Pseudomembranous Conjunctivitis following Exposure to Arisaema ringens Sap: A Case Report

Takashi Ono\textsuperscript{a, b}, Ryohei Nejima\textsuperscript{a}, Katsuhito Kinoshita\textsuperscript{a}, Yosai Mori\textsuperscript{a}, Takuya Iwasaki\textsuperscript{a}, Kazunori Miyata\textsuperscript{a}

\textsuperscript{a}Miyata Eye Hospital, Miyazaki, Japan; \textsuperscript{b}Department of Ophthalmology, Graduate School of Medicine, The University of Tokyo, Tokyo, Japan

Keywords
Arisaema ringens · Corneal erosion · Ocular trauma · Pseudomembranous conjunctivitis · Plant toxin

Abstract
Plants of the \textit{Araceae} family exude a sap containing calcium oxalate, a toxic substance that causes dermatitis. However, ocular injury due to exposure to \textit{Araceae} sap has rarely been reported. Herein, we present a case of severe pseudomembranous conjunctivitis following exposure to \textit{Arisaema ringens}, an \textit{Araceae} species and popular houseplant in Japan. A 67-year-old man presented with pain in his right eye after exposure to the sap of \textit{A. ringens}. At presentation, the best corrected visual acuity and intraocular pressure in the right eye were 20/800 and 15 mmHg. Slit-lamp examination showed strong hyperemia, conjunctival chemosis, and corneal edema with many pseudomembranes, and fluorescein staining revealed corneal epithelial defects in the central area of the cornea. We washed the ocular surface with saline and initiated treatment with topical instillations of 1.5% levofloxacin and 0.1% betamethasone, combined with ofloxacin eye ointment. After repeatedly removing the pseudomembranes and increasing the frequency of the topical instillations, pseudomembranous conjunctivitis and corneal erosion gradually improved. One week following the injury, the corneal epithelial defects were no longer detectable, and the patient's best corrected visual acuity recovered to 20/25. It is important for ophthalmologists and primary care physicians to be aware of the ocular toxicity of \textit{A. ringens} and should counsel their patients accordingly. Moreover, preventative measures, such as the use of protective eyewear, should be taken when cutting this houseplant.

© 2022 The Author(s).
Published by S. Karger AG, Basel
Introduction

_Arisaema ringens_, commonly termed “cobra lily,” is a perennial plant mostly native to Asia. _A. ringens_ is a species belonging to the Araceae family. It has a typical height of 20–50 cm and three large leaves. In nature, it is found in wet woodlands. It is often used for ornamental purposes in Japan because of its large, vividly colored bract.

Many plants in the Araceae family are popular in Asia because they are common staple foods (e.g., taro, konjac). Although _Arisaema_ plants are prevalent and useful, their sap contains calcium oxalate, which can cause phytodermatitis [1–4] and oral cavity edema with consequent lethal airway obstruction [5]. However, to the best of our knowledge, there are few case reports on the potential ocular toxicity of these plants [6]. Herein, we report a rare case of pseudomembranous conjunctivitis and corneal erosion caused by exposure to the sap of _A. ringens_.

Case Presentation

A 67-year-old man presented with visual disturbance and pain in his right eye. He had previously cut _A. ringens_ in his house using a grass cutter, and the plant sap accidentally landed in his right eye. He washed his eyes with water and immediately visited our hospital. At presentation, his visual acuity was 20/800 in the right eye and 20/16 in the left eye. The intraocular pressures were 15 and 12 mm Hg in the right and left eye, respectively. He had a history of asthma and hypertension but no history of ophthalmological disease or any known allergies.

The right eye was further examined. Slit-lamp microscopic examination revealed strong hyperemia and corneal edema with many pseudomembranes (shown in Fig. 1a–c), and

![Fig. 1. Photographs of the right eye at presentation following exposure to the sap of _A. ringens_. a A photograph of the anterior segment. Strong hyperemia and corneal edema are observed. b A photograph of the anterior segment on slit-lamp microscopy. The ocular surface is rough because of corneal epithelial defects in the center of the cornea. Intraocular inflammation is not observed. c A magnified photograph of the conjunctiva. Conjunctival chemosis with hyperemia is observed. d A magnified photograph of the cornea on fluorescein staining. A corneal epithelial defect is seen at the center of the cornea.](image-url)
fluorescein staining revealed corneal epithelial defects in the central area of the cornea (shown in Fig. 1d). Although conjunctival chemosis was strongly evident, the palisades of Vogt comprising the corneal epithelial stem cell niche were intact. There was no intraocular inflammation, posterior segment abnormalities, or cell infiltration into the corneal stroma surrounding the epithelial defects. However, mild cataract was observed. These clinical manifestations were suggestive of pseudomembranous conjunctivitis with corneal erosion in the right eye due to exposure to the *A. ringens* sap.

