

Contact Lens-related Complications

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ABSTRACT

Aim of the work: the contact lenses are widely used for management of refractive errors and cosmetic purposes as well. Their complications are rare and usually caused by inappropriate maintenance of the lens and bad habits for wearing too long. **Methodology:** all the English data related to the subjects were collected after reviewing Pubmed, SCOPUS, ScienceDirect and other search engines. **Results:** this review showed the most common complications, risk factors and management of diseases related to contact lens wearing. Each problem was described by its symptoms, risk factors and management as well as prognosis. **Conclusion:** the selection of proper lens and education about the lens care system is efficient for reducing the complications related to contact lens.

Keywords: contact lens, complications, discomfort, ulcer, dryness, keratitis.

INTRODUCTION

Contact lens have been commonly used for management of refractive errors or cosmetic purposes⁽¹⁾. Contact lenses resemble a profitable industry which is growing by 6.7% every year and are expected to reach about 12,476.3 million US dollars by the year 2020^(2, 3). The prescription of contact lenses is based on management of the simple or massive errors that can't be managed using eyeglasses including irregular cornea, anisometropia, and keratoconus⁽⁴⁻⁶⁾. Also, they can be used for treatment of epithelial defect, dry eye of Sjogren or Stevens-Johnson syndrome as well as post refractive surgery rehabilitation⁽⁷⁻⁹⁾. Furthermore, the contact lens could lessen the activities restrictions, improve the life quality and provide better appearance⁽¹⁰⁾. But, they can cause many complications that could cause disappointment for the patients that could force them to choose other possible modalities⁽¹¹⁾.

This review provided an important issue related to contact lens complications and how to manage them properly.

Complications of contact lens

- Discomfort of contact lens:

The contact lens discomfort is defined as intermittent or continuous sensation from wearing lens that could be associated with visual disturbance or ocular surface staining or conjunctival hyperemia^(12, 13). This discomfort is caused by decreased compatibility between the eye and the contact lens thus could result in cessation of wearing contact lens or at least lessening the wearing time or even cessation of contact lens wear⁽¹⁴⁾.

Two factors are associated with increasing the incidence of contact lens discomfort including

environmental factors and contact lens related factors. The environmental factors include humidity, high or cold temperature, dry eye, computer usage, light and medications^(15, 16). The causes related to contact lens are the design of the lens, wearing times, material including water content and lubricity of the lens⁽¹⁷⁾. The management is based on providing comfortable daily wearing time and using lens care system or using daily disposable lens and lubricating drops^(18, 19).

- Contact Lens-related ulcer

Peripheral ulcer:

This type is categorized by excavation and infiltration of the epithelium with intact Bowman layer which is different from corneal ulcers and they could be differentiated using clinical features. It is associated with injection of the conjunctiva, focal infiltration located at the peripheral cornea⁽²⁰⁾. It is more common with bacterial toxins and inflammatory diseases and is significantly associated with extended wear lenses especially silicone hydrogel lenses^(21, 22). The management could spontaneously regress after discontinuation of contact lens wearing⁽²³⁾.

- Keratitis

Microbial Keratitis

It is an active inflammation of the cornea that associated with viruses, bacteria or even parasites caused by contact lens wear⁽²⁴⁾. Also, contamination, trauma and hypoxia are risk factors for microbial keratitis^(25, 26).

Proper lens care could prevent infectious keratitis, while other severe types that cause corneal perforation or scleritis can be managed either with medical treatments or surgical management^(27, 28).

Acanthamoeba Keratitis

It is an infection of the eye principally caused by protozoa from contaminated lens that could threaten

the cornea^(29,30). Proper corneal scan and microbiology of isolates are recommended for diagnosis of the disease. The treatment begins with topical antimicrobial agents and could be combined with another therapy for resistant types followed by surgical interventions if the treatment fails^(31,32).

- Corneal Neovascularization

This means development of new vessels that could be found in capillaries and venules of the pericorneal plexus that can expand to the corneal stroma⁽³³⁾. The material of the lens could enhance the development of neovascularization inside the cornea as well as hypoxia mechanical trauma. Also, herpes simplex keratitis and transplantation of the cornea could induce these phenomena⁽³⁴⁾. Using contact lens which is more permeable to oxygen and decreasing the wearing time⁽³⁵⁾. Using anti-inflammatory agents as well as angiogenic therapy could decrease the severity of the disease⁽³⁶⁾. Also, using laser, stem cell transplant and other surgical interventions are recommended for severe cases^(37,38).

- Giant Papillary Conjunctivitis

It is called induced papillary conjunctivitis that has several adverse effects on those wearing lenses including redness, irritation and increasing rates of itching and movement of the lens as well as increased mucous discharge associated with hyperemic reaction⁽³⁹⁾. This irritation occurs mostly in case of mechanical trauma and when using soft lens in comparison with rigid contact lens^(40,41). The management of the problem during early stages could prevent the dropping out of the lens. Also, using lubricants and lens care recommendation could resolve the problem in early stages^(42,43).

