Conjunctivitis in Cats

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▲ **FIGURE 1** Rhinosinusitis, conjunctivitis, and mucopurulent ocular discharge in a patient with FHV-1 infection. *Photo courtesy of Michael G. Davidson, DVM, DACVO*

PROFILE

Definition

- Conjunctivitis is an inflammation of the conjunctiva, a tissue that lines the eyelids and covers the sclerae.
- The conjunctiva is an exposed mucous membrane that reacts to antigenic stimulation caused by contact with noxious stimuli.
- The superficial stroma of the conjunctiva is rich in lymphatic tissue, both diffuse and aggregated.
  - When aggregated tissue is stimulated, it forms lymphoid follicles, which produce effector cells. Conjunctival plasma cells produce specific immunoglobulins as part of the secretory component of the immune response.[1,2]

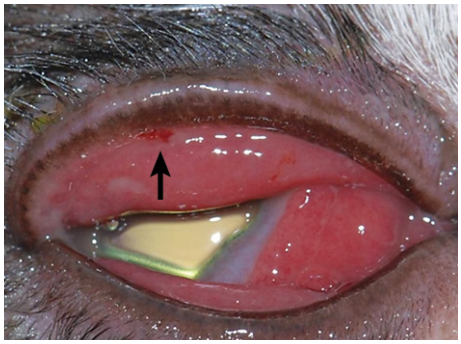
Causes

- Infectious primary pathogens
  - Cause of most cases of feline conjunctivitis[1,3-6]
- Feline herpesvirus type 1 (FHV-1)
  - Most common cause of conjunctivitis in cats
  - Studies suggest that 95% of cats worldwide have been exposed to the virus, and at least 80% of cats are latent carriers of the virus.[7-11]
- *Chlamydophila felis*
  - A common cause of conjunctivitis, especially in young kittens[6,12-14]
- Calicivirus
  - Primarily a respiratory tract pathogen that may cause mild and transient conjunctivitis
  - Most cats will recover spontaneously.[15]
- *Mycoplasma* spp
  - Can be present in healthy cats, however, and may thrive because of coinfection with FHV-1 or *C felis*, making its clinical significance questionable[1,3-6,12-13]
- Because of their epidemiologic prevalence, only FHV-1 and *C felis* will be discussed in this article.

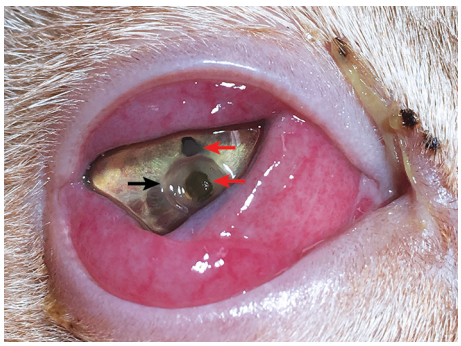
Pathophysiology

- FHV-1 conjunctivitis
  - The primary disease commonly occurs in kittens and is caused by exposure to wild-type FHV-1, which is transmitted between cats by microdroplets (frequently from the queen) or fomites (possibly by the client).[1,3]
  - FHV-1 infection is characterized by conjunctivitis,

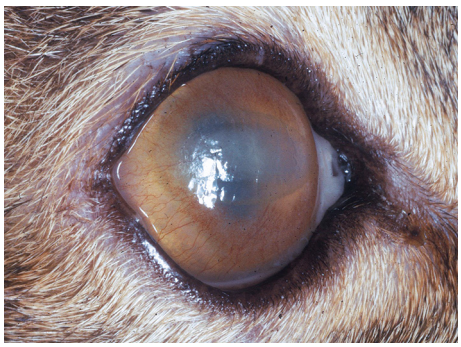
FHV-1 = feline herpesvirus type 1



▲ **FIGURE 2** Conjunctivitis and conjunctival ulceration (**black arrow**) in a patient with FHV-1 infection. Although *C felis* may cause conjunctivitis, presence of an ulcer indicates a viral disease. *Photo courtesy of Michael G. Davidson , DVM, DACVO*



▲ **FIGURE 3** A deep corneal ulcer (**black arrow**) partially obscuring the pupil (**red arrows**) in a patient with FHV-1 infection. Note the congested conjunctiva. *Photo courtesy of Karin Berggren, DVM*



