

Oral Rush Desensitization With Tomato: A Case Report

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Abstract. Adverse food reaction in which no immunological mechanism is demonstrated should be termed nonallergic food hypersensitivity or food intolerance. We present the case of a 12-year-old girl with a clinical history of abdominal pain, nausea, and general malaise after tomato intake which completely remitted with antihistamines. The patient underwent a complete allergy evaluation: skin prick tests, serum specific IgE and IgG₄ tests to tomato, and double-blind placebo-controlled food challenge. Skin prick tests and specific IgE to tomato were negative while the food challenge was positive. At the end of the workup, the patient underwent an oral rush desensitizing treatment. At the end of the treatment the patient could eat a maintenance dose of 100 g of tomato daily with no side effects at all. This successful result suggests that the oral desensitizing treatment can be used in patients with nonallergic food hypersensitivity.

Key words: Nonallergic food hypersensitivity. Tomato intolerance. Oral rush desensitization. Tomato desensitization.

Resumen. En las reacciones adversas a los alimentos (hipersensibilidad alimentaria) en las cuales no actúa ningún mecanismo inmunitario, debe hablarse de hipersensibilidad alimentaria no alérgica o intolerancia alimentaria. En este artículo se presenta el caso de una niña de 12 años con antecedentes de dolor abdominal, náuseas y malestar generalizado tras la ingesta de tomate, síntomas que remitieron por completo tras la administración de antihistamínicos. La paciente se sometió a un estudio alergológico completo: pruebas de punción cutánea, determinación de los niveles séricos de IgE e IgG₄ específicas frente al tomate y provocación alimentaria, controlada con placebo y doble ciego (DBPCFC). Las pruebas de punción cutánea y los niveles de IgE específica frente al tomate fueron negativos, mientras que la DBPCFC fue positiva. Al final del estudio alergológico, la paciente inició un tratamiento de desensibilización rápida por vía oral. Al final del tratamiento, la paciente era capaz de tomar una dosis de mantenimiento de 100 g diarios de tomate sin experimentar ningún efecto secundario. Este excelente resultado sugiere que el tratamiento de desensibilización oral también se podría aplicar a pacientes con hipersensibilidad alimentaria no alérgica.

Palabras clave: Hipersensibilidad alimentaria no alérgica. Intolerancia al tomate. Desensibilización rápida por vía oral. Tratamiento de desensibilización al tomate.

Introduction

Adverse food reactions (food hypersensitivity) can be classified in 2 groups. When an immunological mechanism can be demonstrated, the correct term is food allergy. Moreover, allergic reactions can be distinguished as IgE-mediated or non-IgE-mediated.

When no immunological mechanism is evident, all reactions should be referred to as nonallergic food hypersensitivity or food intolerance [1]. In these cases, aspects other than immunological mechanisms, such as gastrointestinal conditions [2, 3] or psychological problems [4], should be taken into consideration. Thus,

the medical approach to patients with nonallergic food hypersensitivity is very difficult. In these cases some health care practitioners may use unproven diagnostic techniques [5] that may reinforce food avoidance and contribute to malnutrition and/or social isolation.

Several cases of tomato allergy have been described in the literature [6, 7] and glycosylated protein β -fructofuranosidase has been identified as the tomato allergen Lyc e 2 [8]. The tomato profilin has been identified as a minor allergen [8]. Tomato also contains high levels of nickel and this metal can cause symptoms such as abdominal pain, dyspepsia, and meteorism in patients highly allergic to it.

No data are available about tomato intolerance in the literature and specific desensitization with tomato has never been reported. We report the case of a patient with nonallergic hypersensitivity to tomato who underwent an oral rush desensitization treatment.

Case Description

A 12-year-old girl with a clinical history of abdominal pain, nausea, and general malaise after tomato intake which completely remitted with antihistamines had no family history of allergy or atopy. She had no symptoms with acetylsalicylic acid intake. The patient underwent a complete allergy evaluation. Skin prick tests with food allergens, including the commercial tomato extract (Alk

Abellò, Madrid, Spain) and with fresh tomato (prick-by-prick method), were negative. Specific IgE (UniCAP, Pharmacia, Uppsala, Sweden) and IgG (CAP FEIA, Pharmacia, Uppsala, Sweden) tests to tomato were within normal ranges (<0.35 kU/L and <150 mg/L, respectively) while specific IgA (UniCAP) findings were 1.03 mg/L; total IgE (UniCAP) and eosinophil cationic protein (ECP) Standard series patch tests (UniCAP) were within normal ranges too (42.7 kU/L and 6.18 µg/L, respectively). Standard Series patch tests put in evidence a delayed-type allergy to paraphenylenediamine and to diaminodiphenylmethane. The double-blind placebo-controlled food challenge was carried out on 2 different days (for the administration of placebo or of tomato) with a 3-day interval. The allergen was administered in opaque capsules and opaque capsules were used as placebo.

