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Severe effects of accidental orbital trauma by a less venomous fish *Siganus rivulatus*

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A 51-year-old male was injured by the fish, *Siganus rivulatus*, while swimming in the Mediterranean waters of Antalya, Turkey. The injury was caused when a spine of the fish's dorsal fin penetrated in the left lower eyelid superior to the inferior orbital rim, causing his left eye to experience sudden vision loss, total medial gaze restriction, and pupil dilation. A foreign body detected on orbital computed tomography was extracted with orbitotomy. The patient received methylprednisolone and antibiotic for 7 days, then medication was tapered. Final visual acuity reached 20/32 in the left eye, but pupil dilation did not improve. To the best of our knowledge, this is the first reported case of orbital trauma secondary to a *Siganus rivulatus* strike. In this report, we describe the treatment that the patient underwent for this injury and his subsequent recovery.

Key words: Optic neuropathy, *Siganus rivulatus*, trauma, venom

Fish injuries often cause mechanical trauma. However, it has been observed that some fish also rarely cause chemical trauma due to their venoms. While the toxins from different animals may act systemically or locally, optic neuropathy has not been reported from injuries involving venomous marine animals. Fish venoms usually target muscles and have less effect on the nervous system.[1,2]

Case Report

A 51-year-old man was injured by a fish strike while swimming at a beach in Antalya, Turkey. He reported that he heard a splash and saw a fish very close to his face just before he felt the onset of severe pain. The strike occurred on his left lower eyelid and was accompanied by the loss of vision in his left eye. He was transported via ambulance to the nearest local hospital. During the evaluation in emergency services, a spine-like foreign body was removed from the medial part of his lower eyelid. The pain then lessened. No residual foreign body was observed on the first orbital computed tomography (CT). The patient was then referred to the Department of Ophthalmology at Akdeniz University Hospital. At the initial ophthalmologic examination, his best-corrected visual acuity (BCVA) was 20/20 in the right eye and no light perception in the left eye. Pupil was fixed dilated without light reaction; subconjunctival hemorrhage was seen but intraocular lens, vitreous, retina, and optic disc were completely normal on slit-lamp biomicroscopic examination of the left eye. The patient had relative afferent pupil defect ++++ on the left eye. The first examination was shown in Fig. 1a. Examination of the right eye was unremarkable.

Furthermore, adduction of the left eye was totally restricted and the intraocular pressure (IOP) was 32 mmHg. A lateral canthotomy was performed because of high IOP and proptosis, then the IOP returned to normal (18 mmHg). The patient received methylprednisolone (1 g/per day), cefazolin (1 g), and gentamicin (160 mg) intravenously every 12 h for 7 days. The results of the blood test including hemogram, bleeding and clotting time, liver and kidney function tests, acute phase reactants, and electrolyte were normal. Second orbital CT and MR were performed and a foreign body embedded behind the inferior orbital septum near the MR of the left orbita was detected, beside left medial rectus (MR) was swollen and surrounded by hemorrhage [Fig. 2a, b]. An inferior orbitotomy was then performed and a foreign body of 1 cm in length was extracted [Fig. 3]. A week later, the patient's vision was 1 m hand motion. Oral methylprednisolone was continued at 1 mg/kg/day and then tapered over a month.



Figure 1: (a) The patient's left eye showing periorbital edema, diffuse ecchymosis around the lower eyelid and proptosis, a 1.5 mm laceration of the skin superior to the inferior orbital rim and a subconjunctival hemorrhage (White arrow), and chymosis (black arrow). Examination of the right eye was unremarkable. (b) Image showing that the eyes are orthophoric; dilation of the pupil of the left eye is persisted after 24 months

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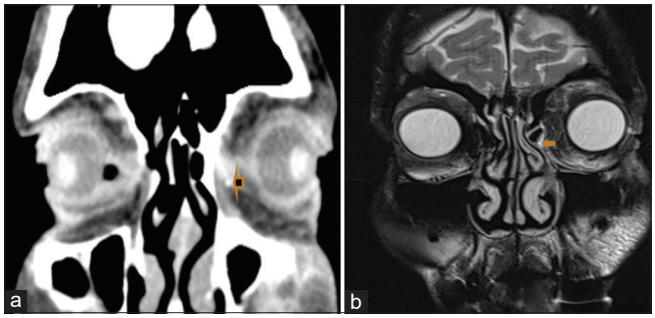


