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Alkali Burn Treated with 2% Rebamipide Ophthalmic Suspension: A Case Report

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Key Words

Alkali burn · 2% rebamipide ophthalmic suspension · Roper-Hall classification

Abstract

A 47-year-old man presented at the Ophthalmology Department of Saku City Asama General Hospital complaining of hyperemia and pain after industrial sodium hydroxide (approx. 40% concentration) had entered his left eye. With an epithelial defect of the bulbar and palpebral conjunctiva, ischemia of the inferior third of the limbal conjunctiva, a total corneal epithelial defect and mild corneal stromal opacity, the damage was determined as Roper-Hall grade III. 2% rebamipide ophthalmic suspension, which is used for dry eye disease, was administered 4 times a day followed by conventional treatment for serious alkali injury. The corneal epithelial defect was resolved, and there were no side effects. The effectiveness of 2% rebamipide ophthalmic suspension in both the repair and improvement of the damage in the conjunctival and corneal epithelia, and its anti-inflammatory effect suggest that it may be an effective treatment not only for dry eye disease but also for alkali ocular damage. © 2014 S. Karger AG, Basel

Introduction

Alkalis saponify the fatty acids in cell membranes, which results in their disruption and dissolution. Fat-soluble alkalis also have a high tissue permeability and can rapidly damage even deep areas of the tissue. Ocular injury due to an alkali burn can result in extremely serious visual impairment, depending on the concentration and amount of alkali involved. Alkali injury causes severe erosion of the corneal epithelium. If the regenerative capacity is lowered, this erosion may become protracted and difficult to treat.

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Sasaki and Kokubun: Alkali Burn Treated with 2% Rebamipide Ophthalmic Suspension: A Case Report

Rebamipide was developed at the beginning of the 1990s as an oral medication for gastritis and gastric ulcer and is widely used in Japan and worldwide. In recent years, a formulation of rebamipide for ocular use has been developed in Japan as a treatment for dry eye disease. This agent is purported to restore the ocular surface mucosa and improve symptoms related to dry eye disease. The major known pharmacological effects of rebamipide on the ocular surface are enhanced secretory and membranous mucin secretion, restoration of the barrier function of the corneal epithelium, the repair of epithelial damage, increased number of goblet cells and anti-inflammatory effects [1–6]. A number of reports have previously described its off-label use for improving the corneal epithelium in patients who do not have simple dry eye disease [7, 8]. However, as far as we are aware, there has been no report of the use of 2% rebamipide ophthalmic suspension to treat alkali burns. Herein, we report the use of 2% rebamipide ophthalmic suspension to treat a case of severe epithelial damage to the ocular surface caused by an alkali burn.

Case Presentation

A 47-year-old man presented at the Ophthalmology Department of Saku City Asama General Hospital on December 28, 2012, complaining of hyperemia and pain after industrial sodium hydroxide (approx. 40% concentration) had entered his left eye while he had been at work. He had no previous medical history of note.

The patient's conjunctival findings comprised severe hyperemia of the entire bulbar and palpebral conjunctiva, with an epithelial defect of the bulbar conjunctiva mainly in the inferior region (fig. 1), defects of the superior and inferior palpebral conjunctiva, and ischemia of the inferior third of the limbal conjunctiva (fig. 2). The corneal findings comprised a total corneal epithelial defect and mild corneal stromal opacity (fig. 3). There was mild inflammatory cell infiltration of the anterior chamber, but no abnormalities of the lens, vitreous, or fundus were apparent. On the basis of these findings, the damage was determined as Roper-Hall grade III [9]. Visual acuity was not recorded at the time of the initial examination because of unavailability of technicians who perform visual acuity testing at the emergency room. On day 8 after the start of treatment, the patient's left visual acuity was 0.1×-1.0 D.

The eye was washed out with 1,000 ml of physiological saline 2–4 times a day for 8 days, starting immediately after the initial examination. 0.1% betamethasone ophthalmic solution was administered 4 times a day for 41 days, 1.5% levofloxacin ophthalmic solution 4 times a day for 67 days, and ofloxacin ophthalmic ointment 4–8 times a day for 65 days. The administration of 0.3% sodium hyaluronate ophthalmic solution 4–8 times a day was continued even after the anterior eye findings had resolved completely. After the patient had given informed consent to the off-label use of 2% rebamipide ophthalmic suspension, the solution was administered 4 times a day starting on day 4 after the injury. This regimen was continued even after the anterior eye findings had improved. Both the off-label use of this drug and the preparation of this paper were approved by the Institutional Review Board of Asama General Hospital.

The epithelial defect of the bulbar conjunctiva resolved on day 19 after the start of treatment. The superior palpebral conjunctival defect resolved on day 25. The corneal epithelial defect resolved on day 43. Final visual acuity was $1.2 \times S -1.5$ D Cyl -1.0 D Ax 180° . There were no side effects of the treatment with 2% rebamipide ophthalmic suspension.

Discussion

This patient was treated with a variety of medications, including steroid ophthalmic solution, sodium hyaluronate ophthalmic solution and antibiotic ophthalmic ointment, because Roper-Hall grade III alkali burns may lead to extremely serious visual impairment [9]. As he was not treated with 2% rebamipide ophthalmic suspension alone, the degree of effectiveness of this agent in wound healing following an alkali burn cannot be determined. However, the fact that the proliferation of epithelial cells and healing proceeded smoothly indicates that it did not have an adverse effect on wound healing in the present case. In particular, its actions in enhancing goblet cell proliferation and mucin secretion may have exerted a beneficial effect in promoting corneal and conjunctival epithelial cell proliferation.

