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CASE REPORT
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Chemical-burns in the Pediatric Population due to Superglue are an Emerging Problem

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ABSTRACT

Cyanoacrylate is used to fix many different things and is now easily accessible in homes. Moisture causes an exothermic reaction that ignites it and causes burns. This paper discusses a one-year-old who had chemical burns after a superglue spillage. This paper attempts to raise awareness of appropriate burn management as first aid, which affects the outcome. It is necessary to place even more focus on ensuring that children are in a secure environment and that products made with cyanoacrylate have clear, understandable warnings about potential hazards.

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INTRODUCTION

Coover and Joyner introduced cyanoacrylate in 1942, in the Kodak laboratories, and its first commercially available derivative (methyl-2-cyanoacrylate), sometimes known as "Super Glue," was later launched in 1958.[1-3] 2-Octyl-cyanoacrylate, which was approved by the US Food and Drug Administration in 1998, is now widely used in healthcare as a tissue adhesive.[2] These liquid substances undergo an exothermic reaction known as hydroxylation, which causes them to polymerize in the presence of water, becoming a solid and waterproof substance.[1,3,4] With an average temperature of 68°C sustained for 12.2 seconds, Kelemen et al quantified the heat potential of these reactions and showed that these chemicals may be the cause of full-thickness burns. Despite the availability and extensive use of cyanoacrylate glues, reports of cutaneous burns are infrequent.[4]

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CASE REPORT

A one-year-old child (Figure 1 A) was first taken to the ophthalmic emergency with the history of spillage of superglue over the face. The child was unable to open his left eye due to adhesion of both eyelashes and spread of super glue over the face or nose, cheek, and periorbital region and left thigh. According to history, the child was at home playing on his own. His father, who has a shoe-repairing business, kept the super glue bottle on a small table. The child grabbed the super glue plastic nozzle bottle and was trying to eat the contents of the bottle. This led to the spillage of superglue on him. The child was taken to the ophthalmic emergency. He was cleaned with saline and was referred to the plastic surgery department as a case of chemical burns. The child was hospitalised to the plastic surgery department and taken for examination under general anaesthesia. It was found that the superglue caused chemical epilation of upper and lower lashes (Figures 1 B&C) along with large corneal epithelial abrasion (Figure 1 D). After removing the super glue from the bulbar conjunctiva thorough wash was given to the left eye. The glue was removed from eyelashes, and the ophthalmic department applied a bandage contact lens over the epithelial defect of the cornea. Superglue was also removed from the cheek, nose, eyelashes, and thighs. The corneal abrasions completely healed within two weeks, and other areas affected with chemical burns also healed within a few days.

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Figure 1 (A to D): (A) 1 year old child with chemical injury to face and closed eyelid due to adherent superglue. **(B)** Separation of eyelid is attempted. **(C)** Chemical epilation due to chemical glue of eyelashes seen. **(D)** Chemical epilation of both eye lashes seen with large corneal epithelial defect.

DISCUSSION

Children often get burns, which contribute significantly to both morbidity and death in this age range. Children are particularly vulnerable because they cannot detect danger, are impulsive, and lack the independence to escape risky circumstances like a house fire.[5] Most burns in children are thermal (approximately 60%), followed by scalds (about 25%) and chemical burns (about 9%). Thermal burns typically occur because of coming into contact with fire, a hot surface, or a hot liquid.[6] A liquid substance called cyanoacrylate is frequently found in homes, mostly in "superglue" and nail glue. The cyanoacrylates react and produce an exothermic reaction when they encounter moisture, which can result in a burn.[7]

In their case report, Tang *et al.* proposed a similar mechanism for the burn damage, with the patient's denim jeans' moisture acting as the catalyst for an exothermic reaction.[8] However, some writers have seen burns following direct adhesive contact with the skin.[9]

Since, the chemical burn caused by the adhesive is frequently not instantaneous, the patient is sometimes ignorant and fails to respond right away. Removing all traces of the chemical, including the contaminated clothes, and properly irrigating the region are essential steps in treating chemical burns. Pulling off clothes should be avoided, if it is severely stuck to the skin after a spill; instead, bathing the afflicted region in tap water is frequently useful.

Although, it is problematic outside of a hospital environment, monitoring the pH of the wound can be used to assess the effectiveness of the irrigation.[10] Concern has been expressed in the literature about the poor labelling of superglue products, which fails to emphasize the potential of burn injuries.[11]

All the burns were seen in children and were brought on by unintentional spills. It is crucial that people are aware that superglue is a chemical substance and that it should be kept out of the reach of youngsters. Additionally, all pediatric burn injuries should be exempt from non-accidental harm. The clinical result in the case described was consistent with the injury's circumstances and history.

Superglue-related chemical burns are rare.[11,12] There is no specific solvent available for treatment.[13] To soften the adhesive, it is advised to bathe the skin with soapy water. Acetone should not be applied to burnt skin and should only be used on skin that is still intact to dissolve cyanoacrylate. Burnt areas should be examined and treated as other thermal burns after any glue residue has been removed.[1,3]

Three decades ago, superglue was widely repackaged into dropper bottles that looked like eye drop bottles, leading to several incidents of unintentional ocular instillation. Superglue eye injuries are caused by accidentally injecting superglue drops into the eye that were mistaken for eye drops because both bottles have a similar appearance, or because the superglue tubing looks like an eye ointment tube.[14-16] The documented cases in the literature ascribed the cause of ocular injuries to patient negligence, who confused the glue for over-the-counter eye drops, patient misidentification by patients who had impaired vision and were administered topical eye treatments.[17] According to Mandal *et al.*, A mother accidentally applied superglue to her 6-year-old child's left eye, thinking it was chloramphenicol eye ointment.[18]

Even though these products are widely available, as was previously mentioned, these injuries are rarely recorded. Despite this, the labelling on cyanoacrylate compounds falls short in describing their potential for harm.[13] Only skin and eye irritation are mentioned in the safety information on the product's packaging,

and it is advised that these areas be immediately rinsed with tepid water and soap. Situations like the ones mentioned above could result from this lack of knowledge. Information on these items needs to be updated to emphasize their hazards.

CONCLUSION

Products with cyanoacrylate bases are widely available for residential usage due to their advantages. However, the damage they may cause is significant and can range from a bothersome form of persistent dermatitis to a terrible burn that may require surgical intervention. Further damage is restricted by prompt and appropriate management, which involves adhering to the standard thermal injury therapy. However, prevention is the most crucial element in the management of this injury. This case study emphasizes the value of creating a secure environment for kids, who can easily use plastic nozzle bottles. Additionally, the language of the warning warnings on these dangerous products should be basic, clear, and spoken locally.

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