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REVIEW ARTICLE

Comparison of clinical outcomes of LASIK, Trans-PRK, and SMILE for correction of myopia

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Abstract: Transepithelial photorefractive keratectomy (Trans-PRK), laser-assisted in situ keratomileusis (LASIK), and small incision lenticule extraction (SMILE) are three mainstay refractive surgeries worldwide. The applicability, efficacy, safety, and predictability of these different techniques are quite similar. Trans-PRK has the strongest biostability, earliest return to normal corneal sensitivity but the longest recovery time, most uncomfortable postoperative experience, and possibility of corneal haze. LASIK possesses the fastest visual rehabilitation but the slowest corneal nerve reinnervation, and flap displacement is possibly lifelong. SMILE incurs no flap-related complications and has intermediate vision recovery time and biomechanics compared with Trans-PRK and LASIK. However, it lacks the cyclotorsion-compensation system, eye-tracking system, and customized treatment profile for high astigmatism or irregular corneal surface. This review aims to introduce the mechanisms, pros, and cons of these three types of refractive surgery. With full understanding, practitioners could advise patients on the most suitable treatment of choice.

Keywords: Corneal Surgery, Laser; Keratomileusis, laser in situ; Myopia; Photorefractive keratectomy

1. INTRODUCTION

Myopia is the main cause of distance vision impairment. Its prevalence is 2620 million in 2020 and is projected to increase to 3361 million in 2030 (rising from 34.0% to 39.9% of the global population).[1] Compared with glasses and contact lenses, refractive surgery is likely to correct the refractive error once and for all. Surface ablation and lamellar ablation through excimer laser have thus been developed to treat refractive errors by creating a new corneal radius of curvature. However, many people still do not dare to undergo refractive surgery because of possible complications such as unpredictability of refractive outcomes, flap-associated complications, and corneal ectasia. In recent years, breakthroughs in refractive surgeries have made them safer. For example, the non-physiological design of automated lamellar keratoplasty was first replaced by microkeratome laser-assisted in situ keratomileusis (LASIK). The precise ablation by excimer laser has made accurate correction possible. Then, femtosecond-LASIK (FS-LASIK) was developed to minimize microkeratome-related complications. Single-step Transepithelial photorefractive keratectomy (Trans-PRK) equipped with SmartPulse technology provides faster recovery and better postoperative experience than conventional PRK.[2] The emerging small incision lenticule extraction (SMILE) offers superior biostability with less short-term dry eye symptoms[3–5] than LASIK and quicker recovery than Trans-PRK.[6,7] On the basis of existing evidence, this review aims to summarize the clinical results of Trans-PRK, LASIK, and SMILE, focusing on their applicability, efficacy, safety, predictability, high order aberrations (HOAs), dry eye incidence, and corneal biostability.

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2. HISTORICAL SYNOPSIS, SURGICAL PROCEDURES, AND APPLICABILITY

2.1. Photorefractive keratectomy

Photorefractive keratectomy (PRK) is the first refractive surgery using the excimer laser for surface ablation approved by the US Food and Drug Administration (FDA) in 1996.[8,9] After removing the corneal epithelium mechanically or chemically, the laser is irradiated onto the anterior stroma. Postoperative pain, corneal haze, and irregular epithelial healing are drawbacks of the conventional PRK. PRK is the only alternative for those unsuitable for LASIK, such as patients with thin corneas, epithelial basement membrane disease, subtle topographic irregularities, and a high likelihood of future ocular trauma.[10]

After several generations of platforms, single-step Trans-PRK, the recent mainstay of surface ablation surgery designed in 2007, ablates both the epithelium and stroma with an excimer laser (Fig. 1A). The procedure is shorter, thus minimizing corneal dehydration, and addresses the ablation energy for both epithelium and stroma with a single program.[11,12] Adjuvant mitomycin-C (MMC) therapy was also developed to reduce haze, especially in high myopia.[13,14] The SmartPulse technology featuring a particular ablative spot geometry introduced in 2017 is designed to enhance the smoothness of the residual stromal bed at the end of treatment, which provides faster reepithelization and visual rehabilitation, lesser pain,[2] as well as better refractive efficacy and predictability in high myopic patients[15] than conventional PRK.

