



Customized Intraocular Lens Implantation: Improved Vision and Quality of Life for Cataract Patients.

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LITERATURE REVIEW

Resumo:

O implante de lentes intraoculares personalizadas representa um avanço significativo no tratamento da catarata, uma das principais causas de deficiência visual em todo o mundo. A catarata, caracterizada pela opacificação do cristalino, impacta a visão e a qualidade de vida dos pacientes. As lentes intraoculares convencionais têm sido eficazes, mas as lentes personalizadas oferecem uma abordagem adaptável, considerando as características individuais de cada paciente. Objetivo: Analisar estudos publicados nos últimos 10 anos sobre o implante de lentes intraoculares personalizadas em pacientes com catarata, focando na melhoria da visão e qualidade de vida. Metodologia: Esta revisão seguiu as diretrizes do PRISMA. As bases de dados PubMed, Scielo e Web of Science foram consultadas. Os descritores incluíram "catarata", "lentes intraoculares", "personalizadas", "visão melhorada" e "qualidade de vida". Critérios de inclusão: estudos que investigaram o uso de lentes intraoculares personalizadas em pacientes com catarata, com resultados relacionados à visão e qualidade de vida. Critérios de exclusão: estudos indisponíveis em texto completo, em idiomas não acessíveis e que não abordavam diretamente os resultados de interesse. Resultados: Os estudos revisados indicaram uma melhoria significativa na acuidade visual e na qualidade de vida dos pacientes com catarata submetidos ao implante de lentes intraoculares personalizadas. Destaques incluem precisão na correção visual, redução na dependência de óculos e alta satisfação dos pacientes. Conclusões: O implante de lentes intraoculares personalizadas demonstrou ser uma intervenção eficaz, oferecendo benefícios tangíveis em termos de visão e qualidade de vida para pacientes com catarata. Esta revisão destaca a importância dessa abordagem personalizada na oftalmologia, ressaltando seu impacto positivo na saúde ocular e bem-estar dos pacientes.

Palavras chave: "catarata", "lentes intraoculares", "personalizadas", "visão melhorada" e "qualidade de vida".



ABSTRACT

The implantation of personalized intraocular lenses represents a significant advance in the treatment of cataracts, one of the main causes of visual impairment worldwide. Cataracts, characterized by opacification of the lens, impact patients' vision and quality of life. Conventional intraocular lenses have been effective, but custom lenses offer an adaptable approach, considering each patient's individual characteristics. Objective: To analyze studies published in the last 10 years on the implantation of personalized intraocular lenses in patients with cataracts, focusing on improving vision and quality of life. Methodology: This review followed the PRISMA guidelines. The PubMed, Scielo and Web of Science databases were consulted. Descriptors included "cataract," "intraocular lens," "custom," "improved vision," and "quality of life." Inclusion criteria: studies that investigated the use of personalized intraocular lenses in patients with cataracts, with results related to vision and quality of life. Exclusion criteria: studies unavailable in full text, in non-accessible languages and that did not directly address the results of interest. Results: The studies reviewed indicated a significant improvement in the visual acuity and quality of life of cataract patients undergoing custom intraocular lens implantation. Highlights include precision in vision correction, reduced dependence on glasses and high patient satisfaction. Conclusions: Implantation of personalized intraocular lenses has proven to be an effective intervention, offering tangible benefits in terms of vision and quality of life for patients with cataracts. This review highlights the importance of this personalized approach in ophthalmology, highlighting its positive impact on patients' ocular health and well-being.

Keywords: "cataract", "intraocular lenses", "personalized", "improved vision" and "quality of life".

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INTRODUCTION:

The implantation of personalized intraocular lenses represents a significant innovation in the field of ophthalmology, especially in the treatment of cataracts, one of the main causes of visual impairment worldwide. Cataracts, characterized by opacification of the lens, compromise patients' vision, directly impacting their quality of life. In this context, conventional intraocular lenses have played a crucial role in restoring vision after cataract surgery. However, as technology has advanced, custom intraocular lenses have emerged, offering a more adaptable and precise approach to correcting visual impairments resulting from cataracts.

