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A survey of contact lens-related complications in a tertiary hospital in China☆

Weiwei Li[a], Xuguang Sun[b,*], Zhiqun Wang[b], Yang Zhang[b]

[a] Tianjin Eye Hospital, Tianjin Ophthalmology and Visual Development Key Laboratory, Clinical College of Ophthalmology, Tianjin Medical University, 4, Gansu Road, Heping District, Tianjin 300020, China

[b] Beijing Institute of Ophthalmology, Beijing Tongren Eye Center, Beijing Tongren Hospital, Capital Medical University, Beijing Ophthalmology & Visual Sciences Key Laboratory, 17 Hou Gou Lane, Chong Nei Street, Beijing 100005, China

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ABSTRACT

Purpose: To describe the type of complications related to contact lens (CL) wear in a tertiary hospital in XX, China.

Methods: A retrospective study of 141 patients who complained discomfort after wearing contact lens on an outpatient basis of XX Hospital were conducted from the January 2012 to December 2015. The data included patients' demographics, lens type, history, slit-lamp examination, reports of corneal scrapings, culture, and examination of *in vivo* confocal microscopy. Binary logistic regression was used to analyse the possible factors which were associated with more severe corneal complications and superficial punctuate keratitis (SPK).

Results: About 86.52% were female and 13.48% were male, the age varied between 12 and 56 years old. Of the 141 patients, 82.27% were soft CL wearers, 2.84% were rigid gas permeable lens (RGP) wearers, and 14.89% patients used overnight orthokeratology. The most common complication was dry eye (36.88%), followed by SPK (36.17%) during these cases. Blepharitis and meibomian gland dysfunction (MGD) were noted in 31.91% of cases. Microbial keratitis was seen in 15 patients including 7 cases of *Acanthamoeba* keratitis. Age was a significant factor to be a case of corneal infection or inflammation [Exp (B)was 0.918, p = 0.030], MGD and blepharitis was found to be significantly associated with being a case of SPK [Exp(B)was2.276, p = 0.047].

Conclusions: The commonest complication was dry eye in this study, followed by SPK. Lid margin and meibomain gland should be paid attention to before contact lens prescription. Younger CL wearers need follow-up examinations.

1. Introduction

Contact lenses (CLs) are used popular for refractive correction and medical purposes. It is reported that approximately 125 million people wear CL worldwide [1]. One study has estimated that 6% of CL wearers develop a complication each year [2]. So CL related complications are an important part of ophthalmic practice. The conditions range from benign allergic conjunctivitis to serious and vision-threatening microbial keratitis [3]. Surveys on CL related complications had been done in many countries and areas, including Asia [1,4–8]. In this study, the conditions of CL related complications were analyzed in a tertiary hospital in XX, China.

2. Materials and methods

This was a retrospective study during the January 2012 to December 2015. Patients who had refractive errors complained discomfort after wearing CL on an outpatient basis of XX Hospital were included. Patients who had previous corneal diseases and surgeries were excluded. The lens type included soft CL (SCL) and rigid CL [rigid gas permeable lens (RGP) and orthokeratology]. One hundred and forty-one patients were involved in this study. All the patients were diagnosed by the same experienced ophthalmologist. The data on patients' demographics, lens type, history, chief complaint, slit-lamp examination were collected. The values of Schirmer's I test and breakup time(BUT) were recorded. The reports of corneal scrapings, culture, and examination of *in vivo* confocal microscopy in the cases with complications like microbial keratitis and infiltrative keratitis were also

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* Corresponding author at: 17 Hou Gou Lane, Chong Nei Street, Beijing 100005, China.
E-mail addresses: lww994012@163.com (W. Li), sunxg2010@163.com (X. Sun), eyewzq@163.com (Z. Wang), 331469388@qq.com (Y. Zhang).

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collected. A multifunctional topographer (Keratograph 5 M, Oculus, Inc) was used to exam the meibomian gland images. This study was conducted in accordance with the Declaration of Helsinki.

The complications commonly associated with CL wear [1,3] include superficial punctuate keratitis(SPK), corneal edema, corneal abrasion, contact lens-induced acute red eye(CLARE), infiltrative keratitis, contact lens peripheral ulcers(CLPUs), microbial keratitis, neovascularization of the cornea, giant papillary conjunctivitis(GPC), superior limbic keratoconjunctivitis(SLK), injection of the conjunctiva, follicles, allergic conjunctivitis, and other conditions like dry eye, blepharitis and meibomian gland dysfunction(MGD). Dry eye was diagnosed as following one of the two criteria: (1) presence of symptoms of dry eye; either BUT ≤ 5s or Schirmer's I test ≤ 5 mm/5 min; (2) presence of symptoms of dry eye; positive ocular surface fluorescein staining; either 5s < BUT ≤ 10s or 5 mm/5min < Schirmer's I test ≤ 10 mm/5 min. Blepharitis was identified as following criteria: (1) a long history of chronic ocular inflammation, recurrent styes or chalazia, with or without seborrheic dermatitis or acne rosacea. (2) presence of the following symptoms: itching or burning of eyelids, eye dryness, irritation, tearing, redness, photophobia, foreign body sensation, contact lens intolerance. (3) clinical examination include lid margins hyperemia, morphological change of the lid margins, altered eyelash appearance, change of meibum character. Lid margins hyperemia is necessary [9,10]. The diagnosis of MGD was made by clinical examination, based on glandular obstruction and meibum quality [10,11].

