

Complications of contact lens wear: what pharmacists should know

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Abstract

An ever-increasing number of people are exposed to contact lenses and the potential problems they may cause. These range in severity from mild to severe and sight-threatening. This article aims to highlight what to look for in the history taken from a contact lens wearer, and to give a brief overview of common eye problems caused by contact lenses and how to manage them appropriately in a primary care setting.

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Introduction

Contact lenses are worn by millions of people worldwide for a variety of reasons. Most commonly, they are used to correct refractive errors in cases where spectacles are either impractical or undesirable, although other applications, such as the use of cosmetic contact lenses to alter the apparent colour of the iris, are also becoming more popular. This means that an ever-increasing number of people are exposed to contact lenses and the potential problems they may cause, which range in severity from mild and innocuous, to severe and sight-threatening.

Contact lens wearers frequently present to healthcare providers, including pharmacists, with a broad spectrum of complaints, and it is of the utmost importance to distinguish accurately between minor complaints and those that could potentially lead to loss of vision. It is therefore always safer to refer contact lens wearers for a second opinion from a suitably qualified professional if any uncertainty exists.

Important clues to look for in the history taken from a contact lens wearer will be highlighted in this article, followed by clinical descriptions of common eye problems caused by contact lenses and how to manage them appropriately in a primary care setting such as a pharmacy.

Vital clues from the history

Any person presenting with an ocular complaint should always be asked whether he or she is currently wearing, or has recently worn, contact lenses. This may seem like an obvious question, but the information is often not volunteered and many will also have removed the offending lenses by the time they seek help.

If ocular pain or discomfort is the main complaint, it is important to ascertain what happens once the lenses have been removed. Pain or discomfort that continues to get worse after removal of the lenses often points to an infective cause, whereas the cause is usually something other than infection if these symptoms subside after removal of the lenses. However, should the complaint be one of severe discomfort occurring immediately after lens removal, when the eye was comfortable with the lens in situ, the diagnosis is most probably mechanical corneal abrasion.

Itching is usually the main complaint if contact lenses are either causing an allergic reaction, or exacerbating an underlying allergy. Burning, on the other hand, could either indicate a problem with the disinfection method used if it is prominent when the lenses are inserted, or it could be caused by dry eyes if it occurs after several hours of lens wear. Foreign body sensation could indicate that the contact lens has migrated over the eyeball to lodge in an unusual site, or that some lens material has remained on the ocular surface after removal of the lens.

Common complications of contact lens wear

Toxic keratoconjunctivitis

Toxic keratoconjunctivitis may be caused by contact lens storage solutions or the chemicals or proteolytic enzymes used for contact lens cleaning if they are not properly removed from the lens surface before insertion.

A moderate to severe burning sensation typically occurs upon lens insertion or shortly thereafter, and is partially relieved by removing the lens. The conjunctiva usually shows some degree of injection or redness, while corneal erosions are often present.

These stain with 2% fluorescein drops, varying in size from microscopic to easily visible to the naked eye (Figure 1).

Treatment consisting of frequent instillation of artificial tears may suffice if ocular redness and discomfort are minimal. The presence of any significant redness or pain should, however, prompt referral to a medical practitioner who is equipped to perform a slit lamp examination of the eye.

Allergic keratoconjunctivitis

Several different types of allergic keratoconjunctivitis may occur in contact lens wearers, of which contact lens allergy and giant papillary conjunctivitis (GPC) are the most common. One should also bear in mind that pre-existing ocular allergies are often exacerbated by contact lens wear.

Contact lens allergy is an allergic reaction to preservatives in contact lens storage solutions. It is characterised by ocular itching and tearing, and conjunctival redness and swelling (chemosis) (Figure 2). The condition is usually self-limiting and will resolve once the offending solution is withdrawn, although topical antihistamines such as levocabastine and emedastine may be used for a few days to relieve symptoms.

Contact lens-induced GPC closely resembles the atopic condition called vernal keratoconjunctivitis (VKC), with the exception that it occurs in contact lens wearers as opposed to atopic patients. It is caused by the combination of mechanical rubbing, of the upper edge of the contact lens against the conjunctiva lining the inside of the upper lid, and long-term exposure to proteins coating the surface of the contact lens. Soft contact lens wearers are affected more frequently than those wearing rigid contact lenses.