▲ **FIGURE 4** Stromal keratitis in a patient with FHV-1 infection. Stromal keratitis is an immune-mediated reaction of the cornea to the viral particles. White-gray stromal infiltration is seen in the axial cornea surrounded by corneal blood vessels. *Photo courtesy of Hebrew University of Jerusalem Seth Koch Slide Collection*

respiratory tract signs (***Figure 1***), and, less frequently, corneal ulceration.[4,5]

- Following primary, and usually self-limiting, disease, FHV-1 establishes lifelong latency in the trigeminal ganglia.
  - The virus is cleared in only a limited number of cats.[7]
- Stress or treatment with steroids will induce subsequent reactivation and shedding of the virus and may result in recrudescent disease.[8-9]
  - Recrudescent disease is usually milder than the primary infection and can affect the cornea, conjunctiva, and/or respiratory system.[9,11,16]
- The recurrent disease may be cytolytic (because of viral replication) and cause conjunctival (***Figure 2***) or corneal (***Figure 3***) ulceration; it also may be immune-mediated and cause stromal keratitis (***Figure 4***) or chronic lymphoplasmacytic conjunctivitis.[1,4,11]

▸ *C felis* conjunctivitis

- Cats are infected by airborne transmission or contact with infected cats or fomites.[1,3]
- The infection initially may be unilateral.
  - It usually spreads to the other eye within a week, but some cases may remain unilateral.[4]
  - If untreated, chronic disease, characterized by membranous or follicular conjunctivitis, may occur, or the cat may become a subclinical carrier and contribute to the spread of the disease.[5]
- Natural immunity may develop, and the disease is rarely seen in cats older than 5 years of age.[17]

History & Physical Examination

▸ In cases of FHV-1 conjunctivitis, client questioning may reveal stressful events (eg, rehousing, traveling, introduction of a new pet or baby to the household) preceding the appearance of clinical signs.

- Pregnancy, parturition, lactation, concurrent illness, or treatment with glucocorti-

coids can also induce viral shedding and recrudescent disease.[1,3-5,7,17]

- In kittens with FHV-1 conjunctivitis, physical examination may show severe signs of upper respiratory disease, including fever, sneezing, rhinitis, and purulent nasal discharge.
  - These signs are milder in cases of *C felis* conjunctivitis and in adult cats with FHV-1 conjunctivitis and may include nasal discharge and sneezing.[1,3-5,11,16]

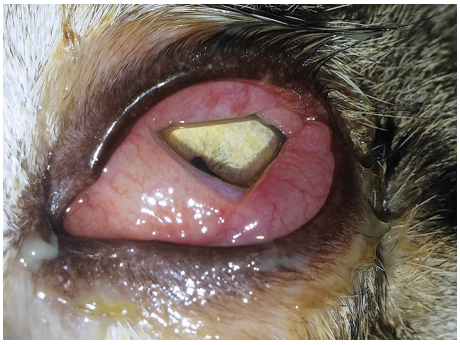
Clinical Signs

- Clinical signs are usually more severe in FHV-1 primary disease in kittens and milder in *C felis* and adult FHV-1 disease.
  - Clinical signs may help distinguish between the pathogens.[1,3-5,7,11,16,17]
- Hyperemia of conjunctival vessels (ie, *red eye*) is usually more marked in FHV-1 conjunctivitis than in *C felis* conjunctivitis.
- Conjunctival edema (chemosis), swelling, and thickening is usually more marked in *C felis* conjunctivitis than in FHV-1 conjunctivitis (***Figure 5***).
- Ocular discharge may be mucoid in *C felis* conjunctivitis and adult FHV-1 conjunctivitis and purulent in kittens with FHV-1 conjunctivitis (***Figure 1***).
- Conjunctival ulceration is more characteristic of FHV-1 disease, especially in kittens (***Figure 2***).
- Concurrent corneal involvement and ulceration may be seen in FHV-1 conjunctivitis but not in *C felis* conjunctivitis (***Figures 3*** and ***4***).
- Minimal ocular pain, but possible discomfort, expressed as blepharospasm, may be seen in conjunctivitis but is marked in cases of corneal ulceration.

