

Allergic Contact Dermatitis from Ethyl Chloride and Benzocaine

Juan Luis Anguita Carazo, Blanca Sáenz de San Pedro Morera, Luis Palacios Colom, and José Manuel Gálvez Lozano

Ethyl chloride (EC) or chloroethane (C_2H_5Cl) is a volatile halogenated hydrocarbon. Reports of contact sensitivity to this gas are infrequent considering its widespread use as a local anesthetic, and it may have a relatively low sensitization potential. Benzocaine is another local anesthetic derivative of the ethyl ester of para-aminobenzoic acid, previously reported as a causative agent of delayed hypersensitivity reactions. We present a patient who developed a generalized itching dermatitis after the application of a medical aerosol containing EC, as well as facial angioedema and tongue swelling after the local application of benzocaine. Patch-test results were positive for EC "as is" (++) , benzocaine 5% in petrolatum (++) , and caine mix (+++) at 96 hours (day 4). The possibility of cross-sensitization between both drugs would not have been chemically plausible. We report the first published clinical case of contact allergic dermatitis from two chemically unrelated local anesthetics (EC and benzocaine) in the same patient.

Case Report

Thirty-six hours after the local application of ethyl chloride on a surgical wound, a 54-year-old woman developed a widespread, pruriginous, erythematous papular eruption, which resolved with parenteral steroids. One year later, she experienced another adverse reaction (facial angioedema and swelling of the tongue) 30 hours after the local application of benzocaine solution to her oral cavity with impregnated cotton-wool.

After written informed consent had been obtained, an allergy study that included patch testing, modified occlusive patch testing with ethyl chloride, prick and intradermal testing with lidocaine, ice testing, and a subcutaneous challenge test with lidocaine commenced. She was patch-tested on her upper back with the European epicutaneous standard series (the Thin-Layer Rapid Use Epicutaneous [T.R.U.E.] Test, Stallergenes Ibérica S.A., Barcelona, Spain), benzocaine 5% in petrolatum (pet) (provided by Bial Industrial Farmaceutica S.A., Bilbao, Spain), ethyl chloride (provided by ERN Lab S.A., Barcelona, Spain) as is, and petrolatum as a negative

control. A modified patch-test procedure was performed to test ethyl chloride (a volatile agent), following the method previously described by Bircher.¹ A test chamber with a tissue pad (16 mm in diameter) covered by a plastic membrane on silk tape (Leukotest, Beiersdorf BDF, Hamburg, Germany) was used. This was previously punctured several times with a thick injection needle through all layers; then the tissue pad was vigorously sprayed with Cloretilo spray (ERN Lab, S.A.), which contains pure ethyl chloride without preservatives or additives, until it was saturated or frozen. To avoid cold damage, the patch was not applied to the back of the patient until the moment it thawed. The gas that instantly forms upon skin contact was allowed to evaporate through the prepared holes. Readings of the test results were made after 2 and 4 days.

Readings at day 2 and day 4 showed erythematous, papular, vesicular, and infiltrative local reactions to ethyl chloride (++) and benzocaine (++) (Fig 1), as well as a positive result to caine mix (+++). A skin-prick test (SPT) (20 mg/mL) and an intradermal test (IDT) (0.2 mg/mL) with lidocaine 2% (from Braun Medical S.A., Barcelona, Spain) were performed on the volar forearm surface, following the method previously described by Brockow and colleagues.² Briefly, an SPT was done with standardized lancets; histamine chlorohydrate at 10 mg/mL and phenol-glycerol saline solution were used as positive and negative controls, respectively. An IDT was accomplished by injecting 0.02 to 0.05 mL of lidocaine solution intradermally, raising a small bleb measuring 3 mm in diameter. In the skin prick test, a wheal greater than 3 mm

From the Unidad de Alergología, Complejo Hospitalario de Jaén, Jaén, Spain.

Address reprint requests to Juan Luis Anguita Carazo, MD, Unidad de Alergología, Hospital Universitario Médico Quirúrgico, Complejo Hospitalario de Jaén, Avenida del Ejército Español 10, 23007 Jaén, Spain. E-mail: juanluanguita@telefonica.net

