CLASER VISION

GUIDE TO CORRECTIVE EYE SURGERY

claritylaservision.com

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OUR PHILOSOPHY

The most important philosophy that Clarity Laser Vision believes in is that when it comes to your vision, there should be no compromise.

We're highly committed to giving outstanding service to our patients; it's eye care with a human touch. We build relationships with our patients; we communicate with them to make sure they're equal participants in their procedure. For all of these reasons, Clarity Laser Vision is proud to be considered a premier laser eye surgery centre in Calgary.

Founded and directed by Dr. Al-Ghoul, Clarity Laser Vision delivers superior results and stellar care for its patients' time and time again.

About the founder of CLARITY LASER VISION

Dr. Ahmed Al-Ghoul is the founder of Clarity Laser Vision and Seema Eye Care Centre. He is one of the most reputable corneal and refractive surgeons in Canada and has consistently introduced cutting edge procedures to help patients in Alberta. Dr. Al-Ghoul continues to be invited to various national and international conferences to present his work and techniques in the areas of Corneal surgery and Cataract surgery. His meticulous attention to detail has been evident in the exceptional visual outcomes his patients have enjoyed since he began his career and is one of the main reasons why he is seen as a leader in anterior segment surgery amongst his peers.

At the age of 19 Dr. Al-Ghoul enrolled in the college of Medicine at the University of Saskatchewan and went on to complete a five year residency training in Ophthalmology. He subsequently completed a prestigious fellowship in corneal and refractive surgery at the University of Pittsburgh and is duly certified in Canada and United States. During his fellowship training he worked extensively on developing various surgical instruments that won him international recognition. He is an avid teacher at the University of Calgary and is actively involved in training residents and medical students in Ophthalmology. In addition to his innumerable medical accomplishments, he also obtained a prestigious Masters of Business Administration (MBA) from Cornell University.

> Dr. Al-Ghoul has appeared on television and in print media to share his exciting work in cornea and cataract surgery. He is an active researcher in the field of anterior segment surgery and his research has been presented worldwide, as well as in various medical journals.

Dr. Al-Ghoul is currently a member of the Royal College of Physicians and Surgeons of Canada, the American Academy of Ophthalmology, the Cornea Society, the College of Physicians and Surgeons of Alberta, the Canadian Ophthalmological Society, the American Society of Cataract and Refractive Surgery, and the Eye Physicians and Surgeons of Alberta. Outside of work, Dr. Al-Ghoul enjoys hiking with his family in the Canadian Rockies and volunteering on charity medical trips abroad.

> Dr. Ahmed Al-Ghoul MD MBA FRCSC Dip ABO

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CLARITY THE WORKINGS OF THE EYE



YOUR EYE IS LIKE A CAMERA. YOUR EYE HAS:

Clear covering over the pupil called the cornea

A variable opening called the pupil

A lens system

A retina that is equivalent to the "film" in an old camera

Various sets of muscles that control eye movements as well as pupil opening and shape of the lens

The ability to focus light on the retina depends on the shape of the cornea and the lens. When you look at something, muscles attached to the lens must contract and relax to change the shape of the lens system and keep the object focused on the retina even when your eyes move. Your nervous system controls this complex set of muscle movements

As light enters the eye, the cornea and lens work together to bend the light rays and focus them to a point on the retina called the fovea. Most vision problems occur when the eye cannot focus the image onto the fovea. The most common problems are Myopia (nearsightedness), Astigmatism (oval shape to the cornea), Hyperopia (farsightedness) and Presbyopia (difficulty in seeing small print at near range).



MYOPIA Nearsightedness

Myopia occurs when your eye is either too deep compared to the curvature of your cornea or the cornea is more curved. The result of this is that light focuses in front of the retina. This means you cannot see distant objects clearly, such as street signs. Laser eye surgery can correct this by changing the shape of the cornea so that its focusing power is matched to the length of the eye.

HYPEROPIA Farsightedness

Hyperopia occurs when your eye is too shallow compared to the curvature of your cornea or the cornea is less curved, so that light focuses behind the retina.

When younger many hyperopic eyes can self correct this situation by essentially "zooming" to correct the focus. As the eye ages, this "zooming" function gets weaker, near vision becomes blurred and later distance vision becomes blurred as well. Therefore people with hyperopia often require reading glasses before their forties and later require them even for distance. Laser eye surgery can correct this by changing the shape of the cornea so that its focusing power is matched to the length of the eye.

ASTIGMATISM

Astigmatism occurs when your cornea is more oval shaped (like an American football) than spherical. The result is that light is focused at two different planes inside your eye. Images appear blurred or ghost images can result. Approximately fifty percent of all people with myopia or hyperopia have astigmatism as well. Laser eye surgery can correct astigmatism, whether it is accompanied by myopia, hyperopia or present alone.



PRESBYOPIA Aging Eyes/Reading Glasses

Everyone develops presbyopia during their life. Most people, whether they have previously worn glasses or not, experience the symptoms of presbyopia in their forties. Effectively, the zooming function that allows your eyes to change focus from distant to near objects becomes weaker. Your ability to read small print (such as magazines) diminishes and you require different lenses for focusing on close and distant objects. Traditionally people have used reading glasses or bifocals to correct this. However, some Intraocular lenses can potentially correct Presbyopia.







WHAT DOES 20/20 MEAN?

20/20 is a measurement of how clear you see in the distance. If your standard vision test reports 20/20, it means that you are able to see clearly at 20 feet what a person with normal vision can see clearly at 20 feet. On the other hand, if you have 20/40 vision, it means that you need to stand as close as 20 feet to see what a person with normal vision can see clearly at 40 feet. If you have 20/15 vision, it means you see clearly from 20 feet what a person with normal vision can see clearly at 40 feet. If you have 20/15 vision, it means you see clearly from 20 feet what a person with normal vision can see clearly from 15 feet which is better than normal.

In laser eye surgery, the surgeon's goal is to get your vision without glasses after surgery to the same level as your best corrected acuity (with glasses or contact lenses) before surgery, or better. When doctors say you have "gained a line of vision" after surgery, they mean that you are able to read an extra line on the chart without glasses, as compared to before surgery with glasses. The opposite scenario can also apply where you could "lose a line of vision" after surgery as compared to before surgery.





MEASURING DISORDERS OF THE EYE

Eye Professionals measure disorders of the eye, such as myopia, hyperopia, astigmatism and presbyopia in units called diopters. Diopters show the amount of correction you need to see normally. One diopter is the equivalent of a lens that can focus on an object one metre away. The more nearsighted, farsighted or astigmatic you are, the higher your prescription in diopters. A typical prescription has three numbers such as $-4.00 / -2.00 \times 180$.

- The first number (-4.00) identifies your degree of nearsightedness or farsightedness. The minus sign in front of the number identifies you as nearsighted. A plus sign shows you are farsighted.
- The second number (-2.00) identifies your amount of astigmatism. This is written with either a plus sign or a minus sign.
- The third number (180) indicates the axis in degrees, indicating the direction of your astigmatism. An axis of 180 degrees, for example, means the astigmatism is horizontal.

A prescription of $-4.00 / -2.00 \times 180$ indicates that the patient is moderately nearsighted, with a moderate degree of astigmatism in a horizontal direction.





PAINLESS, SMOOTH OPERATION

Any operation that corrects the focusing of the eye is called refractive surgery. Laser eye surgery is a type of refractive surgery that uses a beam of ultraviolet laser light to reshape your cornea (the clear curved window at the front of the eye). Adjusting the curve of your cornea allows light to focus correctly on the retina.



Laser refractive surgery is the world's most common elective surgical procedure. The most popular method is LASIK (Laser Assisted InSitu Keratomileusis). The surgeon uses either a femtosecond laser or a mechanical device called a microkeratome to create a very thin corneal flap, about a tenth of a millimetre thick. The corneal flap is then lifted back on a hinge and the laser sculpts the bed of the cornea. It can flatten the cornea to correct nearsightedness, steepen the cornea to correct farsightedness and create better symmetry to the cornea to correct astigmatism. When the surgeon puts the corneal flap back, it takes on this new shape.

