is possible some astigmatism can remain. Astigmatism correction has always been more difficult and less predictable than myopia correction. Surgically-induced astigmatism may result from a poorly-centered ablation (laser treatment) or by the patient's inability to stay focused on the fixation light at the time of surgery. However, the newer lasers have trackers on them that keep up with eye movement during the procedure so each laser spot ends up right where it was intended. Sometimes the axis of the

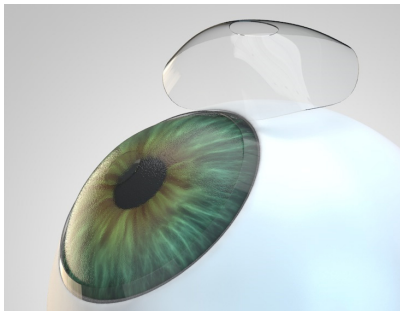
## Prevention and Treatment

Hoopes Vision's laser vision correction suite is climate controlled, and the equipment is regularly serviced and calibrated to ensure an optimal laser environment and treatment. All surgery results are monitored and included in a nomogram to continually improve accuracy. New technology, experienced surgeons as well as an accurate, thorough LASIK examination are the most important controllable aspects to achieving a good initial outcome.

To avoid misalignment, we mark the axis of astigmatism prior to surgery. Newer lasers have the ability to track rotation of the eye from these marks, or from visual landmarks in the iris. All of our lasers track and respond to eye movement to ensure each pulse of the laser is placed as intended.

astigmatism on the surface of the cornea does not align with the axis of the treatment programmed into the laser. This can cause some astigmatism that might be off-axis 10 degrees or so. This may occur when you lie down, as eyes have a tendency to rotate a bit. Most patients who have laser surgery have no complaints of **glare or reduced vision at night**. However, there are some patients who do notice and complain of glare and starbursts around lights at night. This is usually temporary, and is sometimes associated with mild swelling of the cornea early on. Also, patients with larger than normal pupils are made aware of the fact they might experience reduced nighttime vision and increased glare. One of the findings from the FDA clinical trials on laser vision correction was loss of best-corrected vision in a very small percentage of patients. A few patients, after treatment, could not see as well with full correction (glasses, contacts, or new refraction of any residual correction) as they could before surgery. Some patients who could see 20/15 with correction before surgery could now only see 20/20 or 20/25 with their glasses or contact lenses. The main complications that can occur during the actual surgical procedure are related to the creation of the corneal flap with a blade. This part of the surgery usually goes well, takes less than a minute, and is usually painless. However, difficulties creating this thin flap did occur in about 0.5% of cases when using a bladed microkeratome.

Most of those problems were minor and are treated simply by repositioning or smoothing the flap. Some flap problems such as an incomplete, thin, off-centered, or buttonhole flap, are more serious and can lead to postponement and delay of the surgery. Since the surgeon does not manually *carve* the flap, most flap problems are mechanical in nature. We are fortunate we have not seen any complications in flap creation since beginning to perform blade-free LASIK.



**Buttonhole Flap**

**Infections** are very rare following surgery. When they occur, they are usually successfully treated with antibiotic eye drops. However, infections can result in

The newer lasers tend to make the optical zone smoother and wider, minimizing and reducing many of the problems experienced at night. Wavefront-guided and wavefront-optimized custom laser treatments can greatly reduce distortions and aberrations which can actually improve nighttime vision and contrast sensitivity.

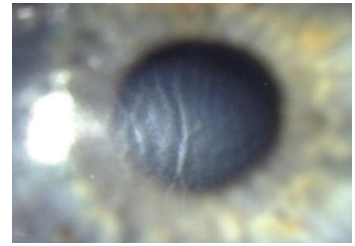
Proper, thorough testing to determine candidacy, use of newer lasers and compliance with postoperative instructions will help patients achieve the best results and may reduce the likelihood of loss of best corrected vision. Since 2003, our practice has created the flap exclusively with safer, more accurate femtosecond lasers such as the iFS Intralase and Wavelight FS200. This newer blade-free technique virtually eliminates the major complications associated with the microkeratome blade. These laser-made flaps are more precise, heal quicker, provide statistically better vision and contrast sensitivity, and cause less dryness. The single drawback is the added cost. However, we have never heard a patient regret the extra expense incurred for the improved safety and visual result they obtained!

scarring, thinning, and haze, which can lead to reduced best-corrected vision. The possibility of postoperative infection can be reduced by adhering to proper and careful hygiene such as washing your hands before using eye drops or touching around your eye.

When creating the flap, a small amount of surface corneal epithelium can sometimes be removed along the edges of the flap. These edge scrapes are normal and usually heal very quickly. However, loosened epithelial cells can grow and spread beneath the flap edge and progress across the underside. This is referred to as **epithelial ingrowth** and is treated by lifting the flap and scraping the cells off. Most cases, however, do not need treatment but only observation.

The most commonly reported aftereffect of laser eye surgery is **dry eye**. Utah is the second driest state in the country and dryness is and can be a problem for surgical patients and the general population as it is. Post-LASIK dry eye typically manifests within the first month and lasts approximately three months; however, in some rare cases dryness my persist in the long term. At Hoopes Vision, we counter this dryness with a regimen of over-the-counter artificial tears, which in the vast majority of cases are enough to maintain comfort and good vision until dryness subsides on its own. In the cases where artificial tears alone are not sufficient, our doctors use temporary or permanent tear duct plugs, or prescription drops such as Restasis (cyclosporine), which stimulate healthy tear production.

It is possible to develop a non-infectious inflammation beneath the flap. Examination of these cases under the slit lamp reveals an accumulation of sand-like particles and is called **diffuse lamellar keratitis (DLK)** or *sands of the Sahara* (SOS).



A rare complication following LASIK has been reported called **ectasia**. The first such case was reported in 1998, and as of 2006, 149 cases had been reported. It has been estimated to occur in about 1 in 2000 to 3000 patients. One third of these cases occur in patients with normal corneas and no risk factors, one third occur in patients with significant prescriptions and treatments, and one third occur in patients with unusual looking

Patients are given a prescription for antibiotic drops, prior to surgery. Following recommended use of these drops along with good hygiene will help prevent infections.

DLK is usually successfully treated with topical anti-inflammatory steroid drops but these can cause corneal thinning and astigmatism. Adherence to scheduled follow-up appointments is important to diagnose and treat any potential complications early on.

With ectasia, vision can usually be corrected with glasses or contact lenses. A new procedure called corneal cross-linking is being studied by our research department and can be effective in halting the progression of ectasia. Additionally, corneal ring segments (Intacs®) can be inserted into the cornea to stabilize the progression of ectasia. In rare cases, a corneal transplant may be required.

topographic maps or thin corneas. Patients under age 30 are more likely to develop this condition. Ectasia can lead to worsening astigmatism and corneal thinning later on requiring the patient to wear glasses or contacts. Ectasia is thought to be related to keratoconus or cone shaped cornea. Many of these cases run in families. Thinning the cornea through laser treatment may cause this condition to manifest sooner than normal. Recent opinion is eye rubbing might be the main cause of keratoconus and ectasia. This condition is treatable. Hoopes Vision is participating in clinical trials in our research center for patients who have keratoconus or develop it after LASIK/PRK surgery (ectasia). The results of these *cross-linking* studies have been amazing and we look forward to making this new treatment available to "everyone soon."

After an explanation of these possible problems, Mike wasn't deterred in his decision to have LASIK. He was glad to hear Hoopes Vision performs exclusively blade-free LASIK procedures, rather than using the outdated microkeratome technology. He understood the risks and was willing to put his trust in his doctors to do what was best for him. Most patients at this stage are given an informed consent form to take home to read and study. This document will provide more detail about any potential problems that can occur and is necessary for a patient to gain a more complete understanding of the surgery. Patients should take their time and ask or write down any questions they need further explanation on. Signing these papers will confirm your understanding of the risks, complications, and benefits of laser vision correction. You should take your time reading its contents thoroughly and ask any questions prior to surgery.

Chapter 9

# THE OPERATION AND POSTOPERATIVE CARE

Mike was a little nervous the day of his surgery. Preoperative jitters are common and normal. With an elective surgery that could affect his eyesight, it was understandable for him to wonder if he was doing the right thing. Some of the questions Mike had were: Would it hurt? Would it take very long? What could he do and not do after surgery? What could he expect during the surgery?

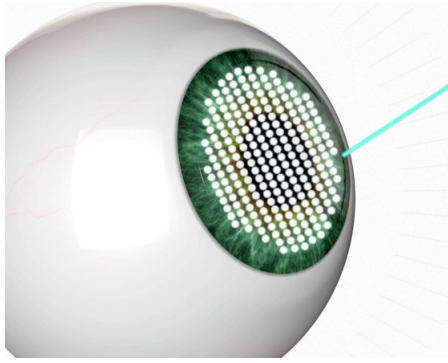
This chapter is designed to explain and answer those and many more questions. It will follow Mike through his surgical experience so you will have a better understanding of what you can expect should you elect to have corrective surgery.

## PREOPERATIVE

It was very important Mike arrive at the laser center on time. His first task was to check in at the front desk and to fill out the usual, but necessary patient information sheet and forms. This is important in obtaining correct personal data, as well as insurance and billing information. The paperwork asked for the name of the doctor who referred him to the center so proper correspondence could be made. He was then escorted back to the preoperative waiting area where he was given a surgical bonnet and booties to wear.

The required preoperative eye drops were placed in his eyes several times over the next 10 minutes. These are usually antibiotic, anti-inflammatory, and numbing drops. No injections or needles were used. Medication such as Valium is usually offered to help the patient relax. Mike was then interviewed to make sure he understood the surgery and what was about to happen. He was told what to expect when he entered the laser room and what the different sounds and noises were that he might hear. The laser suite is vastly different from a hospital or ambulatory surgery center. Patients are allowed to wear casual clothing, and they are able to eat and drink right up to the time of the surgery. There are comfortable chairs to sit in and relax and soft music is playing. The whole atmosphere is more relaxed and casual than people expect. Because this was surgery on his eyes, Mike was told to bring someone along, not only for support and comfort, but also to drive him home. Our laser center also contains large, observation windows so family and friends are able to view the surgery, if so desired.

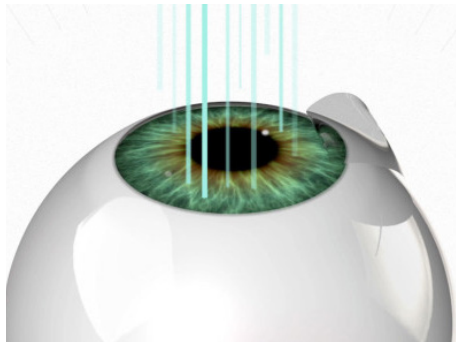
## STEP ONE - CREATING THE FLAP



When it was his time, the area around his eyes was prepped with antiseptic which felt a little cool. The antiseptic was then wiped dry and anesthetic numbing drops were placed into his eyes. Mike was led into the laser suite and positioned flat on his back on the IntraLase® laser bed. His face was straightened and aligned under the laser. An additional numbing drop was placed in the eye. Dr. Hoopes then placed a soft suction ring on Mike's right eye. This created a slight pressure sensation and caused vision in that eye to go dark for about 45 seconds. A cone-shaped apparatus at the end of the laser head was *docked* into the suction ring, and Mike felt a little extra pressure. The flap was then created according to the dimensions Dr. Hoopes selected, which were entered into the laser's computer. It takes only 14 seconds for the IntraLase® laser to make the flap by creating microscopic cavitation bubbles underneath the surface of the cornea. The process was repeated for the left eye. Mike was then led

to a resting area where he sat comfortably in a reclining massage chair for several minutes until the bubbles had dissipated and the cornea was once again clear.

## STEP TWO - RESHAPING THE CORNEA



He was now ready for step two, which was the actual correction of the shape of the cornea. Mike was led back to the laser suite and, this time, was positioned under the excimer laser. He could hear the staff talking and was aware the laser was being programmed and tested for his surgery. The laser is always checked, calibrated, and tested before each treatment, and the patient's information is verified three different times for accuracy.

Mike described later that he could hear talking as his surgeon entered the room after scrubbing his hands and recognized the sound of gloves snapping as the surgeon's assistant helped him put them on. A thin but sturdy wire eyelid speculum or holder was put into position to gently hold his eyelids open during the procedure. A final numbing drop was placed in each eye, and the laser's aiming and aligning light was turned on. He was asked to focus on the blinking light. As discussed earlier, each of our lasers have tracking devices to monitor movement of the eye. This fixation light is very important and patients need to concentrate on looking at this small light in order to keep their eyes from moving during surgery. This will help assure a better result.

The thin corneal flap was then lifted and rolled back on its hinge. Within seconds, he could hear a clicking noise and knew the laser was delivering its light energy to his cornea. Within less than 15 seconds, his laser treatment was over. The flap was replaced and irrigated underneath to remove any debris that might have been created. He waited patiently for a few minutes while the flap adhered. The lid holder was removed, and he was allowed to blink gently. Afterwards, the same procedure was performed on his other eye. Mike was then asked to sit up and walk out into the recovery area. Additional drops were used, and he rested for several minutes with his eyes gently closed. His corneal flaps were carefully inspected for smoothness and any debris and he was given his postoperative instructions. A follow-up appointment for the next morning was made for him. Mike's wife helped him out of the laser center, and drove him home to rest and relax. He was amazed at how well he was already seeing after his surgery, and was optimistic for even better vision later. Many patients are surprised at how quickly they are able to see, and with their new freedom from glasses and contact lenses.

