

involved in the latex-fruit syndrome. Moreover, one of the two major IgE-binding proteins in cherimoya extract with a molecular mass of 34 kDa could belong to the class I chitinases, a fact that would be interesting to confirm in the future.

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Postoperative rash to ceftriaxone

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Key words: ceftriaxone; cephalosporins; delayed hypersensitivity; drug allergy; postoperative rash.

• β -LACTAM drugs are the most commonly prescribed antibiotics and cause the most common drug allergies seen clinically (1). Allergy to them has long been thought to be associated with type I IgE-mediated hypersensitivity. Nevertheless, in recent years, several type IV, cell-mediated

Delayed hypersensitivity with positive patch and intradermal tests.

systemic reactions have been reported. These reactions often consist of cutaneous symptoms, with maculopapular rash being the most typical clinical manifestation (2). Some recent reports demonstrate the usefulness of intradermal and patch tests in the diagnosis of such delayed reactions (2, 3). A case of delayed hypersensitivity to cephalosporins confirmed both by intradermal and patch tests is reported.

A nonatopic, 62-year-old man suffered a generalized maculopapular rash 48 h after a laparoscopic cholecystectomy. Propofol, norcuronium, fentanyl, and dihydrobenzoperidol were used as anesthetic drugs; intravenous ketorolactrometamol and omeprazol were started after surgery. A single dose of intravenous ceftriaxone (1 g) was administered as surgical prophylaxis. Nine years earlier, the patient had started treatment with penicillin, metronidazol, and ceftriaxone for a suppurative cerebral abscess, and a maculopapular rash had developed 48 h later.

An allergologic work-up was performed. Total serum IgE was within normal limits. Specific IgE detections to penicilloyl G and

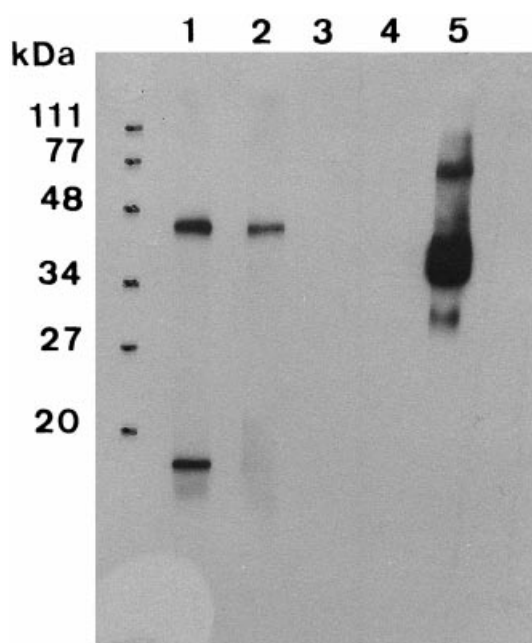


Figure 1. IgE-binding fractions to latex and cherimoya based on molecular mass (SDS-PAGE immunoblotting) in serum from patient. Lane 1) positive control (latex); lane 2) latex plus patient serum; lane 3) negative control for latex; lane 4) negative control for cherimoya; lane 5) cherimoya plus patient serum.

V, amoxicillin, and ampicillin (CAP System RAST FEIA, Pharmacia, Uppsala, Sweden) were all negative. Skin tests (prick and intradermoreaction) with penicilloyl-polylysine (PPL) and minor determinant mixture (MDM) (Allergopen, Merck, Reinbek, Germany), sodium penicillin G, ampicillin, amoxicillin, latex (1 mg/ml), propofol, norcuronium, fentanyl, and dihydrobenzoperidol were performed on the volar surface of the forearm, with negative results. Skin prick tests with some commonly prescribed cephalosporins in our area were also performed at concentrations used in clinical practice (4). In case of negativity, intradermoreaction with 0.05 ml of dilutions of 1/100 and 1/10 of the same were carried out. Histamine (10 mg/ml) and saline were employed as positive and negative controls, respectively. Wheals with diameter at least 3 mm greater than the ones elicited by saline for prick tests and 5 mm for intradermal tests were considered positive.