Figure 2: (a) A foreign body is observed near the medial rectus in the patient's CT image. (b) Foreign body is also seen on MR image. In the T2-sequence coronal section MR image, the hemorrhage is observed around the medial rectus

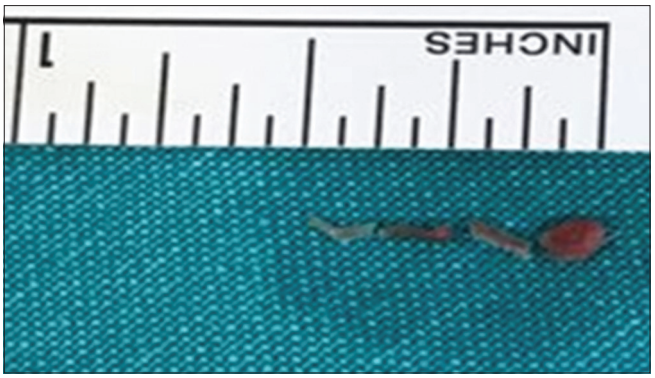


Figure 3: Image of approximately 1 cm foreign body removed from the patient after inferior orbitotomy

The BCVA of the left eye increased to 20/200 and 20/100 at the first and third month follow-up visits, respectively. The restriction of adduction recovered after 6 months, but exotropia continued for 1 year. Two years later, the BCVA of the left eye was 20/32 and eye movements were normal. The left optic disc, however, became diffusely pale. The visual evoked potential response showed prolonged P-100 latency waveforms on the left side. Pupillary dilation was persistent [Fig. 1b].

Discussion

This is the first reported orbital injury caused by the Lessepsian migrant, *Siganus rivulatus*, in the English literature. *Siganus rivulatus* has quickly invaded the benthic areas of the Mediterranean and is found along the coasts of Antalya, Turkey, where the accident happened.[3]

The circumstances of the accident coupled with the patient's sudden pain and vision loss suggested a venomous fish. Indeed, *Siganus rivulatus*, the fish responsible for this injury, uses its venom for defensive purposes and lives in the waters where the accident occurred, though usually in shallow rocky areas far from the beach.[4] In the case of the present injury, it is known that the fish penetrated the surface of the water and struck the patient's lower eyelid.

In the piscine family Siganidae, venom glands are found in the dorsal fin.[4] In our patient, the venomous spine entered the orbita through the lower eyelid to affect the surroundings around the orbita. While only regional effects were observed in our patient, it is possible for there to be systemic effects when highly toxic species are involved. The first symptom is generally severe pain,[1] and our patient experienced severe pain that immediately spread throughout his face. Indeed, the removal of the spine at the first presentation served to greatly reduce the pain. In the second CT, a tiny foreign body was discovered and later removed. As preventative measures, tetanus prophylaxis and antibiotics were used. Neither necrosis nor secondary infection ever developed in our patient.

There are numerous toxic and inflammatory effects of venoms.[2] Fish venoms generally affect muscles but have less effect on the nervous system.[1] Different animals cause optic neuropathy via direct local or systemic effect. Optic neuropathy has not been reported in marine venomous species.[5,6] In our patient, possible effect of the venom was observed in the MR, optic nerve, and ciliary ganglion. There was considerable inflammation, and this was controlled by steroids. The adduction limitation observed may have been the result of the venom on the MR or on the branch of oculomotor nerve supplying the MR or from direct trauma to the muscle by the spine. Whether physical or neurotoxic in origin, the injury to the optic nerve caused sudden vision loss. Although the optic nerve appears normal in the CT and MR [Fig. 2a, b], direct damage still might have been incurred during the strike. Regardless, even after the canthotomy, there was no immediate significant restoration of vision and pupillary dilation was permanent. Importantly, however, partial improvement in visual acuity and the complete improvement in MR function was provided.

Conclusion

In conclusion, we have discussed the treatment and recovery of a patient after an injury caused by the mildly venomous fish, *Siganus rivulatus*. This is the first case of permanent optic nerve and ciliary ganglion injury due to *Siganus rivulatus* to be reported in the literature.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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