## POSTOPERATIVE

Mike's main job upon returning home was to take it easy and relax. He was encouraged to have a nap. He had been given clear, protective plastic shields to wear when sleeping so he wouldn't inadvertently rub his eyes, which could cause wrinkles and folds in the flaps. He was given antibiotic and anti-inflammatory drops to put in his eyes every few hours while awake. Mike also had on hand a supply of moisturizing or artificial tear drops to help lubricate his eyes. In drier climates, it is very common for patients to experience dry eyes after surgery for several months or even longer. Fortunately, Mike's eyes were comfortable, and he only experienced a mild foreign body sensation. The lubricating drops helped this minor problem. Mike was instructed to wash his hands and keep them clean and dry before using his drops.

The examination on the morning following his surgery revealed a very happy and appreciative patient. He later recalled, "The improvement was dramatic, and by my check-up the next day, I was already 20/20! I could read the time on my alarm clock the next morning! Less than a week later, I headed off to Pebble Beach for a tournament. During practice, I was amazed at how comfortable I was not having to worry about my glasses. I felt I had more freedom with my golf swings. However, I knew the big test would come on the putting green. Would the slopes appear the same? Would I be able to judge distances better? My first putt was a 25-footer, and to my total amazement and disbelief, it went in!"

We were all pleased with his results. The flaps were clear, smooth, and already mostly healed. He was instructed to continue his drops for another week and return for a follow-up appointment at that time. When he returned, his vision had improved to 20/15, which is even clearer and sharper than 20/20. Now he was really happy and excited. There would be no way Mike could blame any future missed shots on his new vision!

The usual postoperative routine is to stop the medicated drops after about a week, except the artificial tear or lubricating drops which should be continued for at least 3 months. Patients are usually seen for follow-up at 1 month, 3 months, and 1 year postoperatively. It is important to keep this schedule in order to see any potential problems, and to allow us to collect accurate

### Optometric Co-Management

Co-management is an arrangement between an optometrist or ophthalmologist and the surgeon who performs the surgery. The co-managing doctor provides pre- and post-operative care to his or her patients. They complete this care in their office, and the surgery is performed at the surgeon's laser center. The optometrist or ophthalmologist will have attended several courses and lectures on postoperative care and received the needed and required training from the surgeon they work with. If you were referred by your eye doctor for surgery, it is imperative you return to them for this very important follow-up care.

data to compute surgical outcomes. Many doctors keep track of results so they can make any needed adjustments and changes in their technique in an effort to improve outcomes.

It is not unusual for patients to experience temporary side effects such as discomfort, dry eyes, light sensitivity, glare, haze and halos. These problems, while annoying and irritating, are usually not long-term or disabling. Some of these can affect your comfort, while others affect the early quality of your vision. Some of these problems might affect only one eye and not both. These conditions may depend on how well you take care of yourself after surgery; it is very important to follow your doctor's instructions.

Patients frequently experience dry eyes after their surgery. This is more common in people who had symptoms of dry eyes prior to surgery or who live in dry climates. Many patients who have dry eyes actually have adequate volume and tear flow; the difference is the rate of evaporation. Therefore, if the tears you do have can be made to stay around longer they will be able to do their job better. To help facilitate this, we will sometimes place temporary plugs in the eyelid drainage channels to keep both the natural and the artificial tears on the eyes longer. Studies have shown it takes about 2 to 3 months for the nerve endings to grow back into the flaps. This will enable the eye to reestablish the normal tear reflex and help facilitate keeping the eye moist again. An eye drop, Restasis®, was approved by the FDA to treat dry eyes and is the first medication that can actually stimulate tear production. This new medication is very valuable in treating dry eyes from any cause or problem.

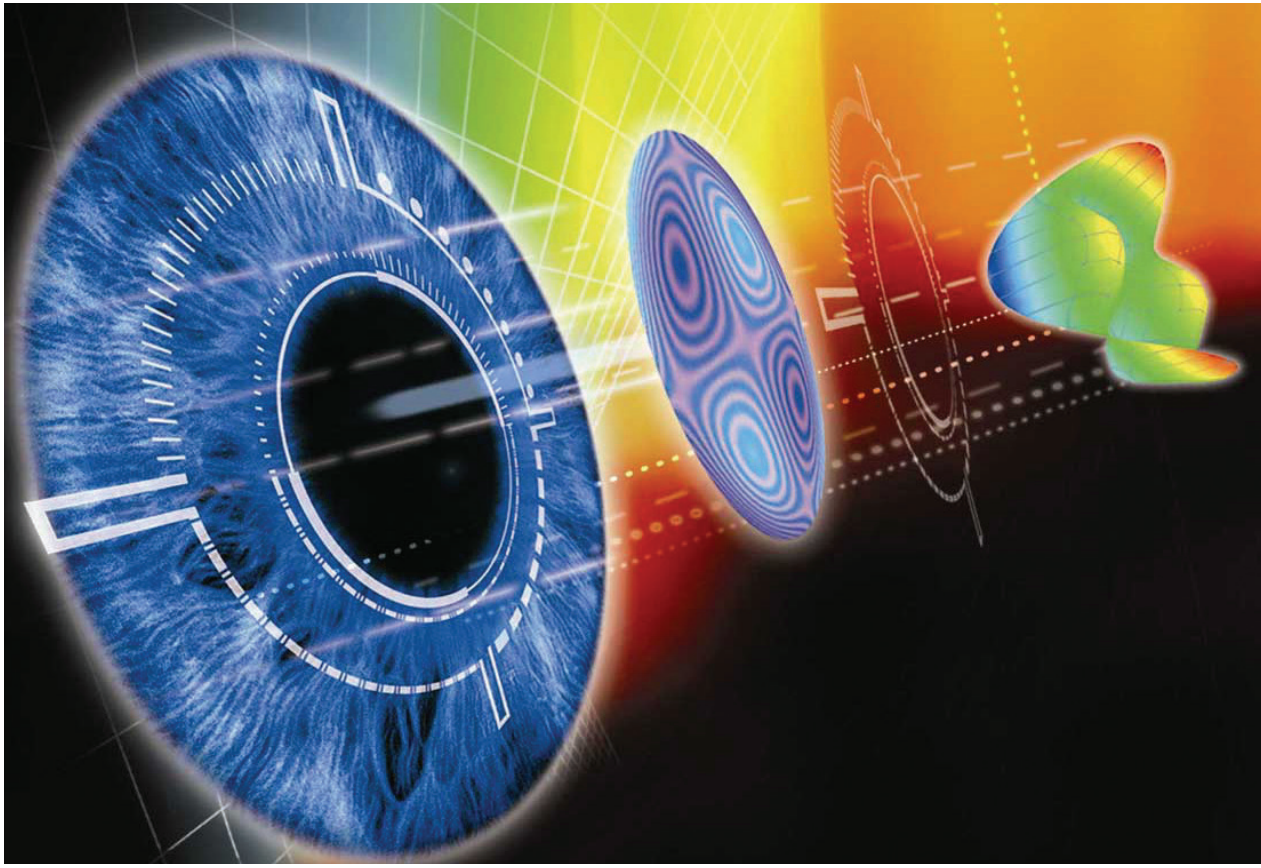
Sensitivity to light during the first few weeks of healing has been reported by some patients. This is quite normal for most types of eye surgery. Light scattering from swelling usually causes this. If the patient uses wrap-around sunglasses, this will usually provide relief.

Two of the most annoying temporary problems following surgery are glare and halos. It is normal for vision to be a little hazy while the eye is healing. Glare is usually noticed at night, particularly while driving. It is similar to the glare experienced at night when wearing contact lenses and often disappears in a few weeks. However, there are a few patients who report this problem beyond six months. The older FDA data showed that four to five percent of patients have more difficulty with night vision after treatment than before. However, the newer small-spot flying lasers with their smoother surfaces and larger optical treatment zones, have significantly reduced glare and halos, and many patients report less halo and glare postoperatively than before with contacts or glasses.

Newer treatments and software are continually being developed and improved to help reduce these problems after surgery. Despite these problems, over 97% of patients surveyed would gladly have the procedure again and would recommend it to their friends and relatives.

Chapter 10

# WAVEFRONT-GUIDED & OPTIMIZED CUSTOMIZED TREATMENTS



Despite the exceptional results patients have been enjoying over the last few years with the newer laser treatments, there are still some patients who experience less than ideal outcomes. This has been due to many different factors such as individual genetic-healing responses, different size optical and treatment zones produced by the various lasers, inaccurate prescriptions, and patients themselves who may have additional distortions or aberrations in their visual system that can be made worse after

standard laser treatment. These higher-order aberrations (HOAs) produce refractive distortions that limit the vision of healthy eyes to less than their full potential. Spectacles and contact lenses do not currently correct these aberrations but may in the future.

In recent years, scientists and clinicians have recognized these inconsistencies and have focused their efforts on finding answers and methods to improve results with the hope of producing clearer vision in a higher percentage of patients. On October 19, 2002, the FDA's Ophthalmic Devices Panel unanimously approved the first wavefront laser, Alcon's LADARVision CustomCornea® System. However, the very first wavefront-guided treatment in the world was performed in 1998, in Germany on the Allegretto Wave® laser. This system first produces a custom *wavefront map* for each individual eye's optical system along with its own personal defects and distortions. This map is then processed and transferred to the laser for a customized laser treatment. This new approval allowed laser eye surgery to advance to the next level of vision correction. Our newer lasers incorporate wavefront principles into every treatment performed to address optical higher-order aberrations. These wavefront-optimized lasers are the only systems with built-in software to minimize spherical aberrations during the standard LASIK treatment. They perform a customized treatment on every eye they treat. The Allegretto Wavelight® also performs wavefront-guided treatments.

It is estimated that five to ten percent of patients have significant higher-order aberrations that will benefit from this new treatment. For these individuals, the difference can be compared to buying a suit off-the-rack versus a tailor-made, custom-fit suit. Higher-order aberrations can actually be made worse by conventional LASIK and some wavefront-guided lasers, and these patients specifically will benefit from wavefront optimized technology. This is another good reason not to consider discount surgeons and centers because of the added expense and cost in equipment and additional time, may not be able to offer these latest advancements.

Wavefront analyzing devices (aberrometers) work by measuring the passage of light going through the eye. The wavefront machines use a system where focal-point rays of light are measured as they are coming out of the eye after being influenced by the different parts of the eye such as the tear film, anterior and

## Hoopes Vision Has Had Experience Using Four Unique Wavefront Aberrometers

1 WaveLight Allegro


2 B&L ZyWave

3 Visx Wave Scan

4 Alcon LadarWave

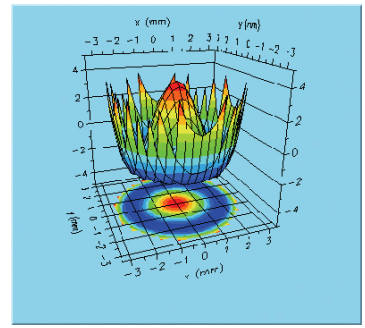
## A custom ablation includes four components:

1 A quantitative measurement of both low- and high-order aberrations is taken with the wavefront aberrometer.

2 These wavefront measurements, known as Zernike data, are then transferred to the laser.

3 Automatic registration or matching of the wavefront to the eye occurs.

4 Calculation and delivery of a unique ablation for each eye by the laser takes place. In order to deliver a precise treatment, it is vitally important the laser system have an active eye tracking system that can follow any movement that might take place. Fortunately, all of our current lasers have fast active trackers that are capable of keeping up with eye movements.




**Wavefront Map**

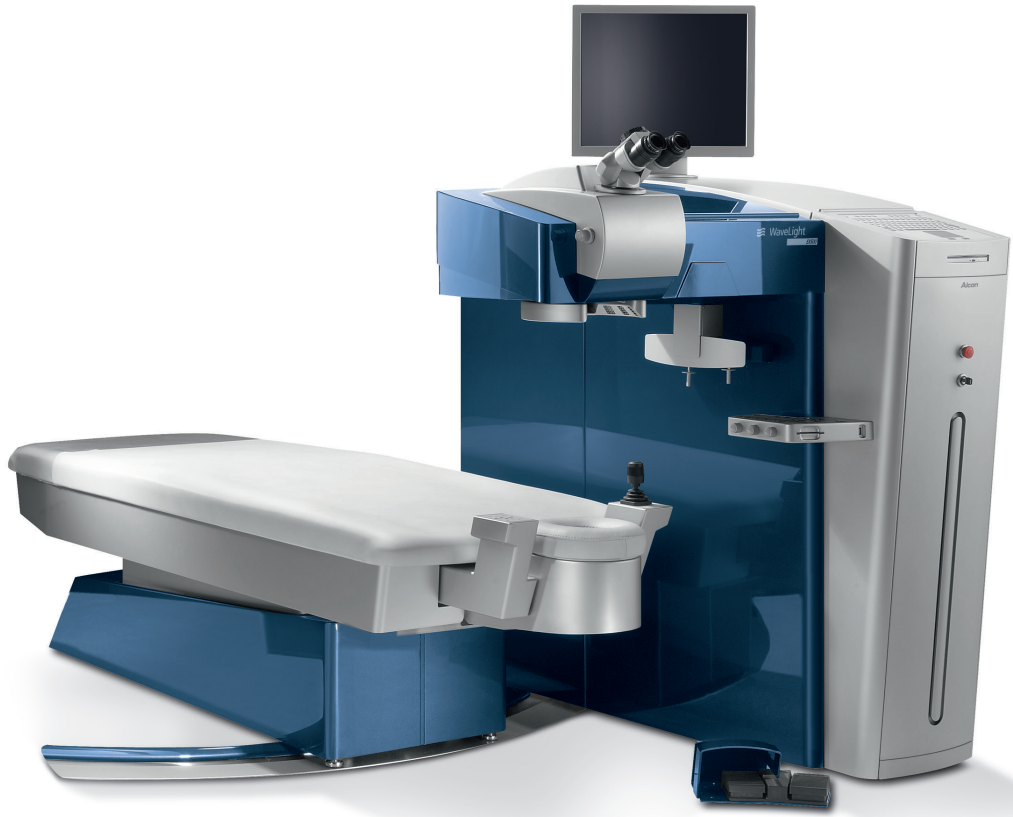
posterior cornea, lens, vitreous and retina. The displayed values give the doctor the ability to observe both the direction and magnitude of each aberration or defect. Depending on the degree and number of aberrations identified, the doctor can determine whether a patient should proceed with conventional treatment (or retreatment) or proceed with a customized ablation. The data can then be used with an excimer laser equipped with specialized software to execute a custom ablation that compensates for aberrations, allowing for better postoperative visual acuity and better vision under low-light conditions.

