Inadvertent Conjunctival Trauma Related to Contact with Drug Container Tips

A Masquerade Syndrome

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Purpose: To report the diagnosis, clinical course, and management of acute painful red eye syndrome associated with unintentional tube- or bottle-tip-induced conjunctival trauma.

Design: A small, noncomparative, interventional case series.

Participants: Twelve eyes of 12 patients (8 female and 4 male, aged 21–84 years) who were urgently reported or referred with a variety of diagnoses resulting from acute onset of red, painful eye. Four eyes had corneal transplants, two were recovering from herpetic keratitis, two had undergone cataract surgery or a laser in situ keratomileusis procedure, one had a corneal neurotrophic ulcer, and one used a contact lens. All the patients had received new medications (ophthalmic ointments in nine patients, topical drops in three patients) within 1 week before onset of symptoms.

Intervention: Assessment of method of self-administration of topical medication, evaluation of the ocular surface lesion, and patient education.

Main Outcome Measures: Association of patient behavior with ocular surface lesions.

Results: All 12 patients presented red, painful eyes, congested lower palpebral conjunctiva, epithelial conjunctival erosions, and episcleritis. In all patients, direct contact of the tube or bottle-tip with the affected area of the conjunctiva was ascertained by inspection. Instructions on proper method of drug administration and eye patching with lubrication were followed, within 2 weeks, by healing of conjunctival lesions.

Conclusions: Drug containers may cause nonintentional conjunctival trauma and simulate severe ocular disorders. Physicians should be aware of this diagnosis in any case of prolonged and unexplained ocular irritation and should instruct patients as to the proper instillation of topical ophthalmic medications.

Adverse effects of drug administration are common and well described in the ophthalmic literature. Topical drug-induced allergic phenomena or drug toxicity cause ocular symptoms such as itching, irritation, pain or discomfort, and ocular surface signs such as hyperemia, swelling, discharge, and erosions.1–3 Usually, these phenomena affect the entire ocular surface, that is in contact with the medication. Self-induced advertent trauma to the ocular surface also is described in multiple syndromes. These include malingering, Munchausen syndrome, mucous fishing syndrome, and self-induced trauma and mutilation in psychotic patients and in severely retarded children.4 Topical anesthetic abuse also has been reported on numerous occasions,5,6 and it poses a diagnostic challenge in any case of unexplained continuous damage to the ocular surface.

Solid containers of topical medications such as bottles or ointment tubes may cause localized trauma by the patient inadvertently touching the ocular surface with the tip of the bottle or ointment tube. This phenomenon, although prevalent in daily practice, has not received proper attention in the ophthalmic literature. In the present study, we describe a syndrome of acute traumatic conjunctival inflammation induced by nonintentional contact of medication containers with the conjunctiva during application of topical drugs.

Case Reports

Between November 1995 and December 1997, we prospectively evaluated 12 eyes in 12 consecutive patients (8 female and 4 male, 21–84 years of age; Table 1), who experienced sudden onset of a painful, red eye. Four of these patients had corneal transplantation after herpetic simplex keratitis, pseudophakic bullous keratopathy, leukemia cornea, and keratoconus, respectively. Two patients were recovering from herpetic simplex keratitis, 2 patients had undergone laser in situ keratomileusis (LASIK) surgery, one patient had...
undergone cataract surgery, one had posttraumatic corneal scar and dry eyes, one patient had a neurotrophic nonhealing corneal ulcer, and one patient was using a soft contact lens for correction of myopia.

In all of these patients, various topical medications were prescribed for different indications, including: management of dry eyes, postherpetic corneal edema, soft contact lens-induced infiltrate, prevention of infections and control of inflammation after LASIK or after cataract suture removal, nonspecific or bacterial conjunctivitis, and neurotrophic corneal ulcer. Nine of the 12 patients received ophthalmic ointments (5% chloramphenicol, 3% acyclovir, Duratears [Alcon, Cleveland, OH], or Lacri-Lube [Allergan, Irvine, CA]), and three patients received topical drops (0.3% acyclovir, coll. 0.1% dexamethasone, or Lacri-Lube, coll. 0.1% dexamethasone).

Two to seven days after initiation of the treatment, 10 patients were referred by community ophthalmologists to our hospital as a result of acute exacerbation of red and painful eye, one patient sought treatment during a scheduled visit, and one patient sought treatment at the clinic for a nonscheduled visit. All patients had ocular pain that had increased markedly immediately after the application of the prescribed medications. In all cases, eye examination revealed a congested, hyperemic, lower palpebral conjunctiva, episcleritis, and epithelial conjunctival erosions of variable sizes with or without minimal mucous discharge (Fig 1). The rest of the palpebral conjunctiva was not inflamed, except for papillary changes in the soft contact lens user and for old trachomatous changes in the patient with the trophic ulcer. Corneas were epithelialized in all the eyes, except in the patient with the trophic ulcer. Three eyes had mild localized corneal edema after herpetic keratitis (two eyes) and soft contact lens use (one eye).

