LASIK is the most common form of refractive surgery performed today, with an annual rate towering at 2 million procedures and an impressive patient satisfaction rate of 95.4%. It is arguably one of the most successful elective procedures in modern medicine. The first three contributions to this month’s cover series on market trends in refractive surgery pay tribute to the history of LASIK, review the current volume of LASIK performed worldwide, and consider the future of this popular treatment. This article reviews the history of LASIK.

Ioannis G. Pallikaris, MD, and colleagues at the University of Crete in Greece performed the first LASIK procedure on a blind eye in June 1989, with studies in sighted humans following in 1990. These first cases showed no signs of significant irregular astigmatism at 3 months and clear corneas. The landmark research by Pallikaris et al marked the beginning of the modern boom of LASIK; however, its historic roots extend far back beyond the summer of 1989.

EARLY RESEARCH

In 1949, José Ignacio Barraquer, MD, of Bogotá, Colombia, theorized that the addition or subtraction of corneal tissue from the eye would modify its refractive power. His first refractive surgical technique based on this theory consisted of creating a corneal lamellar disc and removing stroma from either the stromal bed or the surface of the disc. When removal took place in the stromal bed, the technique was named keratomileusis in situ. His coined word keratomileusis was a combination of two Greek root words, keras for hornlike (ie, cornea) and smileusis for carving.
The contributions of yesterday’s refractive surgery pioneers continue to shape the field of laser vision correction.

Professor Barraquer experimented with myopic keratomileusis, dissecting the anterior half of the cornea with a freehand technique. Later, he designed and transitioned to the use of a manual microkeratome for dissection. He also designed appplanation lenses and suction rings for use with keratomileusis techniques.

Early treatments with myopic keratomileusis carried the burden of postoperative complications including irregular astigmatism and corneal scarring; refinements in the 1980s sought to correct these errors. Surgeons debated the usefulness of freezing lamellar procedures, which sometimes produced corneal haze and irregular astigmatism, and nonfreezing lamellar procedures (Figure 1), which were technically difficult to perform but boasted fast visual recovery and a lower complication rate.

OTHER TECHNIQUES

Several nonfreeze lamellar techniques were subsequently developed, including automated lamellar keratoplasty, originated by Luiz Antonio Ruiz, MD, also of Bogotá. After the surgeon created a corneal disc with an automated microkeratome, an additional keratectomy was performed on the corneal bed, removing tissue from the center of the cornea to induce a flatter central cornea when the disc was repositioned. This technique offered fast visual recovery and stable correction of high myopia; however, induced irregular astigmatism remained as a side effect.

The concept of excimer laser PRK was first described in 1983, the treatment was first performed on enucleated animal eyes by Stephen L. Trokel, MD, of New York.

In these first attempts, PRK was used to treat high myopia, but procedures had poor predictability and resulted in severe corneal haze and myopic regression. Refinements improved outcomes enough for human use, and 5 years later, Marguerite McDonald, MD, of New Orleans, performed the first PRKs in blind eyes, followed by partially sighted and finally fully sighted human eyes in the ensuing years.

LASIK and PRK were both popular laser vision correction strategies in the early 1990s, and literature reviews commonly compared results between treatments. Pallikaris et al published results that suggested LASIK offered better stability and predictability for myopic corrections greater than 10.00 D. However, more recent reports propose that the two techniques are similarly effective. Analogous results have also been detailed for hyperopic LASIK and hyperopic PRK, but debate regarding the superiority of LASIK or surface ablation techniques such as PRK continues today.

CONCLUSION

The contributions of yesterday’s refractive surgery pioneers continue to shape the field of laser vision correction. Procedures such as PRK and LASIK, developed less than 4 decades ago, have made room for modifications and new refractive technologies geared toward presbyopia correction, such as presby-LASIK and Intracor (Technolas Perfect Vision, Munich, Germany). The remainder of the articles in this cover focus explore these newer options in detail.

TAKE-HOME MESSAGE

- The year 1989 signifies the start of the modern boom of LASIK, but its history extends to 1949.
- Both LASIK and PRK became popular treatments in the 1990s, and surgeons still debate the effectiveness of one procedure over the other.
- Early reports suggested that LASIK was more effective than PRK, but recent reports suggest they are similarly effective.