Unlike conventional intraocular lenses, which are manufactured in a standard size, personalized lenses take into account the individual characteristics of each patient. This includes corneal curvature, axial length of the eye, optical aberrations, and even specific visual preferences. This customization allows for more accurate and appropriate correction, resulting in improved and more comfortable vision for the patient. This precision in visual correction is one of the main benefits of personalized intraocular lenses, highlighting their effectiveness in improving the visual acuity of patients with cataracts.

In addition to precision in visual correction, studies have consistently demonstrated a significant improvement in the visual acuity of patients undergoing custom intraocular lens implantation. This improvement not only restores vision impaired by cataracts, but also reduces dependence on glasses after surgery. Patients report greater satisfaction with their corrected vision and an overall improvement in quality of life. These results highlight the importance of personalized intraocular lenses in promoting ocular health and well-being in cataract patients.

Technological advances in ophthalmology have brought with them a new perspective in the treatment of cataracts through the implantation of personalized intraocular lenses. These lenses, unlike conventional lenses, offer an adaptable solution, addressing diverse lighting conditions and reducing visual aberrations. As a result, patients undergoing this procedure report clearer and more comfortable vision, especially in common everyday situations, such as driving, reading and using electronic



devices. The range of vision correction provided by custom lenses is remarkable, covering not only near and distance vision, but also intermediate vision. This versatility results in a more complete and satisfying visual experience for patients, who report a significant reduction in dependence on glasses. Furthermore, in addition to improving visual acuity, the implantation of personalized intraocular lenses has a profound impact on the quality of life of patients with cataracts. The independence gained from reducing the need for glasses, along with renewed confidence in carrying out daily activities, contributes to greater overall satisfaction and well-being. These benefits highlight the importance of personalized intraocular lenses as an effective and promising therapeutic option for correcting vision compromised by cataracts.

METHODOLOGY

To conduct this systematic literature review, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) checklist was adopted as a methodological guide. The search for articles was carried out in the PubMed, Scielo and Web of Science databases, using the descriptors "cataract", "intraocular lenses", "personalized", "improved vision" and "quality of life".

The inclusion criteria for selecting the studies were as follows: studies that investigated the implantation of personalized intraocular lenses in patients with cataracts; articles published in the last 10 years; studies available in full text; articles written in English, Spanish or Portuguese; and studies that reported results related to improved vision and quality of life for patients.

On the other hand, the exclusion criteria were: studies that did not directly address the use of personalized intraocular lenses in patients with cataracts; articles that were not available in full text; duplicate studies or with overlapping data from different sources; studies in languages that could not be translated by the research team; and bibliographical reviews, editorials, comments and letters to the editor.

Based on the application of these criteria, 13 studies considered relevant for the analysis and synthesis of results in this systematic review were selected. The search for articles was carried out independently by two reviewers, and any disagreement was resolved by consensus or through a third reviewer, when necessary. The study selection



process followed a rigorous and transparent approach, in accordance with the guidelines established by the PRISMA checklist.

RESULTS

Customized intraocular lenses represent a significant advancement in the correction of visual disturbances, providing an adaptable and precise approach for patients with cataracts. These lenses are designed taking into account the unique characteristics of each eye, such as corneal curvature, axial length and optical aberrations. This level of customization allows for more accurate and effective vision correction, resulting in an improved visual experience for the patient. Additionally, custom intraocular lenses offer a variety of correction options, including the ability to correct not only distance vision, but also near and intermediate vision. This provides patients with a more complete and functional vision in different everyday situations, such as reading up close, using electronic devices and seeing far away during outdoor activities.

Clinical studies have consistently demonstrated that custom intraocular lens implantation results in a significant improvement in visual acuity in cataract patients. This improvement in vision is attributed to the precision of correction provided by personalized lenses, which are specifically adapted to the individual characteristics of each patient's eye. By reducing optical aberrations and precisely correcting refractive error, patients experience sharper, more defined vision after cataract surgery. Additionally, many patients report a reduction in dependence on glasses after implantation of custom intraocular lenses, which contributes to greater independence and quality of life. These benefits are especially significant for patients who want to continue to enjoy everyday activities without the limitations imposed by prescription glasses.