Even though this is a significant improvement, results are still influenced by the patient's own individual healing response. One of the main drawbacks to wavefront-guided treatments is a patients wavefront map can change over time.

The prospect of customized, wavefront-based laser surgery is exciting and has taken refractive surgery to new, higher levels of excellence. This technology will also be used in the future in grinding prescription lenses (glasses) and contact lenses to correct these higher-order aberrations. This would then allow even lens-corrected patients better, clearer vision.

Chapter 11

# THE WAVELIGHT® EX500

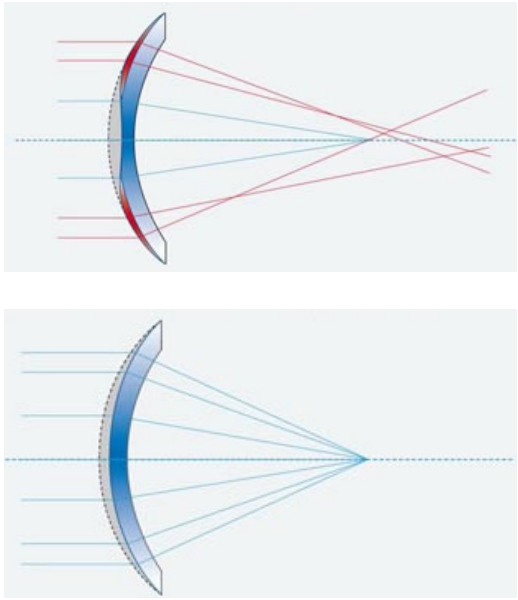


We acquired the WaveLight® Refractive Suite (Wavelight Technologie AG, Erlangen, Germany) in July of 2014. A complete system for laser vision correction, it is comprised of the most advanced excimer laser in the U.S., the WaveLight EX500, and the most advanced femtosecond laser in the U.S., the WaveLight FS200 (described in the next chapter), connected by a swiveling patient bed and computer linkage.

The fastest refractive surgery platform available in the United States, this German-designed laser utilizes PerfectPulse Technology® and was the first and latest new platform to be approved by the FDA in several years. We chose to invest in the WaveLight® EX500 because it offers superior clinical results with greater speed, precision, and safety than any other system. We now bring a customized treatment to more patients than ever before, including patients with high nearsightedness and farsightedness. We were one of the first practices in the country to acquire this laser system. The WaveLight® EX500 performs a wavefront-optimized correction as, well as, a wavefront-

guided correction. The difference is that the WaveLight® laser was built from the ground up using wavefront principles and algorithms. All other manufacturers (other than Zeiss) retrofitted their lasers to incorporate wavefront treatments. Wavefront optimization creates a wavefront-treatment profile that preserves as much of the prolate (round) shape of the cornea as possible and minimizes the side effects of glare, halos, and other symptoms of low-light vision. WaveLight® lasers first received FDA approval in 2006 for wavefront-guided treatments.

We began treating patients with this wavefront-optimized technology on August 26, 2004. Our results have been impressive. This is the first FDA approved laser to receive concurrent approval (October 2003) for both myopia and hyperopia with the broadest initial approval range from – 12.00 D of myopia (astigmatism up to – 6.00 D) through + 6.00 D of hyperopia (astigmatism up to - 5.00 D). This laser has significant technical advances, including a fast, accurate tracker that does not require pupil dilation, an ablation rate of less than 4 seconds per diopter, and a small spot size of 0.95 mm in diameter. Outcomes from the FDA study were comparable to or better than any series submitted to date, including those performed using customized wavefront ablations.



ABOVE: Oblate cornea from non-wavefront treatment leads to blurry image and poor night vision. BELOW: Prolate cornea from wavefront-optimized treatment helps incoming light rays focus on one point, improving vision.

A pioneer in the development of wavefront technology, the world's first wavefront-based custom treatment was performed on a WaveLight® laser in 1998. The normal curvature of the cornea is prolate or round. Most laser systems, however, create an oblate cornea, which is flatter centrally and steeper in the periphery. This oblate shape causes spherical aberration which degrades the quality of vision, especially at night, and often produces glare or halos. The WaveLight® EX500 uses nomograms to adjust the asphericity of the cornea to perform a prolate ablation based on the anterior curvature readings. This prolate curvature accounts for the excellent quality of vision during the day and night. It is one of only three such lasers that maintain the round shape of the cornea. The others are the Carl Zeiss MEL 80™ laser and the EX500's own predecessors, the WaveLight Allegretto and Allegretto Eye-Q.

A unique wavefront-optimized ablation profile was developed during initial wavefront research to ensure a reduction in one of the most common problems following conventional LASIK – higher-order spherical aberrations. The WaveLight® EX500 applies more pulses in the periphery of the cornea resulting in a larger, truer optical zone that preserves the natural prolate curvature of the eye.

The WaveLight® EX500 excimer laser's automatic centering mode ensures perfectly centered ablations, and the closed-loop tracking mode reconfirms every pulse before it is placed on the cornea.

The closed-loop energy control provides a stable output of energy throughout all treatments. Energy levels are checked at several points throughout the system and are automatically regulated.

One of the unique advantages of this laser is for monovision patients, who are able to achieve good near vision (J1–J2) in the reading eye while retaining better distance vision in that eye (20/30–20/60) than was previously possible. All of our patients now receive wavefront-optimized treatments.

In September 2005, Dr. Hoopes, Sr. received the prestigious Accento Award from WaveLight Inc. for his contributions to the field of refractive surgery and for being the second highest volume WaveLight laser user in the country.

Wavelight Features:

- Small beam diameter of 0.95 mm resulting in a very smooth ablation
- Optical zone varies from 6.0 to 8.0 mm with a blend out to 9.0 mm
- High-energy system (500 Hz), closed-loop for stable delivery
- Faster treatment per diopter than any other laser (1.00 D every 1.4 seconds)
- A depth indicator for measuring test ablations to ensure proper energy calibration
- Tissue-saving nomograms that produce accurate results while minimizing tissue removal
- Maintains prolate (round) shape of cornea
- Does not induce higher-order spherical aberrations
- Performs a *custom wavefront-optimized* treatment on every procedure
- Extremely low reported enhancement rates (one-three percent)
- Tracker allows independent position tracking of the iris 250 times per second with a response time of 6 to 8 milliseconds
- No dilation of eye required
- Does not rely on masks, lenses or diaphragms (like broad beam lasers) to size and scan the treatment beam
- Upgraded optics and a slit-lamp attachment which allows for checking the flap for alignment, striae, and debris while still under the laser
- Easy calibration

Chapter 12

# BLADE-FREE LASIK


One of he most significant advances in laser vision correction technology since its inception, without a doubt, is the advent of blade-free LASIK. With the goal of obtaining better results and increased safety for our patients, we obtained the IntraLase™ femtosecond laser in December 2003. We were the first Salt Lake City practice to offer this amazing new technology to our patients. We have used this, and successively more advanced lasers, for over a decade now and have created over 50,000 laser flaps, far more than any other practice in the state. As of March 2016, Hoopes Vision owns and operates three advanced femtosecond lasers for flap creation: the iFS Intralase, the Wavelight FS200, and the Zeiss VisuMax, which is the fastest femtosecond laser in the U.S. We have also tried and tested the Ziemer LDV modular femtosecond laser system. In addition to

making LASIK safer and more precise, another advantage of blade-free LASIK is the ability to make a much thinner flap; this spares additional stromal tissue for treatment and allows many patients with thinner corneas to have LASIK.

We have not experienced any serious flap complications normally seen with bladed microkeratomes such as buttonhole, incomplete, off-centered flaps, and epithelial abrasions or defects. We predict that in the future, all flaps will be made with a laser beam.

Those who do not currently use laser technology to make their flaps often downplay the superiority of blade-free LASIK by suggesting it is merely marketing hype and there isn't any real data to support its claims. Not true, there is plenty of data to support this new technology. We know of no one who actually has a femtosecond laser who doesn't believe it is superior technology and use it for the majority of their surgeries.

Many surgeons who purchased the device in the past few years did so with the idea of gaining a technology edge on the local competition. However, the message changed as clinical evidence emerged supporting claims of lower complication rates, reductions in the percentage of patients requiring enhancements, lower incidence of dry eye, and decreased amounts of induced optical aberrations. Today, there are more than two thousand femtosecond lasers in operation around the world.

The femtosecond laser utilizes a focused infrared beam to create photodisruption below the corneal surface, without generating heat or ablating tissue. It creates a planar cap, with uniform thickness throughout, rather than being thinner centrally, thicker in the mid-periphery and thinner again at the cap periphery as with the traditional razor-blade (microkeratome) technology.

It is much easier to center the flap with a laser than with a mechanical microkeratome. With the IntraLase™, for example, the surgeon can precisely position the suction ring around the center of the pupil. After achieving suction, the surgeon docks the IntraLase™ Delivery System (also

## Bladed Microkeratomes

Since the introduction of lamellar refractive surgery in the early 1980s, mechanical microkeratomes have been used to create the corneal flap. Although three generations of mechanical microkeratomes have evolved, their mechanical principles are similar. The device consists of a fixation device, a suction ring, and a cutting device, which consists of a steel razor blade that oscillates at speeds between 1,000 and 20,000 cycles per minute. It is advanced across the cornea at speeds of 1 mm to 8 mm per second.

There are a number of complications that can and do occur with bladed microkeratomes. These can be related to the suction ring, the microkeratome advancement system, blade abnormalities, and improper and poor surgical technique. In spite of significant advances in microkeratome head design, internalization of the advance system, higher quality blade design and numerous electronic console feedback safety mechanisms, there still exists an ever-present risk of a serious complication every time a microkeratome flap is created.

referred to as the patient interface or PI) and calculates a computerized centration grid. This grid can then be moved and aligned for even better and near-perfect centration. The surgeon then administers laser emission which, on the current lasers, takes under ten seconds.

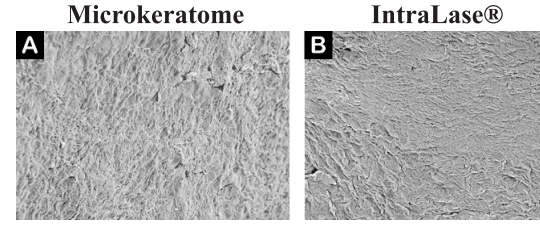
Because bladeless flap creation eliminates buttonhole flaps, incomplete flaps, flap tears, and epithelial defects, both surgeon and patient experience less anxiety. Many surgeons consider this laser an even more significant advance for LASIK surgery than customized ablations.

### Femtosecond Laser Predictability

Several studies have documented the ability of IntraLase™ to create flap diameters within ± 0.1 mm of the planned diameter. The created flap diameter is insensitive to preoperative corneal curvature. Hinge length is extremely repeatable. Flap thicknesses have been reported to be more predictable than those created with mechanical microkeratomes

By creating flaps of more predictable thickness, the laser enables the surgeon to more accurately predict the thickness of the residual corneal stroma, thereby decreasing the risk of ectasia (thinning) and permitting treatment of greater degrees of myopia. Logically, better flaps should lead to better results.

