

## Self-Inflicted accidental chemical injury to eye

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### Abstract

**Background:** Cyanoacrylate has become popular choice as an adhesive for industrial, medical and household purposes. The widespread new packaging of this adhesive into single use unim resembling eye drop/unim have resulted in accidental injuries to eye following inadvertent ocular instillation.

**Aim:** To report common circumstances, presentation, management and change of pain score after treatment of a series of 10 cases of accidental cyanoacrylate induced ocular trauma.

**Methods and Materials:** A retrospective analysis of the computerised emergency medical records for cases of cyanoacrylate induced ocular injuries presenting at ophthalmology department, at a tertiary care centre in central India between 2015 to 2016, was done.

**Results:** 10 patients suffered an ocular trauma due to cyanoacrylate. Age ranged from 22 years to 38yrs (average age =30 years). 8/10 patients suffered ocular injury due to mistaken identity of the adhesive with the prescribed eye drops. 2/10 patients suffered injury due to spray while opening the adhesive packing. Isolated sticking of the eyelashes in 4/10 patients, associated chemical conjunctivitis in 5/10 and corneal abrasion in 2/10 patients. All the patients responded to the conservative management, with a marked change in the pain score post treatment.

**Conclusion:** Accidental instillation of cyanoacrylate adhesive is possible because of the appearance of the adhesive packing like that of eye drops/unim. Immediate medical aid will prevent ocular morbidity. We highlight the need for regulating non-pharmaceutical packaging.

**Keywords:** Accidental, Cyanoacrylate, Eye drops.

### Introduction

Cyanoacrylate has become popular choice as an adhesive for industrial, medical and household purposes. The shape and colour of the adhesive bottle/unim packs bears a striking resemblance to the container of commonly used eye drops, especially to an ignorant eye. The incidence of the accidental eye instillation have been reported with alarming regularity for the past two decades.<sup>(1,2,3,4)</sup> The widespread new packaging of this adhesive into single use unim (Fig. 1a) resembling eye drop/unim (Fig. 1b) have resulted in resurgence of injuries to eye following inadvertent ocular instillation. Patients often confuse the glue for over the counter eye drops. There are no design regulations on plastic bottles. As a result non-pharmaceutical companies are independent to label and produce their products as they see fit. The current case series, the first of its kind from central India to the best of our knowledge, analyses common circumstances, presentations, management and improvement in patient discomfort with management of cyanoacrylate induced ocular trauma in order to acquaint the ophthalmologists with the spectrum of the same, which is prevalent in Central India.



**Fig. 1a: Unim of cyanoacrylate**



**Fig. 1b: Unim of antibiotic drop**

## Materials and Methods

A retrospective analysis of computerised emergency medical records for all cases of cyanoacrylate ocular trauma, presenting in the department of ophthalmology at a tertiary care centre in central India between 2013 to 2014, was done. The demographic details, occupation, literacy, mode of injury, time of injury and primary treatment taken, if any, were noted. The patients were also made to mark the level of pain they could perceive on the visual analogue score (VAS) (Fig. 2), pre-treatment and half an hour after treatment. After a thorough history and torch light examination, all sites impacted with the adhesive were noted. The lids, if adhered, were gently separated

and the lashes were carefully cut. Slit lamp examination with corneal and conjunctival staining with sterile fluorescein sodium ophthalmic strips (impregnated with 1mg of fluorescein sodium U.S.P) was done to reveal the presence of epithelial trauma. This additionally helped to localise any residual particles of solidified glue, which were removed by fine forceps under magnification. Corneal abrasions were treated with topical antibiotic (moxifloxacin) and lubricating eye drop (Carboxy-Methyl-Cellulose 0.5%) and these patients were followed up until complete recovery. Pre-treatment and post-treatment pain assessment was done on the VAS.