With LASIK, the healing process is surprisingly fast. In the vast majority of patients, the skin of the cornea (the epithelium) automatically seals the corneal flap within hours of surgery with no stitches needed. Most patients feel little or no discomfort as their eyes heal. People notice significant vision improvement immediately (the "wow" effect). The rapid visual recovery time means most patients can return to work the next day.

Lasers are also used to correct vision without the creation of a flap. These surface procedures are known as PRK (Photorefractive Keratectomy) or LASEK (Laser Assisted SubEpithelial Keratomileusis) or EpiLASIK (Epithelial Laser Assisted InSitu Keratomileusis) or TSA (Touchless Surface Ablation).Once the epithelium—or surface skin—of the cornea has been removed, the area that is to be treated is exposed.

The main difference between LASIK and surface procedures (PRK, LASEK, Epi-LASIK, TSA) is the healing time. After a surface procedure, a patient's eyes will heal and vision will stabilize in approximately 7 days. Having said that, complete vision recovery may take up to a month or more because the surface continues to heal and vision continues to improve past the 7 days mark. This prolonged vision recovery is not as pronounced as with LASIK and is one of the reasons why some patients prefer LASIK to surface procedures.

CLARITY WHAT SURGICAL TECHNIQUES DO WE USE?

At Clarity Laser Vision, we believe in **aligning the right technology with the right patient**. If a surgeon or a centre only knows how to use one technique for corrective surgery, the surgeon or centre may end up overrecommending that particular technique because they lack the know how beyond that approach. That is why having an **experienced corneal surgeon** like Dr. Al-Ghoul who is very comfortable with both corneal and intraocular surgery is important. There have been tremendous advancements achieved with laser treatments such as LASIK and PRK. Equally impressive however are the advances we have seen with technologies such as Phakic Intraocular lenses and Refractive Lens Exchanges that have allowed us to offer refractive surgery for more patients who may not have met the criteria previously for certain procedures like LASIK or PRK. **Our approach at Clarity Laser Vision is to ensure we align the right technology with the right patient using the latest evidence based medicine.** We fully utilize the most advanced and proven technologies that can achieve excellent visual outcomes for our patients whether it is surface ablation, LASIK, SBK (described below), or Intraocular surgery.

Although it may sound confusing at first, you can be assured that **we will recommend only the safest treatment modality to deliver the best vision outcome for you.**

SURFACE ABLATION: TOUCHLESS SURFACE ABLATION VS TRADITIONAL PRK TECHNIQUE

At Clarity Laser Vision, we have the most advanced laser technology that allows us to truly perform the most elegant surface ablations possible. Using the **Schwind Amaris** laser allows us to perform laser ablation to the surface of the cornea without needing to touch the eye with any surgical instruments. This is what we refer to as **"Touchless Surface Ablation (TSA) which is the most advanced version of PRK.** The advantage to this technique is that it is a very safe procedure where only the laser comes in contact with your eye allowing it to be the fastest treatment modality possible. It also allows for a faster recovery than traditional PRK. There are cases however where we need to utilize traditional PRK because the epithelial surface is not smooth or of normal thickness or there may be irregularities that prevent us from performing TSA. Only an experienced corneal surgeon can best assess which technique is most suitable for your eyes as they have extensive understanding of all layers of the cornea and know better how to choose which surface treatment to recommend.

INTRASTROMAL ABLATION: FEMTO SBK VS TRADITIONAL FEMTO LASIK

At Clarity Laser Vision, we ensure only the most proven and advanced technology is used at our centre. That is why we believe that using mechanical blades to perform flap creation is no longer beneficial when there has been an overwhelming body of evidence proving laser technology is much safer and more accurate to perform such a technique. For that reason we only use Femtolasers to perform flap creations.

We utilize the best laser technology available based on its true merit for our patients. With that said, our laser of choice for performing flap for intrastromal ablation is the most advanced Fifth generation iFS Intralase system from Abbott. This laser is considered by most surgeons as the gold standard in performing the safest and most precise flaps for intrastromal ablations. Unlike traditional LASIK where flaps are typically around 130 to 140 microns thick, we utilize a thinner flap creation that is called Intralase SubBowman's Keratomileusis (SBK). The advantage of SBK over LASIK is that the flap is thinner which gives stronger architecture to the cornea post-operatively.

In some cases however it is safer to perform a thicker flap to allow for more stable and predictable outcomes. Only an experienced corneal surgeon can best assess which patient is suitable for Femto SBK versus Femto LASIK.

INTRAOCULAR SURGERY: PIOL SURGERY VS RLE SURGERY

At Clarity Laser Vision, we believe that intraocular surgery can provide an excellent alternative option for patients who may not be good candidates for either LASIK or surface ablations. Intraocular techniques can be divided into two types:

Phakic Intraocular Lens (PIOL) Technology: an artificial intraocular lens is placed inside the eye over the natural lens. We reserve this procedure for patients who are not excellent candidates for surface laser treatments or LASIK. Although there are slightly higher risks with performing intraocular surgery, in the hands of an experienced surgeon the risks are quite low. There are currently two approved Phakic IOL technologies approved: The Visian ICLTM and ARTISAN® Phakic IOL.

The **Visian ICLTM** (Implantable Collamer Lens) is a lens that is permanently implanted in the eye behind the iris and in front of the natural lens. It is called a phakic intraocular lens (IOL) because the eye still has its natural lens. The Visian ICLTM has been approved by the Food and Drug Administration (FDA) for the treatment of patients with moderate to severe nearsightedness (myopia). The Visian ICLTM is approved for treatment of myopia between the ranges of -3 diopters to -20 diopters, with up to 2.5 diopters of astigmatism.

The **ARTISAN® Phakic IOL** is an intraocular lens that is inserted in front of your natural lens, between the cornea and the iris, during a surgical procedure. This type of lens is called a phakic IOL, because the eye still has it natural lens in place. The IOL is made of the same type of plastic that is used to make intraocular lenses for cataract surgery. The plastic has a long history of use in these types of products. The goal of placing the ARTISAN® Phakic IOL into your eye is to correct your nearsightedness. The ophthalmologist will select the appropriate lens power (diopter) to correct your nearsightedness. Once the ARTISAN® Phakic IOL has been implanted in your eye and your eye has healed, the light coming into your eye can correctly focus on the retina, resulting in improved vision. The ARTISAN® Phakic IOL is approved by the FDA for treatment of myopia between the ranges of -5 diopters to -20 diopters, with up to 2.5 diopters of astigmatism.

Choosing between the two technologies is a decision only your surgeon can make based on your unique eye measurements.

Refractive Lens Exchange (RLE): a procedure for people with very high levels of nearsightedness or farsightedness and for people who have early signs of lens opacity. In addition, people in their middle years may appreciate the dual advantage of a refractive lens exchange where not only will it correct nearsightedness or farsightedness, but it also prevents any future need for primary cataract surgery. During refractive lens exchange, the eye's natural lens is removed and replaced with a better lens, which has been selected to compensate for the eye's refractive problems. In essence, the lens implant acts like a permanent contact lens within the eye. The intraocular lens can come in a variety of designs, as will be discussed below. Although there are slightly higher risks with performing intraocular surgery, in the hands of an experienced surgeon the risks are quite low. **RLE is typically offered as a presbyopia procedure where multifocal intraocular lenses, Extended Depth of Focus lenses, or Monovision lenses are desired.**

Multifocal Intraocular Lenses are used to correct presbyopia through the RLE procedure. These state-of-the-art intraocular lenses allow the patient to see both near and far, significantly reducing and often eliminating the need for reading glasses. This special type of lens mimics the function of the natural lens in young people (under age 40), simulating "accommodation". Although multifocal lens allows light to focus for both near and distance, it requires adaptation as the brain is not naturally used to seeing though a multifocal lens. Furthermore, the multifocal lens can induce glares and halos, particularly at night, which typically subside over time. As such, it is important to have a thorough discussion with an experienced surgeon who can help determine if this option is right for you.

