A Severe Case of Wheat-Dependent Exercise-Induced Anaphylaxis in Adulthood

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Abstract

Food-dependent exercise-induced anaphylaxis (FDEIA), is a severe form of allergy for which the ingestion of a specific food, usually before physical exercise induces symptoms of anaphylaxis. Patients typically have IgE antibodies to the food that triggers the reactions; however, the symptoms appear only if the co-factors act together. The most common reported cause of these reactions seems to be wheat. In some cases FDEIA is displayed even when the food is eaten immediately after exercise, showing that in FDEIA, not the sequence but rather the coincidence of triggering factors use, is of crucial importance. The risk to develop anaphylaxis in these patients depends on the presence and, in some cases, on the amount of cofactors of anaphylaxis. There are lots of evidences about the role of NSAIDs as cofactors of anaphylaxis.

Introduction

Food-dependent exercise-induced anaphylaxis (FDEIA) is a rare but severe allergic reaction, which is induced by exercise after the ingestion of wheat products [1, 2]. It is known that one of the most frequent causative food is wheat [3, 4], and the measuring of IgE specific for omega-5-gliadin (the major wheat allergen), is diagnostic for these patients [5]. Although the omega-5-gliadin fraction in wheat allergen extracts is very small, it is proven that IgE detection has a high predictive value for WDEIA diagnosis [5-7]. The diagnosis of this disorder it is often missed, because neither the exercise nor the ingested food alone induces the symptoms. There are many reports supporting the fact that, aspirin intake is a contribution factor in some patients with FDEIA [2, 8, 9]. The risk to develop anaphylaxis in these patients depends not only on the presence, but in some cases, also on the amount of cofactors of anaphylaxis [5].

Patient history

A 43 years old woman was admitted in our clinic, after she had suffered of three severe allergic reactions. The first episode was observed 12 years ago, the second one 8 years ago and the third one a month ago. The initial symptoms of those episodes were nasal itching, sneezing, rhinoroe, cutaneous itching and flushing, followed by whealing and generalized urticaria with angioedema, dyspnea,
stridor, giving to the patient the feeling of choking, hypotension, and resulting to a collapse, thirty minutes later.

The patient hematological and biological blood tests were normal. The level of serum tryptase was 4.5 ng/mL (normal range values < 11.4 ng/mL). The detailed allergic and immunologic exams results were as following: Commercial SPT for inhalant and food allergens (Lofarma, Milan) showed positive response for wheat proteins 8-30 mm. The level of serum tryptase was 4.5 ng/mL (normal range values < 11.4 ng/mL). The detailed allergic and immunologic exams results were as following: Commercial SPT for inhalant and food allergens (Lofarma, Milan) showed positive response for wheat proteins 8-30 mm. The level of serum tryptase was 4.5 ng/mL (normal range values < 11.4 ng/mL). The detailed allergic and immunologic exams results were as following: Commercial SPT for inhalant and food allergens (Lofarma, Milan) showed positive response for wheat proteins 8-30 mm. The level of serum tryptase was 4.5 ng/mL (normal range values < 11.4 ng/mL). The detailed allergic and immunologic exams results were as following: Commercial SPT for inhalant and food allergens (Lofarma, Milan) showed positive response for wheat proteins 8-30 mm. The level of serum tryptase was 4.5 ng/mL (normal range values < 11.4 ng/mL). The detailed allergic and immunologic exams results were as following: Commercial SPT for inhalant and food allergens (Lofarma, Milan) showed positive response for wheat proteins 8-30 mm. The level of serum tryptase was 4.5 ng/mL (normal range values < 11.4 ng/mL). The detailed allergic and immunologic exams results were as following: Commercial SPT for inhalant and food allergens (Lofarma, Milan) showed positive response for wheat proteins 8-30 mm. The level of serum tryptase was 4.5 ng/mL (normal range values < 11.4 ng/mL). The detailed allergic and immunologic exams results were as following: Commercial SPT for inhalant and food allergens (Lofarma, Milan) showed positive response for wheat proteins 8-30 mm. The level of serum tryptase was 4.5 ng/mL (normal range values < 11.4 ng/mL). The detailed allergic and immunologic exams results were as following: Commercial SPT for inhalant and food allergens (Lofarma, Milan) showed positive response for wheat proteins 8-30 mm. The level of serum tryptase was 4.5 ng/mL (normal range values < 11.4 ng/mL). The detailed allergic and immunologic exams results were as following: Commercial SPT for inhalant and food allergens (Lofarma, Milan) showed positive response for wheat proteins 8-30 mm. The level of serum tryptase was 4.5 ng/mL (normal range values < 11.4 ng/mL). The detailed allergic and immunologic exams results were as following: Commercial SPT for inhalant and food allergens (Lofarma, Milan) showed positive response for wheat proteins 8-30 mm. The level of serum tryptase was 4.5 ng/mL (normal range values < 11.4 ng/mL). The detailed allergic and immunologic exams results were as following: Commercial SPT for inhalant and food allergens (Lofarma, Milan) showed positive response for wheat proteins 8-30 mm. The level of serum tryptase was 4.5 ng/mL (normal range values < 11.4 ng/mL). The detailed allergic and immunologic exams results were as following: Commercial SPT for inhalant and food allergens (Lofarma, Milan) showed positive response for wheat proteins 8-30 mm. The level of serum tryptase was 4.5 ng/mL (normal range values < 11.4 ng/mL). The detailed allergic and immunologic exams results were as following: Commercial SPT for inhalant and food allergens (Lofarma, Milan) showed positive response for wheat proteins 8-30 mm. The level of serum tryptase was 4.5 ng/mL (normal range values < 11.4 ng/mL). The detailed allergic and immunologic exams results were as following: Commercial SPT for inhalant and food allergens (Lofarma, Milan) showed positive response for wheat proteins 8-30 mm. The level of serum tryptase was 4.5 ng/mL (normal range values < 11.4 ng/mL). The detailed allergic and immunologic exams results were as following: Commercial SPT for inhalant and food allergens (Lofarma, Milan) showed positive response for wheat proteins 8-30 mm.
Given that the food and physical exercise can be very well tolerated independently by the patient, this suggests a pliable state of immunological tolerance [10, 12]. Referring to many recent European studies, it is observed that next to exercises, NSAIDs act as a cofactor in 6.1-9% of severe anaphylactic reactions. Epidemiological data show that cofactors are strongly important especially for food dependent anaphylactic reactions, revealing up to 39% of cases in adults [5, 11]. (Fig. 2).

