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JVPP

Journal of Veterinary Physiology and Pathology. 2024; 3(2): 20-23.
DOI: 10.58803/jvpp.v3i2.47
http://jvpp.rovedar.com/

Case Report

The Management and Treatment of Keratoconjunctivitis in A 6-Month-Old Lamb: A Case Report

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ARTICLE INFO

Article History:
Received: 02/04/2024
Revised: 27/04/2024
Accepted: 19/05/2024
Published: 30/06/2024

Keywords:
Afshari sheep
Immunofluorescence test
Mycoplasma conjunctivae
Tetracycline

ABSTRACT

Introduction: Infectious keratoconjunctivitis, commonly known as pinkeye or contagious ophthalmia, is a bacterial disease that affects the healthy eyes. This infection causes inflammation in the tissue lining the eyelid, the conjunctiva, and the cornea of one or both eyes.

Case report: A 6-month-old male Afshari breed sheep with symptoms of blepharospasm, keratoconjunctivitis, and ocular discharge was referred to a veterinary clinic in Mashhad, Iran. Upon ophthalmic examination of both eyes, the signs included conjunctivitis, generalized corneal opacity, blepharospasm, epiphora, positive menace response, and elevated intraocular pressure were observed. The clinical signs suggested Infectious keratoconjunctivitis by *Mycoplasma.* To detect *Mycoplasma*, immunofluorescence tests, and growth inhibition tests were conducted using anti-sera. *Mycoplasma* was isolated from the samples. The sheep was treated with a single intramuscular injection of long-acting tetracycline at a dosage of 20mg/kg. The topical tetracycline ointments were used and applied 4 times daily for 6 days. The topical ophthalmic application of 1% atropine ointment 3 times daily was used due to pain as a consequence of uveitis for 3 days. Due to the mydriasis caused by atropine, animals undergoing treatment were provided with shade. For pain relief, meloxicam (1 ml/50 kg) is utilized to alleviate the clinical signs of the disease. After 10 days of treatment, the clinical signs returned to normal.

Conclusion: The clinical signs and subclinical tests confirmed keratoconjunctivitis caused by *Mycoplasma*. The successful treatment of this disease by following the above-mentioned treatment method can help clinicians and researchers in similar cases.

1. Introduction

Infectious keratoconjunctivitis (IKC), commonly known as pinkeye or contagious ophthalmia, is a bacterial disease that infects the farm animal's eyes. Pinkeye causes inflammation in the tissue lining the eyelid, the conjunctiva, and the cornea of one or both eyes. This inflammation can progress to ulceration, resulting in pain and potentially leading to temporary or permanent blindness[1].

Keratoconjunctivitis in sheep is a painful condition that can result in temporary or permanent blindness. Initial symptoms include redness, watery eyes, increased blinking, and squinting. Typically, both eyes are affected, although symptoms may start in just one eye. As the disease progresses, blood vessels in the conjunctiva dilate and spread across the cornea. The cornea may darken or turn gray, especially around the edges[2]. After a few days, discharge from the eyes may become pus-like, and in some cases, a corneal ulcer may form. In rare instances, the infection can spread to the anterior chamber of the eye, leading to severe inflammation and shrinking of the eyeball. Recovery usually begins within a week, but some

Cite this paper as: Pour Razzaghi M, Raouf S. The Management and Treatment of Keratoconjunctivitis in A 6-Month-Old Lamb: A Case Report. Journal of Veterinary Physiology and Pathology. 2024; 3(2): 20-23. DOI: 10.58803/jvpp.v3i2.47

animals, particularly lambs, may remain unwell for 3 to 4 weeks, experiencing weakness and fever[3].

Infectious keratoconjunctivitis is a condition that affects the eyes of both domestic and wild Caprinae species worldwide. Various infectious agents, such as *Mycoplasma conjunctivae*, *Chlamydophila psittaci*, or *Moraxella ovis* (formerly *Branhamella ovis*), have been identified in the eyes of small ruminants affected with IKC. Among these agents, *Mycoplasma conjunctivae* is considered the primary cause of IKC in sheep, goats, and wild Caprinae[2]. The susceptibility to *Mycoplasma conjunctivae* infection varies among different host species. While sheep and goats typically experience transient blindness due to IKC, resulting in minimal concern and economic impact, the pathogenicity of the disease in wild species is generally high and can lead to outbreaks with significant morbidity and mortality rates of up to 30%[4].