Extended Depth of Focus Intraocular Lenses are used to correct distance and intermediate vision primarily. There are less concerns for any glares or halos with these lenses compared to Multifocal Intraocular lenses. You most likely will need reading glasses with this option for writing and reading but intermediate activities such as computer use, seeing dashboards in cars, and routine day to day chores should be nicely taken care of. It is important to have a thorough discussion with an experienced surgeon who can help determine if this option is right for you.

Monovision Lenses correct presbyopia in a unique way. One eye is fully corrected for distance vision, while the other is under corrected. This will leave the undercorrected eye with a mildly myopic prescription (nearsighted) for near vision. This small amount of myopia allows a person with presby-opia to see clearly up close, and therefore can avoid or reduce the need for reading glasses.



HOW WILL SURGERY IMPROVE MY LIFE?

REDUCING DEPENDENCE ON GLASSES OR CONTACT LENSES

While the use of eyeglasses and/or contact lenses is an effective method of correcting refractive error, it can also place restrictions on normal, everyday activities. For individuals who wear contact lenses, refractive laser eye surgery can eliminate the time and effort involved in cleaning and maintaining contacts. In addition, over time, the costs associated with maintaining and replacing corrective lenses can be very high. Some patients also tell us they enjoy the freedom from having to wear glasses after surgery from an aesthetic perspective.

ENJOYING AN ACTIVE LIFESTYLE

Reduced dependence on glasses or contact lenses can result in substantial freedom for patients with active lifestyles. Many recreational activities, such as contact sports or water activities, can be far more enjoyable if glasses or contact lenses are not needed. Some careers, like boxing, are better performed without glasses or contacts. On the other hand, other careers, such as those in the Air Force, simply would not be possible without being free of glasses or contact lenses.

The reasons for contemplating laser vision correction vary for each person. For those who have depended on glasses for most of their lives, the thought of being able to wake up and see the world clearly again without the need to put on glasses or contacts may be a sufficient reason in and of itself.

The potential benefits, like the potential complications, can vary, and should be considered carefully.



Over 99% of laser eye surgery patients are between 18 and 70 years of age. Patients who are 18 years old may be candidates for the procedure. In some cases, patients over 70 years of age may also be candidates for laser vision correction, but this would usually only follow cataract surgery. It is important to be carefully screened and assessed by your eye doctor and surgeon to determine whether laser eye surgery or other treatment modalities are safe to use on your eyes.

Certain conditions may make you a poor candidate for the procedure or cause additional risks or complications. At Clarity Laser Vision, a thorough and comprehensive eye exam is performed at your pre-operative consultation to ensure that you are a good candidate. Having said that, if you have or may have any of the conditions listed below, it is important to discuss them thoroughly with your doctor, as these conditions could interfere with the healing process and require additional care. Those conditions include, but are not limited to:

- Eye inflammation
- Eye infection
- Severely dry eyes
- Certain rheumatological conditions (e.g. rheumatoid arthritis, lupus)
- Excessive corneal scarring history
- Degenerative or hereditary diseases of the cornea
- Diabetes with advanced retinal disease

Please note that pregnant or breast feeding women are NOT eligible for surgery and that the medication used to dilate the pupils is not recommended for administration in these cases. Pregnancy or breast feeding can cause fluctuation in vision and can make measurements of the eyes inaccurate. If you are pregnant or breast feeding we ask that you notify us upon scheduling your pre-operative consultation.



Laser refractive surgery, Phakic IOLs, and Refractive Lens Exchanges do not correct the vision defects listed below, which do not arise from refractive errors. Patients with such conditions may be subject to additional risks and side effects and should discuss their condition with us.

CATARACTS

A cataract is a condition that, if not treated, can cause reduced vision. It is correctable by cataract surgery. Laser refractive surgery and other elective surgery treatments offered by Clarity Laser Vision will not prevent cataracts, or reverse the effect of a cataract that is beginning to appear.

AMBLYOPIA

Amblyopia (i.e. "lazy" eye), is a medical condition that develops in early childhood, where a person with reduced vision in one eye relies on the other eye to focus, keeping the eye that is not used blurry for life. Laser eye surgery and other treatment modalities offered by Clarity Laser Vision will not reduce or eliminate amblyopia. The vision in the amblyopic eye will not become better than what is achieved with glasses. If the patient experiences side effects or complications from the procedure in the "better" eye, he or she could experience a loss of vision, as the good eye would no longer be able to compensate for the "lazy" eye. It is very important to notify your doctor at Clarity Laser Vision if you have been told you had amblyopia in the past.

STRABISMUS

Strabismus is an eye disorder caused by a weakness in the eye muscles, in which the eyes may not be aligned properly. Laser eye surgery and other treatment modalities will not correct, reduce, eliminate or prevent strabismus. Patients with certain types of strabismus are not eligible for laser vision correction. It is very important to notify your doctor at Clarity Laser Vision if you have had previous surgery to correct strabismus.

PRESBYOPIA

As we age, the crystalline lens of the eye loses its ability to change shape or focus on nearby objects (a process called accommodation). This condition, known as presbyopia, usually begins around the age of 40, and can be corrected with the use of reading glasses. When farsighted people develop presbyopia, Laser eye surgery will improve their near vision, but reading glasses will still be required. Laser eye surgery will not prevent the need for reading glasses in patients over forty years of age.



HOW SAFE IS LASER EYE SURGERY?

Laser eye surgery in the right hands, with the right technology and aftercare, is extremely safe. There have been many studies performed worldwide that indicate that laser eye surgery "is safe and efficacious for use in appropriately selected patients". The key to laser eye surgery is to thoroughly screen our patients to ensure it is safe for them to have an elective laser surgery procedure. Having a solid foundation in the field of corneal disease is of paramount importance to ensure only the most suitable candidates are chosen for the right procedure.

All surgery carries some risk of complications (a complication is defined as an unexpected occurrence), which leads to decreased vision. Only 1 in 1,000 procedures result in even a small loss of vision that cannot be corrected with glasses. Thus, complications and post-operative side effects are largely manageable; expert corneal surgeons are able to manage and correct complications so that virtually all patients have a satisfactory outcome.

HOW IS SAFETY MEASURED?

Safety entails preventing any limitation to one's vision. Visual limitation is defined as distortion, blurring, or doubling of one's vision that cannot be corrected by glasses. This is compared to how one could see before they had surgery. This is also different from a situation in which vision is improved after surgery, but there is some blurring that can be corrected with glasses. In this case the vision is not limited. Rather, it is simply either under or over-corrected with the laser or other treatment modality offered and can certainly be corrected by glasses or a simple enhancement procedure.

It is important to define what constitutes a significant visual limitation is. The standard is to measure visual blurring by the number of lines from the bottom of the eye chart that the patient is no longer able to read. For example, if before surgery you were able to see 20/15 with glasses and after surgery your vision even with glasses is 20/25, this would be classified as a loss of two lines of best corrected vision. On average, less than 1% of LASIK or PRK patients lost more than two lines of best corrected vision with glasses. This incidence is further reduced with having surgeons that are trained and experienced in corneal and refractive surgery. It is important to understand that loss of vision is also dependent on the technology that is used and for that reason, choosing the most advanced technology further helps to eliminate the risk of loss of vision.

The best way to ensure that your treatment is done to the most stringent safety standards is obviously to be treated by an expert corneal surgeon who chooses to operate with the best technology and the best aftercare.

QUESTIONS TO ASK WHEN CONSIDERING LASER EYE SURGERY



CHECKLIST FOR EVALUATING A LASER EYE SURGEON'S QUALIFICATIONS:

- A Fellow of the Royal College of Surgeons / Ophthalmologists or equivalent
- Fellowship subspecialty training in corneal surgery
- Fellowship subspecialty training in refractive laser eye surgery
- On the College of Physicians and Surgeons' Registry

No one wants any compromise to their vision. Ideally, you should find a surgeon who combines the right level of professional training using the most current and proven technology, combined with a wealth of experience in the specific procedure that you are undergoing.

You are looking for a surgeon with experience in the specific procedure you seek. While laser eye surgery is a subspecialty of ophthalmology, not all ophthalmologists are versed in all the different types of refractive surgery, including LASIK, LASEK/PRK and non-laser procedures such as Phakic IOLs and Refractive Lens Exchange. Not all surgeons can treat all prescriptions; if you have a more unusual prescription some surgeons will very appropriately refuse to treat you. This is because either they lack the experience or the technology to treat the particular condition.

