

Case Report

CYANOACRYLATE GLUE BURN INJURY IN 2 YEARS OLD CHILD

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ABSTRACT

Cyanoacrylate, a compound formed from formaldehyde and alkyl cyanoacetate, serves as a potent adhesive in daily life, cosmetics, medicine, and industry. Variants like methyl 2-cyanoacrylate and ethyl 2-cyanoacrylate are common for daily and industrial use, with butyl 2-cyanoacrylate preferred in surgery as an adhesive for its low toxicity. While typically safe for skin, frequent contact can lead to dermatitis, paronychia, and onycholysis. This case report highlights a superficial burn in a two-year-old child caused by cyanoacrylate adhesive. Such burns are rare but require attention. Treatment involves gently separating the adhesive from the skin using soapy water, followed by the use of acetone, petroleum jelly, 0.9% NaCl solution, or 5% sodium bicarbonate solution, followed by the use of pumice stone or nail file to remove residue. Preventive measures include careful glue placement to limit access, especially by children. Caution is crucial when handling cyanoacrylate adhesive near cotton or wool due to its adhesive properties. In summary, cyanoacrylate offers versatility but requires caution to prevent dermatological issues and burns, especially when catalysed by cotton.

Key Words : Burn; Cyanoacrylate; Glue; Paediatrics

Cyanoacrylate, yang merupakan senyawa yang terbentuk dari formaldehida dan alkil sianoasetat, berfungsi sebagai perekat yang kuat dalam kehidupan sehari-hari, kosmetik, kedokteran, dan industri. Varian seperti metil 2-sianoakrilat dan etil 2-sianoakrilat umum digunakan untuk keperluan sehari-hari dan industri, sedangkan butil 2-sianoakrilat lebih disukai dalam pembedahan sebagai perekat karena toksisitasnya yang rendah. Meskipun biasanya aman untuk kulit, kontak yang sering dapat menyebabkan dermatitis, paronikia, dan onikolisis. Laporan kasus ini menyoroti luka bakar superfisial pada anak berusia dua tahun yang disebabkan oleh perekat sianoakrilat. Luka bakar seperti ini jarang terjadi tetapi memerlukan perhatian. Pengobatan melibatkan pemisahan perekat dari kulit dengan lembut menggunakan air sabun, diikuti oleh penggunaan aseton, petroleum jelly, larutan NaCl 0,9%, atau larutan natrium bikarbonat 5%, diikuti oleh penggunaan batu apung atau kikir kuku untuk menghilangkan residu. Langkah pencegahan termasuk penempatan lem dengan hati-hati untuk membatasi akses, terutama oleh anak-anak. Kewaspadaan sangat penting ketika menangani perekat sianoakrilat dekat dengan kapas atau wol karena sifat perekatnya. Singkatnya, sianoakrilat menawarkan keberagaman tetapi memerlukan kehati-hatian untuk mencegah masalah dermatologis dan luka bakar, terutama ketika dikatalisasi oleh kapas.

Kata Kunci: Luka Bakar; Sianoakrilat; Lem; Pediatri

Conflicts of Interest Statement:

The author(s) listed in this manuscript declare the absence of any conflict of interest on the subject matter or materials discussed.

INTRODUCTION

Cyanoacrylate is a monomeric compound formed by the reaction of formaldehyde and alkyl cyanoacetate. This compound is commonly used as a strong adhesive (super glue) in daily household

applications, nail care, medical adhesives, and industries.¹ Utilization of Cyanoacrylate as a daily and industrial strong adhesive is available in the forms of methyl 2-cyanoacrylate and ethyl 2-cyanoacrylate.

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Figure 1. Initial Condition of The Burn Injury

Another form, butyl 2-cyanoacrylate, is used as a tissue and skin adhesive in surgeries due to its low toxicity and minimal risk of skin reactions.^{2,3} Daily utilization is generally safe especially for the skin. However, frequent exposure can lead to dermatitis, paronychia, and onycholysis.⁴

This case report presents an epidermis and superficial dermis burn injury in a two-year-old child following contact with cyanoacrylate glue. The burns occurred on the left side of the hand, chest, neck, and face region. There are limited case reports on burns caused by cyanoacrylate adhesive, so

this report is compiled to raise awareness of the dangers of cyanoacrylate glue and the appropriate initial management for cyanoacrylate glue burn injury.