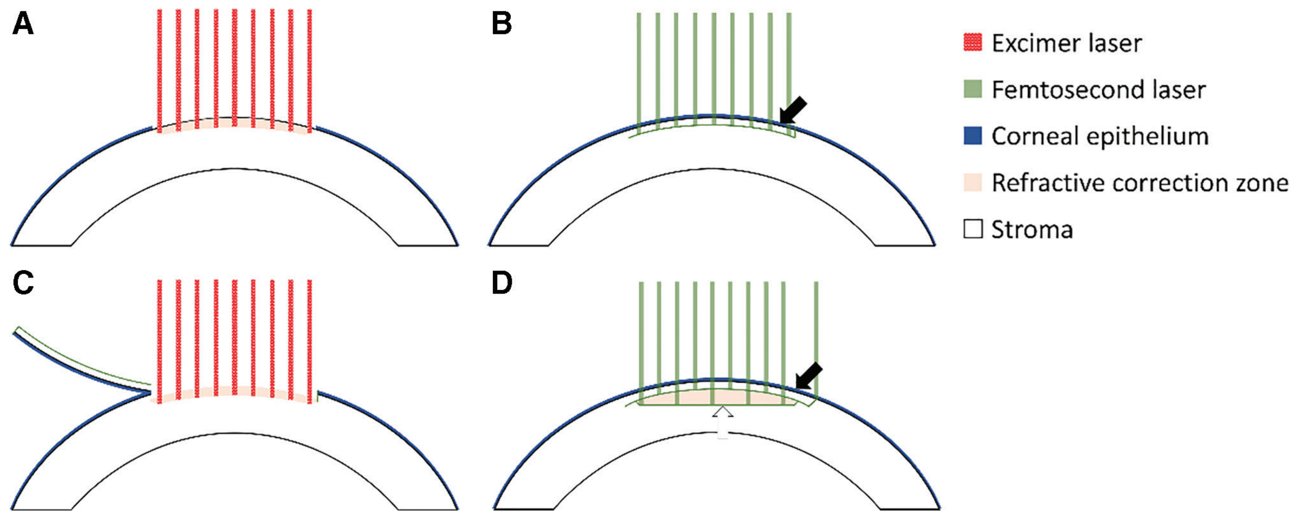

Fig. 1 Schematics of different refractive surgeries. A, Transepithelial photorefractive keratectomy. B, First step of laser-assisted keratomileusis in situ (LASIK): creating a corneal flap with femtosecond laser. The flap thickness indicated by the black arrow is between 90 and 110 μm. C, Second step of LASIK: applying excimer laser to the stromal bed after lifting the flap. D, Small incision lenticule extraction. The cap thickness indicated by the black arrow is between 100 and 120 μm. The structure indicated by the white arrow in the illustration is the lenticule extracted.

2.2. Laser-assisted in situ keratomileusis

LASIK, approved by the FDA in 1998, became the most popular refractive technique in the late 1990s due to lesser postoperative discomfort, faster recovery of vision, and reduction in haze. A lamellar flap with a hinge is first created by a mechanical microkeratome or femtosecond laser (Fig. 1B). After lifting the flap, the excimer laser is applied to the stromal bed (Fig. 1C). The flap is then repositioned back.[8,14,16,17]

The efficacy, safety, and predictability of LASIK have been well established.[18] Nevertheless, LASIK has several disadvantages, including intraoperative or late flap-related complications, more corneal biomechanical insult, and the potential risk of ectasia due to less stromal tissue retained.[8,14,16,17] Femtosecond laser reduces the major complications like creating free cap, buttonhole flap, or irregular flap caused by mechanical microkeratome.[19] The thickness of the flap can be more precise, which lowers the risk of ectasia.[20] Xia et al[21] reported that femtosecond laser might have lesser HOAs, better contrast sensitivity, longer tear break-up time (TBUT), and more predictable flap thickness over mechanical microkeratome. Two platforms are needed to complete the FS-LASIK procedure.[20]