Ideally you are looking for a surgeon who can present statistics that reflect their individual surgical outcomes. It is important to examine quoted statistics carefully to determine if they are relevant to your particular prescription. Statistics for nearsighted patients are often better than statistics for farsighted patients, and that is a reflection of overall success we have with laser correction of nearsighted versus farsighted patients.

PATIENT CHECKLIST:

The checklist below is designed to help patients evaluate their choices.

Does the surgeon monitor your individual patient outcomes on an ongoing basis?

Monitoring outcomes enables a surgeon to objectively measure their performance against an appropriate standard. It is a sign of a surgeon who is concerned about quality. Ideally, a surgeon should be able to provide you with a results table or statistics that are specific to your prescription. This is important as results vary significantly between prescriptions, between surgeons, and between technologies.

Did the surgeon undergo formal refractive surgery training and for how long?

Twenty years ago, many surgeons began to do laser surgery after attending one or two weekend courses, with or without supervision on their first few cases. Lately a number of specific refractive surgery fellowships do exist that are ideally combined with corneal training so that the surgeon can have thorough understanding of the structure they are treating. Fellowship training in cornea refractive surgery prepares the surgeon for dealing with all the complications of refractive surgery, so that when they encounter any complications, they are prepared.

Will the clinic conduct all of the necessary pre-operative tests to ensure my suitability for laser eye surgery? The pre-operative examination is an excellent opportunity to examine the eye fully, including some of the following tests that are not routinely carried out in laser eye surgery assessments:

- Corneal topography
- Pupil size
- Dilated eye examination
 Intra-ocular pressure

- Corneal tomography
- Dry eye assessment
- Corneal thicknessWavefront analysis
- Both manifest and cycloplegic refractions

After conducting all of the necessary tests, **ideally the surgeon should see you in the pre-operative consultation and directly provide you with a clear assessment of your suitability.** If the surgeon determines that you are not suitable for treatment, he or she should provide you with a comprehensive explanation for this. You may want to ask if there is another provider that may have technology or expertise to treat you safely, even if that may not be possible at their practice (for example, some lasers are much better at treating hyperopia than others).

What aftercare regime is provided for my particular treatment plan?

The immediate aftercare will depend on the recommended treatment. Further aftercare should be provided until the one year visit and should be maintained on a yearly basis afterwards. It is important to develop a clear post op visit schedule to ensure your eyes are carefully looked after. Ideally, Laser surgery aftercare is performed in the following way:

1st day after surgery	3 months after surgery
4-7 days after surgery	6 months after surgery
1 month after surgery	12 months after surgery

Note: Surface PRK / LASEK patients should be closely monitored during the first five days after surgery.

Will I have access to the surgeon after treatment?

This is extremely important. You should have access to the surgeon that did your surgery if required. Your surgeon is directly responsible for your care. This is true even if he or she has delegated some aspects of the aftercare to his or her optometrist.

QUESTIONS ABOUT TECHNOLOGY

There are seven technologies that most laser eye surgeons use for laser refractive surgery. These are:

- Topography
- Tomography
- Pachymetry
- Pupillometry
- Wavefront Aberrometry
- Keratome (mechanical and laser)
- Excimer laser

Here we explain what these technologies do and the impact they have on your treatment.



WHAT IS Topography?

Topography measures the shape of the surface of your eye (i.e. your cornea). The picture produced by a topography machine looks like a map of a mountain range with the different elevations shown in different colours. Topography is one of the most important safety factors in determining how suitable you are for laser eye surgery. The most basic kind of topography measures the shape of the surface at the front of your eye.

Topography is especially useful in giving corneal specialists a qualitative assessment of the shape of the cornea.



Tomography focuses on measuring elevation between the front and back surface of your cornea. Common Tomography machines are Pentacam™, Orbscan™, Galilei™, and Sirius™.

The Pentacam[™] and Sirius [™] machines provide the most detailed tomography images. They are the very best options for determining changes in the shape of your cornea from a quantitative perspective. They provide a 3D map of your cornea, which is essential for determining whether it is too thin for surgery to be safe.

WHAT IS PACHYMETRY?

A pachymeter is a hand held device used to measure the depth of the thinnest point of your cornea. Along with tomography, the thickness of your cornea is one of the most important safety factors in laser refractive surgery. During your pre operative screening, the technician or optometrist should take these measurements in order to make surgery as safe as possible. Because measuring corneal thickness is a very delicate process, it is best to use several technologies to obtain an overall average of your corneal thickness. For example, using a pachymeter together with a tomography device provides very accurate data and ensures that the thickness of these areas of the cornea is within acceptable safety limits.

As there are many different technologies that measure the corneal thickness, we feel it is essential to obtain corneal pachymetry using at least two different technologies.

Did you know...

AT CLARITY LASER VISION, WE ROUTINELY USE FOUR DIFFERENT TECHNOLOGIES TO MEASURE THE CORNEAL THICKNESS TO BE ABSOLUTELY CERTAIN OF A PERSON'S CORNEAL THICKNESS.

CLARITY

WHAT IS PUPILLOMETRY?

Pupillometry measures the size of your pupils, the "windows" that let light into your eye. The measurement of your pupil size takes place in a dark room to ensure that your pupils are open to their full extent. Obtaining measurements of your pupil in dark and light settings is very important as the laser treatment zone should be larger than your pupil size to minimize issues of night vision disturbances. If your pupils were larger than the area that can be treated by the laser, you would be left with an untreated ring around the smaller circle corrected by the laser which could create potential problems at night time, such as glares or halos.

This is why pupillometry is such an essential part of the assessment before surgery. The results will determine the type of laser eye treatment you need. Some people with large pupils can only be treated by specific lasers that are capable of covering larger areas.

It is ideal to have pupillometry measurements obtained using at least two different technologies.

Did you know...

AT CLARITY LASER VISION, WE HAVE CUSTOM TREATMENT PLANS TO FIT YOUR PRECIOUS EYES. LET US TAKE CARE OF YOU!

WHAT SWAVEFRONT ABERROMETRY?

Aberrometry measures the unique imperfections of your eye called 'higher order aberrations'. These irregularities of your cornea and lens optical system affect the finer quality aspects of your vision beyond the normal refractive errors of nearsightedness, farsightedness and astigmatism.

A wavefront aberrometer records data from several spots on the surface of your cornea, as well as from the entire visual system of the eye. The most advanced aberrometers give the surgeon the ability to distinguish aberrations stemming from the cornea, as well as the entire optical system. This produces a map of the imperfections on the surface of your cornea, as well as a visual system analysis that can be fed into the laser to achieve better results. The best laser systems enable the surgeon to import that data into the treatment calculation for the patient's eye in order to achieve truly customizable treatments.

Aberrometers, like TV screens, can vary in their resolutions. A high resolution aberrometer will give as sharp a picture as a high quality photograph. It records much more data, giving a more accurate map of the number and location of imperfections. This means the surgeon can plan your treatment more precisely.

There are situations where using a person's wavefront data is crucial to maximizing their visual outcome after surgery. Having a laser system platform that allows the surgeon the flexibility to choose how to treat a patient's eyes is key to maximizing precision. There are only a handful of laser systems that can truly offer patients the ability to have customized treatment based on their corneal shape versus entire optical system of their eyes.

CLASER VISION

At Clarity Laser Vision, our laser technology platform is one of the most sophisticated and versatile systems in the world because it can truly deliver on the concept of true customization of treatment based on the surgeon's assessment of the patient's corneal and ocular aberration measurements.

WHAT IS KERATOME (MECHANICAL & LASER)?

The keratome is a high precision, computer controlled instrument that the surgeon uses for the first stage of the LASIK operation. With it, the surgeon creates the corneal flap that is necessary to perform LASIK.

Today, the majority of surgeons use a femtosecond laser instead of a mechanical microkeratome when creating a LASIK flap. Common brand names of this technology include Intralase[™], Z-LASIK[™] and Visumax[™].

