

Eye Dressings for Corneal Injuries: Protecting and Healing the Eye.

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Introduction

Corneal injuries are among the most common eye traumas, often resulting from foreign objects, chemical exposure, or infections. The cornea, as the transparent outermost layer of the eye, is vital for clear vision but is vulnerable to damage due to its exposed position. Prompt treatment is crucial to prevent complications such as infection, scarring, or vision loss. Functional eye dressings play an essential role in the healing process of corneal injuries, providing protection, promoting tissue regeneration, and enhancing patient comfort. This article explores the various types of eye dressings used for corneal injuries and how they support the healing process [1].

Corneal abrasions, typically caused by foreign objects or trauma, are superficial injuries that can be incredibly painful and lead to excessive tearing, redness, and light sensitivity. Immediate application of an eye dressing is critical to protect the exposed corneal surface from further damage and to alleviate discomfort. A padded eye patch is often used initially to shield the eye from light and dust, providing relief while minimizing the risk of infection. The padding also helps keep the eye closed, reducing friction between the eyelid and the injured cornea, which accelerates the healing process [2].

One of the most effective treatments for corneal injuries, especially for more severe abrasions or erosions, is the use of bandage contact lenses. These soft lenses serve as a protective barrier over the cornea, preventing further mechanical irritation from blinking while promoting epithelial healing. Bandage lenses are commonly used for conditions such as recurrent corneal erosion syndrome (RCES) and after corneal surgeries like photorefractive keratectomy (PRK). They not only reduce pain by providing a smooth surface but also allow corneal cells to regenerate in a more controlled environment [3].

Corneal injuries are highly susceptible to infections, particularly from bacteria or fungi that can enter the eye through the damaged epithelial layer. If left untreated, infections can lead to corneal ulcers, which are a major cause of blindness worldwide. To mitigate this risk, antimicrobial eye dressings are sometimes applied after cleaning the wound. These dressings, often infused with antibiotics or antiseptics, provide localized antimicrobial activity, reducing the need for systemic antibiotics and lowering the risk of infection. They are particularly useful in treating corneal injuries caused by organic materials, which have a higher likelihood of introducing pathogens [4].

Corneal injuries often disrupt the tear film, leading to dry eye symptoms that exacerbate discomfort and delay healing. Moisture-retentive dressings are an effective solution to this problem, as they help maintain an optimal healing environment by reducing tear evaporation and keeping the cornea hydrated. Some moisture-retentive dressings use hydrogels or silicone materials that release moisture gradually, providing long-lasting lubrication to the injured cornea. By maintaining hydration, these dressings not only promote healing but also reduce the risk of further epithelial damage due to dryness [5].

Patients with hypersensitive skin or allergies to traditional adhesives can benefit from silicone-based eye dressings. These dressings offer a gentle, hypoallergenic alternative that adheres securely without irritating the delicate skin around the eye. This is particularly important in cases where long-term dressing use is necessary, such as after a corneal transplant or in patients with ongoing corneal conditions that require extended protection [6].

In certain cases, corneal injuries may lead to significant swelling and inflammation, particularly when the trauma is severe or involves chemical burns. Pressure eye dressings are designed to apply gentle pressure to the eye, helping to reduce edema and control inflammation. These dressings are particularly beneficial after surgeries involving the cornea, such as keratoplasty, where minimizing swelling is critical for promoting graft adherence and overall healing. Careful application of pressure dressings ensures that the eye remains stable while reducing fluid buildup that could interfere with the healing process [7].

Corneal injuries are often accompanied by significant pain, due to the high concentration of nerve endings in the cornea. Therapeutic patches, sometimes referred to as occlusive patches, are designed to manage pain by preventing exposure to light and reducing eye movement. These patches keep the eyelid closed, allowing the injured cornea to heal in a stable, dark environment. Pain reduction not only improves patient comfort but also aids healing by preventing unnecessary eye movement, which could disrupt the regrowth of corneal cells [8].

Amniotic membrane dressings are an advanced therapeutic option for treating severe corneal injuries, such as those caused by chemical burns or infections that lead to extensive tissue damage. These dressings are made from human amniotic membrane, which has anti-inflammatory and anti-scarring

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properties. When applied to the injured cornea, the membrane promotes epithelial regeneration, reduces inflammation, and helps prevent scarring that could impair vision. Amniotic membrane dressings are particularly effective in cases where conventional therapies have failed, offering a promising option for complex corneal injuries [9].

In cases where corneal injuries are extensive or accompanied by other forms of trauma, customizable eye dressings are often required. These dressings are tailored to the specific needs of the patient, based on the size and location of the injury, the type of trauma, and the overall condition of the eye. Customizable dressings may combine different materials, such as moisture-retentive layers with antimicrobial agents, to provide comprehensive protection and support for healing. The ability to adjust these dressings ensures that even complex injuries can be treated with the highest level of care and precision [10].

Conclusion

Eye dressings play a pivotal role in the protection and healing of corneal injuries. From basic protective patches to advanced therapeutic options like amniotic membrane dressings, the choice of dressing depends on the severity of the injury, patient needs, and the goals of treatment. Properly selected eye dressings not only shield the cornea from further harm but also enhance tissue regeneration, reduce pain, and prevent infections, ensuring the best possible outcomes for patients recovering from corneal injuries.

References

1. Andrés-Guerrero V, Perucho-González L, García-Feijoo J, et al. Current perspectives on the use of anti-VEGF drugs as adjuvant therapy in glaucoma. *Adv Ther.* 2017;34:378-95.
2. Wang X, Li F, Liu X. Applications and recent developments of Hydrogels in Ophthalmology. *ACS Biomater Sci Eng.* 2023;9(11):5968-84.
3. Travé Huarte S. Redesigning the Management and Treatment Algorithm For Dry Eye Clinicians.
4. Gündüz AK, Mirzayev I. Surgical approach in intraocular tumors. *Turk J Ophthalmol.* 2022;52(2):125.
5. Osi B, Khoder M, Al-Kinani AA. Pharmaceutical, biomedical and ophthalmic applications of biodegradable polymers (BDPs): literature and patent review. *Pharm Dev Technol.* 2022;27(3):341-56.
6. Hameed H, Faheem S, Paiva-Santos AC. A comprehensive review of hydrogel-based drug delivery systems: classification, properties, recent trends, and applications. *Pharm Sci Tech.* 2024;25(4):64.
7. Kulbay M, Wu KY, Truong D. Smart molecules in ophthalmology: Hydrogels as responsive systems for ophthalmic applications. *Smart Mol.* 2024;2(1):e20230021.
8. Lee ES, Lee SY, Jeong SY, et al. Cataract surgery and lens implantation. *J Cataract Refract Surg.* 2005;31:2379-85.
9. Ding Y, Zhu Z, Zhang X. Novel Functional Dressing Materials for Intraoral Wound Care. *Adv Healthc Mater.* 2024:2400912.
10. Benitez-del-Castillo JM, Dana R, Deng SX, et al. TFOS DEWS II Management and Therapy Report. *J Ocul.* 2017;30:580e634.