2.3. Small incision lenticule extraction

In 2008, femtosecond lenticule extraction (FLEX) was introduced by creating the flap and lenticule from the corneal stroma. The lenticule is removed with forceps after lifting the flap. SMILE was developed from FLEX and approved by the FDA in 2016. SMILE is performed using a femtosecond laser to create an intrastromal lenticule with one corneal incision (2.0-5.0 mm) (Fig. 1D). Apart from FLEX, SMILE removed the refractive lenticule through the small incision.[22] The potential advantages of SMILE over LASIK include decreased laser energy for refractive corrections, better biomechanical stability, and fewer dry eye symptoms.[3–6] However, the learning curve of SMILE is steeper than that of other refractive surgeries for surgeons, with possible complications related to lenticule creation, dissection, and extraction.[23] Compared with LASIK, SMILE has slightly slower visual recovery in the initial phase[24] and limitations with enhancement.[6] The VisuMax Femtosecond Laser (Carl Zeiss Meditec AG, Jena, Germany) is the platform for the current SMILE procedure. SMILE can provide higher maximum spherical treatment than LASIK because there is no flap creation in SMILE.[18]

Corneal lenticule extraction for advanced refractive (CLEAR) is an upgraded software launched in April 2020 on the FEMTO LDV Z8 platform (Ziemer Ophthalmic Systems AG, Port, Switzerland). Two guiding tunnels are required for dissecting the anterior and posterior lenticule, respectively. It also has advantages in centration after docking, and intraoperative optical coherence tomography, which may shorten the surgeon's learning curve. An experiment on enucleated porcine eyeballs found more total laser application, longer time on suction peak pressure and surgery, but smoother lenticule surfaces under scanning electron microscopy in CLEAR compared with SMILE.[25,26] Future studies are suggested.

3. VISUAL OUTCOMES (EFFICACY, SAFETY, AND PREDICTABILITY)

3.1. Trans-PRK vs LASIK

The visual outcomes include the efficacy (uncorrected distance visual acuity [UDVA] of 20/20 or better), safety (not losing one or more lines of best-corrected visual acuity), and predictability of refraction (change in postoperative mean spherical equivalent (SE)) of the above three surgical approaches are discussed in the following.

Limited comparative data between Trans-PRK and LASIK caused comparison of their visual outcomes to be inconclusive. Many studies showed favorable or equivalent efficacy and safety of Trans-PRK in myopic[27] and high myopic patients.[14,16,28,29] Two studies revealed sight overcorrection in Trans-PRK, and undercorrection in FS-LASIK, which might contribute to better UDVA in the Trans-PRK group.[16,27] The predictability of refraction and the percentage for the target refraction of ± 0.5 diopter (D) in 12 months of follow-up were better or comparable in Trans-PRK patients for both myopic[27] and high myopic groups[16,28,29] In contrast, Mounir et al[14] found better predictability in FS-LASIK groups of high myopic Egyptians. Higher variances of SE were observed in Trans-PRK groups during the postoperative 6 months, which might be attributed to the ongoing epithelial healing process.[14,27] The retreatment rates of myopic patients treated with conventional PRK were 3.8% to 20.8%,[30] which were higher than those treated with LASIK (0.38%-16%).[31] The retreatment rates correlated with high correction, MMC, small optical zone, and unstable fixation in PRK and with age over 40 years, flap thickness, high correction, and small optical zone in LASIK.[30] In general, there was a decrease in retreatment rate, probably due to the improved technology and surgeon experience.[31]

Only one study discussed the astigmatism outcomes between Trans-PRK and FS-LASIK. FS-LASIK had better performance than Trans-PRK in predictability of astigmatism ≦2.0D in postoperative 6 months. The uneven reconstruction and distribution of epithelium might affect the results.[32] Wavefront-guided Trans-PRK showed equivalent efficacy, safety, predictability, and a more predictable astigmatism correction axis than wavefront-optimized Trans-PRK in moderate to high astigmatism (≧1.75D) patients.[33] Moreover, the visual outcomes in moderate to high astigmatism (>2.00D) patients treated with Trans-PRK with non-wavefront–guided aberration neutral ablation profile using SmartPulse allocation were satisfactory.[34] Further long-term and comparable prospective studies between Trans-PRK and FS-LASIK equipped with different modalities are needed.

