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Vernal keratoconjunctivitis—A rare but serious comorbidity of allergic rhinitis and eustachian tube dysfunction

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ABSTRACT

Objective: To determine the prevalence of symptoms and signs of allergic rhinitis (AR) in children with vernal keratoconjunctivitis (VKC) and evaluate eustachian tube (ET) function using tympanometry.
Methods: The patients underwent an otolaryngological examination and symptoms of rhinorrhoea, nasal obstruction, nasal itching and sneezing were evaluated for the diagnosis of AR. Tympanometry was performed by a middle ear analyzer (Impedance audiometer AZ 26, Interacoustics A/S, Assens, Denmark). Blood samples were collected for determination of peripheral blood eosinophil count (PBEC) and serum total immunoglobulin E (IgE). Allergen sensitivity was also determined by skin prick test.
Results: The study included 26 males (96.3%) and 1 female (3.7%) with a mean age of 12.1 ± 4.4 years. Eight out of 27 subjects (29.6%) had blood eosinophilia and 11 out of 27 subjects had elevated serum IgE (40.7%). A positive skin prick test was identified for at least one allergen in 40% of patients (10/25 subjects). Symptoms and signs of AR were found in 10 subjects (37%). Median serum IgE level in subjects with AR (262.5 kU/L) was higher than without AR (40.2 kU/L) ($p = 0.08$), whereas there were no differences in PBEC or eosinophilia percentage ($p > 0.05$). Mean middle ear pressures in the right and left ears were −66.4 daPa (range between −268 and 4 daPa) and −57.3 daPa (range between −308 and 0 daPa), respectively. The tympanometry results were abnormal in 5 subjects (18.5%) (3 type C and 2 type B tympanogram). Three out of 10 VKC patients with AR (30%) and 2 out of 17 VKC patients without AR (11.8%) had abnormal tympanograms ($p = 0.33$).
Conclusion: AR is commonly associated with VKC and subjects with AR are almost three times more likely to have ET dysfunction than those without. Therefore, opthalmologists should refer VKC patients to otolaryngologists to delineate associated AR and ET dysfunction. Conversely, patients with OME and/or AR who have persistent allergic eye symptoms may well benefit from opthalmologic evaluation for seasonal allergic conjunctivitis and VKC.

1. Introduction

Vernal keratoconjunctivitis (VKC) is a rare (occurring in less than 1%) chronic and severe allergic inflammatory disease of the eye affecting mainly young boys in their first decade of life [1–3]. Itching, photophobia, burning, and tearing are the major ocular symptoms. VKC shows a seasonal recurrency being worst over the warm spring and summer months and is more prevalent in hot and dry climates such as the Mediterranean basin, the Middle East, central and west Africa, Japan and parts of South America [4,5]. The disease may primarily involve the tarsal or limbal conjunctiva leading to different forms of VKC: limbal, tarsal or mixed (both limbal and tarsal) forms. The presence of giant papillae with a cobblestone-like appearance in the upper tarsal conjunctiva and/or at the limbus is considered as the hallmark of the disease. VKC generally has a good prognosis; however it may be sight-threatening in the presence of corneal involvement [6].

The most common and the least severe form of ocular allergy is seasonal allergic conjunctivitis (SAC). It is mediated by type I hypersensitivity reaction that results from the exposure of the conjunctiva to an environmental allergen such as ragweed and grass pollen and the binding with specific immunoglobulin E (IgE) on the conjunctival mast cells. Allergic rhinitis (AR) is the most common form of non-infectious rhinitis and 75% of these individuals complain of allergic eye symptoms, such as ocular itching, redness, chemosis and lid edema [7,8]. The coexistence of AR and SAC, both of which are induced after allergen exposure by an IgE-mediated inflammation, has led some investigators to use the term ‘allergic rhinoconjunctivitis’ (ARC) [8,9]. AR is associated with eustachian tube (ET) dysfunction and middle ear disease

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[10,11]. Tympanometry is an easily accessible and non-invasive procedure that assesses middle ear disease in daily clinical practice. It is an objective test that assesses transmission and pressure system integrity in middle ear and measures auditory canal volume and ET function by introducing air under pressure [11].

VKC is more complicated compared to SAC and has a different pathophysiology than SAC. IgE-mast cell mediated process does not explain completely the severity and the clinical course of VKC and a more complicated inflammatory response mediated by T helper (Th2) lymphocytes, eosinophils, mast cells and a complex network of interleukines and cell mediators seems to play role in pathogenesis [12–16].

Patients with VKC have a family history of atopic diseases in one third to half of the cases and have a medical history of other atopic conditions including asthma, rhinitis, and eczema in one third of the subjects [2,5]. However, the association of VKC with AR diagnosed by an otolaryngologist is not well-established yet. Besides, VKC subjects with AR might also have middle ear disease and ET dysfunction. In this study, our aim was to determine the prevalence of both symptoms and signs of AR and ET dysfunction in children with VKC.

2. Methods

The study included VKC patients referred to the Cornea Unit of the Ophthalmology Department, Selcuk University, between 2007 and 2008. The study was approved by the University Review Board. All patients underwent a comprehensive eye examination. Diagnosis of VKC was based on the presence of typical clinical signs and symptoms. The disease was classified as tarsal if the patient had giant papillae >1 mm in diameter at upper tarsal conjunctiva (Fig. 1), as limbal if the patient had limbal infiltrates, papillae and Trantas dots (Fig. 2), and as mixed if the patient had both limbal and tarsal signs.