There have been many published data on the advantages of using a laser system to create a flap versus a mechanical microkeratome. For that reason, we at Clarity Laser Vision feel it is much safer to use a laser system, and therefore that is the only approach we advocate.

Although there are several laser systems in the market that can make flaps, the Intralase™ system is considered the gold standard for making flaps by many surgeons in the world today.

Did you know...

AT CLARITY LASER VISION, WE USE THE NEWEST GENERATION INTRALASE SYSTEM TO CREATE TRULY CUSTOMIZED LASIK TREATMENT FOR EACH PERSON

WHAT IS EXCIMER LASER?

ORWIND

There have been significant strides made in laser technology over the last five years, but finding a surgeon who has the expertise to use that laser is critical to successful treatment. Some laser brands are Alcon, Bausch and Lomb, Nidek, Schwind, VISX, and Zeiss.

A laser beam will be a certain size and shape. The point at which the laser touches the eye is called a spot. The smaller the spot, the more focused it is, creating a higher intensity beam that moves around the eye at a faster rate. This means the laser only removes the material that it needs to, providing a more precise treatment. We like to equate the size of the laser spot to a chisel that one uses to create a sculpture; the smaller the chisel, the more refined the sculpture will be.

When we look at all the laser systems in the world today, the laser that has the smallest spot size to create the most precision so far is the Schwind Amaris laser system.

Your eye will move during surgery. Eye tracking technology ensures your safety when this happens. Compensating for eye movement is a key factor in ensuring that the laser will be delivered to exactly the right place. There are different methods (video infrared, 3D, etc.), all of which involve detecting the position of your eye. There is a small time lag between the laser noticing that your eye has moved and compensating for that movement. To date, all laser systems have trackers that allow them to track the eye movements. The more precise the system is in tracking eye movements, the more precise one can expect the laser treatment to be.

When we look at all the laser systems in the world today, the laser that has the most eye tracking capabilities is the Schwind Amaris laser system. It allows for tracking of eye movements in six dimensions, which is the most of any other laser system in existence today.

CLARITY WHAT ARE THE POTENTIAL COMPLICATIONS FROM LASER REFRACTIVE SURGERY?

Like any surgical procedure, Laser refractive surgery involve the risk of producing less than perfect results, complications, or even serious injury from unforeseen causes. Although the vast majority of our patients experience a significant improvement in their vision, no centre or surgeon should promise or guarantee that the procedure will be 100% effective or make your vision better than it was before the procedure.

There is a slight possibility that the procedure or a complication arising from the procedure could cause your vision to be blurred, doubled, distorted, to have halos or other disturbances, including permanent loss of vision, and that these may NOT be correctable with glasses or contact lenses. In the event that a complication occurs, your surgeon will discuss and offer you advice on further treatment, which may involve medication or more surgery. In some rare instances, additional surgery may be needed in the form of a corneal transplant.

In addition, although excimer laser eye surgery has now been performed regularly since 1990, very long term effects of the procedure (greater than 25 years) are unknown.

Although it is not possible to list every potential risk or complication that may result from the procedure, the most important ones are described below. Please note that serious complications are very rare and that the vast majority of our patients are highly satisfied with the results of their procedure.

INTRA-OPERATIVE COMPLICATIONS

Short Flap

A short (or incomplete) flap occurs when the flap making instrument cannot complete its movement. As a result, the flap is made too small, leaving insufficient space for the laser treatment to be performed. The flap is simply repositioned and the laser is not performed. In the unlikely event that a short flap occurs, the recommendation is to wait anywhere from three to six months before making a new flap. Alternatively, PRK can be safely performed one month after the short flap occurred. Despite a slightly increased risk of a flap problem in comparison to an eye that has never had a short flap, the follow up procedure remains very safe. With the introduction of laser technology to produce flaps, the incidence of inadvertent short flap creation is extremely small.

Thin Flap

A thin flap or "buttonhole" occurs when the precision flap making instrument creates a thinner than normal flap. As a result, the flap that is made is too thin to safely perform the laser treatment. In the unlikely event that a thin flap occurs, the recommendation is to wait between three and six months before making a new flap. Alternatively, PRK can be safely performed one month after the thin flap occurred. Despite a slightly increased risk of a flap problem in comparison to an eye that has never had a thin flap, the follow up procedure remains very safe. With the introduction of laser technology to produce flaps, the incidence of inadvertent thin flap creation is extremely small.

Free Flap

A free flap occurs when the flap becomes detached from the cornea. In order to ensure perfect alignment once the laser treatment is complete, the surgeon marks the cornea before creating the flap. The visual outcomes for LASIK with a free flap are therefore typically the same as LASIK with a normal flap. Depending on the situation, the surgeon may choose to continue the laser treatment before realigning the flap. With the introduction of laser technology to produce flaps, the incidence of inadvertent free flap scenario is extremely small.

Equipment Malfunction

The precision flap making instrument and excimer laser are maintained according to the specifications of the manufacturer. Both pieces of equipment have emergency battery power supplies to complete the procedure if electricity is lost at any time. Despite this regular maintenance, the precision flap making instrument or the excimer laser could malfunction, requiring the procedure to be stopped before completion. In some instances, this malfunction may result in a rescheduling of the procedure, possible damage to the cornea and/or a loss of vision. This occurrence is very rare. At Clarity Laser Vision, no patient has suffered a loss of vision related to equipment malfunction.

POST-OPERATIVE COMPLICATIONS

Flap Inflammation

Approximately 5-10% of patients experience a mild, temporary inflammatory reaction beneath the flap. This condition is named Diffuse Lamellar Keratitis (DLK). Patients with this type of inflammation may not show any symptoms at all or may experience blurred vision. This condition can generally be treated successfully with anti inflammatory medication. In certain instances, irrigation under the flap may be necessary, especially if the inflammation is severe. Very rarely, if the condition is not treated effectively in a timely fashion, corneal scarring can result in some loss of vision. The incidence of scarring due to DLK is extremely rare (approximately 1 in 100,000).

Debris under the Flap

A small amount of debris or particles may be found under the flap after the surgeon has completed the LASIK procedure. Debris may result from the instruments used, from tear film oil, or from floating material that is usually present in our eyes. Depending on the extent of debris, the surgeon may decide in the immediate postoperative period to irrigate beneath the flap to remove this debris, which is generally of no visual significance.

Infection

As with any surgical procedure, infection of the cornea is possible but very rare. Infections after LASIK procedures are typically treated with antibiotics and usually do not lead to permanent loss of vision. Severe infection, even if successfully treated with antibiotics, may lead to permanent scarring and loss of vision that would require corrective laser eye surgery. If the infection is very severe, a corneal transplantation may also be required to restore visual clarity. The chance of this occurrence is extremely rare. The incidence of infection is 1 in 50,000. This incidence rate is significantly more favourable than the known incidence of infection of 1 in 2000 per year with contact lenses (1% rate over a 20-year period of contact lens wear).

Flap Wrinkles

It is possible that a flap may dislodge or shift slightly in the first few hours after the operation. If the flap moves, it can occasionally leave small wrinkles on the surface. Depending on the amount of wrinkles noted, they may be visually significant. Having said that, these wrinkles can easily be removed by the surgeon when they are found to be significant. About 1% of patients may need to have wrinkles removed the day after surgery, without any visual significance. Even if left long term, wrinkles rarely become permanent and vision affecting.

Optical Imbalance

This problem can apply when the surgeon performs surgery for each eye on different days. The eyes may not be able to balance and focus properly until the procedure is performed on the second eye because there will be a difference in prescription between the two eyes.

Halos, Starbursts

After the procedure, some patients may experience an optical effect called "halos" or "starbursts" around lights at night or in dim light. These effects are temporary for the most part, as they typically last between two weeks to four months after surgery. Glares and halos may be permanent in 1-2% of patients and these complications are more likely to occur in patients with high levels of nearsightedness, farsightedness or with larger than average pupil size. This complication is rare with modern technology as new lasers allow for a better laser treatment profile to offset the risk of developing these optical effects. In addition, the eye tracking technology advancements in modern lasers have significantly reduced the risk of the laser treating the wrong area of the cornea, a situation that can lead to halos and glares.