DIAGNOSIS

Clinical Diagnosis

- As compared with *C felis* infection, FHV-1 infection causes greater conjunctival hyperemia and ocular discharge, and respiratory signs are usually more severe, especially during the primary disease (***Figure 1***).
  - Recurrent disease, keratitis, and corneal and conjunctival ulceration are definitive hallmarks of FHV-1 infection (***Figures 2-4***).
  - Presence of symblepharon, or adhesions between the cornea and conjunctiva, indicates previous FHV-1 infection.[1,3-5,7,17]
- Chemosis is more severe in *C felis* infection than in FHV-1 infection and is the most notable clinical sign (***Figure 5***).
  - Although infection with *C felis* is generally mild, chlamydial conjunctivitis can be persistent, especially if not treated.
  - In chronic stages, membranous or follicular conjunctivitis may develop.[1,3-5,7-8]
- Diagnosis may also be based on response to treatment.
  - FHV-1 involvement should always be suspected in patients with conjunctivitis.
  - *C felis* infection may be considered in patients with acute chemosis or chronic disease.[1,4,11]



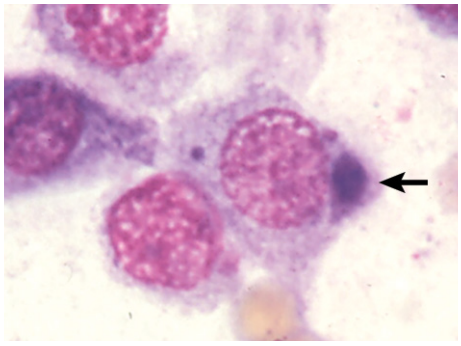
▲ **FIGURE 5** Chemosis and conjunctivitis without corneal involvement in a patient with *C felis* infection

Differential Diagnoses

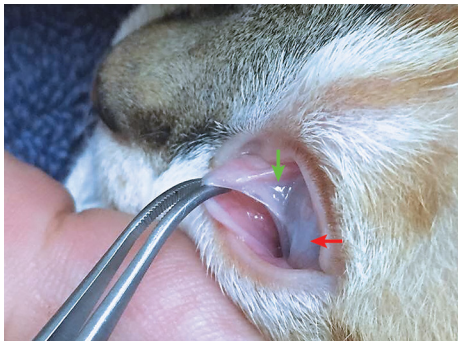
- Eyelid and eyelash disorders
  - Rare causes of conjunctivitis in cats
  - Dry eye (ie, keratoconjunctivitis sicca) is commonly a sequela of FHV-1 infection rather than a primary cause of feline conjunctivitis.[1,4,11]

FHV-1 = feline herpesvirus type 1

- Calicivirus, *Mycoplasma* spp, and *Bordetella bronchiseptica*[1,4,12-13,15]
- Lipogranulomatous, eosinophilic, and parasitic conjunctivitis[1,3-5,17]
- Red eye
  - Clinical sign of anterior uveitis and glaucoma
- Appropriate testing for these conditions should be performed.



▲ **FIGURE 6** Presence of an intracytoplasmic elementary body in an epithelial cell collected from a conjunctival scrape (**arrow**) is indicative of *C felis* infection. *Photo courtesy of Michael G. Davidson, DVM, DACVO*



▲ **FIGURE 7** Symblepharon, or adhesions between the cornea and conjunctiva, is a common complication of FHV-1 keratoconjunctivitis. In this case, most of the cornea is obscured because of adhesions of the bulbar conjunctiva (**red arrow**). Adhesions between the bulbar conjunctiva of the third eyelid and cornea (**green arrow**) are also present.

Laboratory Findings

- Diagnostic tests for FHV-1 include immunofluorescent antibody testing, viral isolation of FHV-1 in feline cell cultures, and polymerase chain reaction (PCR).[1,3,4]
  - False-negative and false-positive test results are common because of subclinical shedding of FHV-1 by healthy animals, reduced shedding in recrudescent stages of the disease, and high prevalence of antibodies from vaccination and exposure.[12-14]
- Diagnostic tests for *C felis* include PCR and cytologic evaluation. Presence of intracytoplasmic elementary bodies in epithelial cells collected from conjunctival scrapes (***Figure 6***) is indicative of *C felis* infection.[12-14,18]
  - These bodies are transient and can be difficult to identify.
- As the utility of diagnostic testing is limited, treatment based on clinical signs without confirmation of the underlying disease is an acceptable approach to conjunctivitis in cats.[1,3-5,7,11]

TREATMENT

Inpatient or Outpatient

- Reducing stress is important in treating FHV-1 infection and may help determine the choice of therapy.
  - Some topical antiviral drugs require frequent administration, which can increase patient stress. In mild cases, no treatment may be preferable.[1,3-5,7,11,17]
- When possible, patients with conjunctivitis should receive treatment at home, where clients can provide a nurturing and less stressful environment.