3.2. SMILE vs LASIK

The visual outcomes of FS-LASIK and SMILE in short-term[4,6,35–38] and long-term studies[39–42] were comparable. In the high myopic group, the results were equivalent between FS-LASIK and SMILE.[43]

The recovery in visual acuity was slower in SMILE than in FS-LASIK patients, the UDVA was better in the FS-LASIK group,[44] and the mean SE was significantly higher in the SMILE group[45] at postoperative day 1. Contrast sensitivity was better in the FS-LASIK group at postoperative days 1 and 7, but there was no difference at 1 month. The quality of vision reported by patients was significantly worse in the SMILE group on day 7.[24] Certain degrees of stromal edema resulting from lenticule manipulation may be the reason for the slower recovery of visual acuity after SMILE.[46]

SMILE is theoretically limited to high astigmatism correction due to lack of cyclotorsion-compensation system, eye-tracking system, and customized treatment profile.[18] Astigmatic correction results between the SMILE and LASIK groups were controversial; some studies found favorable outcomes in the LASIK group,[47–49] whereas some obtained similar findings.[6,37,44,50–53] High astigmatic patients tended to have under-corrected results in both groups.[51] Jun et al[54] proposed that the triple centration technique could improve the astigmatism correction outcome in SMILE.

3.3. Trans-PRK vs SMILE

There were limited articles comparing the results between Trans-PRK and SMILE. SMILE had better visual outcomes and less residual astigmatism one month postoperatively.[7] However, these parameters became comparable between the groups at 3-[7] and 6-month[55] follow-up.

4. HIGH ORDER ABERRATIONS

Most patients achieve their UDVA of 1.0 after refractive surgery. However, some still complain about symptoms, such as glare, coma, halos, ghosting, and poor night vision, all related to reduced visual quality by HOAs. HOAs are induced by the wound healing process, changes in biomechanical properties, flap creation, and tear film stability.[56] Flap centration, ablation zone area, and the degree of myopia could also affect the amount of aberrations.[57] The pupil diameters alter the contribution of aberrations to visual quality. HOAs under mesopic pupil (5 or 6 mm) in most previous reports are summarized and discussed below.

4.1. Trans-PRK vs LASIK

Trans-PRK maintains more corneal integrity than FS-LASIK or SMILE, so it is thought to have fewer aberrations.[16,56] There is a research gap in comparing the aberrations between Trans-PRK and FS-LASIK. Jiang et al[56] reported higher increase in total HOAs, spherical aberrations (SAs), and vertical coma after FS-LASIK than after Trans-PRK at 1 month postoperatively. The aberrations in low to moderate myopia patients of both groups were similar at 3-month follow-up. Zhang et al[16] found that in high myopia patients, the total HOAs and vertical coma were higher in the FS-LASIK group than in the Trans-PRK group at postoperative one year. Previous reports observed that the flap made on the nasal side induced horizontal coma, while the flap made on the superior side induced vertical coma. Biscevic et al[58] had converse findings; that is, the coma, SAs, and trefoil tended to increase after Trans-PRK. However, at 6-month follow-up, the changes compared with preoperative values were insignificant in both groups.

