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Research Article

Outpatient Management of Corneal Inflammatory Events: To Follow-Up or Not to Follow-Up?

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Abstract

Objectives: To assess if a change in ocular discomfort correlates with clinical improvement in symptomatic contact lens related corneal infiltrative events (CIE).

Methods: 12-month study of consecutive patients attending the Specialist Ophthalmic Nurse Practitioner follow-up clinic at Hull Royal Infirmary.

Patients with clinically diagnosed CIE presenting with ocular pain and single infiltrates < 1.5 mm were included. Patients with peripheral corneal ulcers, requiring corneal scrapes (> 1.5 mm), or in which there was a clinical suspicion of acanthamoeba keratitis, viral keratitis or fungal keratitis were excluded. Improvement was defined as reduction in infiltrate density/size and resolution as no residual infiltrate.

Results: Sixty-eight episodes in 67 eyes of 66 patients were included. Hourly 0.3% ofloxacin was used in every episode. Treatment resulted in reduced ocular discomfort at first follow-up in 66 (97%) episodes; 100% of which resulted in clinical improvement. Two (3%) eyes had no improvement/worsening ocular discomfort secondary to ocular surface dryness; these episodes resolved with the addition of lubricants.

Conclusion: Our study demonstrates that a change in ocular discomfort correlates well with a change in clinical signs in this patient population. We cautiously suggest that if first line antibiotics in other units are similarly effective outpatient attendances may be reduced in this patient population whilst still being mindful of the differential diagnosis of acanthamoeba keratitis.

Keywords: *Contact Lenses; Cornea; Keratitis; Infection; Corneal Ulcer*

Introduction

Bacterial contact-lens related keratitis (CLRK) presents with acute/sub-acute eye pain, photophobia, tearing and reduced visual acuity. On examination eyelid oedema, eyelid erythema, conjunctival injection, corneal ulceration, stromal infiltrate, stromal oedema, anterior chamber inflammation and hypopyon may be seen [1]. Poor contact lens hygiene (lack of handwashing, extended continuous wear, sleeping in lenses and showering in lenses), trauma, application of topical steroid to eye, recent ocular surgery, and ocular surface disease are all associated with increased risk of CLRK [2-4]. *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Streptococcus pneumoniae* are the most common bacteria causing CLRK in the developed world [5]. In the United Kingdom up to 95% of bacterial keratitis (of any aetiology) is sensitive to fluroquinolones and thus this bodes the question as to why patients are often follow-up at 48 hours to assess response to treatment [6].

The incidence of CLRK is 1 per 500 wearers and does not appear to vary between daily disposable lenses and extended wear lenses [5]. The number of contact lens wearers is increasing in the United Kingdom and around the world; therefore, as Ophthalmologists our acute

services are seeing more patients with CLRK (Figure 1) [6,7]. The prognosis of CLRK varies from requiring a short course of antibiotic drops as an outpatient with no visual complications to a protracted inpatient stay in which the aim is firstly to save the eye if saving sight is not possible.