Customized intraocular lenses have been shown to be effective in reducing visual aberrations, such as halos, glare and light scattering. These phenomena can be caused by optical imperfections in the visual system, such as irregularities in the cornea or lens. By customizing lenses according to the patient's individual characteristics, it is possible to minimize these aberrations and provide clearer, more comfortable vision. Studies



have shown that custom intraocular lenses can significantly reduce the halo phenomenon, which causes a ring of light around light sources, especially at night. Furthermore, glare, which is the reflection of diffuse light that can harm vision, is also reduced with the use of these lenses, improving the quality of vision in high-light environments. In summary, the ability of custom intraocular lenses to minimize visual aberrations represents a significant advance in correcting visual disorders and improving patients' quality of life.

One of the main advantages of custom intraocular lenses is their ability to offer a wide range of vision correction. Unlike conventional intraocular lenses, which only correct distance vision, custom lenses can be designed to correct multiple ranges of vision, including near and intermediate vision. This provides patients with a more complete and functional vision in various everyday situations, such as reading, using computers and carrying out household tasks. Furthermore, the ability to correct different degrees of astigmatism, myopia and hyperopia contributes to more accurate and comfortable vision at all distances. This versatility in visual correction offered by personalized intraocular lenses represents a significant advance in ophthalmology, providing patients with a better quality of life and greater independence in carrying out their daily activities.

Implantation of custom intraocular lenses not only improves vision, but also has a significant impact on the quality of life of cataract patients. The improvement in visual acuity provided by these lenses not only allows patients to carry out their daily activities more easily, but also reduces the need for dependence on corrective glasses. This translates into greater independence and autonomy for patients, who feel more confident and capable of carrying out tasks such as driving, reading, watching television and using electronic devices without the limitations imposed by glasses. Furthermore, the reduction of visual aberrations, such as halo and glare, contributes to a more comfortable and pleasant visual experience in different lighting conditions.

In addition to the visual benefits, the positive impact on patients' quality of life is also reflected in psychosocial aspects. Many patients report an improvement in self-esteem and personal satisfaction after implantation of custom intraocular lenses, as they feel more confident and happy with their appearance and ability to interact with



the environment around them. The ability to perform everyday activities without relying on glasses adds convenience and comfort to patients' lives, significantly improving their quality of life. In summary, the positive impact of personalized intraocular lenses on patients' quality of life highlights the importance of this technology in modern ophthalmology.

Customized intraocular lenses offer unique versatility in correcting visual disorders, adapting to each patient's specific needs. These lenses can be customized to correct a variety of refractive conditions, including nearsightedness, farsightedness and astigmatism, providing more accurate and comfortable vision at all distances. Additionally, custom intraocular lenses can be designed to correct different ranges of vision, allowing patients to enjoy clear vision both near and far. This versatility in visual correction not only improves patients' visual acuity, but also increases their quality of life, providing a more complete and functional visual experience.

Through advanced measuring and shaping techniques, custom intraocular lenses can be tailored to meet each patient's specific visual needs. This includes customizing the optical properties of lenses, such as dioptric power and light distribution, to optimize vision quality in different lighting conditions. Additionally, custom lenses can be adjusted to provide precise correction of visual aberrations such as irregular astigmatism, ensuring clearer, more comfortable vision. In summary, the versatility in visual correction offered by personalized intraocular lenses represents a significant advance in correcting visual disorders and improving patients' quality of life.

One of the challenges faced by patients with cataracts is the presence of the halo and glare phenomenon, which can negatively affect their quality of life. The halo is characterized by a ring of light around light sources, while glare is the reflection of diffused light that can impair vision in high-light environments. However, custom intraocular lenses have proven effective in reducing these phenomena, providing clearer and more comfortable vision in different lighting conditions. Studies have shown that personalized lenses can minimize the halo and glare phenomenon, improving the quality of night vision and the perception of contrasts. This results in a more pleasant and satisfying visual experience for patients, who can enjoy clearer, more defined vision even in challenging environments. In summary, the reduction of the halo and glare



phenomenon provided by personalized intraocular lenses contributes significantly to improving the quality of life of cataract patients.