Statistical analysis was performed using the SPSS statistical software package (SPSS for Windows, version17.0; SPSS, Inc, Chicago, IL). Binary logistic regression was used to analyse the possible factors which were associated with more severe corneal complications (infection and inflammation, including microbial keratitis, CLARE, infiltrative keratitis and CLPUs [12]) and SPK. A p value less than 0.05 was considered statistically significant.

3. Results

There were 141 patients included in this study, 122(86.52%) were female and 19(13.48%) were male. The age varied between 12 and 56 years old (mean 28.08 ± 7.97 years old). Of the 141 patients, 116 (82.27%) were SCL wearers(including 11 colored cosmetic CL wearers), 4 (2.84%) were RGP wearers, and 21 (14.89%) patients used overnight orthokeratology.

The complications showed in Table 1. Eighty-six patients (60.99%) had more than one complication. More than one third of the patients (36.88%) had dry eye. The commonest corneal complication was SPK (36.17%), and GPC (16.31%) was the most common conjunctival complication. Blepharitis and MGD were noted in 45 (31.91%) cases.

Microbial keratitis was seen in 15 patients (9 cases of SCL and 6 cases of orthokeratology). Seven patients (8eyes) were *Acanthamoeba* keratitis, tap water was used for lens cleaning in 3 cases who used orthokeratology. One patient was wearing SCL during bath, and another patient wore SCL overnight. All corneal scraping were positive for *Acanthamoeba*, and *Acanthamoeba* cysts were seen by *in vivo* confocal microscopy in all cases. Culture for *Acanthamoeba* was positive in 6 cases. Two patients had therapeutic keratoplasty while others responded well to medical therapy. Eight patients (8 eyes) were diagnosed as bacterial keratitis, 4 patients wore SCL overnight. *Pseudomonas aeruginosa* were isolated in 3 cases, *Staphylococcus* was isolated in 1 case. All of the eight patients responded well to medical therapy.

The results of binary logistic regression were summarized in Tables 2 and 3. The results showed that age was a significant factor to be a case of corneal infection or inflammation [Exp(B)was 0.918, $p = 0.030$]. Younger CL wears seem to have more corneal infection and inflammation. Except 29 cases of corneal infection or inflammation, MGD and bepharitis was found to be significantly associated with being a case of SPK during the remaining 112 cases [Exp(B)was2.276, $p = 0.047$].

Table 2
Results of binary logistic regression analyses for the factors possibly associated with corneal infection and inflammation.

Factor	B	Exp(B)	p value
Gender	−0.011	0.989	0.986
Age	−0.085	0.918	0.030
Lens type	−0.288	0.750	0.601
Years of CL wear(≤2 years or > 2 years)	0.347	1.415	0.532

CL, contact lens.

4. Discussion

It is reported that the prevalence of CL related ocular complications was to be as high as 39% [13]. Many practitioners focused on the studies in this area. However, few studies reported CL related complications in China so far. The aim of this study was to describe CL related complications in a tertiary hospital in XX.

In this study, the patients of SCL wearers were the most, this is consistent with other studies [1,4,5] and the surveys of trends in CL prescribing [14–16]. Another reason may be that rigid CL had a lower average number of complications than SCL due to its lens material and wear modality [1]. Moreover, most RGP wearers were keratoconus in

Table 1
The complications in different lens types.

Complications		No. of patients(%)	SCL(%)	RGP(%)	orthokeratology(%)
Microbial keratitis	Bacterial keratitis	8 (5.67%)	7(6.03%)	0(0)	1(4.76%)
	Acanthamoeba keratitis	7 (4.96%)	2(1.72%)	0(0)	5(23.81%)
SPK		51 (36.17%)	44(37.93%)	1(25%)	6(28.57%)
Corneal edema		1 (0.71%)	1(0.86%)	0(0)	0(0)
Corneal abrasion		3 (2.13%)	1(0.86%)	1(25%)	1(4.76%)
CLARE		3 (2.13%)	3(2.59%)	0(0)	0(0)
Infiltrative keratitis		5 (3.55%)	5(4.31%)	0(0)	0(0)
CLPUs		6 (4.26%)	6(5.17%)	0(0)	0(0)
Neovascularization		7 (4.96%)	6(5.17%)	0(0)	1(4.76%)
GPC		23 (16.31%)	20(17.24%)	0(0)	3(14.29%)
SLK		1 (0.71%)	1(0.86%)	0(0)	0(0)
Injection of the conjunctiva		4 (2.84%)	2(1.72%)	0(0)	2(9.52%)
Follicles		7 (4.96%)	5(4.31%)	0(0)	2(9.52%)
Allergic conjunctivitis		15 (10.64%)	14(12.07%)	0(0)	1(4.76%)
Dry eye		52 (36.88%)	45(38.79%)	2(50%)	5(23.81%)
Blepharitis and MGD		45 (31.91%)	42(36.21%)	0(0)	3(14.29%)

SCL, soft contact lens; RGP, rigid gas permeable contact lens; SPK, superficial punctuate keratitis; CLARE, contact lens-induced acute red eye; CLPUs, contact lens peripheral ulcers; GPC, giant papillary conjunctivitis; SLK, superior limbic keratoconjunctivitis; MGD, meibomian gland dysfunction.