Case Record 13

Bacterial Keratitis

Should optometrists treat in the community?

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Introduction
Can Optometrists Deal with Bacterial Keratitis?

Ray-Chaudhuri (2005) states that suspect bacterial keratitis' require a corneal scrape and culture. There are no exclusion criteria.

Charukamnoetkanok and Pineda (2005) however, report yields as low as 63% from cultures and suggest that routine sensitivity testing rarely alters the treatment outcome. Morlet and Daniell (2003) indicate that over 80% of ulcers respond well to empirical broad-spectrum treatment. Regardless no clinician wants to face a worsening keratitis without the benefit of pathogen sensitivities. Would a more objective method of pre-assessing treatment efficacy be of value?

Morlet and Daniell (2003) indicate that significant predictive factors for culture success or failure are lesion size, promptness of presentation, patient age, co-existing corneal pathology and use of topical steroids. A general reduction in immune competence would also contribute. Young patients with small ulcers should respond well with empirical treatment and would be unlikely to be culture positive. Conversely, the elderly (>60 years), with large ulcers (> 5mm) had 5.5 times the risk of primary treatment failure (Morlet and Daniell 2003). Vital, Belloso, Prager and Lanier (2007) amalgamated these observations in the objective '1,2,3' guidelines.

O'Brien (2003) further suggests that resistance is unlikely with community-acquired keratitis, leaving these micro-organisms more susceptible to 'off the shelf' antibiotics. Green, Apel and Stapleton (2008) demonstrated that the majority of community-acquired ulcers were in younger, immuno-competent patients without co-existing pathology. Patients with ocular surface disease or undergoing ocular surgery were older and required more protracted treatment.

However, individualised treatment decisions need to consider contemporaneous data regarding local micro-flora, information that cannot be collated without culturing (Ofloxacin Study Group 1997, Morlet and Daniell 2003). Further there is growing evidence of increasing resistance of a variety of organisms to many antibiotics, including the Quinolones (Bearden and Danziger 2001, Watanabe, Numata-Watanabe and Hayasaka 2001, Mills 2003, Charukamnoetkanok and Pineda 2005, Khosravi, Mehdine and Heidari 2007).

There will always be some clinical decisions based on assessed severity, symptoms, compliance and ease of access to laboratory facilities. Objective quantification of each presentation is very valuable but can't replace culturing, a skill optometrists need to acquire. This case does demonstrate that optometrists are ideally suited to triage presentations before inappropriate treatment is instigated.

MK
Day 1

Slit lamp examination revealed obvious diffuse stromal staining indicating a break in the basal lamina. No history of trauma was elicited and the lesion was diagnosed as bacterial keratitis. Whether infective or not, urgent management would be indicated, due to the stromal involvement (Fleiszig 2006). The patient reported being prescribed chloramphenicol the previous day, to little effect.

Use of ineffective antibiotics can seriously reduce the chances of obtaining a positive culture. Immediate referral to Eye Casualty was arranged; the need for fortified antibiotics or an aminoglycoside was considered probable in light of the previous intervention.

HES

The prompt presentation, small lesion size and state of health of the patient and probable compromise of culture success prompted empirical treatment with Ofloxacin 0.3% q1h, after initial loading dose to achieve therapeutic titre, with Chloramphenicol ointment nocte and Cyclopentolate 1% tid.

Ofloxacin is licensed for use against keratoconjunctivitis, however Chloramphenicol, bacteriostatic and ineffective against Pseudomonas aeruginosa, is only indicated for the treatment of acute bacterial conjunctivitis (emc 2008). The choice of Chloramphenicol ointment was for nocturnal cover. Ciprofloxaicin, available as both a drop and ointment and licensed for bacterial keratitis (emc 2008) would seem a better choice for nyctohemeral cover.

Inappropriate use of antibiotics falls into two categories, incorrect diagnosis and sub-therapeutic dosing (Charukamnoetkanok and Pineda 2005). To avoid the second hazard O'Brien (2003) recommends an initial loading dose of one drop every two minutes for five applications.
This initial corneal 'marinade' approach was instigated, followed by q1h for the rest of the day.
Outpatient management is appropriate for compliant patients with mild keratitis but necessitates meticulous follow-up (Onofrey et al 1998, O'Brien 2003, Charukamnoetkanok and Pineda 2005).

Day 2 : First Review

O'Brien (2003) comments that, even with effective bactericidal therapy, 48 to 72 hours can elapse before progression is halted.

Improvement in signs and symptoms were evident. The reducing lesion size, coupled with reduced stromal staining, supported the view that the management was effective.

The patient was referred back to community care for follow-up.

Days 3 to 7

Resolution was closely monitored over a further five days.
Early morning appointments were arranged to suit the patient's commitments and allow prompt re-referral to the HES if improvement was not noted.

It is often easier to commence than to stop treatment (Morlet and Daniell 2003). End points of treatment are re-epithelialisaton and non-progression of stromal infiltrates (O'Brien 2003). However, toxicity to the medication can mask epithelial heal (Morlet and Daniall 2003). While fluoroquinolones are less toxic than the aminoglycosides, effects can still manifest (Gwon for the OSG 1992) and be enhanced by overly prolonged initial intensive treatment (Morlet and Daniell 2003). These authors suggest that 48 hours of high concentrations is enough to eliminate most bacterial infections; reducing doses after this time. Vital et al (2007) modified frequency and duration of therapy on clinical response as epithelialization was observed.

Caution with cessation of therapy is advocated in case of corneal tissue persistent organisms, such as Pseudomonas aeruginosa (O'Brien 2003). Continued prophylactic cover is indicated even after observable heal is achieved.
The patient was only discharged after several days of prophlactic cover.

Discussion and Adjunctive Therapy

The aim of treatment should not simply be to eradicate the infective agent, but also to reduce the inflammatory response, prevent structural damage to the cornea and promote healing of the epithelial surface (O'Brien 2003).

Pain management must also be considered. The use of cycloplegics, as well as preventing formation of synechiae if anterior chamber inflammation is noted, relieves ciliary spasm and alleviates pain (O'Brien 2003).

Morlet and Daniell (2003) suggest that oral doxycycline, if the ulcer is large and exhibits corneal thinning, can be a beneficial adjunct to the topical medications.

Patching is contraindicated in active infection (O'Brien 2003).

Simple palliatives to optimise the ocular surface environment, particularly non-preserved solutions with Sodium Hyaluronate (Condon, McEwan, Wright, Mackintosh, Prescott and McDonald 1999), have been demonstrated to encourage epithelial heal (Morlet and Daniell 2003).

Corticosteroids can be used with caution once the pathogens have been eliminated (O'Brien 2003). Ray-Chaudhuri (2005) considers a weak steroid appropriate after 48 hours of intense anti-bacterial therapy. These medications decrease the host inflammatory response but longer treatment courses and a higher likelihood of recurrence have been observed (O'Brien 2003). Charukamnoetkanok and Pineda (2005) list guidelines for steroid use : 1) steroids should not be used initially, 2) they should not be used if the eye is improving, 3) they may be used after total sterilization if there is ongoing inflammation, 4) concomitant use of antibiotics must be maintained, 5) steroids should not be used in the presence of stromal thinning.

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