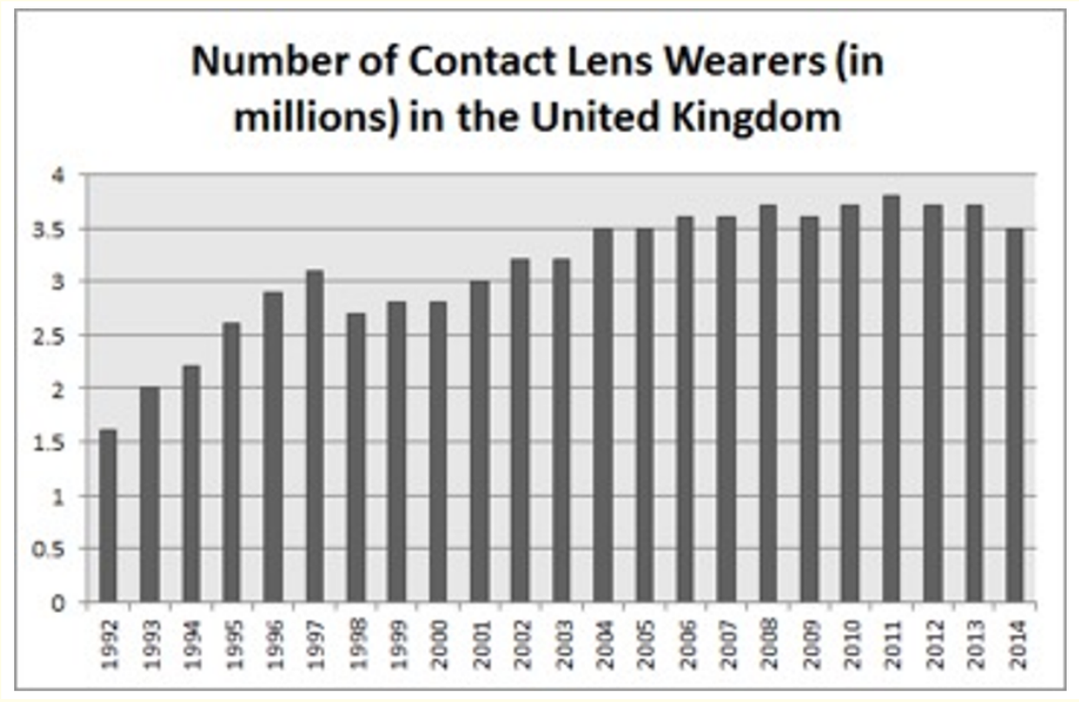

Figure 1: *Number of individuals who wear contact lenses in the United Kingdom (UK) from 1992 to 2014 (in millions) [7].*

Contact lens associated corneal infiltrative events (CIE) may be infectious, such as CLRK, or non-infectious. It may be asymptomatic or present in the same way as CLRK. CIE may also present with single or multiple infiltrates [8,9]. Risk factors for CIE include extended wear lenses, overnight wear and contact lens hygiene [10,11].

Patients with small single non-marginal CIEs (< 1.5 mm) and little anterior chamber inflammation may not require corneal scraping to differentiate between infectious and non-infectious aetiology. In our unit in a contact lens wearer present with an acute history of pain, tearing and photophobia with a reduction in vision in a red eye with corneal infiltrate they are treated as a presumed infectious CIE. They are typically treated empirically as an outpatient with hourly 0.3% ofloxacin eye drops for 48 hours, following which the frequency of application is be reduced as required. Hospital attendances for these patients vary from 3 to 4 in uncomplicated cases. Appreciating the clinical course of these CIEs can help reduce hospital attendances.

Aim of the Study

The primary aim of our study is to assess if a subjective change in ocular discomfort correlates with clinical improvement of CIE.

Methods

This study was carried out at the eye casualty department of Hull Royal Infirmary, UK from August 2017-August 2018. Study approval was obtained from the Hull and East Yorkshire Hospitals NHS Trust clinical audit department to observe results of current clinical practice.

The inclusion criteria were as follows:

- Contact lens wearers diagnosed with CIE
- Patients presenting with acute pain.

The exclusion criteria were as follows:

- Presence of a marginal corneal ulcer (more likely to have an inflammatory as opposed to infectious aetiology)
- Requirement for corneal scrape (performed in our department on all corneal infiltrates > 1.5 mm)
- Multiple corneal infiltrates
- Presence of a hypopyon
- Clinical suspicion of acanthamoeba, fungal or viral keratitis.

Patients underwent a slit lamp examination for diagnosis by an Ophthalmologist. On the first visit age, gender, date of presentation, duration and laterality of symptoms, visual acuity, size and position of infiltrate, anterior chamber activity (according to Sun Grading criteria), antibiotic including frequency and risk factors for keratitis (past ocular history including ocular surface disease, microbial keratitis/corneal ulcers, current use of topical steroids and antimicrobials) were recorded [12]. Follow-up visit was conducted by slit lamp examination with one of two Ophthalmic Specialist Nurses. At the first follow-up, the patients' subjective improvement in status was recorded. At the final follow-up, the point at which the antibiotic was stopped and complications that had occurred during the disease course were recorded. Endpoint of CIE episode was defined as resolution of corneal infiltrate, redness, watering and previous epithelial defect; the patient was then discharged.

Visual acuity was not collected as many patients did not have up to date spectacles and therefore relied upon contact lenses only for best corrected visual acuity.

Results

Sixty-eight episodes in 67 eyes of 66 patients were included. Mean age was 39.9 years; 21 patients (31.8%) were male and 45 (68.2%) female. Eleven (16.7%) patients had a history of microbial keratitis, 1 (1.5%) a history of herpetic keratitis and 7 (10.6%) a history of dry eye/blepharitis. No patients were administered topical steroid or any other topical immunosuppressant.