If you do have glare and halos at night following surgery because of your pupil size, there are a few techniques that can help. Some patients find that, when driving, keeping the overhead light on inside their car stops their pupils dilating so much that it affects their vision. Some people have also found the use of medicated eye drops that stop their pupil from fully dilating to alleviate the problem.

Irregular Corneal Shape (Ectasia)

Certain corneas are genetically predisposed to be weaker than other corneas of the same thickness. A minimum amount of corneal tissue (after the laser treatment removes tissue) is always left under the flap for the corneal shape to ensure the cornea remains stable afterwards. In rare circumstances, a cornea that is predisposed to be weaker than the average cornea may become unstable after laser surgery. This can lead to a condition called ectasia. Ectasia is characterized by progressive corneal thinning along with deformation to the normal shape of the cornea. This results in the cornea developing astigmatism and subsequent blurred vision. The chance of ectasia in a normal eye undergoing laser eye surgery is 1 in 5,000. Historically, this change in corneal shape required patients to wear a hard contact lens or in some cases, undergo a corneal transplant. Today, ectasia is treatable with corneal collagen cross linking (CXL) and possibly a further laser treatment. Due to the development of CXL, the possibility of requiring a corneal transplant due to ectasia after laser vision correction is very rare.

Light Sensitivity (Photophobia) and Fluctuating Vision

Patients may be sensitive to light and glare or find that their visual acuity fluctuates after the procedure. These conditions are typically temporary and will fade with time as the eye heals. Light sensitivity is common for a few weeks after surgery and will rarely persist for longer than a month. Very rarely these conditions can become permanent.

Under-correction, Over-correction and Regression

After laser treatment, it is normal to expect healing to occur to the cornea. While the healing response is anticipated to occur as per normal mechanisms in the eye, there are times when the healing response can vary from one individual to another. A variation in the healing process can affect the treatment accuracy and result in an over or under correction. A more pronounced healing pattern can also cause regression, which is defined as a partial decrease of the effect of the treatment as a result of the cornea replacing some of the tissue removed by the laser. Typically, a maximum of up to two diopters can regress, meaning that the patient has a small remaining prescription which still blurs the vision.

The residual refractive error can be corrected with glasses, contact lenses or additional laser surgery in the majority of patients. A minority of patients may not be able to safely undergo laser retreatment. This scenario occurs when either insufficient corneal tissue remains to do more laser treatment or an irregular corneal shape is evident on exam.

In cases with very small amounts of regression (which lead to refractive error again), the risks of doing more laser treatment to correct the residual refractive error may outweigh the potential benefits of vision improvement. If retreatment is not recommended by the surgeon, wearing a very mild eyeglass prescription is necessary for driving, especially at night time.

Fragility of corneal flap after LASIK

The corneal flap is considered fragile to direct trauma for at least the first three months after treatment. Wearing protective eyewear is absolutely essential when playing any sports or participating in any activities that may lead to contact with the eye. After the initial three months of recovery, it is always advisable to protect your eyes from direct trauma after the procedure.

Strabismus

Patients with pre existing eye muscle imbalance (i.e. the two eyes are not aligned) may have a deterioration of their symptoms that can at times lead to double vision. This complication is rare and occurs typically in patients with pre existing eye muscle balance problems.

Corneal Erosion

When making the corneal flap in LASIK, a scratch (i.e. erosion) might occur on the outer surface of the cornea. Patients with corneal erosions may experience more discomfort and require more time to recover. They may also be at higher risk for further complications such as flap wrinkles, inflammation, or possibly reocurring erosions. Depending on the size and severity of the abrasion, it may be best to wait on performing surgery on the other eye to allow for a smoother recovery. Most corneal erosions heal within three days. With the introduction of laser technology to produce flaps, the incidence of surface skin erosion is extremely small.

While it is very rare to experience erosions after LASIK, it is an expected outcome in patients who have PRK surgery which is why it is considered a surface treatment.

Epithelial Ingrowth

Cells that are at the corneal surface can sometimes find a path to grow under the edge of the corneal flap, creating a situation called epithelial ingrowth. The vast majority of these cells reabsorb and disappear on their own. Rarely if the cells continue to grow, they may affect vision. If vision is compromised, it may be best to lift the flap and remove the epithelial cells that are under the flap. This complication is typically seen in

cases where enhancement surgery is performed and is very rare after the first laser procedure. The incidence of epithelial ingrowth after a second retreatment is estimated to be less than 5%.

Dry Eyes

Dry eyes are a common, yet typically temporary complication arising from LASIK or PRK. This condition can usually be treated with lubricating eye drops, anti inflammatory drops, and occasionally with punctal plugs that prevent the normal drainage of tears into the nose. Dry eyes generally improve within a few months after surgery, but in rare instances can continue for longer periods of time. It is possible that patients may require long term use of various dry eye treatments to keep the eyes comfortable. Patients who have dry eyes prior to LASIK or PRK are more likely to experience dry eyes after the procedure.

As Alberta is a fairly dry environment, our corneal specialists often deal with dry eyes as a general condition in patients who may or may not have had laser eye surgery. Having that expertise is essential in ensuring that you are thoroughly screened for dry eye symptoms and pre emptively treated in preparation for laser eye surgery.

Corneal Haze (In PRK patients)

After PRK, cells within the inner layers of the cornea can create a mild scarring response as part of the healing process. This gradually subsides with little or no permanent effect on one's vision. However, if the scarring is excessive or does not go away, it can affect the vision. Options to resolve the scarring include using steroid eye drops and potentially performing additional laser treatment to remove the scar. Excessive scarring is usually associated with higher levels of correction. This complication is much less common today as medications are used to prevent it and our laser technology has evolved to minimize it from happening. The incidence of significant scarring that affects vision is less than 1 in 1,000.

Drug Reactions

Other possible side effects include drug reaction from medications used.

Floaters

Floaters are little opacities from inside the eye that appear to move in one's line of sight. They are typically seen as a natural phenomenon as we get older but can certainly develop after any procedure to the eye. Floaters themselves are typically benign. However, rarely they can suggest there may be a retinal tear or worse, an impending retinal detachment that is occurring. It is very important to see an eye specialist when new floaters develop.

Subconjunctival Hemorrhage

Another side effect that is of no visual consequence is that red areas may appear on the white part of the eye called subconjunctival hemorrhage. These typically occur as a result of using the femtosecond laser to create the flaps for LASIK surgery. The red spots may last for two to four weeks after surgery and are generally of no consequence to the health of the eye.

Other Rare Complications

Other risks include corneal melting and retinal bleeding. Although extremely rare, blindness resulting from laser vision correction is possible in cases where a severe eye infection develops after treatment that is not responsive to antibiotics or from a retinal complication that cannot be repaired.



WHAT ARE THE POTENTIAL COMPLICATIONS FROM INTRAOCULAR SURGERY?

As with any type of surgery, there are risks and disadvantages to refractive lens exchange or Phakic IOL technology. Some of the drawbacks include:

- Occasional need for glasses: Lens implants provide only a fixed range of focus. Lens implants cannot "accommodate" or change shape as the natural lens does to focus on objects at different focal distances.
- Increased risk of retinal detachment: Nearsighted people usually have longer eyes, which can result
 in fragile retinas that are more prone to retinal holes or tears. Any surgery within the eye carries a risk
 of retinal detachment, and this risk increases as the amount of nearsightedness increases.
- Risks associated with surgery within the eye: The following complications are extremely uncommon, but they can occur: infection (called endophthalmitis), hemorrhage within the eye, swelling around the eye, surgically induced astigmatism, and increased dryness of the eye. Other complications include reflections or slight distortions from the artificial lens implant, an increase in the number, shape or size of floaters, corneal swelling, dislocation of the intraocular lens, wound leakage, glaucoma, and uveitis (inflammation).

Please note that more detailed information packages for both RLE and Phakic IOL technologies are available for patients who are deemed eligible for these techniques. Please contact us if you wish to obtain the packages pertaining to these technologies.



CLARITY ARE THERE ALTERNATIVES?

