

Contact Dermatitis Reaction to 2-Octyl Cyanoacrylate Following 3 Orthopedic Procedures

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abstract

Two-octyl cyanoacrylate is a popular skin adhesive used for closing surgical incisions. Since Food and Drug Administration approval in 1998, the few reports of adverse reactions following its use have primarily been limited to the nonorthopedic literature. The authors present a case series of contact dermatitis associated with 2-octyl cyanoacrylate following orthopedic surgery and a review of the literature on the diagnosis and treatment of this complication. All 3 patients presented with blistering around their incisions within 2 weeks of surgery and responded to treatment involving removal of the offending agent and use of oral diphenhydramine and hydroxyzine and topical triamcinolone. One case was complicated by a draining hematoma, requiring irrigation and debridement. Complete resolution occurred in all cases. This case series is intended to increase awareness in the orthopedic community of allergic contact dermatitis to 2-octyl cyanoacrylate and its appropriate treatment. [Orthopedics. 201x; xx(x):xx-xx.]

CASE REPORTS

Patient 1

A 14-year-old girl presented to the authors' clinic with a skin reaction over her surgical incision site 5 days after knee arthroscopy, distal femoral osteotomy, and medial patellofemoral ligament reconstruction. Her incision had been closed in layers using Monocryl (Ethicon) sutures followed by Dermabond, adhesive bandage strips, and a nonocclusive dressing. She reported 3 days of pain and a burning sensation worse on the medial side of her knee. Examination revealed a well-circumscribed area of erythema,

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The authors have no relevant financial relationships to disclose.

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Received: February 7, 2017; Accepted: August 2, 2017.

doi: 10.3928/01477447-20170918-08

Dermabond (2-octyl cyanoacrylate; Ethicon, Somerville, New Jersey) is a popular skin adhesive used for closing surgical incisions. Since Food and Drug Administration approval in 1998, the few reports of adverse reactions following its use have primarily been limited to the nonorthopedic literature. This series identifies 3 cases of contact dermatitis associated with Dermabond following orthopedic surgery at 1 institution during the course of 1 year. The 3 patients had prior exposure

to Dermabond and presented with similar timelines and symptoms. All 3 responded to treatment involving removal of the offending agent and use of oral and topical medications to complete resolution. The authors review their treatment algorithm and the current literature on the diagnosis and treatment of this complication. This case series is intended to increase awareness in the orthopedic community of allergic contact dermatitis to Dermabond and its appropriate treatment.



Figure 1: Photograph of patient 1's knee 3 days after surgery. A well-circumscribed area of erythema, vesicles, and induration consistent with contact dermatitis is evident. Streaking blisters are present on all locations contacted by the skin adhesive.



Figure 3: Photograph of patient 1's knee 2 weeks after irrigation and debridement, 4 weeks after the index procedure, and after removal of glue and treatment with oral diphenhydramine.

vesicles, and induration consistent with contact dermatitis most pronounced over the medial incision, with streaking blisters present on all locations contacted by the skin adhesive (**Figures 1-2**). Petroleum jelly was applied to effect a chemical decomposition of the skin glue permitting removal, and she was treated with oral diphenhydramine and topical triamcinolone cream. After removal of the Dermabond, she experienced immediate improvement of her symptoms and the blisters began to resolve. A draining hematoma occurred 2 weeks postoperatively, requiring irrigation and debridement. Two weeks after this second operation, her incisions were healing without evidence of infection or fluid collection (**Figure 3**). All blisters resolved by 5 weeks postoperatively. She had no documented allergies and had been exposed to Dermabond after a knee arthroscopy 1 year earlier with no reaction.



Figure 2: Photograph of patient 1's knee 3 days after bandage removal.

Patient 2

A 41-year-old man presented with a surgical site reaction 2 weeks after a high tibial osteotomy and meniscal debridement. The surgical incision had been closed in layers using Vicryl (Ethicon) and Monocryl sutures followed by skin closure with Dermabond and a nonocclusive dressing. At his 2-week follow-up, the patient presented with blisters along the medial incision, several of which were open and draining. There was no surrounding erythema, no pain with short arc range of motion, and no evidence of impaired wound healing. He was treated with removal of the Dermabond in the clinic and oral hydroxyzine. One week later, he had complete resolution of blisters without drainage or signs of infection. He had no documented allergies and had been previously exposed to Dermabond following a high tibial osteotomy on the contralateral leg.

