

# Anaphylactic Reaction to Bacitracin Ointment

Hyland Cronin, MD; Christen Mowad, MD

*We report a case of an 11-year-old boy who experienced an anaphylactic reaction after administration of bacitracin ointment. After falling and scraping his left elbow, bacitracin ointment was applied to the wound. Within minutes, he experienced an adverse reaction consisting of bilateral pruritus of the feet, which quickly progressed to his head; diaphoresis; nausea; vomiting; facial pallor; and hives. An epinephrine injection was administered and the boy immediately felt better. He was taken to the emergency department and given intravenous methylprednisolone sodium succinate and intravenous diphenhydramine hydrochloride. He was kept for observation, recovered well, and was discharged with prescriptions for prednisone and diphenhydramine hydrochloride. We discuss other similar cases so physicians continue to be aware of this rare yet potentially life-threatening reaction to a commonly used medication.*

*Cutis.* 2009;83:127-129.

Cases of anaphylactic reactions to bacitracin ointment have been reported following exposure to clean dermatologic surgical wounds, stasis dermatitis/stasis ulcers, atopic dermatitis, skin graft donor sites, burn wounds, venous ulcers, abrasions, new tattoos, tinea pedis, lacerations, and excoriations, or when used for intraoperative irrigation, intranasal packing, and insertion of ventriculoperitoneal shunt (Table).<sup>1-22</sup> Physicians need to be conscious of both the immediate IgE-mediated (anaphylactic) and delayed cell-mediated (allergic

contact dermatitis [ACD]) reactions to bacitracin ointment.<sup>20</sup> We report a case of an anaphylactic reaction in an 11-year-old boy after administration of bacitracin ointment to an elbow scrape.

## Case Report

An 11-year-old boy presented to the school nurse after falling and scraping his left elbow. The nurse applied bacitracin ointment to the wound and the boy was sent back to the classroom. Within a few minutes, he began experiencing bilateral pruritus of the feet, which quickly progressed to his head. He became diaphoretic and nauseated. The teacher sent him back to the nurse when he reported feeling something stuck in his throat. He then began vomiting and developed facial pallor and hives, which all occurred within 5 minutes. The nurse administered an epinephrine injection and the boy immediately felt better. He was taken to the emergency department where he was administered intravenous methylprednisolone sodium succinate and intravenous diphenhydramine hydrochloride. He was kept for observation, recovered well, and was discharged with prescriptions for prednisone and diphenhydramine hydrochloride. On later questioning, he reported having previously received bacitracin ointment for application to minor cuts but never a similar reaction or rash.

## Comment

Bacitracin ointment is a widely used antibiotic discovered more than 60 years ago after being cultured from a dirty wound in a young girl named Margaret Tracy, hence the name *bacitracin*. It is a polypeptide complex derived from cultures of *Bacillus subtilis* that inhibits cell-wall synthesis. Bacitracin is active against a variety of gram-positive organisms. This over-the-counter product frequently is used on the skin, eyes, and ears, and often is used in combination

Accepted for publication September 9, 2008.

From Geisinger Health System, Danville, Pennsylvania.

The authors report no conflict of interest.

Correspondence: Christen Mowad, MD, Geisinger Health System, 100 N Academy Ave, MC 14-06, Danville, PA 17822 (cmowad@geisinger.edu).

## Case Reports of Documented Anaphylactic Reactions to Bacitracin Ointment (2003-2007)

Reference (Year)	Drug	Exposure (Administration)	Prior Exposure
Antevil et al <sup>18</sup> (2003)	Bacitracin	Revision of total knee arthroplasty (intraoperative irrigation)	Multiple
Freiler et al <sup>19</sup> (2005)	Bacitracin	Pacemaker change and laser lead extraction (intraoperative irrigation and bacitracin soaked gauze)	Bacitracin
Greenberg et al <sup>20</sup> (2007)	Bacitracin	Application to new tattoo (topical)	Unknown
Sharif and Goldberg <sup>21</sup> (2007)	Bacitracin	Laceration on arm (topical)	Multiple

with other topical preparations such as neomycin sulfate and polymyxin.<sup>11</sup>