4.2. LASIK vs SMILE

Comparing the values of wavefront aberrations between FS-LASIK and SMILE showed that FS-LASIK had higher SAs at 3 months,[59,60] 6 months,[44,61] 1 year,[57] and 5 years[42] after the operation. SAs produced more apparent problems than coma in large pupil diameters. Postoperative SAs correlated with ablation zones and the corneal shape.[60] Larger ablation zone and fewer changes in the corneal shape after SMILE might cause fewer SAs than after FS-LASIK.[44,57,62,63] Moreover, FS-LASIK possessed more total HOAs at 3 months[45,59,60] and 1 year postoperatively.[57] Compared with SMILE, FS-LASIK had more wound healing response and inflammatory infiltration,[64] resulting in higher total HOA induction.[60] However, several articles found no significant difference in aberration values between FS-LASIK and SMILE at 3 months,[6,46,65] 6 months,[6,66] 1 year,[6,41] 3 years, and 5 years.[41] The only randomized, pair-eyed study found no significant differences (at 3-, 6-, and 12-month follow-up) in total HOAs and visual outcomes between SMILE and FS-LASIK.[6]

Wavefront-optimized, wavefront-guided, and topography-guided treatments are ablation profiles available for LASIK and Trans-PRK, which could minimize the aberrations due to different principles.[67] Therefore, some articles showed similar,[62,68] or better,[66,69] aberrometric outcomes in wavefront-guided LASIK than in SMILE. When FS-LASIK was equipped with wavefront-guided ablation profiles, SMILE obtained more coma than FS-LASIK at 3-month,[69] 6-month,[66] and 5-year[42] follow-up. Coma reflects the properties of the eye asymmetry, including irregularity, tilt, and decentration.[66] It was hypothesized that less accurate centration resulting from lack of eye-tracker or iris registration in SMILE may account for the induced coma.[62,63,66,69] One study postulated that a single incision in SMILE might produce imbalance healing responses.[65] In studies of high myopia, the comparative studies at postoperative 6 months[62] and 3 years[63] were consistent with the reports above.

Diverse optical zones,[70] positive effects on aberrations by the same surgeon,[41] patient selection bias,[6] and variations in healing response related to the amount of diopter correction[41] may lead to different outcomes.

4.3. Trans-PRK vs SMILE

Little research has been conducted to compare the aberrations between Trans-PRK and SMILE. Zheng et al[7] reported that coma and total HOAs after SMILE at postoperative 1 and 3 months were significantly higher than those after Trans-PRK. Lee et al[55] found larger coma but lesser total HOAs and SAs in the SMILE group at 6 months postoperatively. Coma after SMILE may be related to inaccurate centration, as previously mentioned,[55,62,63,66,69] whereas SAs correlated with the corneal shape and wound healing processes.[55]

5. DRY EYE AND CORNEAL SENSITIVITY

Dry eye is a common side effect after refractive surgeries due to corneal nerve density reduction. The patterns of nerve damage and recovery are different in PRK, LASIK, and SMILE. Corneal sensory nerves, deriving from the ophthalmic branch of the trigeminal nerve fibers, penetrate the limbus at the anterior third of the stroma. The stromal nerves remain as bundles from the periphery toward the center below the anterior third of the stroma. Then the stromal nerve bundle forms branches that run perpendicularly to cross Bowman's layer and form the subbasal nerve plexus between the basal epithelium and Bowman's layer.[71–73] The ablation zone,[74,75] diameter of lenticule,[72] flap size,[75] and the degree of the refractive error[75,76] affect the amount of nerve loss.[72]

5.1. PRK

In PRK, photoablations sever the subbasal plexus and anterior stromal nerves but preserve the deep stromal nerves. After ablation, the nerve endings are exposed at the surface until the epithelium grows so that patients may feel pain in the postoperative 2-10 days. Bandeira et al[72] summed up findings from several studies that the subbasal nerve regeneration was almost 50% at 6-8 months and returned steadily to 90% at 2-year follow-up.[77] The corneal sensitivity recovered to 80% at postoperative 1 week and almost fully recovered after 3-6 months.[72,78,79] Reduction in TBUT, Schirmer test,[78,79] and increased symptoms scores[80] were noted at postoperative 1, 3, and 6 months in PRK.