The patients then underwent an otolaryngological examination and the diagnosis of AR was made according to the clinical definition including symptoms of rhinorrhoea, nasal obstruction, nasal itching and sneezing which are reversible spontaneously or with treatment including second-generation oral or intranasal H1-antihistamines and intranasal glucocorticosteroids [17]. Tympanometry was performed by a middle ear analyzer (Impedance audiometer AZ 26, Interacoustics A/S, Assens, Denmark) and the results were analysed according to the standard criteria [18]. The tympanogram was classified as type A (normal) when the pressure in the middle ear was higher than −100 daPa, as type B when no peak was detectable on the graphic, and as type C when the pressure ranged from −100 to −300 daPa. Tympanograms of type B and C were considered as abnormal.

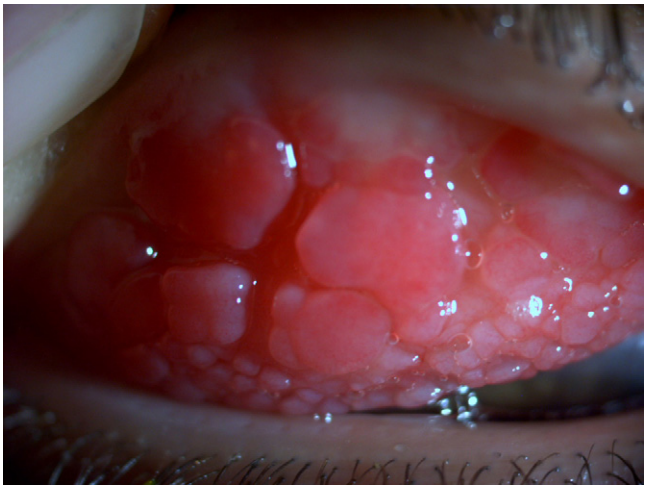

Fig. 1. Cobble stone papillae at the upper tarsus.

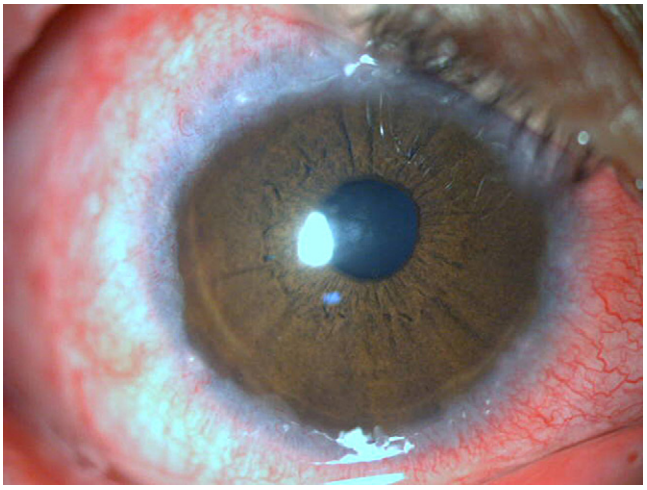

Fig. 2. Limbal papillae.

In Pediatric Allergy and Immunology Unit, a general examination was performed and the personal and family medical history, age of onset and associated allergic diseases were recorded. Blood samples were collected for determination of peripheral blood eosinophil count (PBEC) and serum total IgE. It was considered as eosinophilia when eosinophil number was ≥400/μl. Serum IgE levels were measured with a BN ProSpec® system (Dade Behring Inc, Germany) using the nephelometric method. Serum IgE levels were compared with the reference values according to age. The patients underwent epidermal skin tests (prick tests) for house dust mites (D. Farinae, D. Pteronyssinus), tree pollens, weed mix, grasses-cereal, animal hair, moulds and food allergens (egg and cacao). The allergen extracts used for prick test were obtained from Allergopharma Company (Rhenbeck, Palcentia, CA, USA). The antigens were applied to the forearm with Quicktest applicator (Panatrex, CA, USA). The positive, negative controls and allergen extracts were read 15 min after application. A skin prick test reaction was considered to be positive when the wheal diameter was ≥3 mm.

3. Results

The study included 26 males (96.3%) and 1 female (3.7%) with a mean age of 12.1 ± 4.4 years. Mean age of disease onset was 7.5 ± 3.1 years (within a range of 3–14 years). Seven subjects had limbal (25.9%), 12 subjects had tarsal (44.4%) and 8 subjects had mixed (29.6%) type VKC. Seventeen subjects (63%) had seasonal exacerbations and 17 subjects (63%) had a family history of allergy.

A positive skin prick test was identified for at least one allergen in 40% of patients (10/25 subjects). Seven subjects had pollen allergy, 2 had food allergy and 1 had yeast allergy. PBEC ranged between 0 and 2000/μl with a mean of 396/μl and mean serum total IgE level was found to be 179.9 kU/L (17–1230 kU/L). Eight out of 27 subjects (29.6%) had blood eosinophilia and 11 out of 27 subjects had elevated serum IgE (40.7%).

Symptoms and signs of AR were found in 10 subjects (37%). Median serum IgE level in subjects with AR (262.5 kU/L) was higher than without AR (40.2 kU/L); however the difference was not statistically significant ($p = 0.08$) (Table 1). There were no differences in PBEC or eosinophilia percentage between VKC subjects with or without AR ($p > 0.05$) (Table 1). Seven out of 10 VKC with AR (70%) and 10 out of 17 VKC subjects without AR