Aquarium Coral Keratoconjunctivitis

Zoanthids are an excellent, low-maintenance, fast-growing coral beloved by the marine aquarist (Figure 1). Despite their ease and beauty, zoanthids have specialized stinging cells called nematocysts, which are modified cells that inject a toxin for capturing prey or are released in response to stress or irritation. Some zoanthids produce palytoxin (PTX), one of the most deadly marine toxins.

The toxic effects of PTX have been reported with dermal and ocular contact as well as inhalation exposure during cleaning of an aquarium or handling zoanthid colonies. In this article we report 2 cases of PTX-induced keratoconjunctivitis after the handling of zoanthid coral.

Report of Cases. Case 1. A 31-year-old man who wore soft contact lenses developed ocular irritation and redness and a bitter, metallic taste in his mouth immediately after drilling a zoanthid coral from a rock in his saltwater aquarium. His ocular symptoms did not resolve with contact lens removal. The next day he had significant eye pain, eyelid swelling, photophobia, and purulent discharge from both eyes. On examination, his best-corrected visual acuity was 20/20 OU with diffuse bilateral punctate epithelial erosions. The pH level of his tears was neutral, and no foreign bodies were detected. His eyes were irrigated, and moxifloxacin, 0.5%, and artificial tears were prescribed.

Three days after the patient’s initial exposure, his ocular pain increased and his best-corrected visual acuity declined to 20/60 OD and 20/125 OS. He had significant conjunctival hyperemia without purulent discharge, which was greater in the left eye than the right. There was 3+ punctate epithelial erosions in the right cornea and an 8×7-mm central epithelial defect associated with a peripheral stromal ring infiltrate in the left eye (Figure 2). There was a 1+ anterior chamber reaction in the left eye but normal intraocular pressure and posterior segment examination results in both eyes. Cultures for bacteria, viruses, fungi, and Acanthamoeba organisms were performed. He was empirically given prednisolone acetate, 1%, drops 3 times a day, fluorometholone, 0.1%, ointment at bedtime, and moxifloxacin, 0.5%, drops 4 times a day as well as oral doxycycline and ascorbic acid.

The patient’s right eye healed with a best-corrected visual acuity of 20/20 OD, but his left eye had a persistent epithelial defect with a stromal ring infiltrate that was non-responsive to empirical therapy. The culture results were negative; prednisolone acetate, 1%, drops were increased to hourly dosing, and a therapeutic contact lens was applied. On resolution of the epithelial defect, the fluorometholone ointment and moxifloxacin drops were discontinued, and the prednisolone acetate drops were tapered during a 6-week period. He was prescribed cyclosporine, 0.05%, drops twice a day. At 12 weeks the stromal ring infiltrate resolved, but a 30% stromal thinning remained in the midperiphery with associated central corneal steepening (Figure 3). The best-corrected visual acuity in his left eye improved to 20/30 OS.

Case 2. A 49-year-old man, who had undergone laser in situ keratomileusis surgery in both eyes 4 years previously, developed right eye pain, redness, and blurry vision while cleaning his aquarium. The pa-
tient stated that he was handling his zoanthid corals without gloves when he accidentally rubbed his right eye. He denied using any chemical cleaners. The next day he had an uncorrected visual acuity of 20/25 OD, a 2+/papillary reaction of the upper and lower palpebral conjunctiva, a 2+/bulbar conjunctival injection, and a few scattered punctate epithelial erosions of the cornea. No foreign bodies were noted. There was no anterior chamber reaction, and the rest of the examination results were within normal limits.

The patient was given moxifloxacin, 0.5%, drops 3 times a day in the right eye and prednisolone acetate, 1%, drops 4 times a day in the right eye. He was seen the next day, and his papillary reaction, conjunctival injection, and punctate epithelial erosions had resolved with a return of 20/20 OD uncorrected vision. The prednisolone acetate, 1%, drops were tapered slowly during a 3-week period, and the patient had no recurrence of symptoms on discontinuation of the topical corticosteroid.