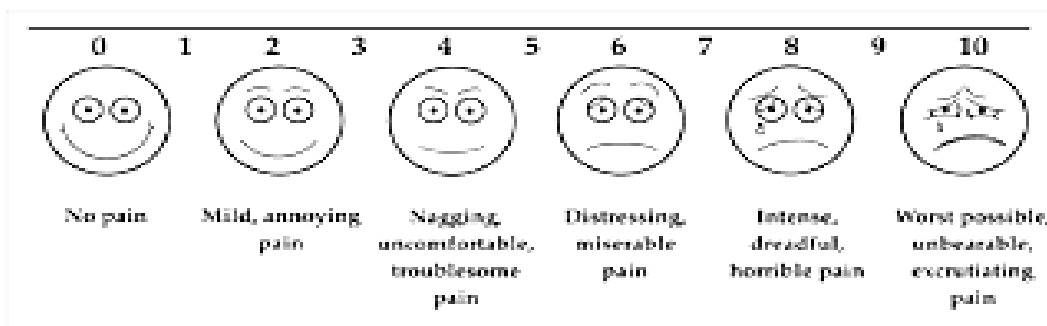


Fig. 2: Visual analogue scale for pain scoring

## Results

10 patients were identified as having suffered from an ocular injury associated with cyanoacrylate (table 1). All patients reported to the emergency maximum within 6 hours of the accident. They had not taken any primary treatment elsewhere and had brought with them the bottle/unim of the drug accidentally instilled. 8/10 patients were males and 2/10 were females. Age ranged from 22yrs to 38yrs (average age = 30 years). Occupation showed 4/10 in service, 2/10 students, 2/10 shopkeepers and 2/10 housewives. All were literate. The patients were divided into two groups, depending on the mode of injury. 8/10 (6 males and 2 females) patients incurred ocular injury due to mistaken identity of the adhesive with the prescribed eye drops. 2/10 (both males) patients sustained the trauma due to spray while opening the adhesive packing. Following the injury, all the patients reacted by immediately irrigating their eyes. On presentation at the ophthalmic emergency, irrigation was repeated in all (because of the complaints of stinging or conjunctival injection). The examination revealed isolated sticking of the eyelashes in 4/10 patients, associated chemical conjunctivitis in 5/10 and corneal abrasion in 2/10 patient. The pre-treatment pain ranged from 5 to 9 (mean= 6.9) with the maximum pain recorded in the patient with corneal abrasion. Post-treatment pain ranged from 1 to 6 (mean=2.5) with the maximum pain recorded again in the patient of corneal abrasion. No patient suffered any long term ocular morbidity.

## Discussion

Inadvertent ocular cyanoacrylate adhesive instillation mistaken for intraocular eye drops has been reported in the literature on several occasions since it was first described in 1982.<sup>(5)</sup> In the present study, we serially examined 10 patients of the cyanoacrylate ocular injury managed at ophthalmology department of a single tertiary care centre in North India during a 12 month period as shown in Table 1. 8/10 (6 males and 2 females) patients suffered ocular injury due to mistaken identity of the adhesive with the prescribed eye drops. The cause of ocular injuries can thus be attributed to patient carelessness. No child suffered from the cyanoacrylate injury in our study. We used visual analogue scale (VAS) for the pain assessment which is a psychometric response scale and frequently used method for the assessment of variations in intensity of pain. In clinical practice the percentage of pain relief, assessed by VAS, is often considered as a measure of the efficacy of treatment. Urgent medical consultation at the ophthalmic emergency at a tertiary centre, within 6 hrs of the accident, without taking any primary treatment suggest considerable psychological distress it causes to the victim and their relatives regarding significant loss of visual acuity and/or functional blindness. Besides, marked change in the pain score post treatment also points towards the same.

**Table 1: Summary of cases**

S. No	Age (years)	Sex	Occupation	literacy	Mode of injury	Pain score (pre-treatment)	Ocular injury	Treatment	Pain score (post-treatment)
1 (Fig. 3a,3b)	28	M	Shopkeeper	L	Glue splash from unim	6	Eyelashes stuck together with mild conjunctivitis	Treated conservatively	1
2	32	M	Service	L	Mistook glue for eye drop	6	Eyelashes stuck together	Treated conservatively	2
3	22	M	Student	L	Mistook glue for eye drop	7	Eyelashes stuck together	Treated conservatively	2
4 (Fig. 4)	25	F	Housewife	L	Mistook glue for eye drop	7	Mild conjunctivitis	Irrigated	2
5 (Fig. 5a, 5b)	38	M	Service	L	Mistook glue for eye drop	9	Conjunctivitis, corneal abrasion	Irrigated, antibiotic	6
6	35	M	Shopkeeper	L	Glue splash from unim	8	Mild conjunctivitis	Irrigated	2
7	32	M	Service	L	Mistook glue for eye drop	7	Eyelashes stuck together	Treated conservatively	2
8	23	M	Student	L	Mistook glue for eye drop	8	Mild conjunctivitis, corneal abrasion	Irrigated, antibiotic	5
9	28	F	Housewife	L	Mistook glue for eye drop	6	Eyelashes stuck together	Treated conservatively	1
10.	34	M	Service	L	Mistook glue for eye drop	5	Mild conjunctivitis	Irrigated	2