Symptoms include varying degrees of itching and foreign body sensation, as well as noticing strands of mucus on the contact lenses. Signs include conjunctival injection with giant papillae under the upper eyelid that are identical in appearance to those seen in VKC (Figure 3).

The aim of treatment in contact lens-induced GPC is to resolve symptoms and thereby hopefully enable the patient to continue wearing contact lenses. The most important step in managing this condition is to reduce the amount of contact time between the contact lens and the conjunctiva by keeping lens wear to a minimum. Removal of the antigenic proteins

from the contact lens surface by enzymatic cleaning at least once a week is also essential. Hydrogen peroxide disinfection systems and preservative-free contact lens storage solutions are preferable to the use of heat for disinfection and preserved chemicals for storage purposes. A suitably qualified contact lens practitioner should be consulted to optimise the type of lens worn and the lens fit. Topical antihistamine preparations and sodium chromoglycate, a mast cell stabiliser, may help relieve symptoms in early cases, although short courses of topical corticosteroids, used under medical supervision, are often needed to control symptoms.

Hypoxic reactions

In order to promote corneal clarity, normal corneas do not contain any blood vessels. The central cornea relies on oxygen from the atmosphere that dissolves in the precorneal tear film to supply its oxygen requirements. The cornea may therefore experience oxygen starvation (hypoxia) if contact lenses are worn that do not allow enough oxygen to pass through them or if the lenses are worn for too long periods at a time.

Corneal hypoxia may result in decreased vision and increased light sensitivity (photophobia), and should be considered when someone presents with a history suggestive of contact lens overwear. Most clinical signs of corneal hypoxia are only visible at slit lamp examination, and patients should therefore be referred to someone with the necessary equipment to make a definitive diagnosis after being advised to discontinue contact lens wear for a while.

Contact lens-associated dry eyes

Dry eyes are either caused by decreased production of tears (aqueous-deficient dry eye) or by increased evaporation of tears from the surface of the eye (evaporative dry eye). It has been shown that the tear film over a contact lens evaporates faster than the tear film over a normal cornea, and this may explain why dry eye symptoms, such as a feeling of ocular dryness, grittiness, burning or nonspecific discomfort, are so common in contact lens wearers. The symptoms typically worsen during the day and are exacerbated by several factors. These include indoor heating and air-conditioning, which increase evaporation of the tear film by decreasing the ambient humidity, and activities such as reading or computer work, which result in decreased eyelid blinking.

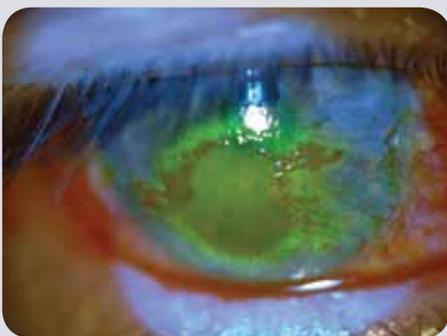


Figure 1: Corneal abrasion, as seen after application of fluorescein dye



Figure 2: Conjunctival redness and swelling in allergic conjunctivitis



Figure 3: Giant papillary conjunctivitis

In most cases, adequate symptomatic relief will be obtained by using lubricating artificial tear drops, with preservative-free preparations being preferred if topical application is required more than four times a day. Oral administration of omega-6 fatty acids has also been shown to be beneficial in the treatment of contact lens-associated dry eye. Any systemic medications taken by the patient should be reviewed, since numerous drugs, such as propranolol, amitriptyline, metoclopramide and pseudoephedrine, may cause or worsen dry eyes. Referral for a thorough eye examination to exclude other problems is advisable if symptoms persist.

Mechanical corneal abrasion

Contact lenses rest directly on the outer layer of the cornea (corneal epithelium), and this layer may be damaged quite easily during insertion or removal of the lens or by problems with the lens itself. The resulting corneal abrasion is extremely painful, since the cornea contains a very large number of sensory nerve endings which become exposed when the epithelium is abraded. Other symptoms include decreased vision, marked photophobia and excessive tearing. On examination, a defect may be noted with the naked eye (Figure 4). Instillation of 2% fluorescein drops will cause staining of the defect similar to that illustrated in Figure 1.