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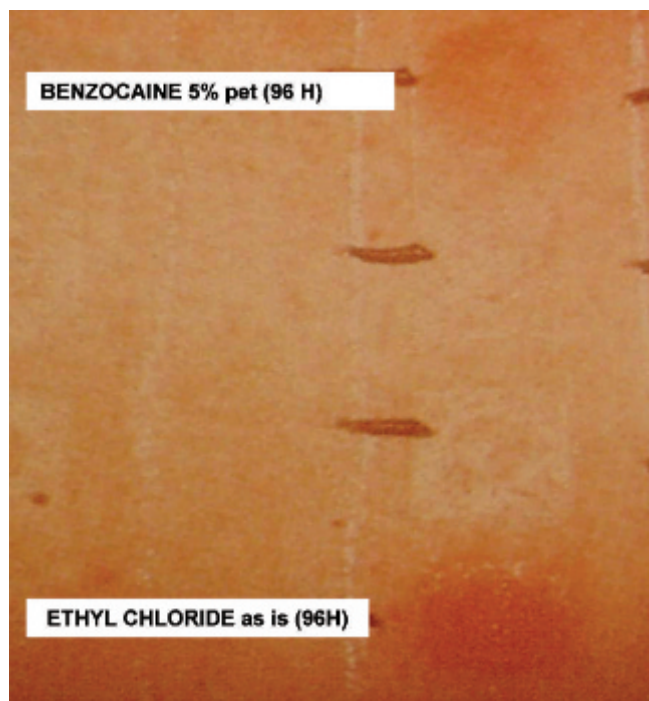


Figure 1. Ethyl chloride and benzocaine patch-test results. (pet = in petrolatum.)

was considered positive. In the intradermal test, the wheal area was marked initially and then 15 minutes after testing, and an increase in diameter greater than 3 mm was considered positive. Both tests on our patient were evaluated after 15 minutes, and they showed negative results. Single-blind placebo-controlled subcutaneous challenge with the administration of lidocaine 2% with incremental doses of 0.2 mL, 0.4 mL, and 0.6 mL at 1-hour intervals was well tolerated. The patient then remained under observation for 2 hours in our challenge room. The skin and challenge tests with lidocaine were performed to establish an alternative anesthetic for a future small surgical procedure in this patient. To exclude a primary hypersensitivity to cold, a frozen tube with ice was applied to the left upper arm for 20 minutes; no reaction was recorded.³ Twenty patients were used as controls and did not react to patch tests with benzocaine 5% pet and ethyl chloride. Neither the skin tests nor the challenge test with lidocaine were performed in control subjects as this anesthetic was not the objective of our study. The results of the different tests are summarized in Table 1.

Discussion

Ethyl chloride (EC), or chloroethane (C_2H_5Cl), is a volatile halogenated hydrocarbon widely used as a topical

Table 1. Allergy Study Results

Test	Patient	Control Subjects
Ethyl chloride modified patch test	(D4, ++)	Negative
Benzocaine 5% pet patch test	(D4, ++)	Negative
Epicutaneous standard series*	Negative	Not tested
Caine mix	(D4, +++)	Not tested
Lidocaine		
Prick test	Negative	Not tested
Intradermal test	Negative	Not tested
Subcutaneous challenge test	Well tolerated	Not tested

D4 = reading on day 4; pet = in petrolatum; ++ = erythematous, papular, vesicular, and infiltrative reaction; +++ = confluent vesicles and erythematous papular infiltrative reaction.

*T.R.U.E. Test.

anesthetic for small surgical procedures and sports injuries. In view of the frequency of its use, adverse reactions are rare, cold cutaneous damage being the most common one. In this case, it was excluded by ice test.³ Allergic contact dermatitis from this gas, though infrequent, has been previously described.^{1,3-5} Benzocaine, a local anesthetic derivative of the ethyl ester of para-aminobenzoic acid, has been reported as a causative agent of delayed hypersensitivity reactions, confirmed by positive results of patch tests.⁶ Therefore, EC and benzocaine are two topical anesthetics with different chemical structures and action mechanisms. To date, there are no reports that support a cross-reactivity between them. As the portion chemically reactive of EC may be the monohalogenated carbon atom,¹ which is not present in the benzocaine molecule, the clinical case suggests a concomitant contact sensitization. In accordance with previous reports, our patient tolerated lidocaine, a local anesthetic belonging to the amide group.⁷

The occurrence of contact allergy to chemically unrelated drugs in the same patient is rare. To our knowledge, allergic contact dermatitis from EC and caines in the same patient has not been previously reported.

References

1. Bircher AJ. Allergic contact dermatitis from ethyl chloride and sensitization to dichlorodifluormethane. *Contact Dermatitis* 1994;30:41-4.
2. Brockow K, Romano A, Blanca M, et al. General considerations for skin test procedures in the diagnosis of drug hypersensitivity. *Allergy* 2002;57:45-51.
3. Kriechbaumer N. Sensitization to ethyl chloride in a handball player. *Contact Dermatitis* 1998;38:227-8.

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4. Aberer W. Allergy to ethyl chloride does occur, and might frequently be misdiagnosed. *Contact Dermatitis* 1989;21:352–3.
 5. Van Ketel WG. Allergic contact dermatitis from propellants in deodorant sprays in combination with allergy to ethyl chloride. *Contact Dermatitis* 1976;2:115–9.
 6. Fisher AA. Dermatitis due to benzocaine present in sunscreens containing glyceryl PABA (Escalol 106). *Contact Dermatitis* 1977;3: 170–1.
 7. Ruzicka T, Gerstmeier M, Ring J. [Allergy to local anesthetics.] *Z Hautkr* 1987;62:455–60.

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