Focus on bacterial conjunctivitis: accurate diagnosis and treatment

Author : Sally Turner

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Sally Turner explains how reaching a definitive diagnosis of bacterial conjunctivitis can be challenging and outlines the therapeutic options

The conjunctiva is a very important, but often overlooked, part of the eye.

Surface disease is very common in general practice, but it is essential to understand the relevance of conjunctival involvement with regards to a purely superficial problem – such as a primary bacterial conjunctivitis – or as part of a more serious intraocular condition, for example, uveitis or glaucoma, where conjunctivitis will be seen alongside other ocular pathology.

What is conjunctivitis?

Conjunctivitis is inflammation of the conjunctiva – the thin mucous membrane that lines the eyelids and the exposed portion of sclera. It is a clinical description, not a diagnosis.

Although conjunctivitis is the most commonly diagnosed ocular condition in general practice, reaching a definitive diagnosis can be challenging in some cases. Primary bacterial conjunctivitis in dogs, cats and rabbits is actually less frequent than might be expected from the amount of antibacterial agents prescribed.

The causes of conjunctivitis can be categorised as:

• infectious – viral, bacterial,

fungal or parasitic;

• immune-mediated/allergic;

• trauma/foreign body;

• toxic or chemical;

• neoplastic;

• secondary to corneal

disease, such as keratoconjunctivitis sicca or ulcer;

• secondary to adnexal disease, such as entropion or distichiasis;

• associated with other ocular or systemic disease, such as intraocular neoplasia oruveodermatological syndrome; or

• miscellaneous.

Like most parts of the eye, the conjunctiva can only respond to noxious insults – be these endogenous or exogenous – in a limited number of ways

The three most common reactions of the conjunctiva are hyperaemia, chemosis and ocular discharge.

• **Hyperaemia** – diffuse redness from the small branching conjunctival vessels both over the bulbar conjunctiva and the ventral fornix. Seen in both acute and chronic cases (Figure 1).

Hyperaemia varies in severity, but should be distinguished from episcleral or scleral congestion. Involvement of these deeper vessels normally indicates some form of intraocular disease, although the conjunctival blood vessels will also be hyperaemic in this instance. Therefore, the anatomic location of the hyperaemia is very important in differentiating a purely superficial conjunctivitis from a potentially more serious intraocular inflammatory process.

Remember that the conjunctival vessels are narrow, branch frequently and are often tortuous in nature. They will move as the eyeball position changes. Deeper vessels tend to be thicker, straighter, perpendicular to the limbus and rarely branch. They are also normally a darker red in colour.

• **Chemosis** – conjunctival swelling (oedema; Figure 2).

Chemosis is most noticeable in acute conjunctivitis, where swelling or oedema of the conjunctiva can be dramatic, especially in cats. The loose arrangement of cells within the conjunctival stroma allows rapid and extensive oedema to develop. Sometimes the chemosis may be so severe as to prevent visualisation of the globe.

• **Ocular discharge** – this usually begins serous, but becomes mucopurulent and can be copious. Both acute and chronic cases will often have some form of discharge (Figure 3):

– serous – acute infection, allergy, irritant;

– mucoid – chronic disease, especially keratoconjunctivitis sicca; or

– purulent – bacterial infection or foreign body.

An ocular discharge is often an owner's reason for presenting his or her pet in cases of conjunctivitis. Consideration of sample collection for viral or bacterial culture should be made and such samples taken before the discharge is cleaned away or any topical agents (such as topical anaesthetics or fluorescein dye) are applied to the eye.

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• **Pain** – variable, but can lead to blepharospasm and spastic entropion.

• **Follicle formation** – normally present on the bulbar surface of the third eyelid, but any chronic conjunctivitis can result in follicles of lymphoid tissue. It is not pathognomic for any particular cause, but reflects the chronicity of the disease.

Conjunctival bacteria

Normal commensal bacteria are present in the conjunctival sac and eyelid margin – indeed they can be isolated from between 70 and 90 per cent normal dogs[1-5].

Lower percentages are isolated in cats, ranging from four to 64 per cent in different studies[6-8]. Therefore, a positive culture does not necessarily correlate to significant infection.

Fewer studies are available in rabbits, but one looking at 70 healthy rabbits found bacteria in 83 per cent[9,10].

The most common isolates from normal canine, feline and rabbit eyes are gram-positive organisms

such as *Staphylococcus* (mainly *S epidermidis* and S aureus) along with lower numbers of *Bacillus, Micrococcus* and *Corynebacterium* species. Gramnegative bacteria are infrequent.

The normal flora will vary with the climate – both geographic and seasonal – and the breed. Therefore, the findings in one location might not be the same on another continent[11].

Normal cytology of the conjunctiva (via scrapings, for example) will reveal sheets of epithelial cells and occasional bacteria, but white blood cells are rare (unlike in disease processes)[12].

In cases of bacterial conjunctivitis the most common isolates are again gram-positive – staphylococcal (*S epidermidis* and *S aureus* again) and streptococcal species as normal commensal bacteria proliferate.

However, up to 34 per cent of samples supported no microbial growth[13],[14].