**Fig. 3a:** Case with accidental adhesive instillation in right eye, getting accumulated on the lids. Lower eyelashes were trimmed to separate the lids for examination. Torch light examination revealed only mild conjunctivitis



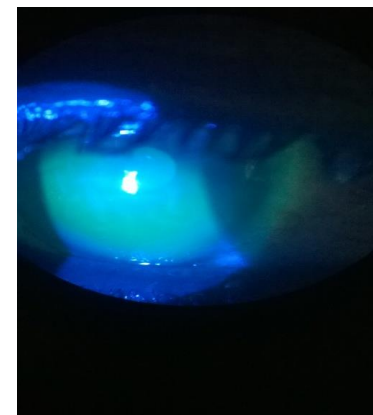
**Fig. 3b:** The same case after trimmed upper and lower eyelashes and irrigation of the right eye



**Fig. 4:** Case showing only mild conjunctivitis on accidental cyanoacrylate instillation in the right eye



**Fig. 5a:** Case presented with accidental pouring of the adhesive in the right eye. The adhesive got washed off on irrigating the eye with normal saline



**Fig. 5b:** The same case showed corneal abrasion on staining the right eye cornea with fluorescein stain

Cyanoacrylate glue has many applications in ophthalmology including temporary tarsorrhaphy for corneal exposure and ulceration, skin closure and blepharoplasty in oculoplastics, sealing impending or frank corneal perforations, aqueous leaks.<sup>(6)</sup> However, cyanoacrylate used commercially have a higher tissue toxicity. The Accidental instillation of commercial cyanoacrylate results in significant short term ocular morbidity. Those reported include corneal abrasion, punctate keratopathy, conjunctivitis and conjunctival abrasion, eyelid skin excoriation, loss of eyelashes, tarsorrhaphy, periocular dermatitis, invariable intense stinging or burning pain upon instillation.<sup>(7)</sup> When the glue drop is instilled, the patient spontaneously blinks forcibly due to burning pain in the eye because of its chemical nature and the glue is forcibly pushed on to the lid margin and eye lashes. Due to dry surface on the lid margins and eyelashes, the glue bonds these surfaces resulting in sticking of eyelashes or eyelid margins (ankyloblepharon). The glue, on coming in contact with conjunctiva or cornea, causes chemical conjunctivitis and keratitis, respectively.

There are two main principles in the management of ocular cyanoacrylate injuries. First is to reverse the chemically induced tarsorrhaphy so that detailed eye examination can be performed and visible glue can be removed. Secondly, to identify the ocular damage by fluorescein staining and treat the ocular damage as per the standard protocols. Immediate irrigation of the eyes helps in removing some of the glue and reduces the rate of condensation of the glue, and severity of resulting tarsorrhaphy and ocular damage. The ankyloblepharon is treated by trimming of eyelashes and separation of lid margins without the need of any anaesthesia in adults; the same has to be done under sedation/general anaesthesia in children. The cyanoacrylate glue can be removed by using acetone, which is a solvent for the glue; but in the eye acetone may cause chemical injury to the conjunctiva and cornea. Removal of the glue on the lid margins can be tried by frequent cleaning with acetone swab. Rubbing of margarine, high molecular weight oil, over the lid margins and eyelashes can be tried to remove the glue on the lid margins.<sup>(8)</sup> Though immediate medical aid will prevent ocular morbidity, 8/10 patients stating that they mistakenly poured the adhesive into their eyes instead of their prescribed eye drops, suggests that the risk of ocular accidental application of cyanoacrylate adhesive can be reduced by implementing changes in the design of the packaging which include distinctive shape of the bottles/unim, warning in bold print on the bottles, vertical ribs on the bottle.<sup>(9)</sup>

### Conclusion

We highlight the need for the introduction of design regulation for non-pharmaceutical companies. For example, child resistant packaging, changing the size, shape, and colour of bottles/unim. Childproofing would also reduce the likelihood of adults inadvertently pouring the adhesive into their eyes rather than their prescribed eye drops, as they would have to scrutinise the bottle much more carefully in order to remove the top and would thus realise they had picked up the wrong bottle.

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