The study was done after approval of ethical board of King Khalid university.

REFERENCES

1. Beljan J, Beljan K and Beljan Z (2013): Complications caused by contact lens wearing. *Collegium Antropologicum*, 37 (1):179-187.
2. Contact Lenses Market Size (2015): Share, Industry Report, 2020. Radiant Insights Inc., Available at: <https://www.radiantinsights.com/research/contact-lenses-market>.
3. Fonn D (2007): Targeting contact lens induced dryness and discomfort: what properties will make lenses more comfortable. Official Publication of the American Academy of Optometry, 84:279-285.
4. Ortenberg I, Behrman S, Geraisy W and Barequet IS (2013): Wearing time as a measure of success of scleral lenses for patients with irregular astigmatism. *Eye and Contact Lens*, 39:381-384.
5. Alipour F, Behrouz MJ and Samet B (2015): Mini-scleral lenses in the visual rehabilitation of patients after penetrating keratoplasty and deep lamellar anterior keratoplasty. *Journal of the British Contact Lens Association*, 38:54-58.
6. Arumugam AO, Rajan R, Subramanian M and Mahadevan R (2014): PROSE for irregular corneas at a tertiary eye care center. *Eye and Contact Lens*, 40:71-73.
7. Pecego M, Barnett M, Mannis MJ and Durbin-Johnson B (2012): Jupiter scleral lenses. *Eye and Contact Lens*, 38:179-182.
8. Lim P, Ridges R, Jacobs DS and Rosenthal P (2013): Treatment of persistent corneal epithelial defect with overnight wear of a prosthetic device for the ocular surface. *American Journal of Ophthalmology*, 156:1095-1101.
9. Ciralsky JB, Chapman KO, Rosenblatt MI, Sood P, Fernandez AG, Lee MN *et al.* (2015): Treatment of refractory persistent corneal epithelial defects. *Ocular Immunology and Inflammation*, 23:219-224.
10. Porisch E (2007): Football player's contrast sensitivity comparison when wearing amber sport-tinted or clear contact lenses. *Optometry*, 78:232-235.
11. Walker MK, Bergmanson JP, Miller WL, Marsack JD and Johnson LA (2016): Complications and fitting challenges associated with scleral contact lenses. *Journal of the British Contact Lens Association*, 39:88-96.
12. Efron N, Jones L, Bron AJ, Knop E, Arita R, Barabino S *et al.* (2013): The TFOS international workshop on contact lens discomfort. *Investigative Ophthalmology and Visual Science*, 54:98-122.
13. Situ P, Simpson T and Begley C (2016): Hypersensitivity to cold stimuli in symptomatic contact lens wearers. Official Publication of the American Academy of Optometry, 93:909-916.
14. Nichols KK, Redfern RL, Jacob JT, Nelson JD, Fonn D, Forstot SL *et al.* (2013): The TFOS international workshop on contact lens discomfort. *Investigative Ophthalmology and Visual Science*, 54:14-19.
15. Dumbleton K, Caffery B, Dogru M, Hickson-Curran S, Kern J, Kojima T *et al.* (2013): The TFOS international workshop on contact lens discomfort. *Investigative Ophthalmology and Visual Science*, 54:20-36.
16. McMonnies CW (2014): How contact lens comfort may be influenced by psychiatric and psychological conditions and mechanisms. *Clinical and Experimental Optometry*, 97:308-310.
17. Sapkota K, Lira M, Martin R and Bhattarai S (2013): Ocular complications of soft contact lens wearers in a tertiary eye care centre of Nepal. *Journal of the British Contact Lens Association*, 36:113-117.