There is a possibility of interspecies transmission of the disease, with domestic sheep playing a crucial role as reservoir hosts for *Mycoplasma conjunctivae* [1]. The current study aimed to indicate the treatment and management of a 6-month-old lamb with keratoconjunctivitis.

2. Case report

A 6-month-old male Afshari breeds sheep with symptoms of blepharospasm, keratoconjunctivitis, and ocular discharge was referred to the large animal clinic in Mashhad, Iran. The sheep's rectal temperature was measured at 38.6 ^{0}C, with pink mucous membranes. The heart rate was 70 beats per minute, and the respiratory rate was 20, showing no abnormalities. Upon ophthalmic examination of both eyes, the clinical signs included conjunctivitis, generalized corneal opacity, blepharospasm, epiphora, positive menace response, and elevated intraocular pressure (IOP) as shown in Figure 1 were observed. To detect mycoplasma, immunofluorescence tests, and growth inhibition tests were conducted using anti-sera[5]. The sheep was treated with a single intramuscular injection of long-acting tetracycline at a dosage of 20mg/kg[4]. The topical tetracycline ointments were used and applied 4 times daily for 6 days. The topical ophthalmic application of 1% atropine ointment 3 times daily was used due to pain as a consequence of uveitis for 3 days[5]. This helps prevent ciliary body spasms and reduces the likelihood of posterior synechia formation associated with miosis. Due to the mydriasis caused by atropine, animals undergoing treatment should be provided with shade. For pain relief, a systemic NSAID (meloxicam 1 ml/50 kg) is utilized to alleviate the clinical signs of the disease[4]. The treatment proved effective, and within 10 days, the clinical signs returned to normal status (Figure 2).

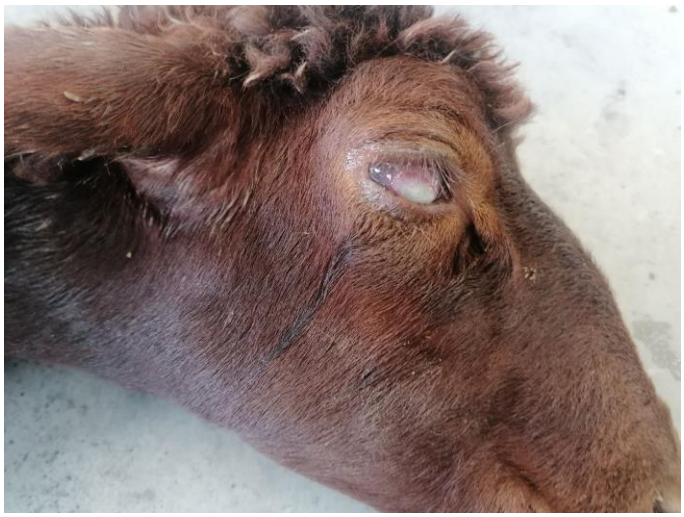

Figure 1. Keratoconjunctivitis in a 6-month-old Afshari lamb

Figure 2. Complete recovery of keratoconjunctivitis in a 6-month-old Afshari lamb after 10 days

3. Discussion

Pink eye disease progresses through four stages of severity. At stage 4, there is complete ulceration of the cornea, protrusion, and adherence of the iris to the cornea, potentially leading to partial or complete blindness[6]. Stress has been identified as a predisposing factor for pink eye disease, with transportation stress potentially precipitating the condition in sheep. Other predisposing factors include exposure to bright sunlight and dusty environments. Poor hygiene conditions on farms can also contribute by attracting flies, which act as mechanical vectors for transmitting the causative agent[2].

Both systemic and topical antibiotic treatments were administered in this case. Long-acting oxytetracycline (20 mg/kg) was given intramuscularly in accordance with recommended protocols[5]. Topical treatments have been reported to accelerate the recovery of affected animals[4].

