Case Report

Pediatric Chemical Burn Case Related to Cyanoacrylate Glue

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Abstract

Cyanoacrylate glue is widely used in daily life. Because of its strong adhesive property, it is widely known as "super glues." Cyanoacrylate may cause burn injuries on the skin by their interaction with wool and cotton textiles that contact with the skin.

Keywords: Chemical burn, cosmetic nail, cyanoacrylate, super glue

Introduction

Cyanoacrylate is a general name for instant-acting methyl-2-cyanoacrylate and ethyl-2-cyanoacrylate glues.[1] Cyanoacrylate polymerizes after exothermic chemical reaction with the presence of water in the media and shows adhesive properties with the formation of long-chain bonds.[2] Cyanoacrylate glue is widely used in daily life. Because of its strong adhesive property, it is widely known as "super glues." Cyanoacrylate is used for wooden stuff fixation, cosmetically for nail prosthesis adhesion and many other areas. Even cyanoacrylate is used since 1970s for medical reasons, its derivative "Dermabond" (2-octyl-cyanoacrylate) approved by American Food and Drug Administration in 1998.[3]

Medically, it is used for inspection of fingerprints in forensic medicine, repair of noncomplicated superficial skin lacerations, for graft intake, and many other unique medical usages.[4] Besides its industrial utilization, daily usage of cyanoacrylate may cause burn injuries by their interaction with wool and cotton textiles that contact with the skin in by the way of showing up exothermic reaction.[5]

When a literature review is done about burns related to cyanoacrylate glues, it will be seen that there are not many cases, but their numbers are increasing recently.[5-11] Besides, most of the victims are in the pediatric age group. Every patient who suffers from chemical burn should be treated according to the causative agent. For that reason, we wanted to share our approach with this unusual chemical burn.

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Case Report

A 3½-year-old female patient was evaluated in the emergency room. According to the history taken from the parents, the child was found to be agitated and irritated after playing with "super glue" which was brought by his father from the workplace to home. The family had delivered the child to another hospital's emergency room on the day of injury. She had discharged from that hospital after dressings and reassurance.

Two days later, parents brought the child to our hospital's emergency room because of worsening of the injured area and agitation of the child. After a complete physical examination, perioral contractions related to glue and 2 cm × 10 cm-sized second-degree deep burn extending from the right supraclavicular area to posterior neck was noticed [Figure 1]. The patient was not in acute distress but was agitated and restless because of the perioral contractures and pain related to burn injury. After an initial intervention with wound cleansing and dressing change with mupirocin-impregnated gauze, the patient was offered to be internalized to burn unit because of her age, type of burn injury, and finally, anatomic location of the burn. The family

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told about split-thickness skin grafting (STSG) for the wound because of the second-degree deep burn. Parents rejected internalization of the child. They were acknowledged about the nature of burn and course of the injury and forthcoming issues such as the need for surgical debridement, hypertrophic scar, and contracture problems after healing.

Daily moisturizing massaging to perioral contractures, daily dressing changes with mupirocin-impregnated gauze for the burned area on the neck, and every other day close follow-ups with clinic visits recommended [Figure 2]. Our prior plan was grafting the burned area after debridement because after a second-degree burn, it might be healed with hypertrophic scar without intervention. Fortunately, burned area was healed with dressing changes in clinic follow-ups. After 4 weeks, the burned area was healed entirely but with a red scar line [Figure 3]. We suggested to our patient to apply silicon sheath for 6 months to prevent hypertrophic scarring and lifelong sunscreen protection of the injured area.