A more recent study found 57 per cent gram-positive isolates, but a surprisingly high (43) percentage of gram-negative organisms, mainly *Escherichia coli* and *Pseudomonas species*[15]. This might reflect different climatic and seasonal parameters or a subset of the population. It suggests that culture and sensitivity testing should be considered – particularly in unusual or nonresponding cases – or, at the very least, gram staining should be performed.

In cats, bacterial isolation rates are low – 34 per cent in cases of chronic conjunctivitis in one study[16], but again, similar potential pathogens are present.

If a profuse growth of a single species is cultured then this finding is likely to be highly significant, unlike a scanty growth of two or three species.

Examination of pathological conjunctival scrapes can help identify the underlying disease process. For example, keratinised cells can be seen in cases of chronic irritation from entropion, while goblet cell proliferation is commonly encountered in keratoconjunctivitis sicca cases.

In acute bacterial conjunctivitis many neutrophils and bacteria will be found, while cytology from chronic bacterial conjunctivitis will still show neutrophils, but with many mononuclear cells and degenerating keratocytes as well. The presence of bacteria is variable in these cases.

Choosing a treatment

Once a thorough ophthalmic examination has been performed to rule out other causes of conjunctivitis – Shirmer tear testing to check for keratoconjunctivitis sicca, assessing eyelid position for entropion, fluorescein testing for corneal ulceration, checking under the nictitans membrane for a foreign body and so on – we can assume that the patient presenting with bilateral red eyes and a mucopurulent discharge has a primary bacterial conjunctivitis.

As previously mentioned, this is not as common as we might assume – but nonetheless, treatment should be considered, even if this is aimed at limiting further bacterial overgrowth while investigating the underlying cause of the conjunctivitis.

Factors to consider when choosing a therapeutic agent are:

• likely offending organism;

• likely sensitivity of the organism;

• location of the organism;

• penetration required of the drug chosen;

• pharmacokinetics of the available drugs;

• spectrum of activity of the available drugs;

• potential toxicity of the available agents; and

• owner and patient compliance.

Knowing that gram-positive organisms are present in the normal conjunctiva, and can frequently cause opportunistic infections, it is sensible to choose an antibiotic with antibacterial properties against these agents.

Fusidic acid is a good choice as a first-line antibiotic in cases of bacterial conjunctivitis. It has a good spectrum of bacteriostatic activity against a range of grampositive organisms (although remember that it is not effective against gram-negative bacteria). It is licensed in dogs, cats and rabbits (Figure 4).

In humans, it is a very effective drug for staphylococcal conjunctivitis and, in addition to its prescription by medical practitioners, optometrists are also licensed to prescribe and dispense it[17].

In addition to having a suitable antibiotic, the base of carbomer gel found in fusidic acid is excellent – it has longer ocular contact time and, therefore, less frequent administration (once or twice daily in most cases), which promotes owner compliance. The carbomer gel is also very soothing[18].

Although infectious causes of conjunctivitis are common in cats – mainly feline herpes virus or *Chlamydophila* – primary bacterial conjunctivitis is rare. However, secondary bacterial infections do occur – with a retained cat claw foreign body or following eyelid trauma, for example – and in these

situations fusidic acid is a good choice. Again, the carbomer gel base makes it lubricating and soothing and hypersensitivity reactions to fusidic acid appear rare – while sensitivity to tetracyclines and aminoglycocides is not uncommon[19] (Figure 5).

We tend to think of *Pasteurella* as a cause of both conjunctivitis and dacryocystitis in rabbits, but one study found only 12 per cent *Pasteurella*, but 42 per cent *Staphylococcus* species[20]. Table 1 lists suitable antibiotic agents for topical use.

Remember, some infections can be caused by gram-negative bacteria, such as *E coli* and *Pseudomonas* species. Therefore, if no improvement occurs in the patient's eyes in 72 hours, this possibility should be considered. In addition, a significant minority of cases that appear infected clinically do not support bacterial growth when tested.

Taking a conjunctival impression smear and gram staining is recommended in any cases that appear atypical on presentation or do not respond to the initial treatment. Culture and sensitivity testing should also be considered. It is also very important to perform a thorough ophthalmic examination again to ensure you have not missed the cause of the conjunctivitis.

Most cases of bacterial conjunctivitis should improve within 48 to 72 hours and be fully resolved in a week. However, if left untreated, they can progress to involve the eyelids and periorbital skin as well (Figure 6).

Clinical tips

The following list contains some useful clinical tips.

• Moisten culture swabs with sterile saline prior to sampling to improve isolation rates.

• Take swabs from both eyes.

• Demonstrate to the owner exactly how to apply the medication and ensure they bathe away all discharges prior to instilling the medication (Figure 7).

• If the patient does not improve as you would expect, perform another thorough ophthalmic examination to ensure you have not missed something, rather than reach for the next antibiotic on the shelf.

• Remember to check Shirmer tear test readings on all patients that present with conjunctivitis – keratoconjunctivitis sicca patients will improve with fusidic acid due to the soothing carbomer gel and the reduction in bacterial flora, but will relapse when treatment is discontinued.

• Consider flushing the nasolacrimal ducts if the conjunctivitis returns on cessation of treatment;

dacryocystitis often develops from bacterial conjunctivitis in dogs, and occasionally cats – not just rabbits.

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