



Letter

Anaphylaxis after application of topical bacitracin-neomycin powder

Bacitracin is a peptide antibiotic, produced by *Bacillus subtilis*, that can inhibit the synthesis of various gram-positive bacteria on the cell wall.

Bacitracin was discovered in 1943 and has increasingly become a popular reagent in different topical products, such as cosmetics, cutaneous ointments, and powders, as a standalone drug or in combination with other antibiotics.

Although this drug was supposed to carry a low sensitization profile, this could not be confirmed by the increasing evidence of allergic delayed contact reactions. For this reason, in the early 1990s, the North American Contact Dermatitis Group listed bacitracin among the top 10 allergens (8–9% positive patch test results).^{1,2} IgE-mediated reactions, such as contact urticaria and anaphylaxis, also were reported, which are potentially life-threatening events, albeit rare.

We report a case of anaphylaxis after the application of powder containing bacitracin on the skin.

A 54-year-old man with a history of rhinitis and allergic asthma was referred to our allergy outpatient clinic for a supposed episode of drug-induced anaphylaxis. Six months previously, he had a mild traumatic skin laceration and he applied to his right first toe an antibiotic powder containing bacitracin, neomycin glycine, cysteine, and threonine (Cicatrene powder; Johnson & Johnson SpA, Rome, Italy). After 5 minutes, he developed local itching that rapidly spread to the rest of his body. This was followed by a sensation of throat constriction, dyspnea, and generalized malaise without loss of consciousness. He was promptly transported to the emergency department of the nearest hospital, where he was found to be slow and unable to respond to commands promptly.

The patient previously used the same powder on many other occasions without developing any immediate or delayed reaction. On physical examination, the skin was diffusely erythematous, with bilateral eyelid edema and conjunctival redness, and diffuse wheezing was found at chest examination. Blood pressure was 70/50 mmHg, heart rate was 130 rpm, and pulse oximetry was 88% on room air.

He was placed on an oxygen mask and given intravenous saline, epinephrine, chlorphenamine, and methylprednisolone, resulting in complete resolution within 90 minutes. The patient showed no signs of a late reaction and was discharged 12 hours after admission.

During the acute phase of the reaction, tryptase levels were not measured. Skin prick test reactions with common inhalants were positive for house dust mites, birch, ragweed, and *Parietaria* pollens. His basal tryptase level was 5.7 µg/L.

We performed an open patch test using the discrete components of the powder. Neomycin (20% in petrolatum; Almirall SA, Barcelona, Spain), bacitracin (15% in petrolatum; FIRMA, Florence,

Italy), and a panel of other aminoglycoside antibiotics, including streptomycin sulfate (2%; FIRMA), dihydrostreptomycin sulfate (2%; FIRMA), amikacin sulfate (20%; FIRMA), kanamycin sulfate (25% in petrolatum; Almirall), gentamicin sulfate (25%; FIRMA), amikacin (20%; FIRMA), spectinomycin chlorohydrate (20%; FIRMA), netilmicin sulfate (20%; FIRMA), and the polypeptide polymyxin B sulfate (3% in petrolatum; Almirall) were applied to intact skin on the back. After 15 minutes, the patient developed pruritus on the back and at 20 minutes positive results were observed for bacitracin (wheal 10 × 10 mm and erythema 50 mm; Fig 1) and polymyxin B (wheal 7 × 6 mm). We also performed an additional skin prick test with neomycin, which yielded a negative reaction.

To our knowledge, this is the first case of anaphylaxis after the cutaneous application of powder containing bacitracin, resulting in an immediate positive response to patch testing.

The first anaphylactic episode to bacitracin was reported in 1967 in a woman who applied this antibiotic to a stasis ulcer.³ Twenty additional cases were subsequently described with different types of exposure, including intraoperative irrigations during cardiac procedures.⁴ However, only a few case reports have highlighted the allergological workup that was used to identify the causative agent when an association of antibiotics was involved.

Currently reported methods to test allergic reaction to bacitracin are passive transfer (Prausnitz-Kustner testing) in monkeys⁵ and in a single human subject,⁶ skin testing, and the levels of IgE against bacitracin using bacitracin and streptavidin ImmunoCAP testing (Phadia, Uppsalla, Sweden).⁷



Figure 1. Patch test reading after 15 minutes; positive response to bacitracin and negative result to neomycin.

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In 2008 Schroer et al.⁸ suggested that skin prick testing with an individual topical preparation was a useful and safe procedure to determine the cause of anaphylaxis in a patient who applied a topical neosporin preparation, thus confirming the findings of Saryan et al.⁹ However, in the present case, the integrity of the skin was lost owing to a traumatic injury, which allowed the absorption and entry of the drug into the systemic circulation. Therefore, we performed a patch test with an immediate reading on intact skin because of the severity of the reaction that occurred and the hypothesis of an immediate contact sensitization.

We observed for the first time a simultaneous positive patch test reaction to bacitracin and polymyxin B in the presence of an immediate reaction, whereas a positive result for the same test was reported only in cases of delayed reactions.¹⁰

Anaphylaxis to topical bacitracin occurs rarely, not only with ointments but also with powder products (usually commercialized without a medical prescription), particularly when the skin barrier is not intact, even in the absence of previous local pruritus and urticaria.

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