LASIK, PRK, Phakic IOL, and RLE are elective surgical procedures. There is no medical condition or emergency condition requiring you to have refractive surgery. They do not correct all levels of refractive error and are not for everyone. We cannot guarantee that refractive surgery of any type will improve your vision, or that they will eliminate your need for glasses or contact lenses. After the procedure, you may still need glasses or contact lenses for some purposes, either immediately after the procedure or years later. It is also remotely possible that your vision will not remain stable, either because the procedure leads to short term and long term changes in the cornea or because your eyes may change over time.

EYEGLASSES

Eyeglasses are safe and most people can wear them reasonably well. However, depending on the nature of the correction, the lenses may be thick, reduce or increase the size of the visual image, and impair peripheral vision. Also, patients usually begin to experience the need for reading glasses as they age. The most common solution to this problem is bifocal or trifocal lenses that can be suitable for patients.

CONTACT LENSES

Contact lenses are another non surgical alternative. Contact lenses come in a variety of materials. As contact lenses rest directly on the cornea, not everyone is able to tolerate them. If fitted and used properly, contact lenses are effective, relatively safe and easy to use. Complications arising from the use of contact lenses include corneal infections, allergic reactions, corneal scratches, and rarely even blindness.



You have the right to consent to or refuse any treatment or procedure at any time prior to having it done. Please remember that we are available to help address your concerns, so please do not hesitate to ask questions. Also, signing the consent form is meant to ensure you have fully understood what laser eye surgery entails and that you wish to proceed knowing the benefits, risks, and alternatives to laser eye treatment. There are several important steps that are necessary to help you make an informed consent.

OUR APPROACH

Eye Exam: During your pre operative evaluation, the doctor will examine your eyes to determine if you are a candidate for LASIK, PRK, RLE, or Phakic IOLs according to certain criteria. We will then provide you with an explanation of the procedure, including the benefits, risks, and alternatives. We will also discuss any particular conditions that might affect your decision to undergo the procedure.

Surgeon: To assist you in making an informed decision, our doctors will help you review the benefits, risks, and alternatives specific to you. Please makes us aware if you have any questions or if you do not understand any topic. You will also be given a specific post operative plan, for which you will also need to provide consent. Please note that our doctors are not required to explain risks that are extremely remote or those that your surgeon does not know about, even if these become known at a later time. Your surgeon will provide you with information and materials that would be considered reasonably necessary for a person in your position to use in deciding whether or not to undergo the procedure.

Surgical Counselling: Before your surgery, we will ensure that you have a copy of the Laser Eye Surgery Information Booklet and the consent forms. We will ask that you review these documents while we are present and we are happy to address any questions that you have at that time or later on. After this, we will complete much of the information on the consent form with you in preparation for the signing and witnessing of your signature.

Patient Consent Form: If you decide to undergo the procedure after reading this material and speaking with us, you will need to sign the Patient Consent Form(s). These specify that you have been advised of the nature of the procedure (its benefits, risks, and alternatives), and that in deciding to have it done, you are making an informed decision. If you would like a copy of the Consent Forms please let us know.

FREQUENTLY ASKED QUESTIONS

CAN LASER EYE SURGERY TREAT THE LOSS OF READING VISION?

Answer: Although there are various techniques proposed to treat the loss of reading vision, there is no perfect solution available. Having said that, there are options that can be presented at time of consultation in patients that are demonstrating signs of needing reading glasses already.

WHY CAN SOME PEOPLE HAVE LASIK, WHILE OTHERS CAN ONLY HAVE PRK?

Answer: The vast majority of patients undergoing laser eye surgery worldwide are suitable for LASIK. We feel that certain eye situations (such as thin corneas) or lifestyle choices (a boxer, for example) may make a person better suited for one procedure more than the other.

HOW LONG SHOULD I BE OUT OF CONTACT LENSES BEFORE CONSULTATION WITH MY SURGEON?

CONTACT LENS TYPE	LENGTH OF TIME LENSES NEED TO BE OUT BEFORE THE CONSENT APPOINTMENT WITH THE SURGEON
All Soft Contact Lenses	At least 1 week before
Extended Wear Soft Lenses	At least 1 week before
Toric Soft Lenses	At least 2 week before
Rigid gas permeable (RGP) worn for 0-10 Years	At least 4 week before
Rigid gas permeable (RGP) worn for 10-20 Years	At least 8 week before
Rigid gas permeable (RGP) worn for 20-30 Years	At least 12 week before
True Hard Lenses (Polymethyl methacrylate)	At least 12 week before

Answer:

: ARE BOTH EYES TREATED AT THE SAME TIME?

Answer: We prefer to do both eyes at the same time. There have been many large scale studies conducted more than ten years ago that demonstrated no difference in safety between single eye surgeries versus bilateral surgery. There are however certain circumstances where it may be best to perform surgery on one eye at a time, but this is usually because of a specific medical issue.

FREQUENTLY ASKED QUESTIONS

: WHAT WILL I FEEL DURING AND AFTER THE LASER EYE SURGERY PROCEDURE?

Answer: You will be given topical anesthetic before the procedure that will make your eyes numb. You may still feel some pressure sensation on the eye as pressure sensors in the eye do not respond to anesthetic drops.

After LASIK surgery, most patients do not experience discomfort after surgery but they may feel light sensitive and have watery eyes. PRK patients may feel some discomfort in the first day or two but the discomfort is usually well managed with the bandage contact lenses placed in the eyes, as well the medications we prescribe.

: HOW LONG DOES LASER EYE TREATMENT TAKE?

Answer: The procedure typically takes 10 to 15 minutes and the laser itself is only active for seconds.

: WHAT HAPPENS IF I LOOK AWAY DURING THE PROCEDURE?

Answer: Although your eye will move during surgery, the eye tracking technology incorporated in the laser system ensures that this is monitored and compensated for, so long as you are still looking in a straight direction. If you look away the laser will immediately stop until you look back in the right direction.

: WHAT IS THE RISK OF A COMPLICATION DURING LASER EYE SURGERY?

Answer: Laser eye surgery is safe, but no surgery is entirely without some level of risk. The fact is that an expert surgeon will have the knowledge to manage complications properly and will usually be able to correct any complications that do occur. In the hands of an expert surgeon, the chance of something going noticeably wrong is very rare. It is even rarer that the surgeon would not be able to correct this issue when faced with this situation. Please refer to the earlier sections in the guide to better understand the possible risks that can occur.

: CAN I TAKE A TRANQUILIZER OR SEDATIVE PRIOR TO THE PROCEDURE?

Answer: Generally it is better to not use strong sedatives as these can alter your cooperation during the procedure. However, patients who suffer from certain psychological disorders such as panic attacks may benefit from the use of sedatives.



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DO LASER EYE SURGERY RESULTS DIFFER BETWEEN PRESCRIPTIONS?

Answer: The simple answer is yes. In general and when assessing the clinical evidence in the literature, visual outcomes after corneal or intraocular procedures are less than expected as prescriptions increase. Therefore, when discussing expected results with your surgeon, it is best to ask about your particular prescription and the success rate in achieving desired vision outcome for your refractive error.

WHAT DOES THE TERM WAVEFRONT MEAN?

Answer: There are machines termed Wavefront Aberrometers that measure the unique optical imperfections of your eye (termed Higher Order Aberrations or HOA). These irregularities of your optical system affect the finer quality aspects of your vision and are typically not corrected with glasses. A Wavefront Aberrometer records the optical quality from several positions over the pupil opening. This produces a map of the imperfections of your eye's optics. There are several types of aberrometers and it is best to go to a centre that uses at least two different aberrometry technologies to ensure more precision in collecting the aberrometry information. This information can be fed into an excimer laser to achieve better results. The laser however, must be designed to receive these measurements and then apply them directly onto the cornea. At Clarity Laser Vision, we can use at least two different aberrometers to ensure we provide accurate information for the laser system to create a truly customized treatment for the eye.

CAN I STILL HAVE LASER EYE SURGERY IF I HAVE ASTIGMATISM?

Answer: Yes. Laser eye surgery can treat astigmatism at the same time as it corrects near or farsightedness.