Patch tests with the same cephalosporins as is, at the same concentrations used for prick tests, were performed on healthy back

skin. Evaluation was assessed after 20 min, 48 h, and 96 h. Ceftriaxone was strongly positive (erythema, induration, and vesicles) at 48 and 96 h (Table 1). The same patch tests were negative in five controls. Patch tests with the contactants of the ICDRG (True Test, Pharmacia & Upjohn AS, Hilleröd, Denmark) were negative. Single-blind, placebo-controlled challenges were performed on different days, reaching therapeutic doses with penicillin G (1 000 000 IU), amoxicillin (500 mg), ketorolac (10 mg), and omeprazol (20 mg) with good tolerance.

As many drugs are used in surgery, it is often difficult to identify the cause of an allergic reaction. More often, only immediate reactions to drugs recently administered are investigated. Nevertheless, delayed reactions are not uncommon, and all the drugs administered to the patient in the last few days must be considered.

Our patient developed a maculopapular rash, the most typical symptom in delayed allergy to β -lactams (2), and no cross-reactivity with penicillin or amoxicillin was observed. Delayed intradermal responses

appear to be more sensitive than patch testing, but the pattern of positive delayed intradermal responses and negative patch tests requires further investigation because of false-positive cases. However, concomitant positivity does not need to be supported by drug challenges (3). Patch tests are not usually performed in routine diagnosis of drug allergy, and this case demonstrates their potential usefulness and safety in the diagnostic work-up of nonimmediate allergy to cephalosporin (2). Moreover, patch and intradermal tests proved useful to detect or rule out cross-reactivity to other β -lactam drugs.

Studies on cephalosporins as allergens have been nowhere near as numerous, but the determinants on cephalosporins causing allergic reactions in man are in the early stages of study (1). A cephalosporoyl conjugate is derived from cephalosporins, but less is known about its minor determinants. For cephalosporins, an antigenic site has also been identified in their dihydrothiazine ring, although side-chains and the thiazolidine ring are the most important antigenic structures (5). In this

Table 1. Results of skin prick, intradermal (ID), and patch tests to different β -lactam antibiotics

Drug	Prick doses	Prick results	ID doses	ID-20 min results	ID-48 h results	ID-96 h results	Patch-test results*
Benzylpenicillin	10 000 UI/ml	Neg.	10 000 UI/ml	Neg.	Neg.	Neg.	NP****
BPO**	5×10^{-5} mol/l	Neg.	5×10^{-5} mol/l	Neg.	Neg.	Neg.	NP
MDM***	2×10^{-2} mol/l	Neg.	2×10^{-2} mol/l	Neg.	Neg.	Neg.	NP
Amoxicillin	20 mg/ml	Neg.	20 mg/ml	Neg.	Neg.	Neg.	NP
Ampicillin	20 mg/ml	Neg.	20 mg/ml	Neg.	Neg.	Neg.	NP
Aztreonam	25 mg/ml	Neg.	0.25 mg/ml	Neg.	Neg.	Neg.	Neg.
Cefazoline	250 mg/ml	Neg.	2.5 mg/ml	Neg.	Positive	Positive	Positive
Cefuroxime	125 mg/ml	Neg.	1.25 mg/ml	Neg.	Positive	Positive	Positive
Cefonicid	200 mg/ml	Neg.	2 mg/ml	Neg.	Positive	Positive	Positive
Cefixime	200 mg/ml	Neg.	2 mg/ml	Neg.	Neg.	Neg.	Neg.
Cefotaxime	250 mg/ml	Neg.	2.5 mg/ml	Neg.	Positive	Positive	Positive
Ceftriaxone	200 mg/ml	Neg.	2 mg/ml	Neg.	Positive	Positive	Positive
Controls							
Histamine	10 mg/ml	Positive		—	—	—	—
Saline		Neg.		Neg.	Neg.	Neg.	—

* Patch tests with same doses used for prick tests.