Patient 3

A 12-year-old girl presented with a surgical site reaction 11 days after remov-

al of a flexible nail from the right radius. An incision had been made at the distal radius to remove the nail and had been closed in layers with Vicryl and Monocryl sutures followed by Dermabond and an occlusive island dressing. Eleven days following surgery, she developed an itchy and painful vesicular rash directly along the distal radius incision as well as a blister just distal to the incision. Her mother was advised to remove the Dermabond using petroleum jelly and to treat with oral diphenhydramine. Two days later, the rash had largely resolved and the blister had resorbed. She has since had routine healing without issues. She had no documented allergies and had been exposed to Dermabond when the flexible nails were placed 9 months earlier.

DISCUSSION

Dermabond is a popular skin adhesive used for closing surgical incisions. Advantages include speed and ease of use, sealing of the wound, and omitting the need for suture removal. Additionally, its use may potentially improve cosmetic outcomes and lower wound infection rates.^{1,2} Dermabond is a cyanoacrylate adhesive that is maintained in the liquid state by an acidic stabilizer. Interaction with water molecules on the skin neutralizes the stabilizer, permitting polymerization.³ The rapid polymerization of cyanoacrylates is believed to minimize the chances of immunosensitization.^{2,4} After polymerization, the degradation products of these adhesives, namely cyanoacetate and formaldehyde, have the potential to accumulate in surrounding skin and trigger a contact dermatitis. The 2-octyl cyanoacrylate of Dermabond is longer chained and degrades more slowly than other adhesives, theoretically reducing the risk of inducing such a reaction.^{5,6}

There were no published cases of adverse reactions to Dermabond until the late 2000s. Although rare, a handful of reports have been published in recent

years describing cases of allergic contact dermatitis due to type IV hypersensitivity reaction to Dermabond.⁴⁻¹⁰ This reaction is distinguished from an irritant dermatitis by its delayed presentation, appearing at least several days, and typically 1 to 3 weeks, after application.^{2,6,10,11} Only a few of these recent reports have focused on orthopedic cases.^{2,5,8,10} Durando et al¹⁰ published the largest series after surgeons began to notice a rash around incision sites after instituting the use of Dermabond to close incisions. They found that 15 (1.7%) of 912 patients developed a contact dermatitis reaction during a 3-year period following total knee arthroplasty. In all cases, the rash was cleared with topical steroids and there were no recurrences.¹⁰

Allergic contact dermatitis to Dermabond is an eczematous reaction focused in the area of application that arises between 3 days and 3 weeks following application.^{2,4-7,9,10,12} The skin reaction can vary from simple erythema to bullous plaques with intense, painless pruritus.^{4,11} Prior sensitization to Dermabond, as seen in all 3 of the current cases, is required for subsequent allergic reaction and is an important part of the history to consider for the diagnosis.¹¹ Therefore, a past history of no reaction to Dermabond does not preclude the development of contact dermatitis. Additionally, the application technique and the duration of skin contact play a role in the development of a reaction. Dermabond should not be used on open wounds or partially closed incisions, as exposure below the epidermis may increase the risk of immunosensitization.^{4,11}

Once identified, initial treatment consists of removal of the offending

agent.^{6,7,9} One manufacturer suggests using petroleum jelly or acetone, which weaken the glue polymerization. Other authors suggested the use of forceps, warm water soaks, and soap and rubbing with gauze.^{6,7} Lower-potency topical steroids such as triamcinolone may be used to treat the dermatitis, while an antihistamine such as hydroxyzine or diphenhydramine can provide symptomatic relief.^{2,4,6,7,10,12} Despite a concern for impairing wound healing, oral steroids have also shown efficacy.⁹

Although the adhesive theoretically lowers the risk of infection by immediately sealing the wound, the inflammation associated with a contact dermatitis reaction may impair wound healing.¹³ Additionally, pruritus can lead to scratching, resulting in microabrasions in the skin acting as a nidus for infection, or may cause disruption of hemostasis, leading to hematoma formation.

CONCLUSION

Rates of allergic contact dermatitis attributed to Dermabond are low. However, as the use of Dermabond continues to expand in orthopedics and other fields, it is important to remain cognizant of this complication. Selectively applying Dermabond and minimizing its duration of skin contact appear to reduce the chances of reaction. Initial treatment includes removing the glue and administering topical or oral steroids and antihistamines. Patients and physicians should be aware of this complication so that it can be identified and treated early. The potential association of contact dermatitis and wound infection should be further assessed.

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