IS MY PRESCRIPTION TOO HIGH?

Answer: In most cases, having a very high prescription may still be treatable with either laser procedure or intraocular procedure. The range that any surgeon can treat depends on their technology, surgical experience and comfort. At Clarity Laser Vision, we would only provide a treatment plan if it is deemed safe for the patient to undertake.

: WHAT RANGE OF PRESCRIPTIONS CAN BE TREATED?

Answer: The majority of laser eye surgery is performed on patients with: Myopia up to -12.00D Hyperopia up to +6.00D Astigmatism up to -6.00D With certain technologies and surgeon expertise, much higher refractive errors can be corrected.



: AM I TOO OLD/TOO YOUNG?

Answer: Patients should be at least 18 years old for laser eye surgery. There is no upper age limit.

: DOES EVERYONE GET PRESBYOPIA?

Answer: During our 40's, almost everyone begins to need glasses for reading, even if they have not worn glasses before. For those who wore glasses prior to that age, bifocal lenses in glasses become required to help address the need for reading while keeping our need for distance correction.

): HOW DOES THE FLAP STAY IN PLACE IN LASIK?

Answer: In the early phases of recovery after LASIK, the flap is kept in position by a suction effect. This occurs when the cells lining the inner surface of your cornea pump water out to the inner part of the eye, which results in the flap staying in place. During the first few hours after surgery, the outer surface of the cornea, known as the epithelium, seals the edges of the flap. Over the coming weeks, natural substances inside your cornea bond the flap to the underlying tissue.

: WHAT CONDITIONS MAY PREVENT ME FROM HAVING LASER EYE SURGERY?

Answer: The following includes conditions or circumstances that prospective patients commonly ask about when discussing their suitability for laser eye surgery:

Pregnant or breastfeeding? Laser treatment is not recommended while pregnant because the vision can fluctuate during that period. It is also best to wait until 4 weeks after breast feeding is complete to be considered for laser treatment.

Taking prescription drugs? You should indicate what drugs you are taking as laser eye surgery may be contraindicated while taking certain medications.

Younger than 21? The lowest age of consent without adult involvement is 18.

Have amblyopia (also known as lazy eye)? Laser eye surgery cannot fix a lazy eye. In other words, it cannot make that eye see more clearly than it does with glasses, even if we completely fix the refractive error in that eye. This does not mean that you are not suitable for laser eye surgery. Many patients with a lazy eye have had very successful outcomes after laser surgery. Occasionally spectacles are not prescribed to fully correct the vision in the lazy eye because the difference in the prescriptions between the two eyes can be too difficult to tolerate by that person. Laser eye surgery can often correct the focus in a lazy eye and achieve better vision than achieved with spectacles.

Have a cataract? It is best to avoid laser treatment to cornea when you have a cataract. A more suitable treatment option would be to do cataract surgery to remove the cataract and improve the vision with an artificial intraocular lens.

Have a collagen vascular disease? Collagen vascular diseases can vary in presentations and severity. Certain conditions can still allow you to have laser treatment, but it is a case by case analysis. It is prudent to indicate to us if you have this condition during your initial assessment with the doctor to ensure a better discussion can occur specific to your situation.

Have a compromised immune system? We assess this on a case by case basis and will provide you with an answer at the initial assessment.

Have a connective tissue disorder (i.e. rheumatoid arthritis)? These conditions can be associated with altered healing responses by the body and can cause a slightly higher risk of complications after laser treatment. There is a possibility that you may still be suitable, but we assess this on a case by case basis and will provide you with an answer at the initial assessment.

Have had a detached retina? A treated detached retina may or may not prevent you from qualifying for laser eye treatment but it is a case by case situation.

Have dry eyes? Your suitability for laser eye surgery depends on the cause and severity of the dry eye. Having a corneal specialist assess your eyes is the most effective way in ensuring your dry eyes are treated properly.

Have epilepsy? You may still be a candidate for laser eye treatment, even if you have epilepsy.

Have glaucoma? Your surgeon will work in conjunction with your glaucoma specialist to ensure your glaucoma management is not affected by laser refractive surgery.

Have hepatitis C? You may still be a candidate for laser treatment. You should indicate this when you have your initial screening.

Have HIV? You may still be a candidate for laser treatment. You should indicate this when you have your initial screening.

Had previous herpes infection of the eye? Herpes infection in the eye can be a serious corneal problem. You may still be a candidate for laser treatment, but such a situation is best assessed by a laser surgeon who is also a corneal specialist to ensure it is suitable for you.

Have diabetes? If the diabetes is controlled and you don't have any signs of active diabetic retinopathy, you may still be a candidate.

Have had iritis? Iritis is a condition whereby the iris becomes inflamed for a variety of reasons. Suitability for laser eye treatment is only likely if there has not been a reoccurrence in the 12 months preceding treatment. We assess this on a case by case basis and will provide you with an answer at the initial assessment.

Have Keratoconus? Keratoconus is a progressive disease that results in the thinning of the cornea. Removing corneal tissue with laser treatment is inadvisable as it will further destabilize the shape of the cornea. However, Clarity Laser Vision can successfully stabilize Keratoconus through a corneal cross linking treatment.

Have large pupils? With our custom programmed treatments we can successfully treat patients with very large pupils without inducing night vision disturbances.

Have macular degeneration? It depends on the severity of your condition. If your central vision is significantly depressed as a result of macular degeneration, laser eye surgery is not advisable as it will provide little improvement to your uncorrected central vision.

Have night vision disturbances? Some clinics have the technology and expertise to correct these problems using wavefront aberrometry technologies. At Clarity Laser Vision, we have the technology and expertise to help with these situations.

Have nystagmus (involuntary eye movements)? Laser eye surgery will not treat the nystagmus, but can be safely performed with the use of sensitive eye tracking systems fitted to most modern lasers.

Have prism? If you need prisms in glasses to correct vision, you can still have laser treatment. But you will likely still need prism glasses if you have double vision with contact lenses or without the prism in your spectacles.

Have strabismus (also known as squint)? You can still have laser treatment. However, laser eye surgery alone will not resolve a strabismus problem. The exception to that is a fully accommodative squint that will likely improve with laser treatment. Strabismus is not automatically a contra indication for LASIK or PRK, however there are several considerations that need to be evaluated before making a decision about refractive surgery.

Have thin corneas? If you have been turned down for laser surgery due to corneal thickness, it is worth having a complete preoperative assessment with us. If you have thin corneas, but do not have Keratoconus, you may still be a candidate for laser refractive treatment or intraocular procedures such as Phakic IOLS or Refractive Lens Exchange.

CONFIRMATION OF YOUR UNDERSTANDING

Please answer either True or False to the statements below to ensure that you understand the information explained in Clarity Laser Vision Guide.			
1. LASIK is the only method to correct someone's vision.	OTRUE	⊖ FALSE	
2. There are no guarantees about the visual outcomes of the laser eye procedure.	TRUE	⊖ FALSE	
3. Deciding on whether you should have LASIK or PRK is best assessed by a specialist with corneal and refractive surgery fellowships.	TRUE	⊖ FALSE	
4. PRK and LASIK both change the shape of the cornea.	TRUE	<i>○ FALSE</i>	
5. Laser eye surgery is the only method to correct my vision.	TRUE	⊖ FALSE	
6. I may experience vision irregularities such as halos and glare that may be permanent in certain cases after laser eye surgery.	<i>○TRUE</i>	⊖ FALSE	
7. After the procedure, follow up visits are not essential.	<i>○TRUE</i>	⊖ FALSE	
8. I may experience mild to moderate discomfort for some time after the procedure.	<i>○TRUE</i>	⊖ FALSE	
9. Laser eye surgery will eliminate the need for reading glasses, especially after 40 years of age.	<i>○TRUE</i>	⊖ FALSE	
10. If I elect to have Laser eye surgery, it is possible to experience complications.	<i>○TRUE</i>	⊖ FALSE	

Verify your answers with the correct answers. If you would like to know why you missed any of these questions, ask your eye care professional for clarifications.

Answers: 1. F 2.T 3.T 4.T 5.F 6.T 7.F 8.T 9.F 10.T