Table 1. Protocol for Oral Desensitization to Tomato*

Day	Dilution	Doses	Daily dose
I	1 drop of mixed tomato in 100 mL of water	1 drop 10 drops 60 drops	0.00026 g
II	10 drops of mixed tomato in 100 mL of water	1 drop 10 drops 60 drops	0.0026 g
	10 drops of mixed tomato in 10 mL of water	1 drop 10 drops 60 drops	0.026 g
III	100 drops of mixed tomato in 10 mL of water	1 drop 10 drops 60 drops	0.26 g
	100 drops of mixed tomato in 10 mL of water	2 mL 3 mL 4 mL	0.99 g
IV	Pure fresh tomato	1 g 1.5 g 2 g	4.5 g
	Pure fresh tomato	3 g 3.5 g 4 g 4.5 g 5 g*	20 g
V	Pure fresh tomato	6 g 7 g 8 g 9 g 10 g 11 g	51 g
VI	Pure fresh tomato	10 g 20 g 30 g 40 g 50 g	150 g

* Dose at which the patient had the adverse reaction.

Table 2. Measurement of Total and Specific IgE and ECP*

	Basal	After 6 Days	After 3 Months
Specific IgE	< 0.35 kU/L	< 0.35 kU/L	< 0.35 kU/L
Specific IgG	< 150 µg/L	172 µg/L	273 µg/L
Specific IgA	1.03 mg/L	< 1mg/L	< 1mg/L
Total IgE	46.5 kU/L	42.9 kU/L	104 kU/L
ECP	24.7 µg/L	10.1 µg/L	5.35 µg/L

* ECP indicates eosinophilic cationic protein.

During that challenge test we used raw tomato. Successive doses of 0.1, 1, 5, and 10 g, increasing every 30 minutes, were used. Each capsule contained a maximum dose of 4 g, so the patient was administered 3 capsules (2 with 4 g and 1 with 2 g) to receive 10 g of tomato. The challenge test was positive: in fact the patient presented strong abdominal pain 20 minutes after the administration of 10 g of tomato, which promptly receded after treatment with an oral anti-histamine (10 mg of cetirizine). The negativity of the allergy evaluation and the positivity of the double-blind, placebo-controlled food challenge allowed us to make the diagnosis of nonallergic tomato hypersensitivity (tomato intolerance).

At the end of the allergy workup, and after obtaining the informed consent of the patient's parents and the ethics committee of our hospital, the patient underwent an oral rush desensitizing treatment according to our successful previous experiences with oral desensitization in patients with food allergy [9, 10] and intolerance [11]. Assessments of specific IgE, IgG and IgA, total IgE antibodies and ECP were also repeated during the rush treatment. The starting dilutions of the desensitizing protocol were obtained by whisking 50 g of raw fresh tomato and adding water until a 150-mL solution (containing 0.33 mg/mL of tomato) was obtained. This solution was then further diluted to obtain the starting doses of the protocol (Table 1). Desensitization was completed in 6 days; on the fourth day the patient presented abdominal pain after ingesting 20 g of tomato, but no therapy was needed. We then decided to use an antihistamine (loratadine 10 mg) and montelukast 10 mg once a day on the remaining days of the desensitization; both drugs were suspended at the seventh day. At the end of the treatment the patient could eat a maintenance dose of 100 g of tomato daily with no side effects at all.

Discussion

Until now we have used oral desensitization with foods in patients with IgE-mediated food allergy [9, 10] and we have successfully carried out an oral specific desensitizing treatment in a single case of nonallergic hypersensitivity to fish (fish intolerance). The success we obtained in the patient with tomato intolerance described in this report suggests that it seems possible to use the oral desensitizing treatment in patients with nonallergic food hypersensitivity.

In practice, patients with nonallergic food hypersensitivity often follow elimination diets that may be too restricted or may have a social impact. In the case of our patient, avoidance of tomato was very difficult since it is a very important constituent of the Mediterranean diet. The possibility of inducing clinical tolerance in these patients could represent a valid alternative treatment, even if the pathophysiological mechanisms are not defined. Moreover, our treatment can be carried out rapidly: in this case the maintenance dose was reached in 6 days in a hospital regimen. The maintenance therapy can be followed by the patient at home with no side-effects and at very low costs. Clinical evaluation was reassessed after 3 months, when the patient was still able to tolerate tomato with no ill effects.

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