Bacitracin ointment is well-tolerated, but there has been an increased incidence of ACD and, in rare cases, it has been reported to cause an anaphylactic reaction. Throughout the 1990s, a sudden increase in ACD to bacitracin ointment occurred. Bacitracin was rated as the contact allergen of the year in 2003 by the North American Contact Dermatitis Group because its incidence of allergic reactions increased from 1.5% in 1989-1990 to 9.2% in 1998-2000.<sup>23-25</sup> According to a study of 5148 patients conducted by the North American Contact Dermatitis Group (2003-2004), bacitracin was the ninth most common allergen, with a reported incidence of 7.9%.<sup>26</sup> Commonly combined with neomycin sulfate and polymyxin, allergy seen with bacitracin and neomycin sulfate is likely caused by coreactivity because they are chemically different structures.<sup>27,28</sup> Allergy seen with bacitracin and polymyxin is likely caused by cross-reactivity because they are both derived from *B subtilis*.<sup>28,29</sup>

Although rare, anaphylactic reactions have been reported after administration of bacitracin ointment. In prior reported cases as well as our patient, bacitracin ointment was applied to compromised skin barriers, thus allowing quicker absorption.<sup>1-22</sup> Also, in many of these cases, the patients had known histories of prior use or sensitization to bacitracin ointment.<sup>1-6,8-16,18-19,21</sup> These life-threatening IgE-mediated events are rare but noteworthy in severity. A broad spectrum of exposures has been reported. Studies have shown that the use of white petrolatum versus bacitracin ointment for a wound dressing may reduce the chance for ACD and a life-threatening anaphylactic reaction.<sup>30-32</sup>

## Conclusion

The widespread availability and use of bacitracin ointment in recent decades has led to a highly recognized increase in incidence of ACD as well as reports of life-threatening anaphylactic reactions. We report this case of an anaphylactic reaction along with other accounts in the literature so physicians continue to be aware of this rare yet potentially life-threatening reaction to a commonly used medication. The use of white petrolatum versus bacitracin ointment in the setting of clean dermatologic surgical wounds may help prevent adverse outcomes.<sup>30-32</sup>

## REFERENCES

- Comaish JS, Cunliffe WJ. Absorption of drugs from varicose ulcers: a cause of anaphylaxis. *Br J Clin Pract.* 1967;21:97-98.
- Roupe G, Strannegard O. Anaphylactic shock elicited by topical administration of bacitracin. *Arch Dermatol.* 1969;100:450-452.
- Vale MA, Connolly A, Epstein AM, et al. Bacitracin-induced anaphylaxis [letter]. *Arch Dermatol.* 1978;114:800.
- Schechter JE, Wilkinson RD, Del Carpio J. Anaphylaxis following the use of bacitracin ointment. report of a case and review of the literature. *Arch Dermatol.* 1984;120:909-911.
- Goh CL. Anaphylaxis from topical neomycin and bacitracin. *Australas J Dermatol.* 1986;27:125-126.
- Netland PA, Baumgartner JE, Andrews BT. Intraoperative anaphylaxis after irrigation with bacitracin: case report. *Neurosurgery.* 1987;21:927-928.
- Elsner P, Pevny I, Burg G. Anaphylaxis induced by topically applied bacitracin. *Am J Contact Dermat.* 1990;1:162-164.
- Eedy DJ, McMillan JC, Bingham EA. Anaphylactic reactions to topical antibiotic combinations. *Postgrad Med J.* 1990;66:858-859.

