

Contact dermatitis after orthopaedic surgery

Contact Dermatitis 2009; 61: 299–300

M. Angeles Gonzalo-Garijo¹, Remedios Pérez-Calderón¹, Inmaculada Pérez-Rangel¹, Silvia Sánchez-Vega¹, Juan A. Constantino², M. Angeles Zambonino¹ and Juan Arroyo²

¹Department of Allergology, and ²Department of Traumatology and Orthopedics, Infanta Cristina University Hospital, Badajoz, Spain

Key words: allergic contact dermatitis; cyanoacrylates; ethyl-cyanoacrylate; octyl-cyanoacrylate; patch tests; tissue adhesives.

The evaluation of cutaneous reactions appearing after surgical procedures is a challenge due to the number of chemical products and materials used.

We report three patients (children, aged 12, 14, and 16 years) who had orthopaedic surgery and presented with eczematous reactions located at the surgical sites. One of them had had three operations to correct genu valgum; the second had been operated on twice for bone lengthening to correct achondroplasia, and the third had been operated on twice for pes planus. All of them complained of pruritus affecting the area of the operation 2–3 days after the first surgical intervention. When the dressings were removed 1–2 weeks later, a papulo-vesicular eruption was evident (Fig. 1). Although there was complete resolution within 15–20 days with topical corticosteroid, there was recurrence with successive interventions.



Fig. 1. The reaction one week after the orthopaedic intervention.

Table 1. Methacrylate series tested

Methacrylates tested
Methyl methacrylate 2% pet.
2-Hydroxyethylmethacrylate 2% pet.
2-Hydroxypropylmethacrylate 2% pet.
Ethyleneglycol dimethacrylate 2% pet.
Triethyleneglycol dimethacrylate 2% pet.
1,4-Butanedioldimethacrylate 2% pet.
Urethane dimethacrylate 2% pet.
2,2-Bis(4-(2-hydroxy-3-methacryloxypropoxy)phenyl)propane (BIS-GMA) 2% pet.

All patients were patch tested using the Spanish Contact Dermatitis Research Group baseline series (True Test[®], Mekos Laboratories, Hillerød, Denmark) and the contact allergens related to the surgical procedures: metals, methacrylates (Table 1), anti-septics, local anaesthetics, dressings, bandages, sutures, staples, adhesive tapes, disperse dyes, and glue Dermabond ProPen[®] (Ethicon Inc, Johnson & Johnson, Somerville, New Jersey USA). Curatest[®] chambers (Lohmann & Rauscher GmbH & Co. KG, Neuwied, Germany) on Oper Por (Iberhospitex S.A. Barcelona, Spain) were used. Patch test readings were performed according to the International Contact Dermatitis Research Group (ICDRG) guidelines. All three patients showed a positive reaction (+++) to Dermabond (containing 2-octyl-cyanoacrylate and D&C Violet 2) at D2 and D4. There were no other reactions. Unfortunately, the manufacturer of Dermabond did not provide us with detailed information about the composition of their product and did not supply us with the individual components for patch testing. Therefore, we excluded possible sensitization to D&C Violet 2 by testing several cosmetics that contained this substance. In addition to

that, we performed open patch tests with Dermabond as well as closed patch tests. The tests were positive at D2 and D4, but intense with the closed patches (+++) than with the open ones (++). The same patch tests were performed in five control patients with negative results.

To study possible cross reactivity among cyanoacrylates and to find alternatives, we performed patch tests with ethyl-2-cyanoacrylate 10% pet. (Chemotechnique, Vellinge, Sweden) and with Epiglu[®] (Meyer-Haake GmbH, Wehrheim, Germany) and Truglu[®] (Trusetal Verbandstoffwerk GmbH, Schloss Holte-Stukenbrock, Germany), commercial products that include this substance. Only one of our patients proved positive (+++) at D2 and D4 to three patch tests.

Cyanoacrylates are formed through the condensation of cyanoacetate and formaldehyde under heat and vacuum conditions. When in contact with various anionic substances, they polymerize into long chains forming a solid film that bridges the wounds and holds the apposed wound edges together. This polymerization is an exothermic reaction which may release significant heat (1).

2-Butyl-, 2-octyl-, and 2-ethyl-cyanoacrylate have been used as tissue adhesives for many years as an alternative to standard wound closure (2, 3). Reports about cutaneous adverse effects to these products are scarce: there are only some cases of foreign body reactions (4) and one case of allergic contact dermatitis due to 2-octyl-cyanoacrylate (5). 2-Ethyl cyanoacrylate has caused contact dermatitis when used in nail cosmetics (6) or dental procedures (7).

The reactions shown by our patients to 2-octyl-cyanoacrylate could have been the result of active sensitization due to the conditions of the adhesive application. Although our patients reported itching 2 days after surgery, this is a common complaint in other patients who do not develop lesions later on and could be due to irritancy. A previous sensitizing exposure could be possible in the case of ethyl-cyanoacrylate as glues based on this product are widely used as contact adhesives.

There are no cross reactions among cyanoacrylates and other acrylates such as methacrylates (6), and we have not found reports about cross reactivity among cyanoacrylates. In our case, only one patient was sensitized both to octyl- and ethyl-cyanoacrylate, maybe due to a co-sensitization.

In conclusion, we report three cases of allergic contact dermatitis due to

2-octyl-cyanoacrylate, a glue often used in orthopaedic surgery and commonly well tolerated. Only one of our patients was sensitized to both octyl- and ethyl-cyanoacrylate.

References

1. Singer A J, Quinn J V, Hollander J E. The cyanoacrylate topical skin adhesives. *Am J Emerg Med* 2008; 26: 490–496.
2. Farion K, Osmond M H, Hartling L et al. Tissue adhesives for traumatic lacerations in children and adults. *Cochrane Database Syst Rev* 2002; 3: CD003326.
3. Coulthard P, Worthington H, Esposito M, Elst M, Waes O J. Tissue adhesives for closure of surgical incisions. *Cochrane Database Syst Rev* 2004; 2: CD004287.
4. Dragu A, Unglaub F, Schwarz S et al. Foreign body reaction after usage of tissue adhesives for skin closure: a case report and review of the literature. *Arch Orthop Trauma Surg* 2009; 129: 167–169.
5. Hivnor C M, Hudkins M L. Allergic contact dermatitis after postsurgical repair with 2-octylcyanoacrylate. *Arch Dermatol* 2008; 144: 814–815.
6. Kanerva L, Estlander T. Allergic onycholysis and paronychia caused by cyanoacrylate nail glue, but not photo-bonded methacrylate nails. *Eur J Dermatol* 2000; 10: 223–225.
7. Leggat P A, Kedjarune U, Smith D R. Toxicity of cyanoacrylate adhesives and their occupational impacts for dental staff. *Ind Health* 2004; 42: 207–211.

Address:

Dra. M. Angeles Gonzalo-Garijo
Hospital Universitario Infanta Cristina
Servicio de Alergología
Carretera de Portugal s/n
06080 Badajoz, Spain
Tel: +34 924 21 81 00
Fax: +34 924 21 81 10
e-mail: magonzalog@telefonica.net