Omalizumab in the prevention of anaphylaxis during immunotherapy: a case report

Iwona Stelmach, Anna Sztafińska, Katarzyna Woicka-Kolejwa, Joanna Jerzyńska

Department of Pediatrics and Allergy, Medical University of Lodz, Poland
Head: Prof. Iwona Stelmach MD, PhD

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Abstract

Omalizumab is approved for the treatment of chronic severe persistent asthma. As a trigger for anaphylaxis, the frequency of subcutaneous specific immunotherapy (SCIT) is high. We report the case of a 11-year-old boy with severe allergic asthma. During the initial phase of immunotherapy he experienced anaphylaxis and SCIT was discontinued. Because of uncontrolled asthma, despite the inhaled steroids and β-agonists were taken into consideration, omalizumab 300 mg once every 4 weeks was initiated. Currently, the maintenance dose has been reached and SCIT is continued without any side effects. The clinical implication of the above case report is that children with severe allergic asthma who are pre-treated with omalizumab might also benefit in the future from SIT as a causal treatment option.

Key words: omalizumab, asthma, immunotherapy, anaphylaxis, prophylaxis.

Introduction

Omalizumab, approved for the treatment of chronic severe persistent asthma, is a treatment option in patients who fail to achieve optimal quality of life (QoL) due to severe asthma symptoms and when uncontrolled asthma is a contraindication to of subcutaneous specific immunotherapy (SCIT) [1]. As a trigger for anaphylaxis, the frequency of SCIT is high. It is known that omalizumab facilitates desensitization in high-risk allergic patients and improves the course of the disease, which has been previously demonstrated in patients with allergic rhinitis, insect venom, food allergy, and asthma [2–4].

Herein, we present a case diagnosed as severe allergic asthma and anaphylaxis during SCIT in a patient in whom SCIT was successfully continued after the initiation of the omalizumab therapy.

Case report

Jacob is a 11-year-old boy with a history of asthma and allergic rhinitis since he was 6. The child was presented to his primary care provider's office with persistent asthma that was limiting his activities. His asthma symptoms were often aggravated by upper respiratory infections and asthma exacerbations; he had had to attend the emergency department about 2 times a year. He had multiple allergies; the skin tests were positive for dust mite, grass mix, multiple trees, and molds.

He was referred to our clinic in October 2011. Under our care the patient received long-term anti-asthma therapy with moderate-to high-dose inhaled corticosteroids (ICS), a long-acting β2-agonist and a leukotriene receptor antagonist. The number of asthma exacerbations and hospitalizations was significantly reduced in our patient and he did not require rescue medications or oral corticosteroids. *In vitro* secretory IgE levels (ELISA the device DYNEX; DSX System) for *Dermatophagoides pteronyssinus* and *D.s farinae* were found to be 80.2 kU/l (class 5) and 72.2 kU/l (class 5), respectively; grass mix (*Phleum pretense* 28.6 kU/l (class 4), *Dactylis glomerata* 15.8 kU/l (class 3); multiple trees (*Birch* and *Alder* > 100 kU/l (class 6), *Hazel* 64.6 kU/l (class 5), *Alternaria* 50.0 kU/l (class 5). Patient's asthma was well controlled and he had qualified for subcutaneous specific immunotherapy with mite extract (*Derp1 50% and Derp2 50%*). During the initial phase of immunotherapy he experienced anaphylaxis. The child developed severe broncho-obstruction, swelling and numbness of the tongue, hot flashes, dizziness, blood pressure level decreased up to 80/40 mm Hg. The attack required treatment with epinephrine, antihistamines and corticosteroids. Subcutaneous specific immunotherapy was discontinued. After this event, Jacob was regularly taking inhaled fluticasone/salmeterol 250/50 μg twice a day and oral montelukast

Address for correspondence: Prof. Iwona Stelmach MD, PhD, Department of Pediatrics and Allergy, N. Copernicus Hospital, 62 Pabianicka St, 93-513 Lodz, Poland, phone: +48 42 689 59 72, fax: +48 42 689 59 73, e-mail: alergol@kopernik.lodz.pl
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5 mg every day. Occasionally he required salbutamol rescue approximately twice weekly and short-course oral corticosteroid therapy. Clinical findings revealed a decreased lung function with forced expiratory volume in 1 s (FEV_1) level at 85% of the predicted level before bronchodilation; after bronchodilation, the FEV_1 was 98% of the predicted level. Fractional exhaled nitric oxide (FeNO) value was 80 ppb, other spirometric parameters: Rint was 200%, sRaw 250%. Pulmonary function testing was performed using a Master Screen unit (Erich Jaeger GmbH-Hochberg, Germany). Flow-volume curves were performed according to the American Thoracic Society standards. The highest of 3 successful measurements was recorded. The results were expressed as percentages of the predicted values.

The NO measurements were performed according to the European Respiratory Society/American Thoracic Society (ERS/ATS) recommendations, with a chemiluminescence analyzer (model 280i nitric oxide analyzer; Sievers, Boulder, CO, USA) and defined in parts per billion.

Because of uncontrolled asthma, though the inhaled steroids and beta agonists, the IgE level of 254 kU/l (Elecsys IgE CalSet Sandwich Immunoassay, Roche Diagnostics, Mannheim, Germany) were taken into consideration, omalizumab 300 mg once every 4 weeks was initiated (July 2012; in March 2013 he was qualified for the Severe IgE-dependent Asthma Therapeutic Program).