CASE REPORT

This case occurred in a 2-year-old boy who suffered a burn injury after playing with super glue containing cyanoacrylate. Initially, the glue was handled with the child's left hand, and he then applied it to his face, extending to the left periorbital area and down to the neck and left chest. At the time



Figure 2. Condition of The Burn Injury After Initial Treatment

of the incident, the child's hand adhered to his eyelid, which startled the parents. They immediately brought the kids to the bathroom and rinsed the affected area with running water. As the adhesion could not be removed from his eyelid, the parents brought him to the emergency department (ED) for further assistance.

On the left side of the face, neck, chest, and hand, multiple epidermis and superficial dermis burn injuries measuring 2 cm x 3 cm each were found, totalling approximately 4% of the body surface area. Initial treatment involved administering 3x5 ml of paracetamol to alleviate pain. Vital signs were stable and a complete blood count revealed microcytic hypochromic anemia. The patient's urine output was monitored for 10 hours, totalling 400 cc. Subsequently, the burn injuries were covered with sterile dressings (steritulle). The child was also hospitalized for 1 day in the burn unit at RS Islam Cempaka Putih for observation.



Figure 3. Condition of The Burn Injury After Treatment



Figure 4. The Superglue That Caused Burn Injury To The Patients

DISCUSSION

Cases of burns caused by cyanoacrylate are still relatively rare. Typically, burns in children occur due to scalding with hot water. However, a few cases have reported that exposure to cyanoacrylate can lead to full-thickness burns.^{1,5} A good understanding of the properties of cyanoacrylate glue can help improve the adequacy of burn case management.

Cyanoacrylate is an organic monomeric compound in liquid form at room temperature. The adhesive properties of this compound can manifest after reacting with specific chemicals or electromagnetic waves. Catalysts that most rapidly trigger the adhesive reaction are textiles like cotton and wool.⁶ When the adhesive reaction occurs rapidly, it causes an increase in temperature. This temperature rise is due to the heat generated not being dissipated through conduction and convection as in typical polymerization reactions but accumulates. Excessive heat accumulation from the reaction between cyanoacrylate and fabric can reach temperatures of 68.8°C and persist for 12.2 seconds. This condition can lead to burns.^{7,8}

The primary initial treatment for burn cases caused by cyanoacrylate glue is not to remove the bond between the glue and cotton forcefully. Forced removal can lead to the detachment of the erythematous layer,

worsening skin damage, and causing severe pain for the child. Instead, it must be softened using soapy water. The addition of vinegar can also help soften the glue together with acetone as it is reported by Clarke, et al.⁹

In our case, we treated the patients with baby oil or mineral oil. Baby oil contains petroleum jelly. Various studies have shown that baby oil has good wound healing outcomes after 2-3 days of application. Baby oil is non-sticky and also non-allergenic.¹⁰ The use of baby oil, especially in developing countries, can be a beneficial alternative due to its lower cost and widely available in Asian countries. This happens as infant massage with baby oil is a common practice.¹¹

Other alternative fluids that can be used as an initial treatment include acetone, petroleum jelly gel (Vaseline), 0.9% NaCl solution, or a 5% sodium bicarbonate solution.¹² However, application of acetone has the risk of skin irritation and should be avoided when it is in contact with ocular.¹³

Using a pumice stone or nail emery board in warm water can be an option when the area is dry enough to remove any remaining glue. The prognosis for cases of burns caused by cyanoacrylate is generally good without complications, with healing typically occurring within 3 weeks to approximately 3 months. In some cases, hypertrophic scars and infections in the wound area have been reported.^{1,12}

CONCLUSION

The use of cyanoacrylate has many benefits, whether it is for daily utilization, cosmetics, medical, or industrial purposes. However, its use should be handled with care because repeated contact can lead to chronic dermatitis and even burns.

Burns caused by cyanoacrylate occur when there is a catalyst substance or material for the adhesive reaction, one of which is cotton. In the event of a burn caused by

cyanoacrylate, the initial treatment should involve using soapy water to release the bond between the skin and fabric. Subsequently, petroleum jelly oil (baby oil) can be applied to the area around the burn, and if it dries, it can be rubbed with a pumice stone or a nail emery board in warm water. Baby oil was chosen because it could be found easily and less expensive. As a preventive measure, the placement of this glue should be done carefully to ensure it is not easily accessible to children.

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