The right eye was anesthetized with 0.4% oxybuprocaine hydrochloride, and the ocular surface was washed with a sufficient volume of saline to remove the chemical substance of the sap. Treatment with a topical instillation of 1.5% levofloxacin and 0.1% betamethasone four times a day and ofloxacin eye ointment twice a day was initiated following the complete removal of the pseudomembranes from the swollen conjunctiva. No abnormalities were observed in the left eye. Intraocular inflammation was not observed 1 day after treatment initiation. However, the conjunctival chemosis with severe hyperemia persisted, as did the corneal epithelial defects, and many pseudomembranes reappeared. Therefore, we continued the topical instillation and completely removed pseudomembranes again. His pain gradually resolved 2 days after injury, along with the disappearance of the pseudomembranes of the conjunctiva. However, the hyperemia, chemosis, and corneal epithelial defects did not improve. Accordingly, the frequency of topical 0.1% betamethasone treatment was increased to six times a day, after which the corneal erosion improved, and the ocular hyperemia and pseudomembranes of the conjunctiva disappeared.

One week after injury, the patient's visual acuity recovered to 20/25, with remnants of mild cataract and an intraocular pressure of 12 mm Hg. The corneal erosion closed completely, although superficial punctate keratopathy was observed without any intraocular inflammation (Fig. 2a, b). Therefore, we decreased the frequency of betamethasone and levofloxacin administration to thrice daily and stopped the treatment when there was no instillation left.

**Discussion and Conclusions**

Herein, we describe a case in which exposure to the sap of *A. ringens* resulted in ocular toxicity, manifested by pseudomembranous conjunctivitis and corneal erosion. This plant exudes calcium oxalate, a known toxin and dermal irritant, as do other members of the *Araceae* family [1, 2, 4]. The giant taro (*Alocasia macrorrhiza*, an *Araceae* species) has been shown to cause crystalline keratopathy; this diagnosis was based on the presence of multiple shiny needle-like crystals (25–40 μm) in the corneal stroma on confocal microscopy [6]. In the current case, we did not examine the injured cornea via in vivo confocal microscopy because no bright object was observed on slit-lamp examination. However, we cannot exclude the possibility of calcium oxalate in the injury because abnormally strong conjunctivitis was observed at presentation. Additionally, the sap of the *Araceae* family has been reported to contain saponins, which could contribute to ocular toxicity in the cornea [7]. Therefore, it is important to wash the ocular surface to remove chemical substances thoroughly and to properly treat the ocular condition.

The patient described herein presented with pseudomembranous conjunctivitis, a condition in which the conjunctiva is highly inflamed. The pseudomembrane associated with this condition is a white or yellow discharge comprising numerous secreted fibrins. Pseudomembranous conjunctivitis frequently occurs in ocular viral infections, including those caused by adenovirus, herpesvirus, and severe acute respiratory syndrome coronavirus 2; in bacterial infections, including those caused by *Staphylococcus aureus* and *Klebsiella*; and in other ocular infections and conditions, including chlamydia, ocular burn, pemphigus, and Stevens-Johnson syndrome [8, 9]. However, it can also reportedly be caused by an ocular foreign body [10]. The pathogenesis of the case presented herein was not suggestive of a viral infection because
of the sudden occurrence of symptoms following exposure to the sap of *A. ringens*. As this sap contains small calcium oxalate crystals, this fractional component could function as an ocular foreign body, resulting in severe conjunctivitis with corneal erosion.