9. Sprung J, Schedewie HK, Kampine JP. Intraoperative anaphylactic shock after bacitracin irrigation. *Anesth Analg*. 1990;71:430-433.
10. Farley M, Pak H, Carregal V, et al. Anaphylaxis to topically applied bacitracin. *Am J Contact Dermat*. 1995; 6:28-31.
11. Dyck ED, Vadas P. Anaphylaxis to topical bacitracin. *Allergy*. 1997;52:870-871.
12. Saryan JA, Dammin TC, Bouras AE. Anaphylaxis to topical bacitracin zinc ointment. *Am J Emerg Med*. 1998;16:512-513.
13. Lin F, Woodmansee D, Patterson R. Near-fatal anaphylaxis to topical bacitracin ointment. *J Allergy Clin Immunol*. 1998;101:136-137.
14. Gall R, Blakely B, Warrington R, et al. Intraoperative anaphylactic shock from bacitracin nasal packing after septorhinoplasty. *Anesthesiology*. 1999;91:1545-1547.
15. Carver ED, Braude BM, Atkinson AR, et al. Anaphylaxis during insertion of a ventriculoperitoneal shunt. *Anesthesiology*. 2000;93:578-579.
16. Blas M, Briesacher KS, Lobato EB. Bacitracin irrigation: a cause of anaphylaxis in the operating room. *Anesth Analg*. 2000;91:1027-1028.
17. Morales CM, Verdecchia S, Lang DM. Intraoperative anaphylaxis to bacitracin during breast augmentation surgery [abstract 436]. *J Allergy Clin Immunol*. 2002; 109(suppl):S149.
18. Antevil JL, Muldoon MP, Battaglia M, et al. Intraoperative anaphylactic shock associated with bacitracin irrigation during revision total knee arthroplasty. a case report. *J Bone Joint Surg Am*. 2003;85-A: 339-342.
19. Freiler J, Steel K, Hagan L, et al. Intraoperative anaphylaxis to bacitracin during pacemaker change and laser lead extraction. *Ann Allergy Asthma Immunol*. 2005;95: 389-393.
20. Greenberg K, Espinosa J, Scali V. Anaphylaxis to topical bacitracin ointment. *Am J Emerg Med*. 2007;25: 95-96.
21. Sharif S, Goldberg B. Detection of IgE antibodies to bacitracin using a commercially available streptavidin-linked solid phase in a patient with anaphylaxis to triple antibiotic ointment. *Ann Allergy Asthma Immunol*. 2007;98: 563-566.
22. Jacob S, James W. From road rash to top allergen in a flash: bacitracin. *Dermatol Surg*. 2004;30:521-524.
23. Marks JG Jr, Belsito DV, DeLeo VA, et al. North American Contact Dermatitis Group standard tray patch test results (1992 to 1994). *Am J Contact Dermat*. 1995;6:160-165.
24. Marks JG Jr, Belsito DV, DeLeo VA, et al; North American Contact Dermatitis Group. North American Contact Dermatitis Group patch-test results, 1998 to 2000. *Am J Contact Dermat*. 2003;14:59-62.
25. Sood A, Taylor JS. Bacitracin: allergen of the year. *Am J Contact Dermat*. 2003;14:3-4.
26. Warshaw EM, Belsito DV, DeLeo VA, et al. North American Contact Dermatitis Group patch-test results, 2003-2004 study period. *Dermatitis*. 2008;19:129-136.
27. Grandinetti PJ, Fowler JF Jr. Simultaneous contact allergy to neomycin, bacitracin, and polymyxin. *J Am Acad Dermatol*. 1990;23(4, pt 1):646-647.
28. Mowad CM. Allergens of new and emerging significance. *Dermatol Nurs*. 2006;18:545-548.
29. Marks JG Jr, DeLeo VA, Elsner P. Medicaments. In: Marks JG Jr, DeLeo VA, Elsner P, eds. *Contact and Occupational Dermatology*. 3rd ed. St. Louis, MO: Mosby; 2002:201-216.
30. Smack DP, Harrington AC, Dunn C, et al. Infection and allergy incidence in ambulatory surgery patients using white petrolatum vs bacitracin ointment: a randomized controlled trial. *JAMA*. 1996;276:972-977.
31. James W. Use of antibiotic-containing ointment vs plain petrolatum during and after clean cutaneous surgery. *J Am Acad Dermatol*. 2006;55:914-916.
32. Jacob SE, James WD. Bacitracin after clean surgical procedures may be risky [letter]. *J Am Acad Dermatol*. 2004;51:1036.