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REVIEW

Visual outcomes and management after corneal refractive surgery: A review

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Abstract Corneal refractive surgery procedures are widely performed to permanently correct refractive errors. Overall, refractive surgeries are safe, predictable and present high rates of satisfaction. Nevertheless, the induced epithelial, stromal and nerve damage alters corneal integrity and function, triggering a regenerative response. Complications that arise from corneal wound healing process might directly impact on visual outcomes of keratorefractive procedures. Most of these complications can be prevented or effectively treated with minimal consequences and minor impact on optical quality. Nevertheless, it is crucial to accurately and timely identify these corneal regeneration-related complications for successful counseling and management. Optometrists, as primary eye care providers, play an essential role in detecting anatomic and functional alterations in vision. It is therefore of great interest for optometrists to be familiar with the principal postoperative complications derived from alterations in regenerative process after corneal laser refractive surgeries. This review aims to provide a basis for optometrists to better understand, identify and manage the main wound healing-related complications after refractive surgery.

PALABRAS CLAVE
Cirugía refractiva;
Regeneración de la córnea;

Resultados visuales y manejo tras cirugía refractiva corneal: revisión

Resumen La cirugía refractiva corneal se lleva a cabo a menudo para corregir de manera permanente los errores refractivos. En general, la cirugía refractiva es segura y predecible, y presenta altos índices de satisfacción. Sin embargo, el daño inducido a nivel

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Complicaciones;
Resultados visuales

epitelial, estromal y nervioso altera la integridad y la función de la córnea, y desencadena una respuesta regenerativa. Las complicaciones que surgen del proceso de cicatrización de la herida corneal podrían tener un impacto directo sobre los resultados visuales de los procedimientos queratorefractivos. La mayoría de estas complicaciones pueden prevenirse, o tratarse de manera efectiva con mínimas consecuencias y un menor impacto sobre la calidad óptica. Sin embargo, es esencial identificar de manera precisa y oportuna dichas complicaciones relacionadas con la regeneración de la córnea, en aras de llegar a un asesoramiento y tratamiento satisfactorios. Los optometristas, al ser profesionales sanitarios de atención ocular primaria, juegan un papel esencial a la hora de detectar las alteraciones anatómicas y funcionales de la visión. Por tanto, es muy interesante que los optometristas estén familiarizados con las complicaciones postoperatorias principales derivadas de las alteraciones del proceso regenerativo tras cirugía refractiva corneal láser. Esta revisión tiene como objetivo proporcionar una base a los optometristas para la mejor comprensión, identificación y tratamiento de las principales complicaciones relacionadas con el proceso de cicatrización tras una cirugía refractiva.

Corneal refractive surgery is a rapidly evolving area of eye care. In general, refractive corneal surgery is successful and presents high levels of satisfaction,[1–3] as a result of excellent uncorrected visual acuities and minimal residual defects.

Despite the success of laser refractive surgery to correct low order aberrations, the incidence of postoperative symptoms remains to be relatively high. The most common complaints are glare (27–55%), halos (30–55%) and reduced night vision (12–57%).[1–3] These visual outcomes can reduce the quality of life of patients and are usually attributed to the induction of high order aberrations, particularly spherical aberration and coma, and large pupil diameters.[4] However, this might be also the consequence of biological events in corneal wound healing process and due to pre- or intraoperative technical errors.[5–9] Technical errors can be potentially avoided with an exhaustive selection of patients or with the development of new technologies. In fact, remarkable efforts are gone to refine and improve technology in laser refractive surgery. The evolution of technology and surgical techniques in the past decades has considerably reduced the incidence of visual disturbances, mainly by accelerating postoperative recovery. However, some drawbacks intrinsic to the procedure still persist unresolved. If the damage to corneal epithelium and stroma triggers an exaggerated wound healing response, it might culminate in undesirable consequences.[6–8,10] In this context, an early detection, accurate diagnosis and treatment of complications are extremely relevant.

The optometrist, as primary eye care provider, plays a key role in the detection of potentially harmful complications of refractive surgery. Therefore, it demands the eye care professionals to be attuned to the principal postoperative complications derived from corneal refractive surgeries, and to recognize their symptoms and visual side effects to improve counseling and management of patients. This review provides a useful base for the diagnosis of corneal regeneration-related complications after corneal laser refractive surgery, and specifically deals with timings and treatments that are tailored to a particular complication in an attempt to contribute to a clearer understanding of wound healing complications for primary eye care professionals.

Corneal laser refractive surgeries

The most commonly performed corneal refractive surgical procedures are Photorefractive Keratectomy (PRK) and Laser-Assisted in Situ Keratomileusis (LASIK). Briefly, PRK is a surface ablation procedure in which corneal epithelium is removed by mechanical debridement. With the evolution and refinement of PRK Advanced Surface Ablation (ASA) procedures emerged. In ASA procedures, corneal epithelium is removed by alcohol-assisted debridement (LASEK) or with an especial microkeratome, named epikeratome (epi-LASIK). An excimer laser in then used to ablate central corneal stroma in myopic corrections and peripheral corneal stroma in hyperopic corrections.[7] In ASA procedures, the epithelial flap can be either discarded during the procedure (flap-off) or reapplied to the photoablated stromal bed (flap-on). The latter has been suggested that reduces postoperative pain and achieves faster visual recovery, but there is no consensus about the clinical superiority of this approach. LASIK is a lamellar procedure in which a corneal flap is created with a microkeratome or femtosecond laser and repositioned after applying excimer laser within the stroma.[6] Small-Incision Lenticule Extraction (SMILE) is a recently introduced flap-less refractive surgery procedure. In this technique, the femtosecond laser creates an intrastromal corneal lenticule, which is extracted through a 2–5 mm incision, usually in the upper peripheral cornea.[8]

Corneal refractive surgery mainly acts on the most anterior cornea, whereas mid and posterior stroma,

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