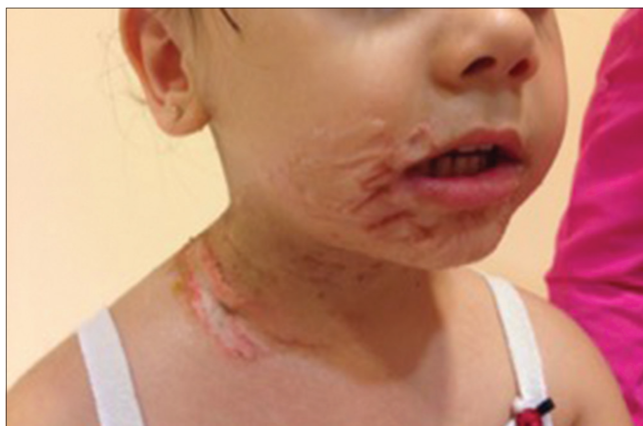

Figure 1: Second day after cyanoacrylate burn injury

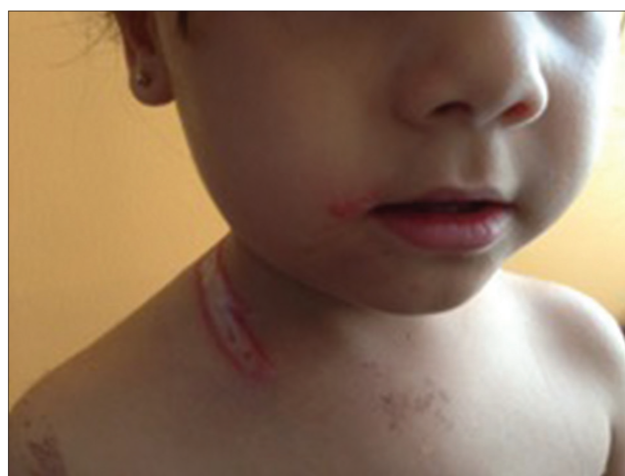

Figure 2: Second week of clinical follow-up

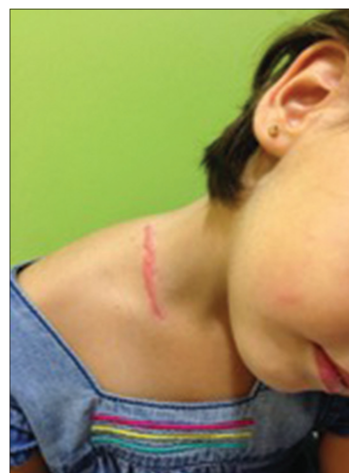

Figure 3: Fourth week of clinical follow-up

Discussion

Literature related with cyanoacrylate are mainly about medical utilization of it. However, there are also a few literature case reports related to burn injuries associated with cyanoacrylate. There are 12 literature articles about cyanoacrylate burn, and a total of 17 burn cases (our case report included) reported about cyanoacrylate. First published case report was from Japan, 2003 by Takeru *et al*.[6]

We wanted to highlight this type of burn because it is a chemical-related burn and that chemical is widely used in daily life and can be reached easily by everyone. For example, one of the cases is related to a senior person who had the burn after spoliation of glue on him mistakenly while using glue for wooden stuff.[7] Another important point that should be kept in mind about cyanoacrylate is that it is widely used in nail cosmetics. Moreover, there are cases reported of cyanoacrylate injury while using it for nail cosmetics.[9,11] In our case, injury was because the child was playing with glue.

As stated by Clarke, after contact with cyanoacrylate glue, individual should wash the skin with warm soapy water as soon as possible. Furthermore, acetone nail polish remover can be used to weaken cyanoacrylate bonds for the aim of the glue peel off from the skin. Never use a cotton swab as it can cause an exothermic reaction and burn injury.[5]

If there is contact with cotton or wool textile spilled with cyanoacrylate, the dress should be removed under warm water after wetting and gently to prevent further skin injury. If the burned area is a first-degree or superficial second-degree burn, it may be followed up with dressing changes.[5,7,8,10,11] However, if it is a deep and full-thickness burn, debridement and STSG are the surgical treatments of the case.[10] In special cases as in Arnout's case where the injury was at the tip of thumb, local flap coverage may be needed instead of STSG.[9]

In our case, the prior plan was STSG after surgical debridement. However, family rejected hospitalization and surgical treatment. By the way, the facial subunits such as cheek and nose where the dermal thickness is greater, respectively, responds good to conservative treatment in pediatric cases because of their vast blood supply. Fortunately, the injury was healed with a residual hyperemic scar. But, it is debatable that healing would be better after debridement and grafting.

Conclusions

Besides medical utilization, this chemical glue has widespread daily usage. For that reason, it is not very hard to access these type of chemical glues. So that these type of chemicals must be concealed to prevent easy access of pediatric age group as soon as possible after utilization. The most important point that should be kept in mind is that cyanoacrylate can cause burn by exothermic reaction with cotton and wool clothes. Hence, when it happens, beware to not to take out dress instantly. The injured area must be washed copiously with warm water then the dress must be removed gently to prevent further tissue injury and pain.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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