



## Corneal Abrasion from Accidental Exposure of Cyanoacrylate

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### Abstract

*A 14-year-old teenager presented in the emergency OPD with pain, blurred vision and congestion in his left eye, 15 min after accidentally spilling cyanoacrylate adhesive into his eye. Foreign body was removed at split lamp and the corneal abrasion was managed with topical antibiotics. Instillation of superglue into eyes has been frequently reported due to similar packaging as ophthalmic style dropper bottles, though in our case it was not due to being mistaken as an eye drop. In our case report we highlight the dangers of cyanoacrylate eye injuries, to promote the introduction of safety mechanisms on all household chemical containers.*

**Keywords:** adhesives, superglue, corneal abrasion, cyanoacrylate.

### Introduction

One of the powerful and fast-acting adhesives that is frequently used in household, biomedical, and industrial applications is cyanoacrylate. Since it was first produced commercially in the 1950s, its use has changed, and it is now widely accessible to the public at a low cost. Cyanoacrylate is a chemical component of the ester acid compound which polymerizes on contact with a dry surface. This compound has several different derivatives, including Ethyl-cyanoacrylate (ECA), which is currently traded as household adhesives. It is frequently referred to as superglues, power glues, or instant glues in the marketplace.<sup>1,2</sup>

Cyanoacrylate comes in liquid form, is colourless, and has a pleasant smell. It is dissolved in suitable solvents like acetone or nitromethane.<sup>1,2</sup> On contact with ocular surface, it causes chemical conjunctivitis and tarsorrhaphy.<sup>2</sup>

Typically, the small plastic containers used to package commercially available cyanoacrylate adhesive resemble those used to package eye drops or ointments, which has resulted many times in accidental instillation.<sup>5</sup> Splash accidents can also happen.

Here we describe a teenager who sustained a cyanoacrylate eye damage through splashing of cyanoacrylate and the further management this required.

### Case Report

A 14-year-old teenager presented to emergency room of Civil Hospital, Kangra because of accidental splash damage while trying to open a bottle of cyanoacrylate adhesive (Fevi Kwik™, Pidilite Industries). He complained of blurring of vision, foreign body sensation, lacrimation, pain and redness of left eye. There was no history of irrigation of eye by patient with water. On torchlight examination the eyelids were not glued together however corneal foreign body (patch of cyanoacrylate adhesive) was apparent (Figure 1). Some residual glue was still stuck to eyelashes. Due to the unavailability of an ophthalmologist at that time, the patient was treated on an outpatient basis with saline wash, administration of tobramycin eye drops & tear substitutes and referred to the RPGMC, Tanda, H.P. to obtain further examination and medication.



Figure 1: Patch of polymerised cyanoacrylate over nasal cornea

Patient was examined at RPGMC, Tanda, H.P. Visual acuity was 6/6 in both eyes. Pupils were reactive to light. Saline wash was done for 30 minutes. On slit lamp examination, eyelashes were matted together, eyelids were swollen and congested, conjunctiva was congested more over the palpebral area. Hyperpigmentation around the limbal conjunctiva was present. Corneal epithelium showed two irregular shaped patches (fluorescein staining negative) of cyanoacrylate glue over the nasal area measuring 3x5 mm. Rest of the anterior and posterior segment were normal. The foreign body was removed on slit lamp under topical local anaesthesia with the help of 15 mm

blade, which left a fluorescein positive defect over the abraded area (Figure 2). The eye was patched for 24 hours with eye drops tobramycin, chloramphenicol ointment. On the next day patient's conjunctival congestion improved and corneal epithelium was healed, however a small linear defect was still present on the next day for which patient was prescribed tobramycin eye drops along with CMC eye drops and chloramphenicol ointment. After two days the patient's cornea was fully healed (Figure 3).



Figure 2: Fluorescein stained cornea under cobalt blue light

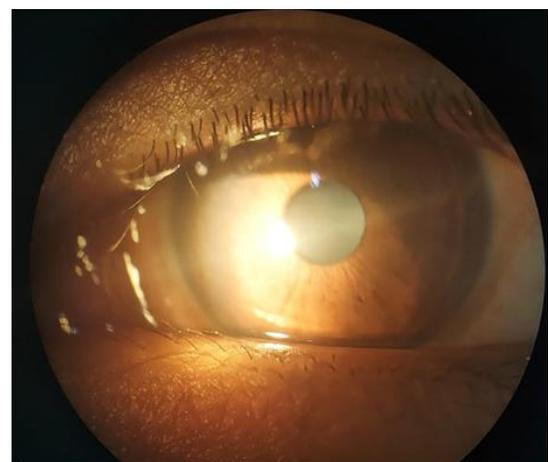


Figure 3: Third day Follow up slit lamp photo of patient's eye showing healed cornea

### Discussion

Accidental instillation of cyanoacrylate adhesive mistaken for eye drops has been described in literature since 1982, and furthermore many times since then. Cyanoacrylate is a monomer of cyanoacetate and formaldehyde and it polymerizes and solidifies on exposure to a surface and moisture.<sup>1,2</sup>

On contact with cornea, it causes a sudden pain due to chemical irritation which causes closing of eyes and spread of adhesive to lid margins which trigger its polymerisation and solidification.

Superglue belongs to the alkyl cyanoacrylate family which includes the Methyl-cyanoacrylate, Ethyl- cyanoacrylate, n-Butyl cyanoacrylate, isobutyl cyanoacrylate, and 2-Octyl cyanoacrylate. Newer cyanoacrylates, such as n-Butyl cyanoacrylate, isobutyl cyanoacrylate and 2-Octyl cyanoacrylate, are less toxic and hence are often used in medical and cosmetic applications<sup>1,2</sup>.

Cyanoacrylate instillation can lead to conjunctivitis, corneal abrasions, dermatitis, conjunctival epithelial abrasion, punctate keratopathy, eyelid skin excoriation, loss of eyelashes, tarsorrhaphy, ankyloblepharon, loss of visual acuity and psychological stress.<sup>3,4</sup>

Management focuses on correction of tarsorrhaphy, removal of glue debris, identifying, treating any observed ocular damage. Though in this case the patient did not suffer from tarsorrhaphy. Copious eye irrigation with saline can help with removal of any glue debris which can decrease the foreign body sensation and chemical conjunctivitis.<sup>6,7,8,9</sup>

Various techniques have been described to release tarsorrhaphy, it begins by identifying an open gap in the glued eyelid margin, followed by applying topical anaesthesia and insertion of Jameson muscle hook through the open gap which is pulled through parallel and away from the eye surface, releasing the adhesion. Acetone based solution can also be used carefully, though risk of chemical injury remains.<sup>7,10</sup>

High molecular weight oils have also been used to dissolve cyanoacrylate bonds. Glue casts can be removed with flicking motion of cotton bud. Topical antibiotics are prescribed to prevent secondary bacterial infection in presence of corneal abrasion and foreign body in the eye.<sup>6</sup>

Slit lamp examination is also required to remove residual fragments of cyanoacrylate, and the instillation of fluorescein drops to identify corneal abrasions.<sup>6,7</sup>

Long term ocular prognosis in patients with cyanoacrylate injuries of the eye is quite favourable. For patients with negligible lid fusion conservative management can also be attempted.

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