Patients were asked to demonstrate how they applied the medications (Fig 2). Patients were pulling down the lower lid, deviating the eye into the upper position, and pushing the ointment tube tips (nine cases) or bottle tips (three cases) into direct contact with the conjunctiva. In some patients, the drug-container tip touched the conjunctiva as a result of the patient losing control and stability of the hand at the time of the drug application. The location of the conjunctival epithelial defect coincided with the site where the patients applied their bottle or tube tip.

All patients were informed of the problem and instructed as to the proper administration of the medication. The eyes were patched, with twice-daily application of lubrication ointment, drops of antibiotics, and dexamethasone phosphate 0.1%. Patients were followed up twice weekly until epithelialization of the conjunctiva was complete and once weekly thereafter, until the inflammation subsided; thereafter, patients were examined at 6 months.

In all patients, the conjunctival epithelial defect healed within 1 week and the patching was discontinued. The symptoms vanished after the epithelialization was complete and the signs of the inflammatory response in the lower conjunctiva subsided within the next 3 weeks.

### Patient 1

A 56-year-old female, 2 years after undergoing penetrating keratoplasty for keratoconus in her left eye, was diagnosed with viral conjunctivitis in that eye and received 5% chloramphenicol ointment to be applied twice daily. Beginning from the second day of the ointment use, the patient had ocular pain in her left eye, redness, and foreign body sensation. On the third day, this patient was referred to our clinic with a presumptive diagnosis of graft rejection and drug toxicity. The best-corrected visual acuity was 20/20 in the right eye and 20/60 in the left eye. The intraocular pressures were 14 mmHg in the right eye and 18 mmHg in the left eye. In the left eye, the lower bulbar conjunctiva was congested markedly and was edematous, with a 5.0 × 2.5-mm epithelial erosion (fluorescein staining) and overlying mucoid discharge with markedly engorged underlying episcleral vessels (Fig 1A, B). The other areas of the bulbar conjunctiva were noninflamed. The corneal graft was clear. The rest of the left eye and right eye examinations were normal. Cultures taken from the conjunctival surface were negative.

While demonstrating the ointment application, this patient touched her lower palpebral conjunctiva at the area of the erosion with the tip of the ointment tube (Fig 2A). After instructions on ophthalmic ointment and drop application, the eye was patched and twice-daily administration of one drop of 0.3% gentamicin and 0.1% dexamethasone phosphate was begun. The conjunctival lesion epithelialized within 2 days and the patching was discontinued. All of the subjective symptoms disappeared after 3 days, and the signs of conjunctival inflammation resolved within the next 10 days.
Patient 2

A 21-year-old female, a soft contact lenses user, had right eye irritation with mild photophobia. She had a small corneal epithelial erosion with a small corneal infiltrate and was treated with topical 5% cefazolin and 1.4% gentamicin solutions. After 1 day, the corneal erosion epithelialized. Cultures from the lesion and conjunctiva were negative for bacteria. After 5 days, the patient was comfortable, had only mild conjunctival hyperemia, and the drops were replaced with application of 5% chloramphenicol ointment twice daily. Two days later, the patient had a red and painful eye and was referred to our clinic with a presumptive diagnosis of uncontrolled infection. The best-corrected visual acuity was 20/25 in each eye, and the intraocular pressures were 12 mmHg in the right eye and 13 mmHg in the left eye. The right eye lower bulbar conjunctiva presented marked edema and hyperemia. Fluorescein staining revealed a 3 × 5-mm horizontal epithelial erosion in the lower bulbar conjunctiva with marked engorgement of underlying episcleral vasculature (Fig 1C, D). The upper bulbar conjunctiva was intact and was not inflamed. The corneal epithelium was intact with a subepithelial scar of 0.2 mm in diameter and minimal stromal edema. The rest of the examination of both eyes was normal. Demonstration of the ointment application by the patient revealed a direct contact between the tip of the ointment tube and the lower bulbar conjunctiva at the area of the conjunctival erosion.

Cultures for bacteria from the lower conjunctiva were negative. The patient was instructed as to the proper application of the ointment. The eye was patched and the patient received 0.3% gentamicin and 0.1% dexamethasone phosphate to be applied twice daily. The conjunctival lesion epithelialized within 4 days and the patching was discontinued. Symptoms regressed and the signs of conjunctival inflammation disappeared within the next 3 weeks.

