

Photorefractive Keratectomy

PRK was the first kind of corrective eye surgery to use a laser rather than a blade to remove corneal tissue. Though the excimer laser was developed in the early 1970s and modified for ophthalmic use in the early 1980s, the Food and Drug Administration did not approve its use for PRK corrective eye surgery until 1995.

PRK became less and less popular following the development of **LASIK**, a procedure that allowed patients to have their vision corrected without the need for extended recovery from surgery.

Procedure

PRK is an outpatient surgery and takes approximately 5-15 minutes per eye to complete. Although some pressure sensation may be felt during PRK, the procedure is generally painless. Before the procedure, anesthetic drops are used to numb the eye. During the procedure, an instrument holds the eyelid open and the patient is asked to focus on a target light. The surgeon then removes the surface layer of the cornea (the corneal epithelium) and uses an excimer laser to apply computer-controlled pulses of light energy to reshape the cornea.

Recovery

After PRK is completed, the surgeon inserts a bandage contact lens to protect the cornea as the epithelial layer grows back over the next 3-4 days. This also helps decrease the discomfort experienced during this time, which is generally mild to moderate and can give the sensation that a foreign body is in the eye. Patients usually experience tearing, sensitivity to light, and a moderate amount of blurred vision which may prevent driving during the first 3 days. These phenomena are typically worst on the second and third days after the procedure, but improve greatly by the fourth and fifth days as the surface layer of the cornea grows back. During this time, chilled lubricating and medicated drops are prescribed to help to decrease discomfort, heal the cornea, and decrease the risk of scar formation and infection. The cornea heals from the edges towards the center, forming a “ridge” of epithelium across the pupil where the healing tissues meet. This ridge usually has formed by the fourth or fifth day, and it is safe to remove the bandage contact lens. The vision is much improved by this time, generally ranging between 20/30 and 20/50, depending on the magnitude of the corrective treatment done. As the ridge of epithelium smoothes out over the next 4-6 weeks, the vision will gradually improve. The correction is usually considered to be stable by 3-6 months after surgery, at which time an enhancement could be considered if necessary.

PRK vs. LASIK

LASIK, **PRK**, and **LASEK** (a variant of PRK) are surgical techniques that use precise excimer laser energy to alter the refractive status of the eye. The difference in these procedures is where the excimer laser energy is applied.

LASIK consists of first making a corneal flap with a device called a microkeratome. A microkeratome is either a mechanical device that uses a blade or is laser-based. Here at Baylor Vision, we use the Intralase laser to create LASIK flaps. After the flap is created, the excimer laser removes small amounts of underlying tissue from the exposed cornea. Following the laser treatment, the flap is placed over the eye and carefully repositioned to complete the surgery.

PRK consists of mechanical removal of surface cells on the cornea (called the epithelium), followed by use of the excimer laser to remove small amounts of tissue from the front of the cornea.

LASEK is simply a variation of PRK in which the surface cells (epithelium) are soaked in a dilute solution of alcohol, pushed aside as a single sheet, and then pushed back over the surface of the corneal after the laser treatment is completed.

Therefore, all these operations involve use of the excimer laser to precisely remove the tissue. The primary difference is that the tissue removal is done under a flap with **LASIK** and on the surface of the cornea with PRK/LASEK.

Advantages of LASIK

There are several advantages to **LASIK**.

- Typically, there is little or no discomfort, both during and after the operation.
- Recovery of vision is rapid, and many people have useful vision within one day of surgery.
- If the outcome of the initial procedure does not meet expectations, then a retreatment can be performed. This is typically done at three months and consists of either lifting the flap that was made and applying an additional amount of laser treatment or doing the retreatment on the surface (like PRK).

Disadvantages of LASIK

- Because **LASIK** involves cutting a flap, it involves surgery that is deeper into the layers of the cornea. This could excessively weaken corneas of patients whose corneas are too thin.
- The creation of the flap also cuts corneal nerves and can increase dry eye symptoms in patients who are predisposed to this problem.

Advantages of PRK/LASEK

- PRK/LASEK avoids the use of the microkeratome or laser to make the LASIK flap. This leaves a greater portion of the cornea untouched by the surgery, which is important in patients who have thin corneas.
- In addition, there appears to be more rapid recovery of the function of the corneal nerves, which minimizes the amount of dryness that can be present following the procedure.
- PRK/LASEK may also provide an extra margin of safety in patients whose corneas have an unusual shape; this advantage is again due to leaving more of the cornea untouched by the surgery.

- If eye trauma were to occur following refractive laser surgery, there is less risk of complications with PRK/LASEK than with LASIK. With LASIK, the flap, in very rare instances, can become elevated or partially dislodged if the eye is struck at just the right angle with just the right object. This problem is obviously avoided with PRK/LASEK--because there is no flap. In PRK/LASEK, the trauma may cause a surface abrasion, but without a flap the abrasion would be the same as in an eye that had not undergone any laser surgery.

Disadvantages of PRK/LASEK

- For the first couple of days following PRK/LASEK, there can be mild to moderate eye discomfort. It takes several days for visual recovery, with good vision sometimes requiring 7-10 days, or in rare cases even longer. Depending on the rate of recovery of vision, patients can usually drive and return to work within 3 to 6 days after PRK/LASEK surgery.
- As in LASIK, if the outcome of the original procedure does not meet expectations, retreatment can be performed. This would essentially be the same process as the original surgery.
- PRK/LASEK patients are usually required to take cortisone drops for up to 4 months after surgery; the purpose of these drops is to minimize the risk of the development of haze in the cornea. A mild amount of haze is common, and this is not discernable by the patient. The purpose of the drops is to help prevent the development of any haze that might be noticeable to the patient.

Additional Resources

- Boyd K, Yeu E. What Is Photorefractive Keratectomy (PRK)? American Academy of Ophthalmology. EyeSmart® Eye health. <https://www.aao.org/eye-health/treatments/photorefractive-keratectomy-prk> Accessed March 26, 2019.
- Sachdeva R, Feldman B, Grewal S, Kreuger R. LASEK. E-Medicine from WebMD. June 21, 2007. Updated February 9, 2010. Available at:
- International Society of Refractive Surgery Refractive Surgery Procedures Summary

CME Resources

- 2010 Focal Points Module: Innovations in Advanced Surface Laser Refractive Surgery.

Sourced from: https://eyewiki.org/Photorefractive_Keratectomy