Comment. Two cases of toxic keratoconjunctivitis linked to marine biological toxins outside of the aquarium setting have been reported in the literature.4,5 Soft coral was linked to a follicular tarsal reaction, conjunctival chemosis, punctate conjunctival hemorrhages, and epithelial keratopathy in a fisherman after ocular contact. This resolved with antibiotic and corticosteroid treatment within 2 weeks.5 A case of red coral ocular exposure in a scuba diver caused multiple scattered corneal epithelial infiltrates and conjunctival injection after the patient dived within several inches of a red coral reef in the Bahamas. The patient recovered without sequelae after a 10-week course of topical antibiotics and corticosteroids.4 To our knowledge, we report for the first time 2 cases of coral toxic keratoconjunctivitis incidental to contact with aquarium zoanthids.

It is likely in case 1 that a certain concentration of and exposure time to PTX, enhanced by contact lens wear, caused epithelial toxicity and interfered with the corneal epithelial barrier. This produced stromal swelling and triggered a cellular immune reaction and antibody production, accounting for the immune system–related stromal ring infiltration. Direct cellular toxicity of PTX and concomitant cytokine and protease activity led to peripheral degradation of keratocytes, collagen, and proteoglycans in the immune system–related stromal ring, with resultant steepening of the corneal curvature (Figure 3). Case 2 illustrates the benefits of early recognition and aggressive corticosteroid therapy.

On the basis of information available in the scientific literature and online forums, it appears that PTX is not found in all commercially available zoanthid species, but potentially dangerous concentrations clearly exist in a few types. Identification of zoanthid type in the aquarium trade is very difficult. Many of them are noncommercially exchanged and traded, making their original source undetectable; therefore, all zoanthids should be assumed toxic. The risk of zoanthid PTX contact with the eye is a topic of discussion in online forums for aquarists,6,7 and many aquarists recommend using goggles or a face shield when handling zoanthids.

The receptor for PTX is the ubiquitous plasma membrane that contains the sodium-potassium–adenosine triphosphatase pump8; consequently, the toxicity of PTX can be severe and can affect multiple organ systems. In addition, PTX interference with sodium-potassium–adenosine triphosphatase pump can result in corneal epithelial sloughing and corneal nerve altered sensation.

There is no specific type of therapy or widely available laboratory test for PTX. Aquarium coral...
keratoconjunctivitis should be suspected in patients who have ocular surface symptoms and report a metallic taste in their mouth and who handle zoanthids, as occurred in case 1. After excluding the infectious causes, toxic keratoconjunctivitis might be treated with aggressive use of topical corticosteroids as well as topical cyclosporine and lubricants.

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3. Hoffmann K, Hermanns-Clausen M, Buhl C, et al. Congenital grouped albinotic retinal pigment epithelial spots (CGARPES), or polar bear tracks, is a rare anomaly characterized by multiple grouped, white, variably sized, albinotic spots. They generally involve the peripheral retina, similar to that of bear track grouped pigmentation. Usually the macula is spared, and the spots may occur in one or both eyes. The lesions seem to be stable, and visual acuity, visual fields, color examination, dark adaptation, and electrophysiologic findings are normal. There is only 1 report of a decrease in visual acuity in this entity. Fluorescein angiography revealed a variable pattern related to the choroidal fluorescence seen through these lesions that was considered sporadic and rare in frequency. In this article, we describe 4 cases that occurred in a Brazilian family of Italian descent. This is the first reported instance of familial CGARPES.

Report of Cases. Case 1. A 19-year-old woman was referred for evaluation after her general ophthalmologist noted areas of retinal abnormality on opthalmoscopy after a routine refraction. She had occasional headaches but no specific ocular symptoms, and she was in excellent general health. Visual acuity was 20/20 in both eyes with −0.50 cylinder correction in the left eye. Slitlamp examination of the anterior segments and vitreous cavity was unremarkable. Intraocular pressures were normal. Funduscopy of both eyes revealed multiple white and sometimes yellow flecks of variable size and configuration affecting all parts of the retina (periphery, equator, posterior pole, and fovea) (Figure 1). The size of the flecks was highly variable, from the diameter of one vessel to 4 times the diameter of the optic nerve but the flecks had a consistent color pattern: in the smaller lesions, the color was more homogeneous, and in the larger lesions, it was concentrated at the edge of the flecks (Figure 1). Fluorescein angiography showed a normal choroidal and retinal vascular perfusion. The arterial phase revealed a transmitted hyperfluorescent lesion (a window defect of the retinal pigment epithelium) that corresponded to the lesions seen during the ophthalmic examination. No intraretinal fluid was seen during the late phase of the angiogram (Figure 1).

Color vision tests with the Farnsworth dichotomous (D-15) test,