



HAND SANITIZER-INDUCED IATROGENIC EYE CHEMICAL BURN: A COVID-19 REPERCUSSION? CASE SERIES

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ABSTRACT

PURPOSE: We report a case series of nine patients diagnosed with eye chemical burn managed in Ophthalmology Department in one single day. All patients reported sudden symptoms of pain, photophobia, tearing and blurred vision of both eyes. Symptoms started in the night, 5 to 8 hours after visiting Laboratory for PCR testing for COVID-19 in private medical center.

METHODS: Examination revealed reduced visual acuity, diffuse upper and lower eyelid erythema and swelling, diffuse conjunctival inflammation, congestion, diffuse chemosis without perilimbal ischemia; fornices swept without foreign bodies; corneal punctate epithelial erosions, mild stromal edema, 1+ Descemet folds (in 3 patients). The other ocular structures were normal. A clinical picture of ocular surface chemical burn of Grade 1 was present.

RESULTS: Meticulous medical history revealed that all patients before entering the laboratory, were sprayed with aerosol-driven hand sanitizer, by a nurse, standing two or three steps above the level of patients (the bottle was nearly at patient's eye level), on the stairs in front of the building.

CONCLUSION: Outpatient management to promote rapid re-epithelialization and reduce inflammation to restore ocular surface integrity was prescribed, no one of patients needed admission in the clinic.

Key words: COVID-19, eye chemical burn, sanitizer, aerosol-driven

INTRODUCTION

With increasing COVID-19 infected cases daily, people worldwide are practicing strict personal hygiene against infection. Hand hygiene is one of the main barrier gestures for prevention and limit of spread of the virus transmission. In hospitals and medical centers preventive measures, including disinfection and antiseptics use, are extremely strict. Alcohol-based hand sanitizers and rubs, both gel and aerosol spray, is one of the most used, and its associated accidents is also on rising trend. The current literature illustrates the potential threat to skin and mucosal surfaces, especially the eyes, with its use. An iatrogenic

new disease, named sanitizer aerosol-driven ocular surface disease was described and raised in recent ophthalmology literature (1, 2).

We report a case series of nine patients diagnosed with sanitizer aerosol-driven ocular surface disease (chemical burn) diagnosed in an Ophthalmology department in one single day.

MATERIALS AND METHODS

Patients came in emergency office in Ophthalmology clinic, three of them in the night, the rest in the early morning. All patients were adults, from 24 to 48 years old, 4 women and 5 men. All of them reported sudden symptoms of pain, light sensitivity, excessive tearing, red eyes and blurred vision of both eyes. Symptoms started late at the night, between 1 and 3 o'clock a.m.

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Patients denied any contact with UV radiation-lamps or other devices, usage or contact with any chemicals or cleaning agents, foreign bodies. They didn't have any ocular or systemic diseases, nor contact lens usage or corneal refractive surgery. All of them were travelling- entering Bulgaria from abroad, some by plane, some by car; none of them worked previous day. On detailed history taking, we found one common circumstance between all patients. All of them visited Laboratory for PCR testing for COVID-19 in private medical center previous afternoon (between 4 and 6 o'clock pm). They were obliged to, according to current legal anti-COVID measures as entering the country. All performed in laboratory PCR tests were negative, but in all cases symptoms started 5 to 8 hours later.

On examination, the triage nurse revealed no periocular or systemic burns. Immediate irrigation was done at triage, and test on pH was 8. Topical anesthetic eye drop was instilled, and ocular irrigation device (physiological serum bank) was then inserted. Irrigation by 1 L normal saline was given at full rate before formal eye examination.

RESULTS

Eye assessment revealed reduced visual acuity (below 20/20). Diffuse upper and lower eyelid erythema and swelling was present at all eyes, together with diffuse conjunctival inflammation, congestion, diffuse chemosis (**Figure 1**).



Figure 1. Diffuse upper and lower eyelid erythema and swelling, conjunctival inflammation, congestion, diffuse chemosis in one of the patients.

No perilimbal ischemia was noted. Fornices swept without foreign bodies. Anterior ocular segment biomicroscopy revealed corneal punctate epithelial erosions-toxic keratopathy, positive on fluoresceine staining with blue filter, with mild stromal edema and 1+ Descemet folds (in 3 patients). The other ocular structures were normal. A clinical picture of ocular surface chemical burn of Grade 1 was present (**Figure 2**).

Meticulous medical history revealed that all patients before entering the laboratory, were sprayed with aerosol-driven hand sanitizer, by a nurse, standing two or three steps above the level of patients (the bottle was at patient's eye level), on the stairs in front of the building. We contacted the private laboratory for COVID testing,

informed them about the cases and they insured us that measures will be taken to avoid future similar incidents. No information about hand sanitizer content was given to us.

No one of patients needed admission in the clinic. Outpatient management to promote rapid re-epithelialization and reduce inflammation to restore ocular surface integrity was prescribed- topical antibiotics and lubricating eye drops, oral analgesia and ascorbic acid of 1 g in tablets per day per os. The punctate corneal defects were healed gradually in 2-week times, and final visual acuity was 20/20 without any permanent visual loss.