- 18.Dayer L, Heldenbrand S, Anderson P, Gubbins PO and Martin BC (2013):** Smartphone medication adherence apps: potential benefits to patients and providers. *Journal of the American Pharmacists Association*, 53:172-181.
- 19.Hickson-Curran S, Spyridon M, Hunt C and Young G (2014):** The use of daily disposable lenses in problematic reusable contact lens wearers. *Journal of the British Contact Lens Association*, 37:285-291.
- 20.Wu P, Stapleton F and Willcox MD (2003):** The causes of and cures for contact lens-induced peripheral ulcer. *Eye and Contact Lens*, 29:63-194.
- 21.Jalbert I, Willcox MD and Sweeney DF (2000):** Isolation of *Staphylococcus aureus* from a contact lens at the time of a contact lens-induced peripheral ulcer: case report. *Cornea*, 19:116-120.
- 22.Szczotka-Flynn L and Chalmers R (2013):** Incidence and epidemiologic associations of corneal infiltrates with silicone hydrogel contact lenses. *Eye and Contact lens*, 39:49-52.
- 23.Aasuri MK, Venkata N and Kumar VM (2003):** Differential diagnosis of microbial keratitis and contact lens-induced peripheral ulcer. *Eye and Contact Lens*, 29:60-194.
- 24.Schein OD, McNally JJ, Katz J, Chalmers RL, Tielsch JM, Alfonso E *et al.* (2005):** The incidence of microbial keratitis among wearers of a 30-day silicone hydrogel extended-wear contact lens. *Ophthalmology*, 112:2172-2179.
- 25.Zaidi T, Mowrey-McKee M and Pier GB (2004):** Hypoxia increases corneal cell expression of CFTR leading to increased *Pseudomonas aeruginosa* binding, internalization, and initiation of inflammation. *Investigative Ophthalmology and Visual Science*, 45:4066-4074.
- 26.Alarcon I, Tam C, Mun JJ, LeDue J, Evans DJ and Fleiszig SM (2011):** Factors impacting corneal epithelial barrier function against *Pseudomonas aeruginosa* traversal. *Investigative Ophthalmology and Visual Science*, 52:1368-1377.
- 27.Rahimi F, Hashemian MN, Khosravi A, Moradi G and Bamdad S (2015):** Bacterial keratitis in a tertiary eye centre in Iran: a retrospective study. *Middle East African Journal of Ophthalmology*, 22:238-244.
- 28.Narsani AK, Jatoi SM, Khanzada MA and Lohana MK (2010):** Etiological diagnosis of microbial keratitis. *Journal of the College of Physicians and Surgeons Pakistan*, 20:604-607.
- 29.Lorenzo-Morales J, Khan NA and Walochnik J (2015):** An update on *Acanthamoeba* keratitis: diagnosis, pathogenesis and treatment. *Parasite (Paris, France)*, 22:10-15.
- 30.Lim N, Goh D, Bunce C, Xing W, Fraenkel G, Poole TR *et al.* (2008):** Comparison of polyhexamethylene biguanide and chlorhexidine as monotherapy agents in the treatment of *Acanthamoeba* keratitis. *American Journal of Ophthalmology*, 145:130-135.
- 31.Coulon C, Collignon A, McDonnell G and Thomas V (2010):** Resistance of *Acanthamoeba* cysts to disinfection treatments used in health care settings. *J. Clin. Microbiol.*, 48:2689-2697.
- 32.Ferrari G, Matuska S and Rama P (2011):** Double-biguanide therapy for resistant *acanthamoeba* keratitis. *Case Reports in Ophthalmology*, 2:338-342.
- 33.Liesegang TJ (2002):** Physiologic changes of the cornea with contact lens wear. *Official Publication of the Contact Lens Association of Ophthalmologists*, 28:12-27.
- 34.Lee DS, Kim MK and Wee WR (2014):** Biometric risk factors for corneal neovascularization associated with hydrogel soft contact lens wear in Korean myopic patients. *Korean Journal of Ophthalmology*, 28:292-297.
- 35.Mucci JJ, Utz VM, Galor A, Feuer W and Jeng BH (2009):** Recurrence rates of herpes simplex virus keratitis in contact lens and non-contact lens wearers. *Eye and Contact Lens*, 35:185-187.
- 36.Cursiefen C, Colin J, Dana R, Diaz-Llopis M, Faraj LA, Garcia-Delpech S *et al.* (2012):** Consensus statement on indications for anti-angiogenic therapy in the management of corneal diseases associated with neovascularisation: outcome of an expert roundtable. *The British Journal of Ophthalmology*, 96:3-9.
- 37.Al-Torbak AA (2012):** Photodynamic therapy with verteporfin for corneal neovascularization. *Middle East African Journal of Ophthalmology*, 19:185-189.
- 38.Romano V, Spiteri N and Kaye SB (2015):** Angiographic-guided treatment of corneal neovascularization. *JAMA Ophthalmology*, 133:143544-143550.
- 39.Elhers WH and Donshik PC (2008):** Giant papillary conjunctivitis. *Current Opinion in Allergy and Clinical Immunology*, 8:445-449.
- 40.Sorbara L, Jones L and Williams-Lyn D (2009):** Contact lens induced papillary conjunctivitis with silicone hydrogel lenses. *Contact Lens and Anterior Eye, Journal of the British Contact Lens Association*, 32:93-96.
- 41.Garcia-Porta N, Rico-Del-Viejo L, Martin-Gil A and Carracedo G (2016):** Differences in dry eye questionnaire symptoms in two different modalities of contact lens wear. *Biomed. Res. Int.*, 16:1242845-242855.
- 42.Uchio E (2008):** Treatment of allergic conjunctivitis with olopatadine hydrochloride eye drops. *Clinical Ophthalmology*, 2:525-531.
- 43.Torkildsen G, Narvekar A and Bergmann M (2015):** Efficacy and safety of olopatadine hydrochloride 0.77% in patients with allergic conjunctivitis using a conjunctival allergen-challenge model. *Clinical Ophthalmology*, 9:1703-1713.

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