Are there any studies supporting this technology as more precise and safer? There have been a number of studies that clearly demonstrate better results and safety with IntraLase. Dr. Dan Durrie, a former partner of Dr. Hoopes in Kansas City and a current partner in the Hoopes, Durrie, Rivera Research Center, wrote concerning his research and studies on IntraLase™:



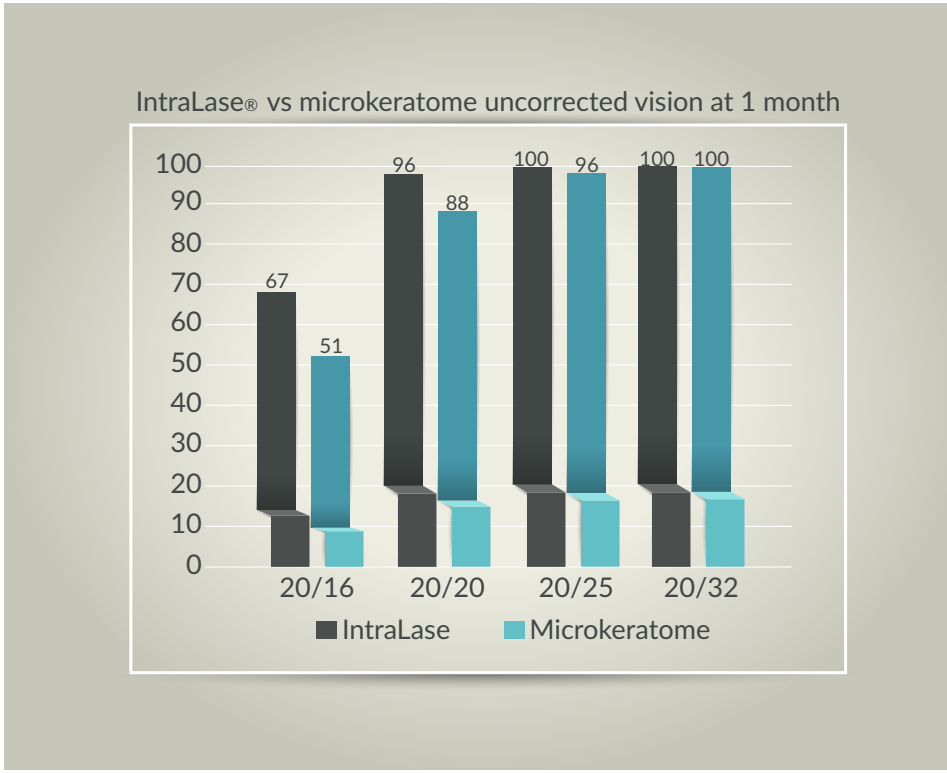
**Cornea surface comparison under magnification**

- "It's clear to me that blade microkeratomes will be a thing of the past. With lasers, we have a whole new level of control and accuracy available to us."
- "Clinical results of IntraLase have exceeded those of blade microkeratomes with 20% more patients seeing 20/20 and twice as many patients seeing 20/16 or better."
- "The need for LASIK enhancements is reduced 50% when creating flaps with [the] laser keratome."

The U.S. Navy also finished a study on the benefits of IntraLase™ on their fighter pilots who perform vision-demanding feats, such as, landing fighter jets on aircraft carriers at night. Results of the survey indicate that the IntraLase patients had better contrast sensitivity and acuity "at all postoperative time periods." The Navy now uses blade-free technology on all of their LASIK procedures.

Dr. Durrie and associates also designed a unique study comparing results with IntraLase™ flaps compared to bladed microkeratome flaps. He performed a study on 200 eyes of 100 patients undergoing custom wavefront-guided LASIK. One eye received a LASIK flap via a bladed microkeratome and the other eye

had the flap created with the IntraLase FS™ femtosecond laser. The only variable in this study was the method of making the corneal flap. Visual acuity, residual astigmatism, corneal sensitivity, aberrations, and contrast sensitivity were measured and compared for each keratome group up to 12 months postoperatively. The mean level of myopia was around –4.00 D. The parameters of the study were kept as close as possible, in order to keep the flap creation device as the only variable. The patients were masked from the treatment, and an independent observer performed the follow-ups. They also performed dry-eye testing and tested quality of vision under certain lighting situations.

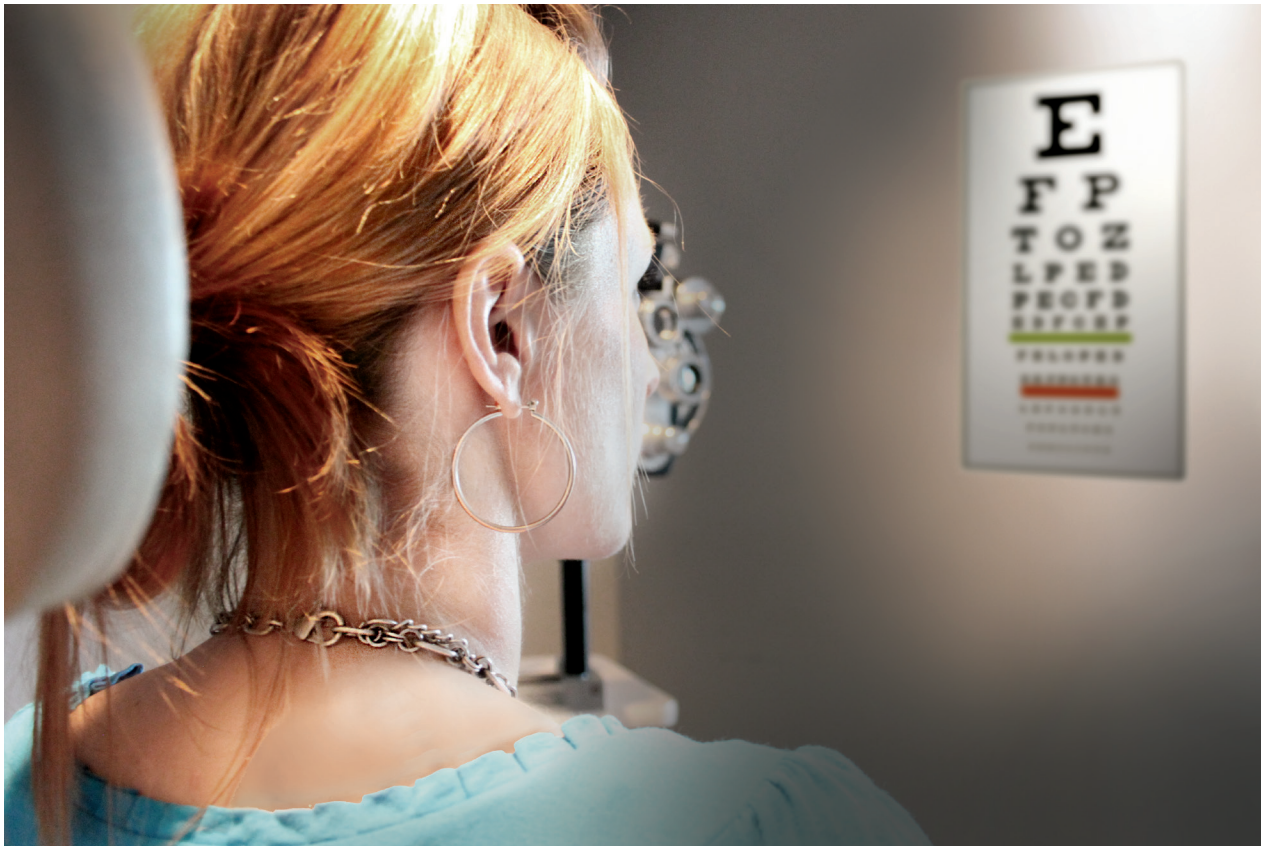



There was statistically significantly better vision in the IntraLase™ eye. Vision in the IntraLase™ eye was 20/20 or better in over 90% of patients and 20/16 or better in 75% of patients. In the bladed microkeratome group, only 45% were 20/16 or better. Contrast sensitivity was better in the IntraLase™ eye as well as quality of vision. IntraLase eyes were less dry and exhibited fewer higher-order aberrations.

Source: Durrie D. S., Kezirian G. M. Femtosecond laser versus mechanical keratome flaps in wavefront guided laser in situ keratomileusis: prospective contralateral eye study. *Journal of Cataract and Refractive Surgery.* 2005; 31(1):120-126

Chapter 13

# RETREATMENTS AND ENHANCEMENTS



Although results from laser vision correction continue to improve, a certain percentage of patients still require fine-tuning or a *touch-up* at a later date. Some of these patients may wonder why they didn't achieve 20/20 vision the first time around. There are many reasons a patient may require an enhancement surgery to achieve their best vision. This may occur even with ideal pre-operative data and a perfect surgery because of differences in each patient's genetically-determined healing response. This miraculous surgery, like everything else, has its limitations.

There are many reasons why some patients do well while others will require further treatment. One of the most critical and obvious reasons for this difference relates to how accurate the refraction

or prescription is that is programmed into the laser. The prescription a doctor gives you for glasses, contacts, or programs into the laser is the direct result of the accuracy of your verbal responses during your refractive test. Having been there myself, it can be confusing and difficult to discern the difference between *number 1* and *number 2* when looking at the smaller letters and lines on the eye chart. However, the doctor can't really see what you are seeing and must rely on your answers to arrive at a final prescription. Therefore, it is important for both the patient and the doctor to take their time and be as alert and accurate as possible during this critical test.

Patients with milder prescriptions have a better chance of seeing 20/20 or better than patients with extremely high prescriptions. The probability of needing a future retreatment appears to be proportional to the degree of correction the patient has. Patients with multiple refractive errors such as myopia and astigmatism are also somewhat less likely to achieve excellent vision when compared to those patients with just one refractive error such as simple myopia. Other reasons for differences in results include off-centered flaps and ablations, inflammation, dryness, and regression of effect. Based on our experience, we believe patients who follow their postoperative instructions carefully do better than those who don't.

As precise as the laser is, it is limited in what it can do by the actual size of the individual microscopic cells that are being removed or ablated. As a rough rule-of-thumb, 5 microns of tissue removal will produce about 0.5 diopters of correction. The problem is that a single corneal cell is 5-7 microns in diameter. Therefore, it is difficult to remove tissue at a sub-cellular level and achieve corneal sculpting finer than the size of a single cell.

After the cells are vaporized, corneal wound healing then takes place. This corneal healing response is a critical factor limiting refractive correction accuracy. Unfortunately, we still know very little about wound healing or how to control or modify it. We do know genetics play a key role. As an example, corneal tissue contains two main substances that cement the cells together, called dermatan and keratan sulfate. Patients have different, genetically determined ratios of these substances*, and this ratio can affect wound healing response, which can in turn affect final vision after surgery.

Patients will occasionally ask me what my *enhancement rate* is. Many web pages and articles suggest this to be an important question to ask before deciding on a surgeon for laser surgery. The answer, however, can be misleading for some patients; because a surgeon's touch-up rate usually has little to do with his abilities or the quality of his surgery or results, and much more to do with that surgeon's policies on performing enhancements. We know of a surgeon who often boasts of a 1% touch up rate. This sounds impressive, but the truth of the matter is that his policy is to not reoperate on anyone who sees 20/40 or better. Many discount centers will also not enhance a patient who sees 20/30 or 20/40 or better unless they pay a hefty fee. A higher enhancement rate can sometimes actually reflect the surgeon's willingness to go to great measures to help his patients see well. Perhaps, a better question is, "What percentage

of patients with prescriptions similar to mine will achieve 20/20 vision at your office?"

Is it reasonable for a patient who sees 20/25 to request an enhancement? That one line of difference can be the result of just one extra microscopic cell of thickness. It should be pointed out that the average vision of individuals who have never worn glasses or contact lenses is not 20/20 but closer to 20/30. These patients have always been able to pass the driving test (20/40 required) and their school eye-test screenings. Also, most surgeons know that enhancing a patient at this good level of vision can actually make vision worse and increase the chances of an over-correction.

The actual enhancement procedure often consists of lifting the already existing flap. We usually do not need to place the suction ring on the eye or cut a new flap. We have been able to lift flaps made by a blade up to 6 to 7 years after the original surgery. An IntraLase® flap is difficult to lift after about three years. After the original flap is lifted, the laser time is usually only a fraction of the original time. The flap is replaced and healing occurs similar to the first time. Sometimes, even if the patient initially had LASIK surgery, we may perform an enhancement surgery as PRK (treating the surface of the cornea). We have found with either type of surgery, the eye isn't quite as dry the second time around. Usually, a touch-up is truly a "fine tuning" and makes a significant and noticeable improvement. We rarely, but on occasion, have had to perform enhancement surgery for individuals over the age of 40 years who cannot make the adjustment to monovision. When this is done, they need to understand they will be dependent on reading glasses for close work.

Enhancements are not without risks, problems, or complications. About 1 in 20 touch-ups can develop microscopic cell growth under the flap that may require another lifting and scraping to remove these cells. Of course, on rare occasion, a retreatment can make the vision worse. Some patients may not have enough corneal tissue remaining after the initial surgery to safely perform an enhancement surgery.

*Wang, Ming. Limits of wavefront-guided surgery. Refractive Eyecare. Pg. 1, 32-34. Oct., 2001.

Chapter 14

# CHOOSING A LASIK PROVIDER

When laser vision correction was introduced in the mid-1990s, it was performed by a relatively small number of ophthalmologists, pioneers who saw the potential life-changing qualities of this new technology. As LASIK proved to be a safe, effective surgery with excellent results (when performed by an excellent surgeon), the procedure grew in popularity, to the point there are now well over a thousand LASIK centers in the USA.

By the late 90s, a new type of LASIK provider started to appear: discount LASIK centers. Using eye-catching ads offering LASIK at improbably low prices, these discount centers experienced success for a number of years. Rather than by doctors, these chains were started by corporations who saw LASIK as a commodity like any other; and who in many cases, answered to shareholders whose only

interest in LASIK was cutting costs and maximizing their own profits. Within a decade, dozens of these chains had gone out of business, in many cases leaving thousands of patients with lifetime guarantees they had paid for and were now useless.

While the vast majority of those discount LASIK companies are gone, a few still remain even today. A prospective LASIK patient looking to make the best decision about where to have this life-changing surgery is likely to see a wide range of providers available in his or her area. Some providers may be housed in large buildings while others are smaller. Some may bear the doctor's name, while others display the name of a regional or national chain. Some may provide a wide variety of eye care services, while others specialize in surgery only. Some may advertise extremely low prices (even if those prices are not actually available to most patients), while others are priced higher.

It would be reasonable to ask, "Is there any real difference between all these LASIK providers? If so, what's the difference and how can I know which is the best option for me?" The decision of where to have LASIK is an important one – a life-changing one – and there is often only one chance to get it right.

In our experience, the three highest priorities to patients seeking vision correction are safety, results, and cost, usually in that order. The factors that play the greatest role in determining the safety and result of a vision correction procedure are the technology used, and the experience and skill of the surgeon.