Some authors suggest that alterations in transglutaminase (tTG) enzyme induced by exercises, lead in peptide aggregation, which increase the ability of IgE cross-linking. Many inflammatory mediators increase genetic expression of tTG, but one of the most important is interleukin-6 [12, 13]. The most important tissues that produce interleukin-6 during exercises are: contracting skeletal muscles, central nervous system and peri-tendinous tissues, as well [12]. There are reports that blood gliadin levels correlate with clinical symptoms induced by exercise and aspirin intake in patients with WDEIA [3]. Peptides which derive from omega-5 gliadin are cross-linked by tTG and they cause a marked increase in IgE binding [14, 15]. Matsu et al. could show that there is an increase uptake of gliadin after the ingestion of wheat meal followed by physical exercises [16].

Moreover, the biological study done on metabolism of gliadin in humans, have shown that 30 min after consuming wheat products, the absorption of gliadin is increased rapidly from fivefold, if it is accompanied at the same time with NSAID intake [14, 15]. Takahashi et al. have identified that, not only wheat omega-5 gliadin but also high molecular weight-glutenin subunit (HMW-glutenin) is an important major allergen in this patient. Detection of serum IgE to synthetic epitope peptides of these allergens diagnoses more than 90% of WDEIA patients [7]. A possible hypothesis supported by several studies in humans, also has shown that the mechanism of NSAID idiosyncrasy is involved as a cofactor, and systemic administration of NSAIDs may increase skin test reactions to food allergens. The NSAIDs not only modulate the intestinal absorption of allergens, but also modulates the function of effectors’ cells present in this disorder [10].

Finally a following scenario is indicated: (a) the intensity of physical effort, (b) the level of sensitization and (c) allergen quantity co-regulate the intestinal absorption of allergens, resulting in the symptoms of anaphylaxis by contributing each of them on an individual level [11]. It is important to know that in WDEIA patients, the presence of exercise is an indispensable prerequisite to trigger anaphylaxis [5].

In conclusion, it was the first case of WDEIA diagnosed in our clinic, which in itself is a rare but very troubling condition. A careful step-by-step approach is required, as that is the reason why that disorder escapes so often the diagnosis. We recommend a gluten-free diet for treatment, or, at least, refraining from exercise for 4 to 6 h after wheat-products ingestion. Aspirin and other NSAIDs are to be included in diagnostic measures, and should not be taken in association with exercise. It should be especially recommended the avoidance of combined intake of identified food allergens, NSAIDs and effort.

References