Prior to seeing a specialist topical chloramphenicol had been started by generalists (Primary Care Physicians or Emergency Department Physicians) in 11 (16.7%) episodes. At presentation the median duration of ocular pain was 2 days (range 1 - 28). Hourly topical 0.3% ofloxacin was used in each episode. Median time to first follow-up was 2 days (range 1 - 7). Hourly antibiotics resulted in reduced ocular discomfort at first follow-up in 66 (97%) episodes; all of which were noted to be improving clinically at follow-up. In two episodes there was no improvement or worsening ocular discomfort at first follow-up. One patient was thought to have a pseudo-dendrite and therefore went on to have a corneal scrape for acanthamoeba and bacterial culture and sensitivity, all of which were negative. The patient went on to complete an uncomplicated outpatient course of treatment with 0.3% ofloxacin and was discharged. The other patient went on to be diagnosed with recurrent corneal erosion syndrome and is under the follow-up of the corneal specialists within the unit. One (1.5%) patient presented twice with CIE with lesions at similar sites 1 month after cessation of 0.3% ofloxacin, however, this resolved with the same antibiotic.

Mean number of follow-ups to end-point/discharge was 3 (range 2 - 5) with mean number of days from presentation to final follow-up being 10 days. Corneal scarring was noted on discharge in 21 (30.9%) episodes.

All patients had resolution of active inflammatory infiltrate, conjunctival redness and pain. No episodes required a change of antibiotics midway through course of treatment or any antibiotic in addition to the one initially prescribed. The only additional treatment received by patients at follow-up appointments was topical lubrication.

Discussion

Our study demonstrates that a change in ocular discomfort correlates with a change in clinical signs at first follow-up in our patient population. It also shows that 0.3% ofloxacin is a good empirical treatment in our cohort, with patients only requiring lubrication as an adjuvant. Patients responded quickly to topical antibiotic without the need for topical steroid, therefore it is likely that cases were caused by bacterial aetiology. Although this cannot be guaranteed as those requiring corneal scrapes were excluded in this cohort. We have demonstrated this patient population may potentially be treated with less than 3 outpatient attendances (as currently is our practice) using subjective ocular discomfort as a safety net.

It is important to note that none of our cases were found to be caused by acanthamoeba, likely due to greater awareness amongst admitting Ophthalmologists. Despite Hull, UK, being a hard water area (Figure 2) in our unit there was only a 1% incidence of acanthamoeba in corneal scrapes 2013 - 2018; this is significantly lower than elsewhere in the UK [13]. A study at Sunderland Eye Infirmary, UK, found acanthamoeba in 6% of corneal scrapes and it is reported as 5% elsewhere in the United Kingdom [14,15].

