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Cover: *Saproamanita praeclara*: Sporocarp in habitat © Kantharaja. R.



Management of traumatic ulcerative keratitis in a Red Serow

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Abstract: Red Serow *Capricornis rubidus* is an elusive herbivore native to the montane forests of the Himalaya. Currently it is categorized as 'Vulnerable' in the IUCN Red List and placed under Schedule I species of the Wildlife Protection Act, 1972. A serow was presented with complaints of mild inappetence, irritability, sporadic scratching of head over the enclosure barrier and serous ocular discharge from the left eye. Based on detail clinical examination, the animal was diagnosed with unilateral conjunctivitis, corneal oedema, and ulcerative keratitis. A combination of Xylazine @ 1.5mg/ kg body weight and Zolatil[®] (zolazepam and tiletamine) @ 2.5 mg/kg body weight was used to chemically restrain the animal, followed by auriculo-palpebral nerve block using 1 ml of 2 % lignocaine hydrochloride. The affected eye was adequately cleaned with isotonic sterile Normal Saline solution (NSS). Combination of 0.5 ml of ceftriaxone and 0.5 ml of flubiprofen was injected into upper and lower palpebral conjunctiva. The cornea and the third eyelid flap were carefully sutured using 5-0 and 3-0 Vicryl, respectively. Finally, tarsorrhaphy was done using 2-0 nylon. Post-operative care consisted of an antibiotic regimen of Cephalaxin @ 20 mg/ kg body weight b.i.d-twice in a day for seven days along with probiotic supplement (Vizylac[™]) and Vitamin A capsules (Aquasol A[™]) orally once daily for the next 30 days. The animal showed complete recovery within 30 days of proper treatment, monitoring, care and management.

Keywords: *Capricornis rubidus*, Ceftriaxone, Flubiprofen, Vulnerable, Tarsorrhaphy.

The conjunctiva is a mucous membrane that covers the inner aspect of each eyelid (Palpebral conjunctiva) and the sclera of the eye (bulbar conjunctiva). Inflammation of this conjunctival mucous membrane is known as conjunctivitis (Kumari et al. 2016). It can be unilateral or bilateral and can be caused by various etiological factors like virus, bacteria, fungi, parasites, allergens (e.g., foreign proteins, pollen, drugs), irritant chemicals, and trauma (Gelatt 2014). Red Serow *Capricornis rubidus* is an elusive, mostly solitary (Prater 1993) herbivore belonging to the class Mammalia, order Artiodactylia, family Bovidae, and subfamily Caprinae. It is presently categorised as 'Vulnerable' in the IUCN Red List (Shepherd 2021) and as a schedule I species of the Wildlife Protection Act, 1972 (Aryal 2008). The serow is oriental in origin (Schaller 1979) and is found within the geographical boundaries of Jammu & Kashmir in India to Japan in the far east (Shackleton & Lovari 1997). The present paper discuss about a clinical case of traumatic ulcerative keratitis in a male serow of 3.5 years of age belonging to the Assam State Zoo and Botanical Garden, Guwahati, Assam. Surgical correction with tarsorrhaphy

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technique was employed to protect the cornea and to attain faster recovery of the affected cornea.

CASE HISTORY AND OBSERVATION

The affected serow was presented with a history of depression, slight inappetence, occasional scratching of the head over the enclosure barrier, and ocular discharge from the left eye.

Chemical restraining was planned in order to conduct better and clear clinical examination of the affected eye. On comprehensive clinical inspection, it was revealed that the serow was suffering from cloudiness of the cornea, redness and swelling of the conjunctiva along with muco-purulent ocular discharge (Image 1). All the physiological parameters were within the normal range. The probable aetiology is believed to be of traumatic origin inflicted by a sharp object or enclosure fence. On the basis of these clinical findings, a diagnosis of ulcerative keratitis, unilateral conjunctivitis, and corneal oedema was made. The serow responded well to external stimuli, viz., menace reflex, direct papillary light reflex, and dazzle reflex. Fluorescent dye test revealed moderate ulcerated lesions covering partially paraxial and perilimbal location ranging 1.5–2 mm in size. Schirmer tear test was found to be higher (27 mm per minute). Tonometry test revealed no other abnormality or intra-ocular pathology.

Treatment

It was planned to restrain the animal chemically in the early morning hours to reduce sedation stress. For chemical restraining, a combination of Xylazine @ 1.5 mg/kg body weight and Zolazole® (zolazepam and tiletamine) @ 2.5 mg/kg body weight, were loaded into a pneumatic dart and was fired using a pneumatic gun. Prior to anaesthesia, fasting for 20 hours followed by withdrawal of water for the next 12 hours was advised. Upon darting, induction of anaesthesia was observed within 5 minutes evident by the staggering movement, followed by sternal recumbency after 10 minutes. A stage of complete surgical anaesthesia was finally achieved within 20 minutes with lateral recumbency. Auriculo-palpebral nerve block using 1 ml of 2% lignocaine hydrochloride was injected to the affected side soon after complete sedation.

The affected eye was adequately irrigated with isotonic normal saline solution (Image 2) to soothe irritation and discomfort. Normal Saline Solution (NSS) is an isotonic solution that helps in flushing out any loose foreign material in the eye. Mixture of antibiotic and Non-steroidal anti inflammatory drug (NSAID)

preparation containing 0.5 ml of ceftriaxone and 0.5 ml of flubiprofen respectively was injected into the conjunctiva (Image 3).