** BPO: penicilloyl-polylysine.

*** MDM: minor determinant mixture.

**** NP: not performed.

patient, positivity to five out of six cephalosporins tested with different side-chains was observed, suggesting the presence of a common antigenic determinant. Further studies on the pathogenesis of allergy to cephalosporins are required.

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Predictors of *Anisakis simplex* symptoms

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Key words: *Anisakis simplex*; children; prevalence; sensitization.

● THE prevalence of sensitization to *Anisakis simplex* (AS) (nematode belonging to the Anisakidae family, found as a parasite in fish, crustaceans, cephalopods, and marine mammals) has been investigated in adult patients, and ranges from 6% to 56% according to various studies (1–4). There are no studies on the prevalence of sensitization to AS in a pediatric population.

The aim of this study was to determine the prevalence of, and the risk factors associated with, AS sensitization in a total of 805 (324 female, 481 male) consecutive children (mean age [SD] 7.9 [3.8] years, range 0.52–17.61) referred to our center for evaluation of allergic symptoms.

Parents and/or patients answered a questionnaire supervised by a pediatric allergist that revealed any presence of

IgE-mediated diseases such as rhinoconjunctivitis, asthma, atopic dermatitis, urticaria, and clinical manifestations (urticaria, angioedema, anaphylactic reactions, or other symptoms) after the ingestion of fish, cephalopods, and crustaceans. Every child underwent skin prick tests (SPT) with commercial extracts of AS (supplied by International Pharmaceutical Immunology, SA, Madrid, Spain: protein concentration was 1 mg/ml), 13 aeroallergens (*Dermatophagoides pteronyssinus*, *D. farinae*, horse, cat, and dog dander, *Alternaria tenuis*, *Cladosporium herbarum*, grass pollen, *Parietaria officinalis*, *Artemisia vulgaris*, olive pollen, cypress pollen, and plane-tree pollen) (Bayer, Milan, Italy), six food allergens (milk, egg white, tomato, peanut, wheat, and soybean) (Bayer, Milan, Italy), and six seafood allergens (dogfish, sole, salmon, shrimp, tuna, and codfish) (Laboratorio Lofarma, Milan, Italy). SPT results were assessed as positive (wheal response $\geq 2+$) according to the recommendations of the European Academy of Allergology and Clinical Immunology (5).

The chi-square test, Fisher's exact test, and Student's *t*-tests were used for statistical analysis, with $P < 0.05$ considered to be significant. Multivariate analysis was performed by logistic regression. Variables

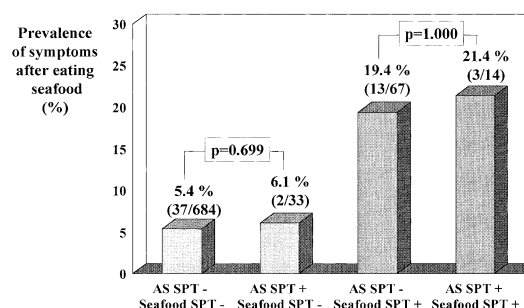


Figure 1. Prevalence of symptoms after eating seafood by skin test reactivity to *Anisakis simplex* and seafood allergens (absolute numbers in parentheses). Notes: AS SPT- =negative skin prick test to AS; AS SPT+ =positive skin prick test to AS; seafood SPT- =negative skin prick tests to one or more of six seafood allergens; seafood SPT+ =positive skin prick tests to one or more of six seafood allergens. *P* values are calculated by two-sided Fisher's exact test. Seafood SPT- vs seafood SPT+: $P < 0.001$ among AS SPT-negative subjects, $P = 0.148$ among AS SPT-positive subjects.