Medical

- Medical management includes use of topical and oral antivirals and antibiotics.
- *C felis* conjunctivitis
  - Treated with topical ointment containing 1% tetracycline q6-8h for 1 to 2 weeks
  - Recent studies suggest that topical treat-

ment be supplemented, or even replaced, with oral doxycycline 10 mg/kg q24h for 3 weeks.
- Systemic treatment may be indicated in patients with concurrent respiratory disease.
- Systemic treatment is also useful in preventing secondary ocular bacterial infection in FHV-1 conjunctivitis.[19,20]
- Rapid resolution of signs during treatment may suggest that *C felis* is the causal agent.

▸ Topical antiviral drugs
- Usually administered 5 to 6 times a day, with treatment continuing for 10 to 14 days after resolution of signs[21,22,25]
- Trifluridine 1%, idoxuridine 0.1%, and vidarabine 3%
  - Variably effective[19,21-25]
  - Trifluridine has the highest efficacy and provides transcorneal penetration but may be more irritating to cats.[19-23]
  - Idoxuridine and vidarabine are less irritating but may be difficult to obtain because they are not widely available commercially.
    - They can be ordered from compounding pharmacies.
- Cidofovir 0.5%
  - Unavailable commercially as an ophthalmic preparation
  - Has strong in vitro and in vivo efficacy against FHV-1 infection, with treatment reducing severity of clinical signs and viral shedding[26-28]
  - Has beneficial effects when administered q12h, which is a significant advantage as compared with other topical antiviral medications.[26-28]
  - Less toxic than other antivirals because of its relatively high specificity for viral—rather than host—replication proteins[26-28]

▸ Systemic antiviral treatment
- Famciclovir
  - A prodrug of penciclovir
  - Safe and effective for treating FHV-1 conjunctivitis
  - Recommended dose is 90 mg/kg q12h[29-33]

▸ All current systemic and topical antiviral drugs are virustatic and achieve their effect by interfering with active viral DNA replication.
- They are ineffective at eradicating latent infection.
- Significant toxicity can occur with antiviral administration because of the intracellular location of the virus and the inability of available medications to selectively target viral—rather than host cell—replication.[19,21-25]

▸ Many commercially available antiviral drugs, notably acyclovir, are effective against human herpes simplex virus but ineffective against FHV-1.[20-25]
- Others, such as valacyclovir, may be toxic to cats and should not be used.[19,23]

▸ Most patients greatly benefit from frequent application of high-quality artificial tear (eg, hyaluronate) preparations, as FHV-1 infection reduces conjunctival goblet cells and causes qualitative tear film disorders.[1,4,34,35]

▸ Glucocorticoid use in cats should be considered carefully, as these drugs may also induce viral shedding.
- When glucocorticoid treatment is unavoidable (eg, in patients with eosinophilic keratitis or anterior uveitis), concurrent antiviral treatment should be provided and the patient monitored closely for recrudescent disease.
- Because FHV-1 infection may be reactivated during immunosuppression, the prognosis is poor in immunosuppressed patients (eg, those with feline leukemia virus or feline immunodeficiency virus).[1,3-5,7,11,17]

Client Education

▸ Clients should be advised that:
- Antiviral drugs are ineffective against latent FHV-1 infection.
- Few cats will clear the virus, and it will

FHV-1 = feline herpesvirus type 1

PCR = polymerase chain reaction

remain latent in most patients.
- Even after clinical signs have resolved, recurrence of disease is possible, especially when cats experience stress.[8,11,19]

FOLLOW-UP & COMPLICATIONS

- Treatment should be continued for 2 weeks after resolution of clinical signs and the patient re-examined.[8,19,23]
- FHV-1 has been implicated in the pathogenesis of corneal sequestrum, eosinophilic keratitis, and dry eye.[4,7,17]
  - These should be regarded as possible sequelae of infection.
  - In kittens, FHV-1 keratoconjunctivitis may result in ulceration of both the cornea and conjunctiva.
    – These ulcerated tissues may adhere to each other and form symblepharon (***Figure 7***, page 98), which is challenging to treat and requires surgical intervention.[4,7,17]

PROGNOSIS

- Most patients with FHV-1 infection will remain carriers of the virus.
  - Recurrence is possible, particularly for patients in a stressful environment.
- Cats also may be subclinical carriers of *C felis*.
  - The carrier state is not characterized by recurrent disease, but it contributes to the spread of *C felis* infection to other cats.[1,4,13,15]

FHV-1 = feline herpesvirus type 1

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