Technology plays a vital role in ensuring the safest LASIK procedure and best outcome, even more so than in most other types of surgery. This is because of the tremendous advances that are continually being made. Hoopes Vision, for example, acquired six different excimer lasers in our first 15 years in Utah, each representing an advance in safety and effectiveness over previous models. These advances are significant: for example, wavefront-optimized lasers like Hoopes Vision's Wavelight EX500 are the first ones to help eliminate complications such as nighttime halo and glare, which were some of the more common complaints with earlier lasers.

However, even the most advanced laser in the world is only as effective as the surgeon using it, so technology and experience go hand in hand in ensuring a great outcome. An experienced surgeon develops smooth and efficient surgical technique that leads to better results. In the unlikely event of any kind of complication, a more experienced doctor is more likely to have seen similar issues in the past, and know how to correct them. A surgeon who has performed tens of thousands of procedures using the newest technology is going to be more familiar with its strengths and limitations, allowing him to know who is a great candidate for laser vision correction and perhaps more importantly, who is not.

While safety and results should be the primary concerns for anyone seeking freedom from glasses and contact lenses, there's no denying that LASIK and other vision correction procedures can represent a substantial investment. The price a provider charges for LASIK is an indication of many factors.

These include:

- The cost of operating the lasers; newer, more advanced lasers have a higher cost per use
- The cost of the diagnostic equipment used to determine a patient's candidacy for LASIK, and the best treatment plan for each patient's unique eyes
- The value a surgeon places on his or her own skills and experience

When comparing price between LASIK providers, it is important to take into account the services that are or are not included in that price. For example, it is customary for the price of LASIK to include post-operative care, but how much is included? Is it a full year, or only three or six months? If temporary tear duct plugs are required during the post-operative period, are they included in the price of the surgery or are they a separate expense? If the surgeon is willing to guarantee your results, is that guarantee included in the price of surgery, or is it a separate expense?

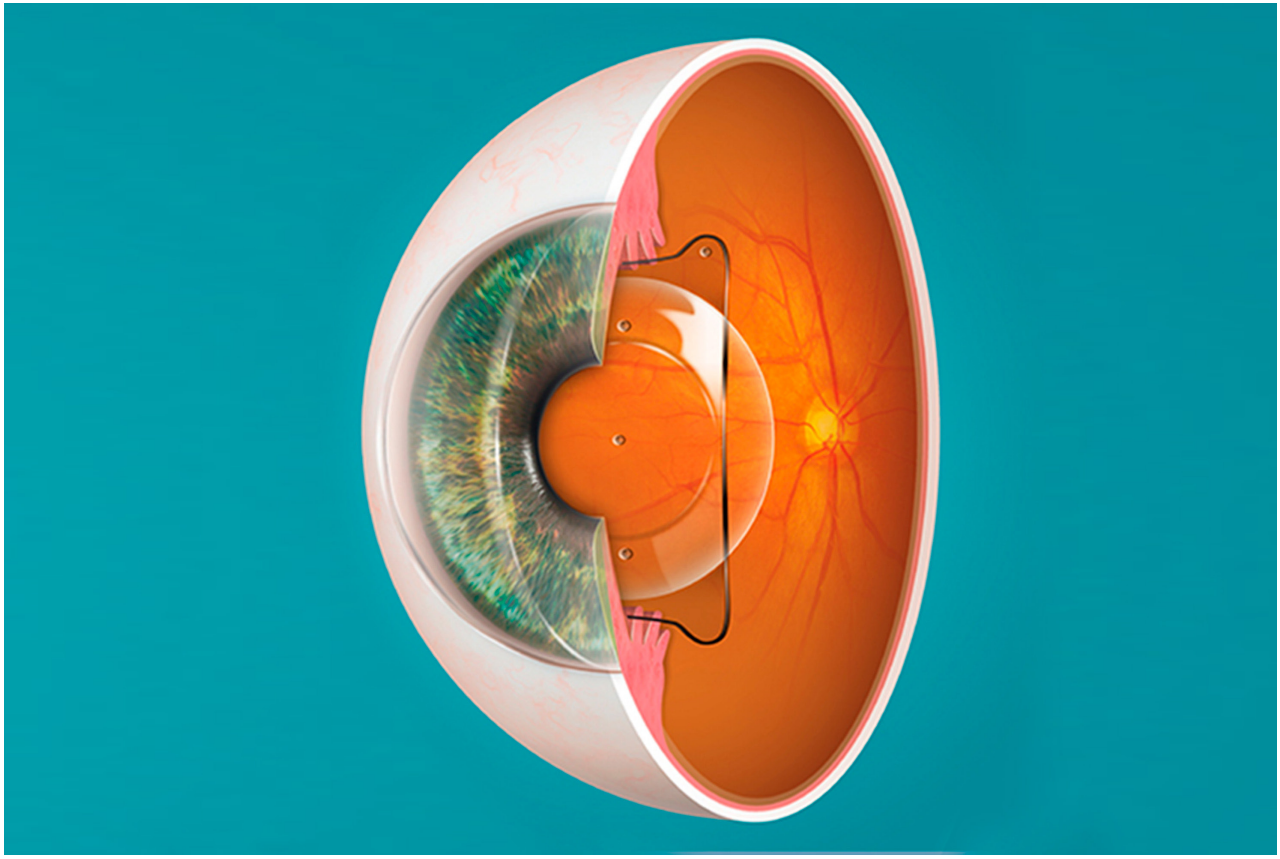
It is also worth noting advertised claims such as "LASIK as low as $299 per eye!" sound too good to be true because they are. Patients who look at the fine print at the bottom of one of those ads, or call that office, quickly find the rock-bottom advertised price is available to only a tiny percentage of people, and the vast majority are charged far, far more.

While LASIK is one of the safest, most predictable surgeries in the world today, there is a wide variance in quality between LASIK providers whose main objectives are your safety and your vision, and those whose main objective is to be able to offer LASIK at a particular price point.

Our philosophy has always been the same: to offer patients the best available technology, in the hands of the most experienced surgeons, at a fair price that is all-inclusive, with no hidden charges. Our doctors and surgery counselors are not commissioned salespeople, and in any event have nothing to upsell, since every patient receives our best possible treatment. Their only motivation is to help patients understand their options and make the most informed choices possible. What is surprising and gratifying to us, is in spite of this philosophy (or perhaps because of it), vision correction surgery at Hoopes Vision is often more affordable than at so-called *discount* LASIK centers, when comparing the actual services provided.

Chapter 15

# VISIAN EVO ICL



LASIK is an amazing procedure. Since its introduction in the 1990s, this fast, safe technology has helped millions of people see better, free from glasses and contact lenses. It is still by far the most commonly performed elective vision correction surgery in the world, and accounts for the majority of procedures performed at Hoopes Vision. But, even this miraculous surgery has its limitations: people with extremely high prescriptions, thin or irregularly shaped corneas, extremely dry eyes, or any combination of these factors, may not be good candidates for laser vision correction. Until a few years ago, those people had no choice but to remain dependent on glasses or contact lenses, but now there is an exciting new option: implantable collamer lenses, or ICLs. The Visian™ ICL was approved by the FDA in 2005, and has become known for its speedy recovery and extremely sharp post-operative vision. The ICL procedure does not involve removing any corneal tissue, it can be a great alternative for patients with thinner corneas. ICLs have become an increasingly popular option for vision correction, both in the US and abroad.

Hoopes Vision was one of the clinical research sites which studied the effectiveness and safety of EVO ICL before FDA approval in April, 2022. Our surgeons were the first in Utah to implant this newer ICL on the day of approval.

During the ICL procedure, a small artificial lens, known as a phakic intraocular lens, or pIOL, is implanted in the eye. The lens, comprised of a unique and highly biocompatible material, is rolled and inserted through a minute incision at the edge of the cornea. The lens is placed in front of the eye's natural lens, where it corrects moderate to extreme myopia (nearsightedness). The procedure typically takes less than fifteen minutes and requires no sutures. Patients usually experience no discomfort and often go back to work the next day. Currently, ICLs are approved to treat prescriptions ranging from -3 diopters to -20 diopters. Earlier types of ICLs were implanted in front of the iris, where they were visible to others, but modern implants such as the Visian™ ICL go behind the iris and are invisible to outside observers. Visual recovery is extremely fast, with most patients seeing dramatic improvement as soon as they sit on the operating bed.

Once implanted, the ICL can remain in the eye safely for the life of the patient. Typically, the ICL stays in the eye until the patient develops cataracts later in life. The ICL is then explanted at the same time the cataract surgery takes place, having provided years or decades of outstanding vision in the meantime.

As with every other advance in vision correction technology, Hoopes Vision was an early adopter of ICLs, being one of the first vision correction centers in Utah to perform the procedure. Today, Hoopes Vision is one of the highest volume ICL providers in the country, and hosts teaching events and live surgery seminars to promote knowledge of this remarkable procedure. Many well-known and highly respected surgeons from around the United States and the world travel to Hoopes Vision to receive the latest training in the highly advanced procedure that is ICL implantation.

Recently the Visian ICL technology has been improved with additional safety measures. This new generation of the ICL, now called EVO ICL has additional microscopic holes added to increase nutrient flow through the eye. These added holes eliminates the need for patients to have a peripheral iridotomy (a hole in the iris or colored part of the eye) prior to implanting the lens. The EVO ICL also has an expanded optic, which benefits patients with larger pupils and can treat both astigmatism and high amounts of nearsightedness. The EVO ICL has been implanted worldwide in more than 1 million individuals. Hoopes Vision was one of the clinical research sites which studied the effectiveness and safety of the EVO ICL before FDA approval. All the surgeons at Hoopes Vision have been certified to provide this lens to their patients.

At the time of your complimentary LASIK consultation, the doctor will be able to determine whether the EVO ICL is a safer or better option for your unique eyes and visual needs, so you may make a well-informed decision about your own surgical vision correction options.

## Chapter 16

# SMILE (SMALL INCISION LENTICULE EXTRACTION)

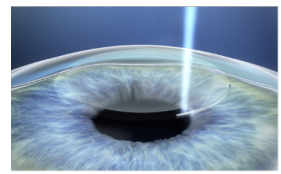
SMILE (Small Incision Lenticule Extraction) is a novel technique where just one laser is required, the Zeiss Visumax. Based on the prescription of the patient, the laser creates a thin *lenticule* (disc of tissue) inside the intact cornea. First generation laser surgery was called PRK (photorefractive keratectomy) and is still in use today, comprising 10 to 20 percent of laser corrective eye surgery in the United States. In this technique, the surface covering of the cornea (epithelium) is removed and the laser is applied directly to the surface of the cornea. This is a very safe technique but requires longer healing. Patients wear a bandage contact lens for five to six days and nights and then go through a three- to four-week visual recovery. This technique is still preferred in cases of thin corneas, irregular corneas, and some higher prescriptions.

## Rapid Visual Recovery

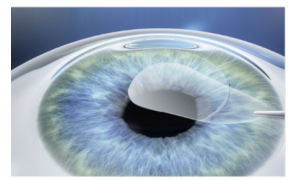
Second generation laser surgery is called LASIK (laser in situ keratomileusis). This is the most common form of laser vision correction. It involves two steps to correct vision. First, a corneal flap is made at the surface of the cornea using a laser (all-laser LASIK, intraLASIK) or a microkeratome (razor blade). Second, the flap is lifted back and the second laser (excimer laser) is then used on the exposed undersurface. Finally, the flap is placed back down into position. This allows for dramatic, rapid visual recovery.

One of the main advantages is SMILE preserves a greater amount of integrity of the structure of the cornea. This is because only a small incision is made to remove the lenticule, rather than a flap. This will potentially reduce dry eye symptoms which can be seen in some LASIK patients. Those who may not have been LASIK or PRK candidates in the past could potentially benefit from this new technique.

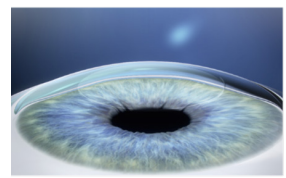
**The treatment steps**



***Step 1***
***Lenticule creation***
*A thin lenticule and small incision are created inside the intact cornea.*



***Step 2***
***Lenticule removal***
*The lenticule is removed through the incision with minimal disruption to the corneal biomechanics.*



***Step 3***
***Impairment is corrected***
*Removing the lenticule changes the shape of the cornea, thereby achieving the desired refractive correction.*

Hoopes Vision was the first center in Utah to use the SMILE technique. In preparation for this exciting surgical procedure, the surgeons at Hoopes Vision had already performed hundreds of LASIK flap surgeries with the Zeiss Visumax. Hoopes Vision has used femtosecond laser technology for the past 14 years and performs more femtosecond laser surgery than all other Utah surgical practices.

Chapter 17

# AFTER 40 VISION: CUSTOM LASER CATARACT & REFRACTIVE LENS EXCHANGE

Near and intermediate vision result from the action of the focusing muscle in the eye, called the ciliary muscle. This muscle changes the power and thus the focus of the natural lens. Over time, however, the natural crystalline lens becomes larger and harder. This prevents the lens from focusing as it once did and is why people need glasses or bifocals to read as they get older. This inability to focus, or accommodate, is called presbyopia, and its earliest symptom is difficulty seeing things up close. It usually

manifests itself around age 40, and gradually becomes more noticeable and problematic over the years.

