PROTOZOAL INFECTIONS OF THE CORNEA AND CONJUNCTIVA IN DOGS

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Purpose

• To describe five cases of protozoal keratitis and conjunctivitis in dogs with chronic ocular disease treated with long-term immunosuppression or immunomodulation.

• These dogs presented with a local protozoal disease without systemic involvement.
Protozoal ocular infections in the literature

- Uncommon
- In dogs:
  - Ocular leishmaniasis in 25% of systemically ill dogs
  - *Neospora Caninum* in eyes of systemically ill puppies
- Almost invariably associated with systemic illness
Methods

• Retrospective study
• COPLOW database search for canine protozoal corneal or conjunctival infections
• 5 cases that developed mass lesions of the cornea and conjunctiva and underwent diagnostic biopsies were included
• Submissions included corneal and conjunctival biopsies and two globes of one dog
• All dogs but one were systemically healthy
Study population

- 5 dogs
- Sex- 3 MN, 2 FS
- Age- Median 11.5 years (range 5-14 years)
- Breeds
  - 2 Pugs and 1 each: Shih Tzu, Havanese, Yorkshire Terrier
- Clinically, SCC was suspected in 4 cases and NGE in one case
<table>
<thead>
<tr>
<th></th>
<th>Eye</th>
<th>Preexisting ocular disease</th>
<th>Duration of treatment</th>
<th>Clinical presentation of new ocular dz</th>
<th>State</th>
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<tbody>
<tr>
<td>1</td>
<td>OU</td>
<td>KCS + Pigmentary keratitis</td>
<td>6 years</td>
<td>Pink limbal mass</td>
<td>Florida</td>
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<tr>
<td>2</td>
<td>OU</td>
<td>Pyogranulomatous meibomian adenitis</td>
<td>&gt;2 years</td>
<td>Raised fleshy conjunctival masses</td>
<td>New York</td>
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<td>3</td>
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<td>8 months</td>
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<td>4</td>
<td>OD</td>
<td>KCS + pigmentary keratitis</td>
<td>4 months</td>
<td>Pink corneal mass</td>
<td>Florida</td>
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<tr>
<td>5</td>
<td>OS</td>
<td>KCS + Pigmentary keratitis</td>
<td>6 years</td>
<td>Fleshy corneal mass</td>
<td>Florida</td>
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</table>
# Pathogen identification and characterization

- Histology- HE, PAS, GMS, Gram stain

<table>
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<td>+/-</td>
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</table>
Case 1- KCS, pigmentary keratitis years of topical immunosuppression

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CASE REPORT

Keratoconjunctivitis associated with *Toxoplasma gondii* in a dog

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Figure 1. Photograph OD 7 weeks following superficial keratectomy and cryosurgery of a corneal mass. Note the dorso medial 10 mm yellow/tan peribulbar conjunctival mass and associated diffuse conjunctival chemosis and hyperemia. Additionally, dense pigmented keratitis affects the entire corneal surface.

Figure 2. Photomicrographs of the conjunctival biopsy from the mass shown in Figure 1. There is extensive tissue edema, lymphoplasmacytic and suppurative inflammatory infiltrate, and dilated blood vessels. Clusters of *T. gondii* tachyzoites are noted by the arrow.

Figure 4. Immunohistochemical staining of the conjunctival biopsy in Figure 3. *Toxoplasma gondii* antigens are labeled red.
Repeat IHC

For this case both serological tests were negative.
Case 2- Pyogranulomatous meibomitis (>2 years systemic and topical immunosuppression)
Cytology- suspect neospora/toxoplasma/leishmania
Histology suspected toxoplasma or neospora

For this case IHC was equivocal for toxoplasma and negative for neospora. Both serological tests were negative.
Outcome

Before treatment

After tacrolimus d/c and clindamycin
Case 3- KCS + Pigmentary Keratitis
8m tacrolimus

Courtesy Dr. Sturgeon
Histology- suspicious of toxoplasma or neospora

For this case both serological tests were negative.
IHC- suspicious of neospora

Neospora

Toxoplasma
EM (Case 2)

- This case was suspected as toxoplasma by histology
- Was positive by IHC for Neospora
- EM showed a kinetoplast (flagellated protozoa)
IHC for Leishmania spp.

Negative control

Positive labeling
PCR for Leishmania and T. Cruzi

- Positive for Leishmania Spp.
- Negative for T. cruzi.
- Sequencing provided 100% match with *L. mexicana*
- Genbank accession # KM061043
Case 4- Amoeba keratitis 1 KCS + pigmentary keratitis (4 months tacrolimus)

Suspected SCC clinically
Improved after keratectomy and d/c tacrolimus
Case 5- Amoeba keratitis 2
KCS + pigmentary keratitis (6 years)

Suspected SCC clinically
Improved after keratectomy and d/c tacrolimus
treated topically with compounded chlorhexidine digluconate
and polyhexamethylene biguanide
Literature

• CSA associated with ocular papillomatosis
• In dogs steroids were associated with reactivation of herpetic keratitis (Ledbetter 2010)
• In mice CSA was associated with improvement of HSK (Yoon 2008)
• Systemic immunosuppression associated with dermal neosporosis in dogs (La Perle 2001)
• Fungal keratitis in dogs receiving topical steroids and CSA, or with pre-existing corneal disease (Scott 2014)
• SCC
Discussion

• All cases had an ocular surface disorder
• Treatment was initiated due to KCS, Pigmentary keratitis, and pyogranulomatous meibomitis
• Treatment ranged from 4 months to 6 years
• In most cases the immune suppressor was d/c after an infectious agent was diagnosed
• Specific therapy was initiated in three patients
• Excision seems to be helpful
Conclusions

• Corneal and conjunctival protozoal infections are rare
• Local disease with local immune suppression
• Finding the organisms is challenging!
• Identifying the organism presents further challenges
• Get cultures, biopsies and cytology
• Negative serology does not rule out a diagnosis
• idiopathic pyogranulomatous conjunctivitis
• First report of amoeba keratitis in dogs
• First report of *L. mexicana* in the US in dogs
Thank you for your attention!