Medical treatment involves the use of topical broad-spectrum antibiotic drops, such as fluoroquinolones or tobramycin, to prevent bacterial infection and cycloplegic drops to provide pain relief. Patching of the eye should be avoided, since it does not aid the healing process and might prevent early detection of secondary infection. Frequent slit lamp examinations are also required to ensure that the defect closes without any further problems.

Contact lens-related infectious keratitis

Infectious keratitis (corneal infection) is by far the most serious complication of contact lens wear and may be sight-threatening if appropriate treatment is not commenced immediately.

Factors such as the type of contact lens worn and poor lens hygiene increase the risk of corneal infections in contact lens wearers. Patients who use extended-wear contact lenses or who wear their contact lenses overnight are at much higher risk of corneal infections than those using daily disposable

lenses. Poor lens hygiene practices include infrequent cleaning of lens storage cases and the use of tap water or saliva to wet contact lenses. Smoking may also be a risk factor for developing infectious keratitis.

The majority of contact lens-related corneal infections are caused by Gram-negative bacteria, such as *Pseudomonas*, followed by Gram-positive bacteria, such as *Staphylococcus* and *Streptococcus*. Fungi and *Acanthamoeba* are less common causes, but tend to cause very severe infections with poor visual outcomes.

Patients with infectious keratitis mostly complain of ocular pain, which persists or even worsens after removal of their contact lenses. Other symptoms may include reduced vision, photophobia and a sticky discharge from the eye. On examination, conjunctival injection is usually prominent and a defect may be visible in the corneal epithelium (Figure 5). Hypopyon (pus in the anterior chamber) may be present and most often forms a visible level behind the lower part of the cornea (Figure 5). The cornea may also show yellow or whitish discolouration as a result of the infection, and infiltration by inflammatory cells (Figure 6).

Corneal perforation with permanent loss of vision, or even ultimately loss of the eye, may occur if the patient is not immediately referred to a suitably qualified medical practitioner. The eye should not be patched, since the dark and humid conditions under an eye pad may enhance growth of the causative organism. If anything, a protective plastic eye shield may be used to cover the eye. Topical corticosteroid drops should also never be given to a patient with possible corneal infection unless prescribed by a medical practitioner.

Conclusion

With millions of people worldwide wearing contact lenses, it is inevitable that healthcare providers will be faced with contact lens-related problems on a daily basis. Many of these complications are amenable to diagnosis and appropriate treatment in a primary care setting, while others require more specialised care. By taking a thorough history aimed at eliciting the vital clues highlighted above and bearing in mind the common conditions discussed, it should be possible to make an informed decision regarding the level of care required by most patients seen in everyday practice. A second opinion should rather be sought if any doubt remains. ●

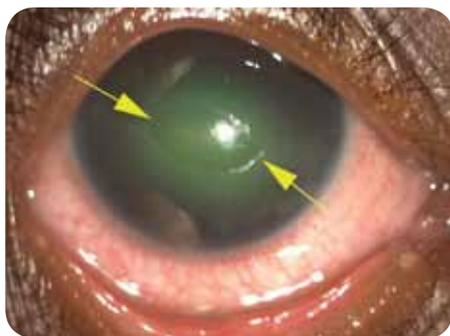


Figure 4: An area of mechanical abrasion on the cornea (arrows)

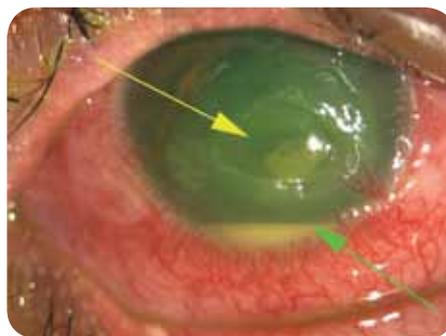


Figure 5: Infectious keratitis: corneal epithelial defect (yellow arrow) and hypopyon (green arrow)

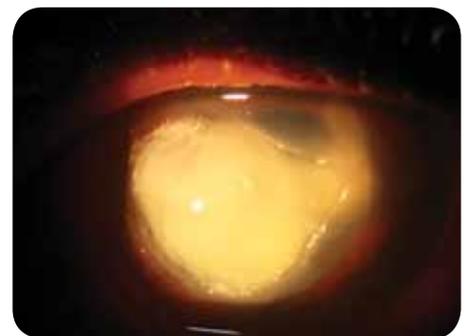


Figure 6: Infectious keratitis: yellow discolouration of the cornea