Eventually, as the natural lens continues to age, a cataract will form. A cataract is a clouding of the natural lens inside the eye. Cataracts are a natural part of the aging process and are found to some degree in up to 65 percent of persons in their sixties, and in over 80 percent of persons older than 70 years of age. Cataracts can be responsible for glare, haziness, difficulty in reading or driving, and halos around lights at night. The visual difficulties caused by cataracts cannot be corrected by glasses or contact lenses; they will continue to worsen unless the cataracts themselves are removed.

Cataracts are treated by removing the natural lens has become cloudy, and replacing it with a clear artificial lens, called an intraocular lens, or IOL for short. Cataract surgery is performed on an outpatient basis, and is one of the safest and most commonly performed surgical procedures in the world.

Advances in IOL technology have made it so that today's cataract patient has several options for restoring their vision. The most basic option involves a conventional artificial lens, which will give good distance vision postoperatively, but leaves the patient dependent on reading glasses for near vision. A second option is monovision, a procedure where one eye is treated to provide good distance vision and the other eye is treated for good close vision, sometimes by means of a laser refractive procedure after cataract surgery. In many cases, monovision can reduce or eliminate dependency on glasses after surgery. Then there is the most advanced option: implantation of advanced IOLs such as the Tecnis® Multifocal or ReSTOR®. These newer lenses can provide excellent vision in both eyes at all distances, and can be a great option for a life free of glasses and contact lenses after cataract surgery.

An increasingly popular option for people with presbyopia is what is called a clear lens exchange (CLE) or refractive lens exchange (RLE). In this procedure, a multifocal lens is implanted before cataracts form, thus restoring good reading vision. This procedure is a popular option for patients with presbyopia who don't want to be dependent on bifocals or readers, but don't want to wait until cataracts form.

The newest advance in cataract surgery technology is the introduction of lasers. Cataract laser platforms such as the Optimedica® Catalys™ and Alcon LenSx® automate the first steps in cataract surgery for greater precision and accuracy. They can provide benefits for any cataract patient, but are especially indicated for patients who choose multifocal IOLs or whose prescriptions require incisions for correcting astigmatism. Hoopes Vision was an early adopter of this new technology, and in 2012, became the first surgery center in the world to acquire and use multiple cataract laser systems. After a head-to-head comparison study of the effectiveness of the two systems, our surgeons now exclusively use the Optimedica® Catalys™ system for cataract and CLE patients.

# Commonly Asked Questions

**DOES LASIK HURT?** There is usually no pain or discomfort with LASIK or laser vision correction surgery. The eye is anesthetized with numbing drops at the start of the procedure. Pressure can be felt, but it is not uncomfortable. For the first 12 to 24 hours, the eye can feel scratchy.

**HOW LONG DOES THE PROCEDURE TAKE?** LASIK usually takes less than 10 minutes and is performed on an outpatient basis. Patients can expect to remain at the laser center for about 2 to 3 hours on the day of the procedure.

**HOW SOON WILL I SEE WELL?** Most patients see clearly within 24 hours after surgery. Most patients are able to drive after their first day post-operative exam. Many return to work and resume normal activities within a few days of LASIK. However, it can take several weeks to completely stabilize.

**WHAT ARE MY CHANCES OF NOT HAVING TO WEAR GLASSES OR CONTACTS?** This depends on how severe your prescription is. In a random study of nearsighted patients at Hoopes Vision in 2012 (all ranges of myopia with -3.00 diopters of astigmatism or less), 95.9% saw 20/20 or better, 99.2% saw 20/25 or better, and 100% saw 20/40 (i.e. well enough to pass the driver's license vision test without corrective lenses) or better. However, there are no guarantees, and the surgery is really designed to improve and reduce your current refractive error, but not necessarily make your vision perfect. You may still need to wear glasses and, as you get older, will most likely require reading glasses to see up close (like everyone else who is not nearsighted!).

**CAN I GO BLIND?** To date, there haven't been any cases of blindness reported from LASIK, and there were no serious vision threatening problems encountered in the FDA studies for approval. There have been cases of worse or reduced vision following PRK and LASIK that were related to infections, haze and scarring, flap formation, or improper positioning. Many of these problems were improved at a later date. As with any type of surgery, anything can happen. We have had no serious sight-threatening problems in our practice.

**CAN I STILL WEAR CONTACT LENSES AFTER SURGERY IF NOT FULLY CORRECTED?** If you could wear contacts before surgery you should be able to afterwards. If you were having problems using contacts before surgery because of dry eyes and discomfort, this could still be a problem. The surgery does change the shape and contour of the cornea afterwards, which could make proper contact lens fitting more difficult. However, a careful and patient doctor should be able to find the proper fit.

**WHAT IF I MOVE MY EYE DURING SURGERY?** Our lasers are equipped with tracking mechanisms (trackers) that follow any eye movement made during surgery. This system brings peace of mind for patients worried about moving their eye during surgery.

**WHAT TYPE OF ANESTHESIA WILL BE USED, AND WHAT IF I'M NERVOUS?** The only type of anesthesia used is anesthetic or numbing eye drops. These are very effective in making this a truly painless surgery. If you are very nervous and cannot relax, the doctor and nurses will give you some medication to take by mouth to help you stay calm.

**CAN I HAVE SURGERY ON BOTH EYES ON THE SAME DAY?** Yes. Most surgeons operate on both eyes at the same setting.

**DOES IT LAST, OR WILL I NEED TO HAVE IT DONE AGAIN?** Results are permanent. Fine-tuning or enhancement treatments may be performed within the first year to attain the final desired correction. In the past, enhancements were needed for between 6-10% of patients. With the new technology of bladeless flap creation and wavefront optimized treatments, between 1 and 3% of patients are requiring an enhancement.

**WHAT LIMITATIONS ARE THERE AFTER SURGERY?** It is suggested immediately after surgery the patient should go home, relax, and sleep for a few hours, if possible. You will be asked to place drops in your eyes about every 2 - 4 hours and artificial tear drops more frequently. Many patients return to work the next day following their postoperative exam. It is not wise to drive until you are seeing well, which is usually by the next day. You should wear protective clear shields over your eyes at night the first week to keep from inadvertently rubbing them.

**WHAT IS YOUR SEE CLEARLY GUARANTEE AND ASSURANCE PROGRAM?** We are so confident in our technology and results we back it up with a full money back guarantee. This guarantee insures your procedure so if you don't obtain at least 20/25 or better vision in your 12-month LASIK postoperative period, we will refund your procedure cost. Our See Clearly Assurance Program provides the security of knowing if your vision ever falls below 20/40 (20/50 or worse), we will provide enhancements or touch-ups at no additional charge, subject to conditions of the program. Most, but not all patients, qualify for this guarantee. Details are given at the time of your initial evaluation.

**WHAT IS THE HOOPES, DURRIE, RIVERA RESEARCH CENTER?** Our reputation for excellence in eye surgery means we are often selected to participate in and perform clinical research studies. Our doctors participated in many of the clinical trials involved in the development of laser vision correction surgery. These studies are performed for companies involved in research and development of new technologies and improvements in surgical outcomes.

**HOW EXPERIENCED ARE YOUR DOCTORS?** As of June, 2022, the surgeons at Hoopes Vision have performed more than 120,000 LASIK and refractive surgery procedures and over 200,000 total vision correction surgeries. There are only a few clinics in the country with that much experience and even fewer who have access to the facilities and technologies available to surgeons at Hoopes Vision.

# Refractive Surgery Glossary

**ABERRATIONS** Distortions in light rays or waves as they pass through the cornea and lens to the retina. Caused by irregularities and imperfections encountered along the visual pathway.

**ABERROMETER** Device capable of detailed measurements of lower and higher-order aberrations or distortions present in the optical system of the eye.

**ACCOMMODATION** The ability of eye to focus on near objects. Accomplished by changing the shape of the crystalline lens of the eye. Decreases with age, necessitating the use of reading glasses.

**ASTIGMATISM** A condition where the surface of the cornea is shaped oblong like a football or the back of a spoon rather than round. This causes light to focus at different planes on the back of the eye and causes doubling or bending of straight lines and objects.

**AXIS** The direction of the astigmatism in degrees.

**CATARACT** A clouding of the normally clear crystalline lens of the eye.

**CO-MANAGEMENT** Currently accepted arrangement where the referring doctor, usually an optometrist, provides most of the pre-operative, follow-up, and postoperative care of the patient he/she referred to the surgeon.

**CORNEA** The clear, transparent covering of the surface of the eye. One of the two refractive lenses of the eye. Receives the laser light energy on its surface to flatten or steepen the center.

**CORNEAL TOPOGRAPHY** A computer generated map of the shape and elevation of the surface contours of the cornea. Colored topographical maps help identify astigmatism, keratoconus, and postoperative shape changes of the cornea.

**CUSTOMIZED ABLATION** A laser procedure where treatment or photoablation patterns are derived by direct input from wavefront measurements, including higher-order aberrations, not conventional phoropter based measurements.

**CYCLOPLEGIC REFRACTION** Measuring and testing the refractive error of the eye after strong dilating drops paralyze the muscle that focuses the eye. Gives a truer measurement of the eyes' optical system and avoids overcorrections.

**DIOPTER** The unit of measurement of the refractive strength or error of the eye and the ability of the human lens to focus light rays. One diopter will focus light one meter behind the lens.

**ENHANCEMENT** A surgical treatment or fine-tuning of a refractive surgery result.

**EPITHELIUM** The thin layer of cells on the surface of the cornea. This layer is usually removed in PRK and takes several days to replicate and grow back.

**EXCIMER LASER** Uses argon-fluorine gas to produce a *cool* invisible ultraviolet light beam of energy, which very precisely removes tissue. Eye trackers are available on certain lasers and allows the laser beam to follow and keep up with any inadvertent eye movement during the surgery.

**FARSIGHTEDNESS (HYPEROPIA)** A refractive error where light focuses behind the back of the eye or retina. Often confused with the reading problems associated with aging. Usually caused by the cornea being too flat, the eye too short, or a combination of the two. These patients can have difficulty seeing clearly both in the distance and close up. Surgically treated by steepening the cornea.

**FEMTOSECOND LASER** A laser with an extremely short pulse time. In eye surgery, femtosecond lasers are used to create flaps for blade-free LASIK procedures, as well as in laser-assisted cataract and cornea transplant procedures. Hoopes Vision was the first practice in the Salt Lake City area to acquire a femtosecond laser (IntraLase) and perform blade-free LASIK.

**HYPEROPIA** See farsightedness.

**IMPLANTABLE COLLAMER LENS (ICL)** A small artificial plastic corrective lens that is placed inside the eye in patients who are very nearsighted or farsighted. The normal human lens is left in place and not removed.

**INFORMED CONSENT** The process of educating a patient about a medical procedure and its alternatives. Should cover the risks, complications, and benefits to be expected. Signature on the consent form acknowledges the patient's acceptance of these risks and understanding of the procedure.

**INTRAOCULAR LENS (IOL)** A small, plastic artificial corrective lens that is placed into the eye for the correction of refractive errors. Mainly used after cataract removal but clinical trials are being conducted on their use in correcting higher degrees of myopia and hyperopia.

**IRREGULAR ASTIGMATISM** Distorted or irregular curvature on the cornea resulting in blurred vision.

**KERATOCONUS** An abnormally shaped cornea where the center becomes thinner and cone shaped. Creates blurred and distorted vision which is usually best corrected by careful contact lens fitting. Can progress and often leads to a corneal transplant. Is a contraindication to refractive surgery.

**KERATOME** The automated instrument used to create and make the corneal flap. Uses sharp disposable blades that oscillate at high rates to produce precise cuts.

**LASER** Used to produce a high-energy beam of light and is commonly utilized in industry and medicine.

**LASIK (LASER IN-SITU KERATOMILEUSIS)** A procedure for correcting refractive errors where a corneal flap is created with a microkeratome and laser is applied to the stroma beneath to mold or reshape its contour. The flap is then replaced back into position.

**LASER VISION CORRECTION** An all-encompassing term referring to the use of the excimer laser to correct refractive errors such as myopia, hyperopia, or astigmatism.

**LOW MYOPIA** Mild myopia of two diopters or lower.

**MODERATE MYOPIA** Nearsightedness ranging between two to five diopters.

**MONOVISION** Where one eye is corrected for distance and the other eye for close-up or reading.

This is usually done with contact lenses, but can also be accomplished with refractive surgery.

**MYOPIA** See nearsightedness.

**NEARSIGHTEDNESS (MYOPIA)** A refractive error where light focuses in front of the retina. This is caused by the eye being too long or large, the cornea being too steep, or a combination of the two. Without correction, a myopic person sees poorly in the distance, but clearly up close. Surgical treatment consists of flattening the curve of the cornea.

**OPTICAL ZONE** The center of the cornea where the laser photoablation takes place. The diameter of this circle or zone can range between 5 to 9 mm depending on which laser is used.

**OVERCORRECTION** Is obtained when too much tissue is removed or from excessive healing properties of an individual eye. This means an over-treated myope ends up a little farsighted. Additional laser treatment can now reverse most cases of overcorrection.

**PHOTOABLATION** The use of focused laser light energy to remove tissue.

**PRK (PHOTOREFRACTIVE KERATECTOMY)** Laser treatment of the surface of the eye or cornea where the epithelium is removed creating a large abrasion.

**PRESBYOPIA** A condition of the eye caused by aging and usually occurring in the early or mid-forties when accommodation is lost creating difficulty reading or doing close work.

**REFRACTIVE ERROR** When light cannot focus clearly on the back of the eye because of structural abnormalities or defects in focusing ability and strength. Includes myopia, hyperopia, and astigmatism.

**REFRACTIVE SURGERY** The surgical specialty and art of correcting or reducing refractive errors of the eye. Procedures include RK, AK, PRK, LASIK, LASEK, phakic intraocular lenses, and corneal rings.