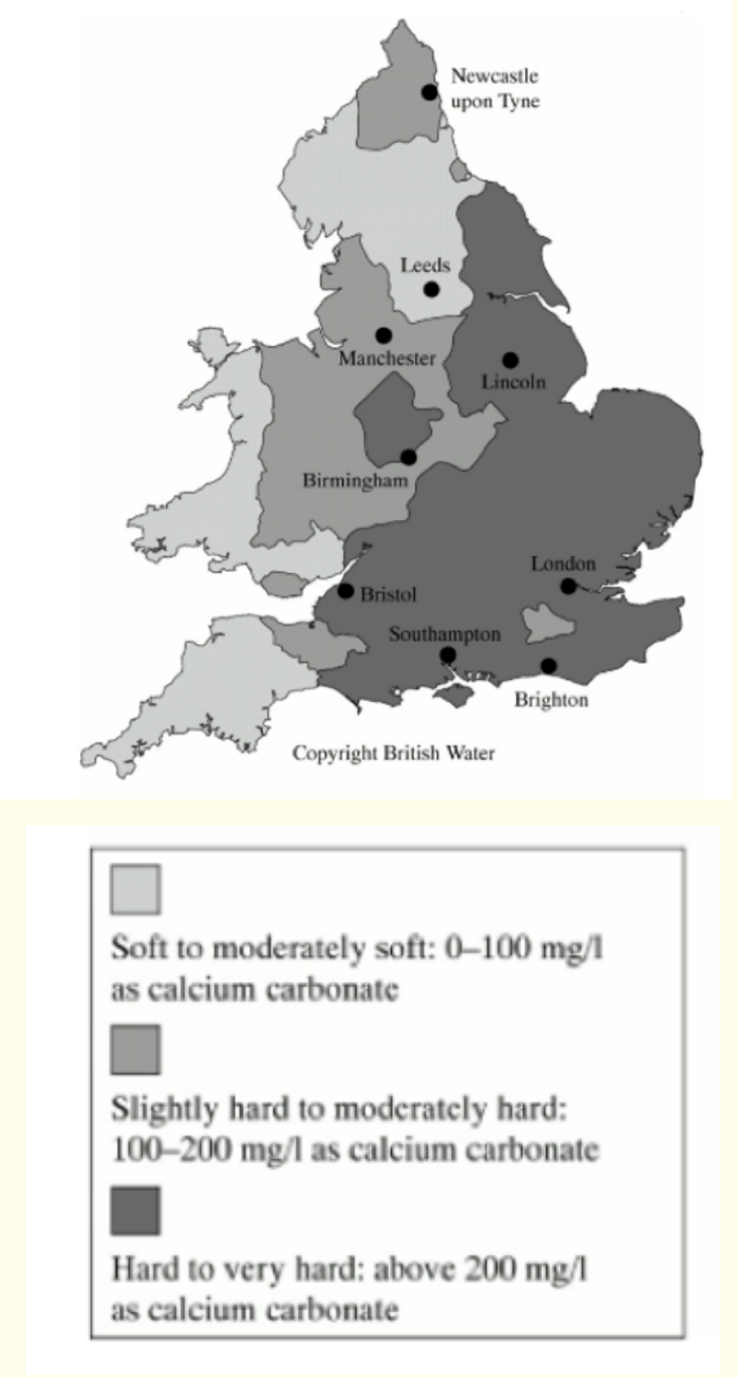

Figure 2: *Map of calcium carbonate levels in water in England [10].*

In reducing follow-up for these patients there is a necessity to ensure that admitting Ophthalmologists are aware of risk factors for acanthamoeba and how it presents, especially in its early stages, to continue to diagnose and manage these patients promptly and accurately. In patients where there is any suspicion of acanthamoeba early follow-up is still indicated.

A similar point could be made about the challenges of distinguishing between bacterial and fungal keratitis, which is also rare in the UK with an annual incidence of 0.32 cases per million individuals [16]. Fortunately, differences in signs have led to the development of algorithms that determine the likelihood of fungal keratitis according to features such as corneal surface profile, corneal ulcer margin, and fibrin deposition [17]. Again in these patients early follow-up is still indicated.

Patients with large lesions requiring corneal scraping require inpatient treatment or close outpatient treatment to follow-up response, microbiology results and potentially add adjuvants to save sight or even save the patient's eye e.g. topical lubricants, steroids, mydriatics and oral tetracyclines.

Furthermore, we noted a significant proportion of patients (16.7%) in the study received topical chloramphenicol from a general doctor (either from the Emergency Department Physician or Primary Care Physician) prior to being seen by an Ophthalmologist. Given that chloramphenicol has poor activity against gram-negative organisms such as *Pseudomonas aeruginosa*, a common cause of CLRK, we would suggest a topical fluoroquinolone to be given instead by generalists in patients with suspected CLRK or no topical treatment until follow-up by an Ophthalmologist [5].

In the United Kingdom Specialist Ophthalmic Nurse Practitioners provide adjunct services in many Ophthalmic subspecialty clinics to reduce patient waiting lists and allowing Ophthalmologists to care for a more complex case mix [18]. In post-operative cataract clinics Nurse consultation has been shown to be cost-effective [18]. Specialist Ophthalmic Nurse Practitioners help staff the Eye Casualty department at our unit. They perform a crucial role in diagnosing and managing non-sight threatening anterior segment pathology and following-up contact lens patients with CIE. They practice under the supervision of an Ophthalmologist, who is in an adjacent room if needed. This also helps reduce the risk of excessive patient review (however, this cannot be completely ameliorated). The two Ophthalmic Nurse Practitioners at our unit have over 40 years' experience between them. They receive on the job training and access practical training on emergency eye care along with Ophthalmology Residents. Nursing staff provide a stable workforce; educational training and close supervision can potentially provide a cost-effective way of providing care for some anterior segment pathologies [19].

Conclusion

In summary, our study demonstrated that a subjective change in ocular pain in our population may be a sensitive way in monitoring clinical improvement in CIE. Clinicians still must be wary that their initial diagnosis is correct as symptoms of acanthamoeba keratitis can wax and wane. Furthermore, it also demonstrates that 0.3% ofloxacin is an empirical treatment in our region, suggesting that the number of outpatient clinical follow-ups may be reduced in our cohort. We have implemented this approach within our eye casualty unit. We recommend that other units perform similar service evaluation to determine if reducing outpatient visits is safe in this patient population as microbial flora and sensitivities vary with geography.

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Disclosure

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