Four months later he had achieved better asthma control (no further need for rescue bronchodilator use) and a significant improvement of FEV_1 up to 100% of the predicted value. After 16 weeks of treatment with omalizumab, the Asthma Control Questionnaire score had fallen from 2 to 0 points, and the asthma-related quality of life questionnaire (AQLQ) revealed a score of 6.7. Before starting the anti-IgE therapy, he had a severely impaired quality of life, with an AQLQ of 4 points (3.7 points improvement). Jacob is taking inhaled fluticasone (Flixotide Dysk) 100 μg twice a day and oral montelukast 5 mg every day. More importantly, during therapy he was able to reduce his use of ICS and did not require any oral corticosteroids. Six months after omalizumab introduction, he was again qualified for subcutaneous specific immunotherapy with mite extract. Currently, the maintenance dose has been reached and SCIT is continued without any side effects.

Discussion

The described case shows that the administration of omalizumab prior to SCIT reduces the risk of SCIT-related systemic reactions and enables more patients to achieve the target SCIT maintenance dose. As a trigger for anaphylaxis, the frequency of SCIT is high [5]. Omalizumab is a humanized anti-IgE antibody, which prevents allergic cascade by blocking binding of free IgE in circulation to the Fc epsilon Receptor 1 [6]. There are several case reports, which have demonstrated that omalizumab has been successfully used in the treatment of idiopathic anaphylaxis. In 2009, Warrier and Casale presented a 12-year-old boy with a history of uncontrolled allergic asthma, allergic rhinitis, multiple food allergies and recurrent episodes of idiopathic anaphylaxis who responded very well to 375 mg of omalizumab every 2 weeks [7].

Subcutaneous specific immunotherapy should be considered in all children with IgE-dependent asthma and it should be initiated in patients with controlled asthma. However, if the immunotherapy cannot be introduced due to poor asthma control, despite multi-drug therapy or if the maintenance dose cannot be reached, the only available option is pretreatment with omalizumab. It has been recently shown that a combination of omalizumab with specific immunotherapy for treatment of patients with allergic rhinitis and asthma is safe and reduced the symptom load during the first pollen season, however showed no prolonged effect during treatment with SCIT only [8, 9]. The treatment with omalizumab was clinically effective in our patient: the frequency of exacerbations and the number of hospitalizations were reduced, and there was a significant decrease in steroid use. This effect of omalizumab enabled the initiation of SCIT in our child with severe asthma. However, this case does not make it possible to draw a conclusion that omalizumab only treats asthma and afterwards we can have hyposensitized patients [10]. Omalizumab in the described case either improves asthma control or weakens SCIT serious side effects.

The clinical implication of the above case report is that children with severe allergic asthma who are pre-treated with omalizumab might also benefit in the future from SCIT as a causal treatment option. It has also shown that a combination of anti-IgE plus SCIT may be beneficial for the treatment of allergic diseases by improving efficacy and limiting side effects of SCIT. Large comprehensive clinical trials are needed to elucidate this matter.

Conflict of interest

None declared.

References

1. Kupczyk M, Kuna P. Omalizumab in an allergology clinic: real life experience and future developments. Postep Derm Alergol 2014; 31: 32-5.
2. Szynkiewicz E, Filanowicz M, Graczyk M, et al. Analysis of the impact of selected socio-demographic factors on quality of life of asthma patients. Postep Derm Alergol 2013; 30: 218-25.
3. Gawrońska-Ukleja E, Różalska A, Ukleja-Sokołowska N, et al. Anaphylaxis after accidental ingestion of kiwi fruit. Postep Derm Alergol 2013; 30: 192-4.
4. Kupryś-Lipińska I, Korczyńska P, Tworek D, Kuna P. Effectiveness of omalizumab in a patient with a life-threatening episode of bronchospasm and larynx angioedema after exposure to house dust. Postep Derm Alergol 2014; 31: 39-44.

5. Serbes M, Can D, Atlihan F, et al. Common features of anaphylaxis in children. Allergol Immunopathol (Madr) 2013; 41: 255-60.
6. Demirtürk M, Gelincik A, Colakoğlu B, et al. Promising option in the prevention of idiopathic anaphylaxis: omalizumab. J Dermatol 2012; 39: 552-4.
7. Warrier P, Casale TB. Omalizumab in idiopathic anaphylaxis. Ann Allergy Asthma Immunol 2009; 102: 257-8.
8. Kopp MV, Hamelmann E, Zielen S, et al. Combination of omalizumab and specific immunotherapy is superior to immunotherapy in patients with seasonal allergic rhinoconjunctivitis and co-morbid seasonal allergic asthma. Clin Exp Allergy 2009; 39: 271-9.
9. Kopp MV, Hamelman, Bendiks M, et al. Transient impact of omalizumab in pollen allergic patients undergoing specific immunotherapy. Pediatr Allergy Immunol 2013; 24: 427-33.
10. Kupryś-Lipińska I, Kuna P. Loss of asthma control after cessation of omalizumab treatment: real life data. Postep Derm Alergol 2014; 31: 1-5.