**RETINA** The lining in the back of the eye that contains photoreceptor cells such as rods and cones. Transmits light images through the optic nerve to the brain for interpretation. Often compared to the film in a camera.

**SMILE TECHNIQUE** Short for small incision lenticular extraction, SMILE is a new procedure wherein the femtosecond laser, the Zeiss VisuMax, bladelessly *cuts* a thin, lens-shaped section out of the central layer of the cornea. This section, or lenticule, is then extracted by the surgeon through a tiny access incision that is 80% smaller than the cut required to make a flap for LASIK. The result is a surgery that can provide the same outstanding vision as LASIK, but with an even faster, more comfortable healing period and no flap. Hoopes Vision is the first center in Utah, and one of the first practices in the United States, to perform SMILE.

**STRIAE (WRINKLES)** Folds that can occur in the corneal flap following LASIK surgery. Corrected by lifting or irrigating under the flap and repositioning it.

**TOPOGRAPHICALLY GUIDED** Topographically guided procedures are based on extremely detailed and accurate maps of the patient's cornea, known as corneal topography. They represent the next step in customization, after wavefront guided and wavefront-optimized procedures.

**VISUAL ACUITY** The measurement of how well a patient sees. Usually performed on an eye chart (Snellen) where the larger letters are on the top and the smaller ones on the bottom. Testing is usually performed 20 feet away from the chart.

**WAVEFRONT MAP** A mathematical plot of *wavefront* data points that are reflected back from the eye after light rays are directed into the eye, through the cornea and lens and focusing them on the retina.

# Testimonials

Since opening our doors in 2000, we have had the privilege of helping tens of thousands of happy patients see the world clearly, free from their glasses and contact lenses. These patients have come from every walk of life: from bestselling authors, NFL players, Olympic athletes, and media personalities; to the teacher, nurse, police officer, or computer programmer next door. Some of these patients have been so excited about their new vision that merely telling family and friends wasn't enough – they wanted to share the good news with the world. Here are some of their stories. Please visit hoopesvision.com/testimonials for more patient experiences.

"In my business, I wanted to be certain that I went to a doctor who I could trust, and someone who had plenty of experience. I started calling friends in the health care field and asked them who has this kind of reputation and who could I trust my eyes with. The answer was unanimous, Hoopes Vision. My own optometrist recommended them! My brother-in-law, who is an ophthalmologist, and could have performed the surgery himself, even told me to see Dr. Hoopes!

Postoperatively, the improvement was dramatic and by my check-up the next day, I was already 20/20! I could read the time on my alarm clock the next morning! Less than a week later I headed off to Pebble Beach for a tournament. During practice, I was amazed at how comfortable I was not having to worry about my glasses. I felt I had more freedom with my golf swings. However, I knew the big test would come on the putting green. Would the slopes appear the same? Would I be able to judge distances better? My first putt was a 25-footer and to my total amazement and disbelief, it went in!

I strongly recommend custom wavefront LASIK and the surgeons at Hoopes Vision to anyone considering this life-changing miracle of modern medicine! I recommend Dr. Hoopes and his staff to everyone."

**MIKE REID**
Professional golfer, Orem, Utah

"Fifteen years ago, I had corrective eye surgery to help my distance perception and green reading. In the past couple of years I've noticed that although I still see very well, my ability to read many small contours on the greens has decreased. I had a consultation with Dr. Hoopes, Jr. and decided to have an enhancement procedure to help me with this. I've been impressed with the technology and experience available at Hoopes Vision. Thanks Dr. Hoopes."

**MIKE WEIR**
2003 Masters Champion

"After spending over 30 years requiring assistance to see and attempting to lead an active lifestyle I was more than ready to get rid of my glasses and contacts. But like most who are considering eye correction surgery I was concerned about who I could trust to perform the procedure. Over the years when ever talking to anyone who had LASIK or PRK done, everyone who had gone through Hoopes Vision had nothing but great things to say about Dr. Hoopes, the staff and how well they could see.

Growing up bike racing and now working in the cycling industry I now think back on all of the issues I dealt with like fighting wet, dirty or fogged up glasses or contact lenses shifting around in my eye, drying up or falling out. My vision was very poor and coupled with my astigmatism I did not think I would even be a candidate. The knowledgeable and friendly staff at Hoopes Vision put me through the most thorough exam I have ever experienced and determined that I would benefit best with the PRK procedure. I can honestly say that my life has gotten easier with not having to deal with corrective lenses and enjoy being active without the restrictions I had experienced in the past. I highly recommend anyone who is considering LASIK or PRK see Dr. Hoopes. They will be glad they did; I know I was."

**STEVE SPENCER**
Two-time National Champion BMX Racer

"Hoopes Vision has changed my life forever! Being a computer nerd my eyeballs where starting to get worn out and my near sighted vision became debilitating. I didn't enjoy wearing soda bottle glasses while skiing and enjoying insane video games. I was very nervous being I was only born with one set of eyeballs. The whole experience was incredible and exceeded my expectations. Thanks Dr. Hoopes. You are awesome!!"

**DAN "THE LAPTOPMAN" YOUNG**
CEO - PC Laptops

"After struggling with contacts and glasses for over 20 years, I finally sought LASIK correction with Dr. Michael Bradley at Hoopes Vision. Dr. Bradley was very personable and knowledgeable. He made me very comfortable with the process and I could not be more pleased with the results. It is amazing just to be able to go to my crying baby in the middle of the night without fumbling for my glasses. My only regret is that I waited so long!"

**CARA LARSON**
South Jordan, UT

"My experience with Hoopes Vision was incredible. The doctors took genuine interest with my situation and made sure that I received an exact diagnosis of what laser they needed to use on my eyes. If there was ever a doubt about the risks or professionalism of LASIK, Hoopes Vision removed those concerns. They were very professional and thorough. The day of surgery was not a stressful day of any sort. I was amazed on how short the surgery was. But I was even more amazed on the immediate results. The day after surgery I had 20/15 vision and was able to see 20/10 characters by my next doctor's visit. Dr. Hoopes and his team are one of the most qualified practices in the country and on top of that, they have the best equipment available. Due to the results and my experience that I have had, I would recommend it to anyone who wants to wake up and have their vision back. Without a doubt, this was an easy decision for me and Hoopes Vision made it everything I had hoped for"

**JACKSON EMERY**
Former BYU Basketball Star

"My husband and I had heard about the good reputation of the surgeons at Hoopes Vision, here in New Orleans. I had been previously told that my corneas were too thin and my prescription was too high (-9.75) for LASIK or even PRK surgery. We made the trip in October 2011 and it was one of the best decisions of my life. Dr. Rivera explained that I was an ideal candidate for the ICL procedure, which I underwent the following day. I was comforted to learn that he has more experience placing this implant than any other surgeon in the country! I was amazed that I could see so well right after I sat up from the surgery. The next day my vision tested 20/15! Thank you Hoopes Vision for your skills, kind and caring ways. You will be receiving more patients from here I can assure you."

**MICHELLE YAO**
New Orleans, LA

"My life as a constantly touring musician, but more importantly a composer, demands great levels of concentration; I need to read the small notes and write them down quickly and accurately as they come into my mind. Being told that I had cataracts was a reminder that my lifestyle was changing and I would need to make the decision to wear bifocals or at least glasses to keep up with my workload.

I tried glasses but they were always inconvenient for me. Then I heard about a new type of cataract surgery (multifocal implants) that would potentially give me back what I was losing, being able to see like I needed to. Everyone I spoke to, including my own optometrist, Dr. Robert Briggs at Park City Vision Center, suggested Hoopes Vision for my surgery. I went for an examination to find out what it was all about. Our eyes are so much a part of who we are and I didn't know if it was right for me, it seemed like a big step. I was undecided until I met Dr. Phillip Hoopes, Jr., and he explained everything in detail, what I could expect and what the future held either way. After the visit I was sold, the facility was like a family home and they were the nicest people and, I felt, very sincere. I had the surgery and wow! I saw things I hadn't seen in years, close up and distant and the surgery took less than 15 minutes each eye. I would recommend Hoopes Vision to anyone that wants to get their eyes back and see the world close up. It will change the way you live!"

**LORD GRAHAM RUSSELL**
Singer/Composer, Air Supply

"Since 1971, I required corrective lenses to play baseball: high school, college, and 10 years in the major leagues. I had heard of LASIK from family, friends, and reading but was not sure I wanted to take the risk with the only set of eyes I have. My desire to rid myself of the constant need for glasses, along with the advances in LASIK technology finally pushed me to look into it. I read about different doctors and clinics and even visited one for an evaluation. I then heard about Hoopes Vision first from my sister–in–law, and then called a good friend, Mike Reid, who recommended Hoopes without reservation. From the first time I stepped into their beautiful facility, the treatment was first class, from the receptionists to the vision specialists to Dr. Phillip Hoopes, Jr. All of my questions were thoroughly answered, never rushed to feel like just a number. They know how important vision is to their clients and had a feel for the trepidation one has for such a weighty decision. I decided to have the surgery done after seeing and hearing of the success of patients that I know personally. Add that to the vast experience of Drs. Hoopes and their state of the art laser technology and my decision was simple. My surgery went smoothly and was pain free and my vision tested 20/20 by the next day! It is nice not to be tied down to a set of glasses each morning when I wake up. I am still enjoying baseball, but now I am enjoying it without glasses."

**VANCE LAW**
Former BYU Baseball Head Coach, MLB All-Star

"As a mogul skier on the US Ski Team, every competition is important. Several times I have had my contacts blur while I am part way through my mogul run, or upside down in a backflip. This is the main reason I decided to have the surgery, however I had no idea how incredible it would be for daily life as well. In years past I have had two other preliminary appointments from other eye centers, but was not comfortable enough to trust them with surgery on my eyes. At Hoopes Vision, everyone from the first person I talked to was friendly, informed, and I was encouraged to ask questions. At my preliminary appointment, every person I worked with introduced themselves, explained what they were doing, and had a smile on their face. When I met Dr. Hoopes at the first appointment, he was personable, took the time to review my chart, and walked me through what to expect during the surgery. It was also impressive that I never waited even ten minutes to start my exams, or the procedure. They were very clear with the instructions throughout the process, and whenever I had questions they got back to me the same day. Now, three weeks after my surgery some of the main changes I have noticed include: waking up able to see, not dealing with the hassle of contact lenses and glasses, and I am seeing better than I ever did with my prescription eyewear! Thanks to Dr. Hoopes and the rest of the staff at Hoopes Vision Center, I am looking forward to training and competing without fear of not being able to see at any given moment. Thanks, Dr. Hoopes!"

**HEATHER MCPHIE**
US Ski Team

"As a writer, I work my eyes pretty hard. As my vision got worse, I knew I had to do something. I had tried glasses, but they gave me a headache. Contacts were such a bother I just stopped wearing them. I had many friends who raved about LASIK surgery, but I was a little nervous about the procedure. I asked my assistant to research LASIK centers across the United States and find the best. Cost was no object. When she came back with the recommendation of Hoopes, just a few miles from my home, I was a little suspicious that she had opted for convenience. (I guess an expert is always in the next state.) But she defended her decision with some pretty impressive research. My consultation with Dr. Hoopes and his staff confirmed what my assistant had said. I felt completely confident in my decision and the procedure was quick and painless. The doctors at Hoopes took no chances: they checked my eyes over and over again to make sure everything was just right. I was kept informed every step of the way. After the surgery, my vision quickly became clear. Not only could I see trees on the mountains, but I realized it had been years since I had really seen the faces in the audiences I was speaking to! I was amazed at how much I had been missing! I'm not surprised that Hoopes has a national reputation. I've already recommended Hoopes to several family members."

**RICHARD PAUL EVANS**
Author of Over 30 NYT Bestselling Books

"I am now 49 years old. I started wearing contact lenses during my college years. After I stopped playing basketball professionally, I began to wear glasses full-time instead of contacts. I became interested in LASIK surgery years ago but I was comfortable with my glasses and afraid of the LASIK procedure. Two years ago, in 2007, I finally got up the courage to see if I might be a candidate for LASIK. Dr. Hoopes and his staff did an excellent job helping me feel confident with the LASIK procedure. I took comfort in knowing that Dr. Hoopes' experience is unparalleled in the industry. After the procedure my vision was 20/15. Now two years since undergoing LASIK, my vision is as crisp as is was when the surgery was performed. Looking back, would I have done anything different? Just one thing–I would had have the surgery years earlier! Thank you, Dr. Hoopes. I am a very grateful and satisfied customer!"

**DEVIN DURRANT**
Former NBA Basketball Player, NCAA All-American, Author/Real Estate Investor

"For over 28 years I have been a soldier and have been exposed to dangerous environments. My eyes have been hard to protect while wearing corrective glasses with goggles. During airborne operations it is difficult to see while jumping and not expose your eyes to high winds. After my procedure I deployed to Iraq and felt fully confident with my vision in all situations. While flying or conducting convoys I was able to protect my eyes without fogging. My new vision allowed me see in all tactical environments. I was able to see with no limitations and was fully capable to complete my mission."

**PAT VALDEZ**
Command Sergeant Major, United States Army, Stockton, UT

"As captain and driver of the Jamaican national bobsled team, I depend on my eyes to get our sled across the finish line first. Unfortunately, I wasn't one of those people born with perfect vision. I asked my optometrist, Dr. Russell, about LASIK surgery, and he recommended that I travel from our team training camp in Wyoming down to Utah, to visit Hoopes Vision.