5.2. Laser-assisted in situ keratomileusis

LASIK creates a flap in the anterior stroma just below the epithelial basal membrane. The lamellar ablation transects the stromal nerves, and the flap margin cuts the subbasal nerves. The subbasal nerves are preserved only from the hinge, which may undergo a degenerative process in the early postoperative period. Postoperative discomfort is minimal due to no exposure to nerve endings. Reinnervation after LASIK was the slowest among the three techniques. The reinnervation was only around 27% at postoperative 6 months and gradually recovered to 79% at postoperative 5 years.[72,77] However, corneal sensitivity returned almost to normal from 6 to 16 months, which was inconsistent with results of *in vivo* confocal microscopy studies.[72,81]

Few studies compared the dry eye parameters between LASIK and PRK. Lee et al[78] reported shorter TBUT and lower Schirmer test in LASIK than in PRK at 3-month follow-up; however, Bower et al[79] found more reduction in Schirmer test in PRK than in LASIK at postoperative 1 and 3 months. The symptoms scores in both LASIK and PRK were increased at 1-, 3-, and 6-month follow-up, and both returned to their baseline at postoperative 12 months.[80]

5.3. Small incision lenticule extraction

Theoretically, SMILE is less invasive than LASIK, as its incision is smaller, and the excised lenticule can be cut in a deeper plane, thus sparing the superficial nerves. Initial reinnervation was rapid, achieving almost 55% after 1 month. Corneal sensitivity recovered to 76% at 1 week, and gradually improved till 6 months though to lower levels than baseline (86%).[72,82] The only long-term study that compared reinnervation between LASIK and SMILE showed more corneal nerve fiber density in the SMILE group at average 4.1-year follow-up (59% vs 49% in the LASIK group).[83] In addition, Cetinkaya et al[84] found no difference in dry eye symptoms between 2-, 3-, and 4-mm incisions.

Several meta-analyses compared the dry eye parameters between SMILE and LASIK.[3–5,35,44,85–87] SMILE had better corneal sensitivity, longer TBUT, lower Ocular Surface Disease Index at postoperative 1, 3, and 6 months. However, Schirmer test[3–5] and tear osmolarity[4,5] showed no difference within 6 months of follow-up.

Another meta-analysis reported a significant reduction in TBUT and tear production after LASIK at 6-, 12-, and 24-month follow-up as compared with that in the PRK and SMILE groups.[88]

6. CORNEAL BIOMECHANICAL PROPERTIES

Corneal refractive surgeries affect corneal biomechanical properties. Ocular response analyzer (ORA) is the most commonly used non-contact tonometry for evaluating corneal biomechanical properties. It projects an air pulse to the cornea and measures the variables related to corneal deformation.[8] ORA measures corneal hysteresis (CH) and corneal resistance factor (CRF). Corneal hysteresis, the difference between inward and outward applanation pressures, reflects the elasticity and rigidity of the cornea.[89] CRF indicates the corneal resistance ability.[8,90] Lower CRF and CH may increase the risk of corneal ectasia after refractive surgeries.[89]

6.1. PRK vs LASIK and SMILE

There is no article on biomechanical properties for Trans-PRK; hence, the comparison was made with PRK due to their similar structure integrity theoretically. PRK has the least impairment in biomechanical properties because there is only superficial ablation without flap creation. Kamiya et al[91] reported a smaller decrease in CH and CRF in eyes undergoing PRK without MMC compared with eyes treated with LASIK at 3-month follow-up. The amount of myopia correction also correlated with reduction of biomechanical properties. Hwang et al[89] compared the biomechanical properties of PRK without MMC, PRK with MMC, and LASIK. They found PRK with MMC showing the most significant reduction in CH and CRF at 3 months, followed by a substantial increase from 3 to 12 months, but similar results in three procedures at 12 months. Although the baseline data of the three groups are controlled, this study still had a higher baseline CRF and CH in the LASIK group and higher SE (−5.9D in the PRK with MMC group vs −3.5D in LASIK and −3.1D in the PRK without MMC group) in the PRK with MMC group. Moreover, MMC application during PRK did not cause additional changes in biomechanical properties in some reports.[92,93]

