

Case Series: Venom Ophthalmia – Can Heparin be Used Routinely?

LOKESH KOLHE^{1,*}, ADELIN NGO¹, LOO KEE VOOI², GREGORY CHAM²

¹National healthcare, Woodlands Health, Singapore.

²Department of emergency medicine, Ng Teng Fong General Hospital, Singapore.

Abstract

Background: Venom ophthalmia (VO) is caused by inoculation of venom in the eyes. In Singapore, the spitting cobra is associated with VO. We present 2 cases of VO treated with topical heparin despite not proven for clinical use.

Case Report: Our first patient was spat by a spitting cobra in his eye while working and complained of throbbing pain and blurring of vision. He irrigated his eyes with drinking water before attending the Emergency Department (ED). His pain and vision minimally improved despite irrigation with normal saline. 1ml of unfractionated Heparin (UFH) resulted in improvement of pain.

Our second patient was spat by a spitting cobra in his right eye, had right eye pain and tearing. He had irrigated the eye with water before coming to the ED. In ED, his eye was irrigated with 9.5L of normal saline followed by 1 ml of UFH.

Both were reviewed by Ophthalmology and showed punctate epithelial erosions (PEE), which resolved 2 weeks after for the first patient. Unfortunately, the second patient defaulted his follow up. However, none showed immediate side effect after UFH.

Discussion: Multiple anterior segment complications have been reported in cases of VO. Copious irrigation of the eyes with water or saline is single most important step in management. Heparin has not been described to be a part of standard treatment protocol.

Conclusion: Topical heparin drops may safely be used in cases of VO, where traditional irrigation methods do not result in improvement in symptoms.

Keywords: Spitting Cobra, Naja Sumatrana, Topical Heparin

How to cite this article: Kolhe L, NGO A, Kee Voo L, Cham G. Case Series: Venom Ophthalmia – Can Heparin be Used Routinely? Asia Pac J Med Toxicol 2023; 12(2):72-73.

INTRODUCTION

Venom Ophthalmia is a condition that results in the constellation of symptoms secondary to inoculation of venom in eyes. Amongst the venomous snakes in Singapore-Malaysian peninsula, *Naja Sumatrana* or the black spitting cobra from *elapidiae* family is known to eject venom into the eyes of their preys or predators [1]. A variety of case studies have described various treatment options, yet there are no established treatment protocols for corneal injury secondary to venom ophthalmia.[2,3]. However, in this study, we report a case series of two uncommon cases of venom ophthalmia treated with normal saline and topical heparin despite heparin has not been proven for clinical use.

CASE REPORT

Case 1:

A 57-year-old male, living in an urban city of Singapore was spat in the eyes by a spitting cobra 1 hour prior to presenting to the Emergency Department (ED). This episode was witnessed by his co-worker. Patient soon complained of blurring of vision. Prior to the arrival to the

ED, he irrigated his eyes with drinking water. On arrival to the ED, patient complained of throbbing eye pain and continued blurring of vision. On examination, both eyes were injected and had blepharospasm. The patient could only count fingers with the right eye. The vitals were stable, and the laboratory data including full blood count, renal panel, coagulation panel, urine did not show any sign of systemic envenomation. The physician in charge initiated bilateral ophthalmic irrigation with normal saline immediately, however noted minimal improvement in pain as well as vision and consulted Ophthalmology and toxicology on call. 1ml of unfractionated heparin (UFH) 5000 IU/mL was then instilled into both eyes, which resulted in marked improvement of pain. The patient was reviewed by the Ophthalmology doctor on call; punctate epithelial erosions (PEE) were noted on the left eye nasal conjunctiva. The impression was that of ocular surface injury from venom of the snake. The patient was deemed fit for discharge with topical lubricants, antibiotic, and steroid eye drops. He was reviewed in specialist outpatient clinic two weeks later and complete resolution of PEE was noted.

*Correspondence to: Lokesh Kolhe, MRCEM, MBBS, National healthcare, Woodlands Health, Singapore.
Email: Lokesh.kolhe@yahoo.in, Tel: +6597962565

Case 2:

A 21-year-old male, from Singapore, who works at pest control for national parks of Singapore (NParks) was dispatched to catch a wild cobra. He was spat by the cobra in his right eye. While he was wearing protective goggles, some of the venom did enter his right eye. He subsequently complained of right eye pain and tearing. He did not have any blurring of vision then. The patient had irrigated his right eye with water hose for about 30 minutes prior to coming to the hospital. On arrival to the ED, his eye pH was 9. His right eye was irrigated with total of 9.5L of normal saline before his right eye pH was 7. 1 ml of UFH 5000 IU/ml was instilled in the right eye before review by Ophthalmology physician on call. Examination of the eye revealed PEE and patient was then discharged with topical antibiotics and lubricants. He was reviewed in the specialist outpatient clinic the next day and the Ophthalmology physician started him on oral Doxycycline, however no clear indication for this was documented in their electronic medical records. In this case, there was no topical steroid used. The patient subsequently defaulted his follow up appointments.