Discussion

Exacerbation of an ongoing disease is a critical event for the clinician who must make decisions as to treatment under the changing circumstances. Patients who present with clinical patterns of a diagnosed and well-known external eye disease are expected to respond to an accepted routine treatment. When the symptoms and signs do not respond to that treatment, the clinical approach should be re-evaluated: the working diagnosis should be questioned and drug compliance, drug toxicity or allergy, and masquerade syndromes should be considered. Self-induced injury diagnoses should arise in conditions of poorly explained delayed healing of
the ocular surface, particularly when the inferior or nasal bulbar conjunctiva is involved.7

Our group of patients presented a sequence of events that may confuse many clinicians. All the patients except one had known corneal disorders such as: corneal surgery (LASIK or a penetrating keratoplasty), soft contact lens-induced corneal infiltrate, recurrent herpetic keratitis, neurotrophic corneal ulcer, dry eyes, and suture removal after cataract surgery. In all patients, except three, topical ointments were used. All the patients had an acute red and painful eye at presentation and reported ocular burning and pain on application of the medication. The significant observations included localized lower bulbar conjunctival erosion with hyperemia, conjunctival edema, and underlying episcleritis. The upper bulbar conjunctiva usually was intact and was not congested. In some cases, the location of the erosion was deep in the inferior fornix, making the identification of the epithelial defect more difficult for an inexperienced observer. Despite the acute event of painful red eye, all the patients presented improvement of the basic corneal or conjunctival disorder, which had been diagnosed and treated before the acute event, further complicating the clinical picture.

The localized irregular epithelial defects with some mucoid discharge and the underlying swelling and engorgement of conjunctival and deeper episcleral blood vessels raised possible diagnoses of herpetic or bacterial infections, scleral and episcleral involvement, drug toxicity, or trauma by foreign bodies. Results of a microbial work-up were negative in all the cases.

In this series of patients, the primary diagnoses and the medications varied, but the clinical picture was the same, that is, an epithelial erosion in the lower bulbar conjunctiva, surrounded by hyperemia and conjunctival edema. The site of the erosion, the way patients use the topical treatment (they were asked to demonstrate how they do it), and the fact that regardless of the primary condition, the symptoms regressed and the erosion healed after proper patient education and patching of the eye for a few days, suggest that the cause in these patients was trauma, self-induced by the patient when touching the eye with the tip of the tube or bottle.

Drug containers have not been described previously as a means of inducing self-inflicted conjunctivitis. This lack of previous reports is probably a result of unawareness of physicians who may not pay attention to the inferior bulbar

Figure 2. Patients demonstrating an application of eye drops. In both cases, the bottles are very close to the eye, and any additional movement can cause a traumatic contact with the ocular surface.
conjunctiva. A small conjunctival erosion easily may be overlooked, and even when found may not be attributed to a self-inflicted injury, especially if physicians do not thoroughly ask their patients as to the mode of topical drug administration. A self-inflicted injury often is difficult to diagnose, and a high index of suspicion, coupled with a thorough eye examination and meticulous interrogation of patients on compliance and method of drug administration, is crucial for a correct diagnosis.

Although our patients did not admit self-induced damage, the coincidental use of the drugs and the sudden onset of pain and inflammation were identified in all cases. Patients were asked to demonstrate their application of the eye drops or the ointment. They all were extending their gaze upward and unable to see the approaching drug container, were pushing the tip of the ointment tube into direct contact with the lower bulbar conjunctiva, and were inducing the trauma by squeezing the drug with an unstable hand.

Topical medication toxicity is another cause that may be associated with signs similar to those observed in our patients. Discrete epithelial defects of the lower bulbar conjunctiva were described previously in association with topical fortified amino glycosides. Although only one patient in our series was using fortified gentamicin, it seems unlikely that all of our other patients, receiving other topical medications (such as dexamethasone or chloramphenicol), would have a similar presentation resulting from toxicity to different medications. Furthermore, additional prevalent signs of medication toxicity, such as follicular conjunctivitis or punctate keratitis, were not evident in our patients. Therefore, we believe that medication toxicity is less likely in our series of patients, although it should be considered in the differential diagnosis of any unexplained damage to the ocular surface epithelium.

This group of patients presents a condition with which many ophthalmologists are unfamiliar. Some of our patients had a well-known significant corneal disorder with a potential for exacerbation or complications, and others had undergone surgical procedures. All patients were taking topical medications and the ocular disorder was under control by their ophthalmologists when the acute exacerbation of the red, painful eye occurred. Although no clinical deterioration in the basic condition was observed, all the patients (except two) were referred urgently for consultation by their ophthalmologists with a variety of diagnoses, including: suspected rejection of a corneal graft, uncontrolled infection, scleritis, drug toxicity, and decrease in vision. The referring physicians were assuming correctly that the acute event was related to the present disorder or its treatment, but were unaware of the potential for damage of the drug containers. This explains the fact that in none of the referred cases was the conjunctival epithelial defect diagnosed.

Ophthalmologists should recognize the potential for localized damage by traumatic application of topical medication. This is particularly important in patients with pre-existing ocular disorders or in those who have limited visual acuity or have mental or neurologic syndromes and in the aging population. A high index of suspicion for a self-induced trauma should be raised in any case of an unexplained red and painful eye. The inferior bulbar conjunctiva should be inspected carefully, and fluorescein staining should be used to rule out epithelial defects. Patients should be asked to demonstrate the way they apply topical medication and made aware of their mistakes. All patients and—when needed—their families as well should be instructed routinely in the proper application of topical medications.

References