Inflammatory cytokine expression on the ocular surface is known to occur in alkali burns, and its suppression is reportedly effective for alkali burn wound healing [10–12]. Some studies have suggested that it may be particularly important to suppress inflammatory cytokines during the acute phase following injury [12]. The anti-inflammatory action of rebamipide reportedly suppresses the production of TNF α , interleukin-1 β , interleukin-6, and interleukin-8 [4–6]. Rebamipide is also known to suppress the disruption of barrier function at the corneal epithelium induced by TNF α [3, 4]. These pharmacological actions may have a favorable effect on wound healing of the ocular surface after an alkali burn.

In addition to being used in the treatment of dry eye disease, 2% rebamipide ophthalmic suspension may also have the potential to serve as an agent for improving and repairing the corneal and conjunctival epithelia in cases of alkali burn.

Conclusion

We reported a case in which 2% rebamipide ophthalmic suspension was used for treating severe alkali burn. No adverse side effects of 2% rebamipide ophthalmic suspension were observed in this case. The action of 2% rebamipide ophthalmic suspension in repairing and improving damage to the conjunctival and corneal epithelia and its anti-inflammatory action suggest that it may be an effective treatment for alkali ocular damage.

Disclosure Statement

The authors have no financial and proprietary interests related to this paper. No granting and sponsoring agencies were involved in the writing of the manuscript.

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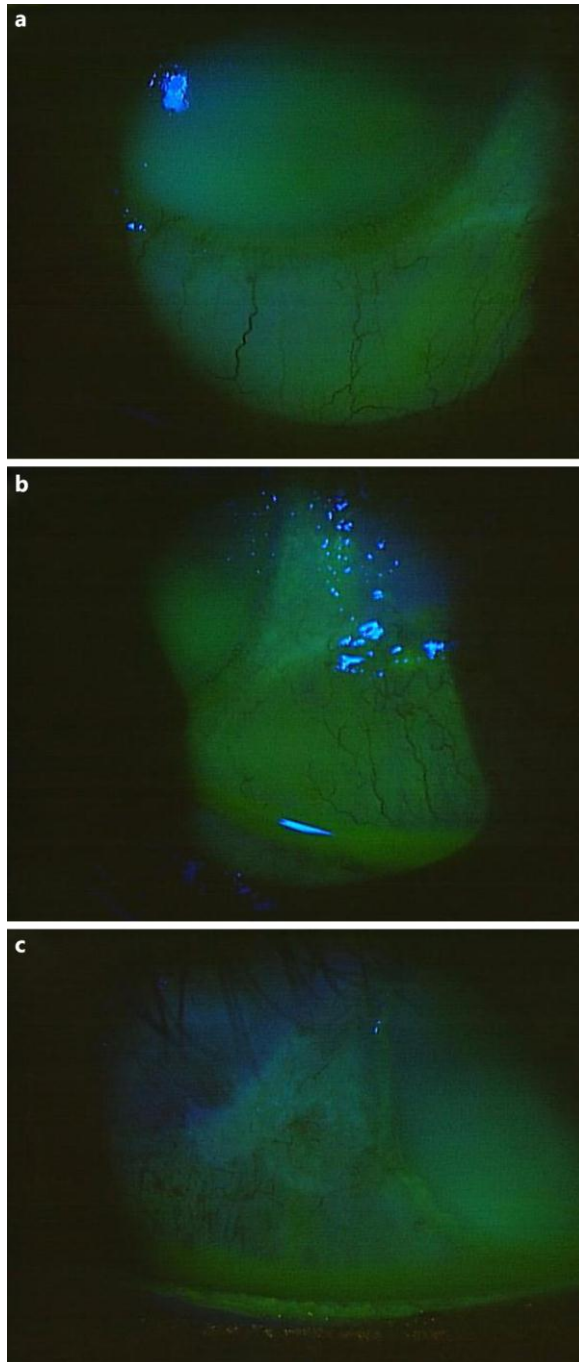


Fig. 1. Epithelial defect of inferior (a), lower left (b) and lower right (c) bulbar conjunctiva at the time of the initial presentation.



Fig. 2. Inferior conjunctiva of ischemia and edema at the time of the initial presentation.

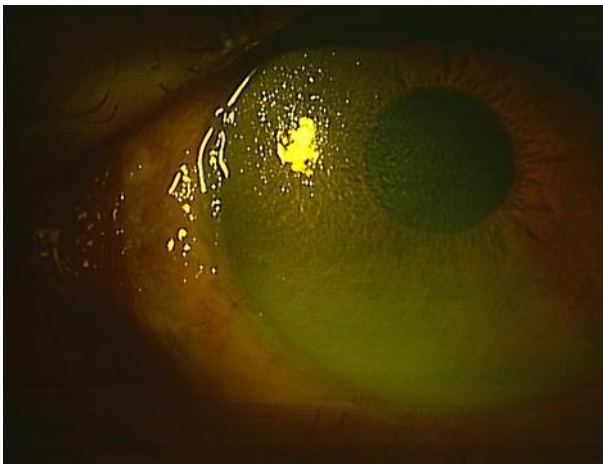


Fig. 3. Total epithelial defect and stromal opacity at the time of the initial presentation.