The method of administering antibiotics plays a crucial role in treating bacterial eye diseases to achieve effective antibiotic concentrations that inhibit the target organisms in ewes. A study demonstrated *in vitro* sensitivity of

Mycoplasma conjunctivae to tylosin, oxytetracycline, chlortetracycline, and streptomycin, but raised concerns about whether these drugs could maintain a minimum inhibitory concentration (MIC) in lacrimal fluid for sufficient durations to eradicate the pathogen[7]. In another study, the authors found that although daily ocular application of chlortetracycline for five days led to clinical improvement, *Mycoplasma conjunctivae* was not completely eradicated[3]. Similarly, the authors of a study treated affected lambs with a long-acting injectable form of oxytetracycline, resulting in clinical improvement but without pathogen elimination[4]. More recently, florfenicol administered intramuscularly has been suggested as potentially effective, although doses higher than the licensed 20 mg/kg for respiratory infections are necessary to reach the MIC in lacrimal fluid for *Mycoplasma conjunctivae*[6]. Consideration of herd conditions, housing, and pasture size should precede treatment initiation. Therefore, in extensive grazing settings, decisions are often made against treatment efforts[1]. Prophylactic use of a single intramuscular injection of long-acting tetracycline at 20 mg/kg can prevent clinical conjunctivitis in unaffected herd members while halting further progression in clinically ill animals. This approach should be considered for herds with high morbidity, ensuring rapid recovery from keratoconjunctivitis caused by *Mycoplasma conjunctivae* with this treatment alone[4].

Tylosin, a macrolide and another option for Extra-Label Drug Use (ELDU), has shown positive outcomes when administered via intramuscular injection[7]. In situations where systemic administration of medications risks milk contamination, tetracycline-based powders, drops, and ointments can provide effective results[5]. Additionally, subconjunctival injections can be employed to achieve high local concentrations of antibiotics[4]. Animals experiencing severe secondary uveitis, which can be particularly painful, may benefit from topical application of 1% atropine ointment 1-3 times daily to prevent ciliary body spasms and reduce the risk of posterior synechia formation resulting from miosis. Due to the mydriatic effect of atropine, animals treated with it should be provided shade[2]. For pain management associated with clinical signs, systemic administration of NSAIDs like banamine or meloxicam may be used[3]. In cases where the infected eye is extremely painful, topical anesthesia such as 0.5% proparacaine can be applied, and for very fractious animals, an auriculopalpebral nerve block may be necessary to administer treatments[7].

Preventative measures and careful management of clinically ill animals are crucial in reducing herd morbidity. Simple steps such as wearing gloves while treating sick animals, and attending to healthy animals first before handling sick ones can significantly decrease transmission rates. Severely affected animals should be isolated from the rest of the herd and housed in dark surroundings with easy access to clean drinking water and high-quality feed. Because the disease may cause partial blindness in affected animals, confining them to a relatively small space helps them locate food and water more easily[4].

The primary risk factor for the manifestation of clinical disease is introducing asymptomatic carriers of the causative agents of infectious keratoconjunctivitis into a new herd without following proper protocols[6]. The introducing of replacement animals from external sources, inadequate segregation upon introduction, and the stress of transportation have all been identified as precipitating factors for the keratoconjectivitis in goats. Other predisposing factors for animals showing clinical signs include exposure to intense sunlight, dusty environments, and poor hygiene conditions on the farm[5]. *Mycoplasma conjunctivae* and *Chlamydia psittaci* are commonly recognized as pathogens associated with ovine infectious keratoconjunctivitis[1].

Different species of *Mycoplasma* can be distinguished based on their abilities to ferment glucose, utilize arginine, or hydrolyze urea[3]. Mycoplasmas and ureaplasmas that hydrolyze arginine turn HAU medium red, while acid-producing species like *Mycoplasma conjunctivae* turn it yellow[3]. In contrast, other *mycoplasmas* such as *Mycoplasma arginini*, *Acholeplasma oculi*, and *Mycoplasma ovipneumoniae* isolated from cases of ovine keratoconjunctivitis in different countries exhibit differing properties[2].

4. Conclusion

In this study, clinical signs and subclinical tests confirmed keratoconjunctivitis caused by *Mycoplasma*. Treatment involving parenteral tetracycline, topical tetracycline, atropine eye drops, and NSAIDs effectively managed the condition in a 6-month-old sheep. It is recommended that veterinarians and researchers pay attention to the present method of treatment in other ruminants and even farm animals.

Declarations

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

Mahdi Pour Razzaghi contributed to collecting the data, and treatment procedure. Saba RAOUF wrote the draft of the manuscript. The last edition of the manuscript is checked and approved by the authors.

Funding

There is no external funding source for this study.

Availability of data and materials

All data regarding the study are presented in this article.

Ethical Considerations

The article was written originally by authors from the obtained original data and it was not submitted or published totally or even partially in other publications. The text article is checked by a well-known plagiarism checker software before submission to the journal.

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