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Mini Review

Aesthetic and Functional Restoration in Ophthalmology: Advances in Ocular Prostheses and Orbital Epitheses

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Abstract

Aesthetic and functional rehabilitation in ophthalmology, particularly in anophthalmic sockets and post-exenteration orbital cavities, presents a multifaceted challenge encompassing clinical, technical, and psychological dimensions. External ocular prostheses, typically made from polymethyl methacrylate (PMMA), are crucial for maintaining orbital volume and facial symmetry, even in cases with residual visual structures such as severe microphthalmia. Meanwhile, orbital epitheses have significantly evolved through the use of biomedical-grade silicone and 3D printing technologies based on high-resolution CT and MRI, allowing for unprecedented anatomical and chromatic customization. These innovations enhance aesthetic integration and overall quality of life. In pediatric patients, ongoing craniofacial growth necessitates lightweight, flexible materials and periodic prosthetic updates. A multidisciplinary approach is essential, with the ocularist's craftsmanship playing a pivotal role in replicating complex anatomy and restoring facial expressiveness. Ultimately, the synergy between technological innovation and human expertise remains fundamental to delivering truly restorative outcomes.

Keywords: Orbital Cavities; Silicone; MRI

Introduction

Those of this orbital content present a complex challenge that includes aesthetic, functional and psychological dimensions, with particularly profound effects on pediatric patients. Achieving adequate rehabilitation of anophthalmic and non-anophthalmic cavities, of orbital defects after exenteration, remains a critical objective in contemporary oculoplastic practice.

External prostheses in anophthalmic and non-anophthalmic cavities

In anophthalmic sockets, external prostheses play a vital role in the restoration of facial aesthetics and the preservation of orbital volume. Traditionally made from polymethyl methacrylate (PMMA), these devices are highly valued for their biocompatibility, durability and customization. In non-anophthalmic cases, severe congenital microphthalmia or ocular atrophy, prosthetic adjustment requirements special consideration to preserve any residual visual function and prevent complications from chronic conjunctival irritation or restricted residual motility.

Orbital epitheses after exenteration: innovation and personalization

Post-exenteration orbital reconstruction has advanced significantly in the last decade, driven by the introduction of new materials and custom manufacturing technologies. The biomedical grade silicone epitheses can restore not only the orbital contour, but the facial expression of the patients, thus substantially improving the quality of life.

Recent developments in three dimensions (3D) printing, based on high-resolution computed tomography (CT) and magnetic resonance imaging (MRI). These technologies offer superior precision

in the replication of facial contours and facilitate the integration of the distinctive characteristics of their skin pigmentation and the positioning of the eyelids, thus improving the fit and aesthetic realism of the orbital prostheses.

Specific considerations in pediatric patients

The rehabilitation of pediatric patients presents unique challenges, ongoing craniofacial growth and the need for periodic prosthesis updates. Selecting light, flexible and highly biocompatible materials is critical to minimize long-term complications, socket contracture or eyelid dysfunction.

In addition, the essential role of the multidisciplinary approach has been underlined, with particular emphasis on the ocularist contribution. The craftsmanship of the ocularist when it comes to replicating complex anatomical details and conveying facial expressiveness (speciality in the developing faces of children) remains an irreplaceable element of a successful rehabilitation.

Meticulous prosthetic adjustment, great attention to anatomical and chromatic nuances and sensitivity to the emotional needs of all patients are essential to achieve optimal results [1-4].

Conclusion

The aesthetic and functional rehabilitation of orbital cavities, whether an ophthalmic or post-exenteration, has benefited enormously from recent advances in materials science and 3D personalization technologies. However, the human touch, embodied in the clinical insight and artisanal experience of the ocularist, remains fundamental.

Looking to the future, it is essential that technological innovation is harmoniously integrated with clinical experience and artistic craftsmanship, to ensure that patients, especially the youngest, receive rehabilitative solutions that do not restore their appearance.

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