DISCUSSION

Venom ophthalmia has been reported all over the world to be caused commonly by a group of snakes that is spitting cobras, which are native to Africa and Asia. *Naja Sumatrana* (Black spitting cobra) is one of the commonest venomous snakes in Singapore, which can eject venom up to 3 meters with the goal of hitting the opponent's eyes to blind them so that the snake can safely flee [4,5]. Spitting cobra venom contains a mixture of neurotoxins, cytotoxins, phospholipases, and cardiotoxins [6,7]. Cardiotoxins with membrane lytic properties are thought to be responsible for corneal erosions and conjunctival chemosis. Anterior segment complications such as corneal injury, conjunctivitis, Keratitis, and blepharitis have all been reported following the exposure of venom to the eye [2,4,5,7-9]. However, it is extremely difficult to prognosticate the potential ocular morbidity as multiple factors such as, amount of venom injected, time of contact with ocular tissue, exposure to various forms of irrigations fluids prior to the presenting to healthcare as well as time for irrigation. As such, no standardized treatment protocols exist for the management.

As described in multiple case reports previously, copious irrigation of the eyes with water or saline solution at the earliest is single most important step in management of this condition. [7,8,10]. To our knowledge, systemic envenomation secondary to venom ophthalmia is not reported and thus, the role of topical or systemic antivenom therapy has not been proven to be useful. The use of topical corticosteroid and topical or intravenous anti-venom is not recommended in 2016 World Health Organization guidelines (level of evidence E)[3]. Topical corticosteroid increased corneal collagenase activity and may cause corneal melting in case of cornea epithelial defect. It may also increase the risk of herpes simplex keratitis[3].

In our 1st patient, 1.5 L of saline was used to irrigate each eye, however this did not result in significant improvement in

pain or vision. Heparin has been used to treat snake venom ophthalmia in animal model [2]. Its use is based on the fact that the cardiotoxin in snake venom readily binds to the acidic sites in the heparin molecule and renders the cardiotoxin inactive in experimental models. Sharma et al, [10] reported a case of venom ophthalmia where the patient was treated with topical antibiotics, homatropine, and heparin eye drops. The patient reported significant improvement in his symptoms within 5 days and all the medications were stopped after a week with normal ocular examination at 1 month review. Our patients reported improvement in pain and vision after instilling heparin with no untoward outcome.

CONCLUSION

Snake venom ophthalmia is a relatively uncommon presentation in the urban EDs, such as those in Singapore. Patients may present with intense eye pain, blepharospasm, conjunctival injection, corneal epithelial defects, and chemosis. Based on the current available literature, snake venom ophthalmia has not been reported to cause systemic envenomation. Timely evaluation and early intervention are crucial to prevent any permanent ocular sequelae. Topical heparin drops may safely be used in cases of venom ophthalmia where traditional treatment such as irrigation with normal saline or sterile water does not result in improvement in symptoms. More case studies will be helpful in proving this theory and potentially allow clinicians to use heparin more routinely in clinical practice.

REFERENCES

1. Wüster W. Taxonomic changes and toxinology: systematic revisions of the Asiatic cobras (*Naja naja* species complex). *Toxicon*. 1996 Apr;34(4):399-406.
2. Cham G, Chuan-Hsin Pan J, Lim F, Earnest A, Gopalakrishnakone P. Effects of Topical Heparin, Antivenom, Tetracycline and Dexamethasone Treatment in Corneal Injury Resulting from the Venom of the Black Spitting Cobra (*Naja sumatrana*), in a Rabbit Model. *Clinical Toxicology*. 2006 Jan;44(3):287-92.
3. Guidelines for the management of snakebites. New Delhi, India: World Health Organization, Regional Office for South-East Asia; 2016.
4. Ang LJ, Sanjay S, Sangtam T. Ophthalmia Due to Spitting Cobra Venom in an Urban Setting - A Report of Three Cases. *Middle East Afr J Ophthalmol*. 2014;21(3):259-61.
5. Jalink MB. Ocular complications of spitting cobra venom. *Indian J Ophthalmol*. 2020 Nov;68(11):2632-3.
6. Yap MKK, Tan NH, Fung SY. Biochemical and toxicological characterization of *Naja sumatrana* (Equatorial spitting cobra) venom. *J Venom Anim Toxins incl Trop Dis*. 2011;17:451-9.
7. Chang KC, Huang YK, Chen YW, Chen MH, Tu AT, Chen YC. Venom Ophthalmia and Ocular Complications Caused by Snake Venom. *Toxins (Basel)*. 2020 Sep 8;12(9):576.
8. Chen IH, Hsu SL. Title of the article: A Rare case of cobra venom ophthalmia in Southern Taiwan – a case report. *Visual Journal of Emergency Medicine*. 2023 Jan;30:101606.
9. Ismail M, Ellison AC. Ocular Effects of the Venom from the Spitting Cobra (*Naja nigricollis*). *Journal of Toxicology: Clinical Toxicology*. 1986 Jan;24(3):183-202.
10. Sharma VK, Baranwal VK. Snake venom ophthalmia. *Medical Journal Armed Forces India*. 2015 Jul;71:S197-8.