At Hoopes Vision, I was impressed with everything - the clean, modern facility; the warm, friendly staff; the extensive collection of equipment; and the doctors. The day of my surgery was smooth and totally stress-free. I now see 20/20, and I'm back training with my team – only this time without glasses or contact lenses! Thanks to Dr. Hoopes and everyone at Hoopes Vision, we'll be "The Hottest Thing on Ice" once again!"

**WINSTON WATTS**
Captain, Jamaican National Bobsled Team

"Corrective LASIK surgery is amazing! It is one of the best things I have ever done for myself. I would have done it years ago if I had known what a difference it would have made. I considered having it done about 2 years ago but didn't feel good about it at the time and opted to wait. I'm glad I did! Dr. Hoopes used the new Allegretto Wave laser – now my eyes are corrected and with confidence! No more contacts, contact solutions, irritated eyes, lost contacts wakeboarding or glasses! It has been amazing to get up and see the alarm and to clearly see the beautiful mountains and lakes all without glasses or contacts! That first morning after surgery was truly a treat – I could hardly contain myself! Even my staff noticed my excitement that morning and ever since. As a surgeon and patient I recognize and appreciate Dr. Hoopes' expertise and their staff's professionalism."

**KIMBALL CROFTS, M.D.**
Plastic Surgeon, Lindon, UT

"My eye problems began at the age of 10. By the time I was 15 I was wearing contact lenses. As the years went by my eye sight progressively got worse - to the point where I could not function without my lenses in all the time. My prescription was a -8.25 which means the big "E" on the test was a blur. Because my corneas were too thin, I wasn't a candidate for Lasik or PRK. I was starting to lose hope until I got a call from Hoopes Vision last autumn telling me about Dr. Rivera and the new procedure ICL. I felt confident that the doctors at Hoopes Vision would not recommend any procedure that they were not sure would be safe and effective. The procedure was easy, painless and the recovery was quick. I went in and they inserted new lenses in my eyes. As soon as they finished I was able to see! For the first time in my life I have perfect vision. I take people to Italy on tours for a living, and now I'm able to see Italy through a brand new set of eyes - hassle free! Every day I am grateful for this miracle that has changed my life. Thank you Dr. Rivera and Hoopes Vision!"

**KERI EVANS**
Tour Guide

"I recommend anyone seeking this modern-day miracle of vision correction to trust the most knowledgeable, technologically advanced LASIK professionals available – at Hoopes Vision. My vision was so horrible that Hoopes was the only institute willing and competent enough to perform the surgery. For almost 20 years, I had been enslaved to coke-bottle glasses and expensive contact maintenance. Now, after the very quick and comfortable procedure, I have the vision of a pilot and a deep gratitude for this truly life-enhancing fortune. Eyesight is too precious to negotiate with mediocrity. Hoopes IS excellence!"

**REBEKAH LAW**
Singer/Actress Nashville, TN

"I was a nearsighted little kid from about the age of 12. Actually I was nearsighted at a much earlier age...I just didn't know it. I got my first pair of glasses when I was 12 and was thrilled. I could see the individual leaves on the trees. The mountains near my home in Ogden were no longer a blur of beige and green. I could read the blackboard in class.

Glasses were great at first but then I started to hate them. They slipped down my nose. They got scratched all the time or they were broken. I couldn't see when I went swimming. Contact lenses? I couldn't wear them. They turned my eyes into burning red holes that I could barely see out of after about an hour of wear. Then, the miracle of laser vision correction...LASIK...and the glasses are gone forever. Dr. Hoopes has restored my eyesight to where it needs to be with a short, painless procedure. Now I don't have to reach for a pair of glasses when I get up in the morning. I can ride my bike or work out at the gym without heavy, thick glasses sliding down my nose or fogging up. I don't have to carry a pair of glasses and a pair of sunglasses with me and keep switching them back and forth.

The experience I had at Hoopes Vision was top shelf all the way. I got the most thorough eye exam I'd ever had and everyone was friendly and professional. It's probably the only surgical procedure I've ever had that I could say was actually kind of fun. Thanks Dr. Hoopes."

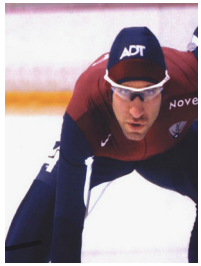
**BILL ALLRED**
X96 Radio Personality

"Hi, my name is Taan Robrahn and I was a member of the Australian National Snowboard Team (Boarder cross). I competed on the World Cup Tour for 6 years and represented Australia in 3 World Championships. I recently had LASIK at Hoopes Vision and it is AMAZING!! I have better vision now then I did with contacts, and it has helped with my snowboarding as well.

The final tipping point where I knew I had to get LASIK was at a race in Canada. I was getting warmed up before my qualifying run and one of my contacts got dry and popped out into my goggle. As I took off my goggles and put my contact on my finger a random gust of wind came and blew my contact away. I ended up having to race only being able to see out of one eye. It had to be one of the scarier situations I have been in, hitting a 70-foot tabletop jump with three other guys right next to me. It probably would have been scarier for them if they knew I could only see out of one eye!!!

I figure that when it comes to your vision, you need to do your research and choose the best. Hoopes Vision was the most professional and experienced eye center I have ever been to and I would trust them with my vision any day."

**TAAN ROBRAHN**
Professional Snowboarder



"As a professional athlete, I depend on my sight to perform my best. Simply put, perfect eyesight creates perfect physical balance. In speed skating you are balancing on a very thin blade. Proper balance leads to proper physical alignment which gives you the ability to generate power into the ice...and go fast!

Dr. Hoopes brought me from 20/200 to 20/20 THE DAY AFTER my procedure! With perfect vision, my speed increased! The folks at Hoopes are very professional and knowledgeable. I also like that Dr. Hoopes has the best lasers around and has the most experience with those lasers. Within 24 hours; I was comfortable, saw an improved vision from 20/200 to 20/20 and was back to work. It is with great respect that I highly recommend Dr. Hoopes to perform any LASIK procedure. Thanks Dr. Hoopes!"

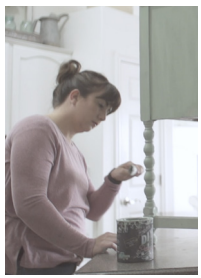
**NATE DIPALMA**

Speed skater- 10K World Record Holder, National Champion 1500M

"I can't tell you how many times I have lost a contact during a game and have had to scramble to find another one or call it a night, because I couldn't see. I had fears about LASIK, but finally decided to look into it. After meeting with Dr. Hoopes, I felt very confident about the procedure. I chose Hoopes Vision because they have the newest, safest technology and the most experienced doctors. The best part is now that it is done, I don't have to worry about losing a contact during the game. So, thank you Dr. Hoopes and everyone at Hoopes Vision for being so nice and supportive of an old mascot."

**JAZZ BEAR**

Salt Lake City, UT



"Hoopes Vision is awesome! I was so tired of having my glasses slip off my nose when I'd be working on projects or just playing with my kids. I went to Hoopes Vision, found out I was a good candidate for surgery and a week later stepped into the LASIK surgery area. Now I can see clearly without those annoying glasses and look forward to many project and activities with family and friends! Thanks, Dr. Hoopes – I couldn't be happier!"

**JAMI RAY**

VINTAGE YOUTUBE

"I cannot say enough to express my gratitude to Dr. Hoopes and his staff for the way they took care of me during my LASIK experience. I am now living without the hassle of contact lenses and loving every minute of it. My vision is currently better than 20/20, and I now see better after the procedure than I did with my contacts. My only regret is that I did not see Dr. Hoopes years ago.

As a professional football player, I depend greatly on my vision to do my job. I simply cannot play if I cannot see. Losing a contact during a game is frustrating. I have had to sit out during games while I waited for a trainer to dig up a spare contact. Those days are gone. Also gone are the days of red irritated eyes because of wearing contact lenses for long periods of time.

For years I would hear of how happy people were with their corrective procedure. Honestly, I cannot remember meeting anyone that has had LASIK that has not loved it. Many of my friends and teammates have had their eyes surgically corrected. I was always envious of how they did not have to deal with the hassles of contact lenses and glasses. I knew that I wanted to get my eyesight corrected. This lasted for years. The only thing keeping me from getting serious about getting my eyesight fixed was that I was really nervous. When it comes to getting a shot or going to the dentist I cringe and lock up. To me, I had the same mental block with LASIK.

Dr. Hoopes helped me get over the initial nervousness and made me very confident in the decision to go ahead with the procedure. The procedure was a huge success and not that uncomfortable at all. I can honestly say the LASIK procedure is easier than getting dental work done. They have thought of everything to make the experience as painless as possible. I am so glad that I went to Hoopes Vision. They made the process easy and convenient. Thank you Dr. Hoopes."

**KIRK CHAMBERS**
Professional Football Player

"As those around me will tell you, I can't stop talking about how fantastic my vision is since having my cataracts removed and vision corrected three weeks ago. Cataract and refractive surgery have evolved like computer memory. The entire process and all of its complexities, have been refined into a quick and easy experience. To me, this new technology was nothing but impressive. Each step occurred with deliberate precision allowing Dr. Phillip Hoopes, Jr. just enough time to narrate each step of the process as it was occurring. I want to thank each staff member that I encountered at Hoopes Vision as I went through the process. Your dedication to skill, accuracy and the patient's comfort are second to none."

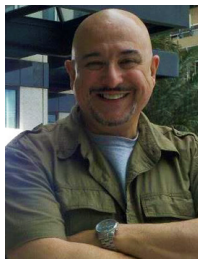
**BRENDEN R. WHITE, OD**
Optometrist, Sandy, UT

"Vision is very important in sports. You can run fast, you can jump high, but if you can't see – you're at a disadvantage all the time. So, LASIK is definitely something I needed. Ever since I can remember, I've worn glasses – I've lost and broken countless pairs of glasses. Contact lenses pop out all of the time – I've lost five contact lenses in one game – sometimes you find them, sometimes you don't. Sometimes you have to put them in your mouth until you can get to the sideline and get some solution. Trying to fit in the NFL, you're with the best of the best. You can't be out there thinking about losing contacts – you've got to be ready to perform and compete and be as physical as you want every day. When deciding to have surgery, I asked around, talked to other guys who've had LASIK, and Hoopes Vision kept coming up. After hearing about their track record, my nervousness went away. Now my vision is perfect. To wake up and look across the room and see how clear everything is – it just gives you a better outlook on the day. I'm really glad I chose Hoopes Vision – I wouldn't change it for the world."

**DERRICK SHELBY**
Professional Football Player/Former University of Utah Player

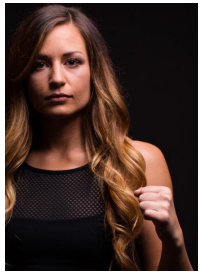
"As an athlete, dealing with contacts and glasses was a pain. I had several instances where I lost a contact lens during practice or a game and had to continue to play with only one. It was a hassle to have to bring extra contacts, solution, etc. everywhere I went. I have always wanted LASIK surgery, but didn't want to trust just anyone with my vision. After meeting with Dr. Hoopes and having all of my questions answered, I felt extremely comfortable with my decision to have surgery at Hoopes Vision. The outcome is unbelievable. I'm seeing better now than I ever did with contacts or glasses. The procedure was easy and comfortable. I can't wait to get out on the field this season with my new vision!"

**CODY ARNOUX**
Professional Soccer Player



"What was most impressive to me was everyone at Hoopes Vision took an interest in me as a patient. Dr. Hoopes' entire staff couldn't have been more informative. They went out of their way to explain the different options I had for LASIK surgery. I was so well informed that by day of the surgery I wasn't the least bit nervous. Dr. Hoopes and his staff made me feel relaxed and comfortable before they proceeded. And Dr. Hoopes explained what was going on every step of the way during my LASIK procedure. It took only a few minutes and the results were miraculous! I have worn glasses pretty much my whole life and literally in minutes I no longer needed them. I walked out of the office that afternoon seeing. Dr. Hoopes and his staff are incredible."

**TONY TOSCANO**
Host, Talking Pictures



"I was pretty nervous about having surgery on my eyes because, well, they're my eyes! But I felt like I was in good hands at Hoopes Vision! Dr. Hoopes was really friendly and he made feel comfortable and relaxed. The surgery was fast, simple, and not painful at all. I had PRK and the recovery was easy; it was just a matter of remembering to use my drops!

Having PRK was one of the best decisions I ever made. Sometimes I just sit back and think, "Wow, I can see everything with MY eyes, not through contacts or glasses." After getting the surgery, I felt free! I don't have to worry about not being able to see or losing a contact when I swim.

I am also an MMA fighter, and my first fight since my vision correction surgery was in January. I was so happy to look out at the crowd and actually be able to see all of the friends and family who came to support me. I felt more comfortable than I ever had before during warm-up and walking to the cage because I could see everything that was happening so clearly. I am so grateful I had PRK, and got the results I did. It was one less thing I had to worry about in my fight and it made a world of difference – and yes, I won!"

**KAYTLIN NEIL**
MMA Fighter

"I couldn't be more satisfied. I was pretty nervous going in the consultation but after realizing that there are no needles or sharp tweezers involved (am I the only one who thought this?), and how it would be pain free, I was much calmer. Surgery day came and the thing I was most nervous about was the "blackout" that my husband told me about(he got LASIK 10 years ago elsewhere) where I wouldn't be able to see anything and it'll be pitch black for a moment, but that never happened! I was able to see the whole time, just blurry but still able to see. If I knew it was going to be this easy and painless, I would have done this a long time ago!"

**SARAH TYAU**
Refashion Designer