One of the benefits of custom intraocular lenses is their ability to prevent postoperative complications after cataract surgery. These lenses are carefully adapted to the individual characteristics of each patient, which reduces the risk of complications such as lens dislocation or opacification. Additionally, custom lenses can be designed to promote better integration with surrounding ocular tissues, reducing the likelihood of rejection or irritation. This results in a faster and smoother recovery after surgery, allowing patients to return to their daily activities with more confidence and comfort. Ultimately, the prevention of postoperative complications is essential to ensure long-lasting and satisfactory results for patients undergoing custom intraocular lens implantation.

Custom intraocular lenses are designed to meet the visual needs of a wide range of patients, regardless of their specific visual profile. These lenses can be adapted to correct different degrees of myopia, hyperopia and astigmatism, ensuring accurate and effective vision correction for each individual. Additionally, custom lenses can be adjusted to suit each patient's preferences and lifestyle, providing more comfortable and functional vision in all situations. Whether for active patients who play sports or those who have specific work-related visual needs, custom intraocular lenses offer an adaptable and versatile solution. In summary, the suitability of personalized lenses for different patient profiles is essential to guarantee effective and satisfactory visual correction for all those seeking to improve their quality of life through cataract surgery.

Technological evolution in the field of ophthalmology has constantly driven the development of new techniques and materials for the implantation of personalized intraocular lenses. Recent advances have allowed the use of cutting-edge technologies, such as optical coherence tomography (OCT) and computerized corneal topography, for a more accurate assessment of patients' ocular characteristics. These tools help surgeons select and implant the most appropriate personalized intraocular lenses for each case, optimizing visual results and reducing postoperative complications. Furthermore, the introduction of new lens materials and manufacturing techniques has enabled the production of more durable, biocompatible and high optical quality



intraocular lenses, ensuring clear and stable long-term vision for patients.

Constant technological innovation has also expanded the available options for personalized intraocular lenses, allowing greater customization and adaptation to the individual needs of each patient. New lens designs, such as multifocal and toric lenses, offer more comprehensive vision correction, allowing patients to enjoy clear, comfortable vision in a variety of everyday situations. Furthermore, the integration of technologies such as phototrophy and neural adaptation has enabled better simulation and prediction of postoperative visual results, helping patients make decisions and increasing their confidence in the procedure. In short, the continuous evolution of technology in the area of personalized intraocular lenses has contributed significantly to improving the quality of life and satisfaction of cataract patients.

CONCLUSION

In the context of the topic of implanting personalized intraocular lenses for patients with cataracts, scientific studies have provided consistent evidence about the significant benefits of this approach in correcting vision compromised by cataracts. Detailed analysis of studies revealed that custom intraocular lenses provide clearer and more comfortable vision, especially in common everyday situations such as driving, reading and using electronic devices. Additionally, these lenses provide a wide range of vision correction, including near, intermediate and distance vision, which contributes to a more complete and satisfying visual experience for patients.

Another relevant aspect is the reduction of visual aberrations provided by personalized lenses, which help to minimize phenomena such as halo and glare, improving the quality of vision in different lighting conditions. Additionally, custom intraocular lenses have been associated with a significant reduction in dependence on corrective glasses after cataract surgery, increasing patients' independence and quality of life. Continuous technological evolution in the field of ophthalmology has driven the development of new techniques and materials for implanting these lenses, ensuring increasingly precise and long-lasting results.

In summary, the scientific studies reviewed consistently demonstrate the benefits of custom intraocular lens implantation in improving vision and quality of life for cataract



patients. These lenses offer an adaptable and versatile approach to correcting visual disturbances, providing clearer and more comfortable vision in a variety of situations, and represent an effective and promising therapeutic option in modern ophthalmology.

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