To address the clinical presentation in our case, we administered topical antibiotics and steroid instillation. These treatments were effective within 1 week after increasing the frequency of administration. A previous report demonstrated that similar ocular symptoms resolved with topical steroids and antibiotics, with the bright corneal crystals disappearing within 3 months, as confirmed via confocal microscopy [6]. Another report emphasized the importance of removing the foreign body completely and removing the pseudomembrane repeatedly and stated that topical steroid instillation is effective for recovery [10].

In the current study, infectious keratitis was an unlikely differential diagnosis based on the mechanism of occurrence and the clinical manifestations. Hence, we used steroid instillation, although corneal erosion was observed. We performed repeated peeling of the pseudomembrane and continued the administration of topical antibiotics and steroid instillations, which substantially improved conjunctivitis. Since ocular injuries caused by wild plants are known to lead to corneal perforation and/or ocular infection accompanied by fungal or bacterial infection, frequent observation is necessary during the clinical follow-up. Thus, ophthalmologists and other treating physicians should use steroid instillation carefully to avoid exacerbating an ocular infection caused by bacteria or fungi.

In conclusion, we presented a case of pseudomembranous conjunctivitis caused by exposure to the sap of *A. ringens*. Ophthalmologists and primary care physicians should consider the toxicity of wild plants (even those in home gardens) when ocular disturbances occur and should counsel their patients accordingly. Moreover, caution should be exercised when cutting *A. ringens* to prevent its sap from entering the eyes. The findings

**Fig. 2.** Photographs of the right eye 1 week after injury. **a** A photograph of the anterior segment. The corneal and conjunctival edema are resolved, and the hyperemia has disappeared. **b** A photograph of the anterior segment on fluorescein staining. Although slight superficial punctual keratopathy remains, a corneal epithelial defect is not observed.
of this case report would aid future research and in the development of medical guidelines for ocular trauma.

Statement of Ethics

This study protocol was reviewed and approved by the Institutional Review Board of Miyata Eye Hospital, approval number CS-349. Written informed consent was obtained from the patient for publication of the details of their medical case and any accompanying images.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Funding Sources

No external funding or grant support was received for this clinical report.

Author Contributions

Takashi Ono and Ryohei Nejima drafted this case report. Takashi Ono, Katsuhito Kinoshita, Yosai Mori, and Ryohei Nejima were responsible for collecting, managing, analyzing, and interpreting the clinical findings. Takashi Ono, Katsuhito Kinoshita, Yosai Mori, Ryohei Nejima, Takuya Iwasaki, and Kazunori Miyata have read and approved the manuscript.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

References

1 Dorsey C. Philodendron dermatitis. Calif Med. 1958 Apr;88(4):329–30.
2 Sanchez-Morillas L. Contact dermatitis due to Dieffenbachia. Contact Dermatitis. 2005 Sep;53(3):172–3.
3 Zhong LV, Wu H. Current researching situation of mucosal irritant components in Araceae family plants. Zhongguo Zhong Yao Za Zhi. 2006 Sep;31(18):1561–3.
4 Ayres S Jr. Philodendron vine as a cause of plant dermatitis. J Am Acad Dermatol. 1983 Dec;9(6):962.
5 Jadhav DR, Gugloth R. Poisoning due to arisaema triphyllum ingestion. Indian J Crit Care Med. 2019 May;23(5):242–3.
6 Tang EW, Law RW, Lai JS. Corneal injury by wild taro. Clin Exp Ophthalmol. 2006 Dec;34(9):895–6.
7 Okoli CO, Akah PA. Mechanisms of the anti-inflammatory activity of the leaf extracts of Culcasia scandens P. Beauv (Araceae). Pharmacol Biochem Behav. 2004 Nov;79(3):473–81.
8 de-Arriba-Palomero F, Salvá-Palomeque T, de-Arriba-Palomero P, Arnalich-Montiel F. Epidemiology of pseudomembranous conjunctivitis in a tertiary hospital: a 2-Year Retrospective Study. Eur J Ophthalmol. 2021 Sep;31(5):2275–9.
9 Navel V, Chiambaretta F, Dutheil F. Haemorrhagic conjunctivitis with pseudomembranous related to SARS-CoV-2. Am J Ophthalmol Case Rep. 2020 Sep;19:100735.
10 Ho D, Lim S, Kim Teck Y. Pseudomembranous conjunctivitis: a possible conjunctival foreign body aetiology. Cureus. 2020 May;12(5):e8176.