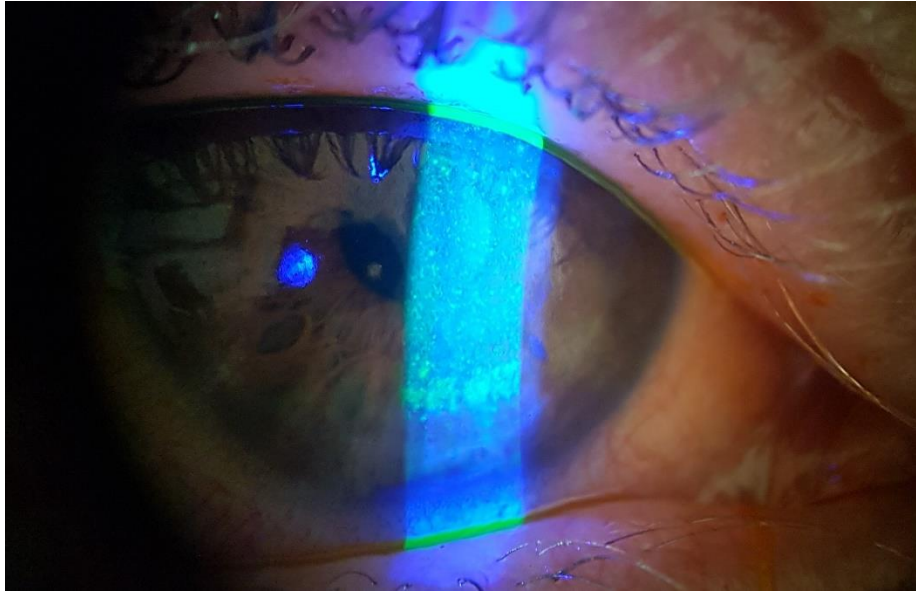


Figure 2. Anterior ocular segment biomicroscopy of one patient: corneal punctate and confluating epithelial erosions (toxic keratopathy), positive on fluoresceine staining.

DISCUSSION

Chemical injury is almost the only ocular emergency that should be treated before even taking medical history and perform clinical examination. There are different classifications for eye chemical burns; which the widely accepted Roper-Hall and Dua classifications took into account of corneal clarity, limbal ischemia and conjunctival involvement to determine the prognosis (3). Most cleansing agents are alkali. Unfortunately alkaline burn is worse than an acidic burn, because acid triggers tissue coagulation, and the coagulum acts a natural barrier preventing further penetration of the agent deeper in tissue. Concerning ocular treatment, on site instant irrigation with copious amount of water is essential to dilute the offending chemicals. Fornices swabbing and prolonged irrigation are very important to remove residual over the blind-ended sac in case of persistent abnormal pHs.

Hand sanitizers, used in hospitals, are alcohol-based, ethanol or isopropanol. This fact gives us a clue about etiology of our patients anterior ocular surface disease- chemical burn, probably caused by alcohol. There are a few published articles, reporting alcohol-related corneal injuries (4-6). Although ethanol has a therapeutic role in ophthalmology for epithelial debridement in

various ophthalmologic procedures, it is known to be highly toxic to corneal limbal stem cells and exerts an immediate cytotoxic effect on corneal epithelial cells. In their experimental study on human corneal limbal epithelial cells, Oh et al. found that ethanol markedly decreased viability of cells in a concentration-dependent manner. According to Guidelines for hand hygiene in health-care settings of the US Food and Drug Administration for alcohol based hand rubs, recommendations for efficacy are for a concentration of 60% to 95% ethanol or isopropanol (7).

Most of published cases about alcohol based hand rub ocular surface disease and burns describe pediatric patients (8,9). In brief report in January 2021, Martin GC et al. describe a 7-fold increase of alcohol-based hand sanitizer-related ocular exposures in children in France in 2020, in comparison with 2019 and cites pediatric ophthalmology center reports for 13% of patients requiring surgery for severe lesions. These facts are based on national retrospective review from the French Poison Control Centers (8).

Small children are at greater risk of severe ocular injury and iatrogenic eye chemical burn due to inadvertent ocular exposure to alcohol hand sanitizers. In most public places, the hand

sanitizers are installed at a waist-level height of an adult but at eye level or above for a young child. That explains why most of published in literature cases are of children (9,10). Sonam Yangzes reports two cases of toxic keratopathy in children (4 and 5 years old) after unintentional contact between alcohol based hand rubs and the eye. The irritant in Soman cases was 70% ethyl alcohol, which led to total loss of corneal epithelium along with conjunctival ischemia in one case and localized epitheliopathy in the other (9). Toxic keratopathy following use of alcohol-containing antiseptics in 3 cases was described also by Liu et al (4). All patients needed further surgery, including cataract surgery, penetrating keratoplasty, and lamellar keratoplasty.

The mechanism of exposure in our patients is similar, even though they are all adults, because of different level of the bottle of spray disinfectant liquid.

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CONCLUSION

To maintain good public and healthcare worker's compliance with hand disinfection in the COVID era, these findings support that health authorities should ensure and control the safe use of alcohol-based hand sanitizers- rubs and sprays. Caution in positioning the dispensers and sprays and their proper and safe use in public places, in addition to informative illustrations emphasizing the risk of unintentional exposures in children, are required to prevent further severe ocular injury, including iatrogenic.

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