Following corneal suture using vicryl 5-0, the third eyelid flap was carefully sutured using vicryl 3-0 (Image 4). For Tarsorrhaphy, the eyelids were sewn together by simple interrupted technique using 2-0 nylon suture (Image 5). Intravenous injection of Yohimbine (concentration 10 mg/ml) @ 0.5 mg/kg was used to reverse the effects of anaesthesia.

The animal was subsequently shifted to an isolated enclosure and was closely monitored for a period of 20 days. Cephalaxin @ 20 mg/kg body weight twice in a day for seven days along with probiotic supplement (Vizylac®) and Vitamin A capsule (Aquasol A®) orally once daily was continued for the next 30 days. Further, the animal was kept under normal diet during this duration.

On the tenth day, the sutures were opened to assess the recovery of the operated eye. Formation of granulation tissue was observed (Image 6). Subsequently, with proper care and post-operative management, full recovery was achieved by one month, uneventfully (Images 7 & 8).

DISCUSSION

Eye injuries when treated within 24 hours there is higher chances of recovery, delay in same (more than 24 hours) may result in loss of eyesight, prolapse of corneal membrane and severe complications (Rajak et al. 2015).

The animal showed complete recovery within one month of the above mentioned treatment. This suggest that tarsorrhaphy along with sub-conjunctival injection of ceftriaxone and flubiprofen is the best and safest option for the treatment of conjunctivitis complicated with corneal ulceration, especially in wild animals, as it becomes increasingly difficult to restrain them regularly which may result in undue stress. (Fischer et al. 2019). Startup (2008) opined that the probable cause of trauma/injury in case caged animals is mostly inflicted by a sharp object, enclosure fence, grass blade or during infighting. Also, continuous itching, rubbing, and photophobia seen in ulcerative keratitis might have resulted into excessive lacrimation, subsequently may have resulted in getting a higher range of Schirmer tear test results during physical inspection (Senchyna & Wax 2008).

Third eyelid flap provides protection and supports the weakened cornea. It assists corneal healing by decreasing evaporation of tears, warming of cornea, supplying inflammatory cells, fibroblasts, blood and eventually providing better stability by reducing trauma associated with movement of eyelids (Gellat et al.



Image 1. Day of Examination: ulcerative keratitis.



Image 2. Cleaning affected eye with NSS.



Image 3. Administering sub-conjunctival injection into upper and lower palpebral conjunctiva.



Image 4. Nictitating membrane (3rd eye lid) pulled over eye ball and holding with suture through the skin lateral to the eye.



Image 5. Tarsorrhaphy: Sewing of upper and lower eyelids.

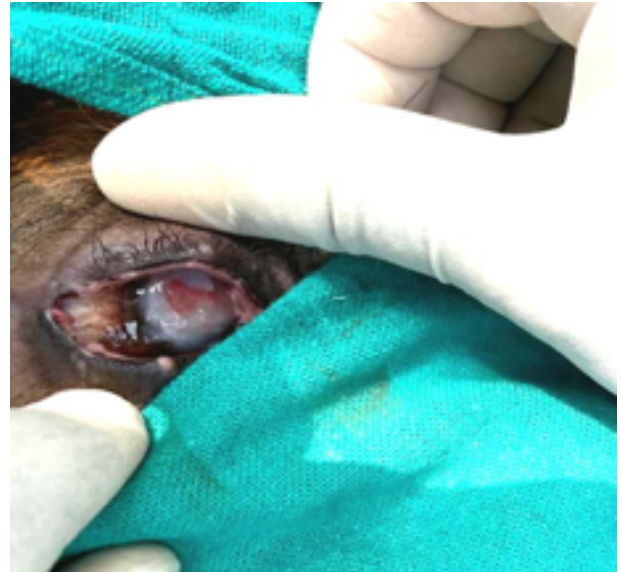


Image 6. Appearance of granulation tissue on tenth day of post operation.



Image 7. Thirtieth day of post-operative care.

1994). Tarsorrhaphy was conducted to facilitate healing of corneal ulcer and to prevent corneal exposure to environmental contamination (Acharya et al. 2020). Tarsorrhaphy is a convenient option and advisable in cases where repeated handling of an animal is difficult. Also, in those cases where patient may create sort of animal welfare issues/conflict or augments certain vetero-legal disputes.

The eyelids were sewn by simple interrupted suture instead of vertical mattress suture. This helps in avoiding chances of rupture of sutures during scratching the eye.

Further, specifically Vitamin A supplement was added in the ration. Vitamin A is a fat-soluble vitamin having wound-healing and anti-oxidant properties (Palace et al. 1999). Inclusion of Vitamin A is necessary as it initiates epithelisation that accelerates wound-healing especially,

when it comes to perform surgical corrections of eye diseases (Zinder et al. 2019).

CONCLUSION

Traumatic ulcerative keratitis is often considered to have a good prognosis. However, the same may be challenging for field veterinarian especially, when it comes to wild fauna. Early identification of causes and prompt diagnosis may be potentially curable with good prognosis in such cases. In the present case, tarsorrhaphy along with sub-conjunctival injection of ceftriaxone and flubiprofen was found to be effective. Constant monitoring over health attributes and other supportive medications has yielded a better response without any complication. Catamnesis revealed that the serow had attained a stable condition with improved appetite and muscle volume.

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Image 8. Showing complete recovery after one month of operation.

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