The only study comparing SMILE and PRK showed that SMILE had a more significant reduction in biomechanical strength than PRK due to lamellar cuts and removal of more tissues from the anterior stroma. In addition, amount of maximal ablation and lenticule thickness were found to correlate with changes in CH and CRF.[90]

6.2. LASIK vs SMILE

Several studies compared the biomechanics between flap cut in LASIK and cap cut in SMILE. Two meta-analyses concluded that SMILE had strengths superior to either FS-LASIK or LASIK..[8,36] In the 1-, 2-, and 3-year follow-up studies, SMILE still had better CH and CRF than LASIK.[94–96]

Bowman's layer is the strongest part of the cornea, followed by the central tightly interwoven anterior stroma (100-120 μm).[94,97] Flap thickness in the LASIK group is between 90 and 110 μm, and cap thickness in the SMILE group is between 100 and 120 μm.[8,94] Hence, SMILE removes the deeper stroma, leaving the anterior-most stroma intact (except for the small incision) and maintaining more structural integrity.[36,94] In contrast to SMILE, LASIK involves flap creation by cutting the peripheral collagen fibers, thus causing lower stability.[8,98] Lesser inflammatory response in wound healing after SMILE may contribute to better biomechanics.[64,99]

The difference tended to be more significant in patients with high myopia,[94,100] probably because thinner flap and larger ablation depth affected more anterior stroma in LASIK.[8]

Table 1

Comparison of Trans-PRK, LASIK, and SMILE

	Trans-PRK	LASIK	SMILE
Indication	Myopia (−0.5 to −9.75D), astigmatism (0.0 to 5.0d), hyperopia (+0.5 to +6.0D)	US FDA: myopia (−0.5 to −8.0d), astigmatism (0.0 to 3.0d), hyperopia (+0.5 to +6.0D)	U.S FDA: myopia (−1.0 to −10.0d), astigmatism (0.75 to 3.0D)
Refraction correction	Surface ablation	Lamellar ablation	Lenticule extraction
Globe contact/suction-required	No	Yes	Yes
Platform	Single	Two (flap creation and excimer laser)	Single
Eye-tracking system	Yes	Yes	No
Cyclotorsion compensation system	Yes	Yes	No
Customized treatment profile	Yes	Yes	No
Visual recovery time	3rd (mo)	1st (d)	2nd (wk)
Aberrations	Least (limited compared data with LASIK or SMILE)	Higher SA, HOAs	Higher coma when compared with wavefront-guided FS-LASIK
Dry eye (corneal nerve reinnervation %)	90% at 2 y FU	27% at 6 mo FU; 79% at 5 y FU 49% at average 4.1 y FU	55% at 1 month FU 59% at average 4.1 y FU
Dry eye (corneal sensitivity recovery %)	100% at 3-6 mo FU	100% at 6-16 mo FU	86% at 6 mo FU. Limited long-term data.
Biostability	Strongest	Weakness	Intermediate
Other advantages	Thin cornea, epithelial basement membrane disease, subtle topographic irregularities		No flap-related complication
Disadvantages	Postoperative pain, corneal haze	Flap-related complication, potential risk of corneal ectasia	Lenticule-related complication, limitation in enhancement

D = diopter; FS-LASIK = femtosecond-LASIK; FDA = Food and Drug Administration; FU = follow-up; HOAs = high order aberrations; LASIK = laser-assisted in situ keratomileusis; SA = spherical aberration; SMILE = small incision lenticule extraction; Trans-PRK = Transepithelial photorefractive keratectomy.

In conclusion, this study has reviewed as many articles as possible and the differences between the three refractive surgeries are summarized in the Table. The applicability, efficacy, safety, and predictability between the three different techniques were comparable in most populations. None of the procedures outperforms the other ones in all respects. If prompt vision recovery is the main concern, patients may choose LASIK. If athletes wish to avoid flap-related problems and maintain strong biostability, they may consider PRK. However, patients with dry eyes and who prefer relatively quicker recovery may favor SMILE. Therefore, by understanding the mechanisms, advantages, and disadvantages of all types of refractive surgery, the practitioner can make a more holistic assessment in patients' best interest.

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