

COMMON PHYSIO-PATHOLOGICAL ASPECTS OF ALLERGIC CONJUNCTIVITIS AND ALLERGIC RHINITIS

Cristina Dancă¹, Andrei Ionuț Cucu^{2*}, Camelia Margareta Bogdănici³, Gabriela Dimitriu¹, Dana Mihaela Turliuc^{2,4}, Mihaela Roxana Popescu⁵, Alexandru Cărăuleanu⁶, Claudia Florida Costea^{1,3}

1. “Prof. Dr. Nicolae Oblu” Emergency Clinical Hospital of Iași, 2nd Ophthalmology Clinic
2. “Prof. Dr. N. Oblu” Emergency Clinical Hospital of Iași, Neurosurgery Unit II
3. “Grigore T. Popa” University of Medicine and Pharmacy Iași, Faculty of Medicine, Department of Ophthalmology
4. “Grigore T. Popa” University of Medicine and Pharmacy Iași, Faculty of Medicine, Department of Neurosurgery
5. “Grigore T. Popa” University of Medicine and Pharmacy Iași, Faculty of Medicine, Department of Radiology
6. “Grigore T. Popa” University of Medicine and Pharmacy Iași, Faculty of Medicine, Department of Obstetrics and Gynecology

*Corresponding author: e-mail: andreiucucu@yahoo.com

ABSTRACT:

Patients suffering from allergic conditions often also complain of ophthalmological symptoms. There are many anatomic connections between allergic conjunctivitis and allergic rhinitis. In addition to the physical connections existing within the nasolacrimal duct, the most important systems involved in pathological processes are innervation, circulation, and the lymphatic and neurogenic systems. A significant number of neurogenic compounds have been identified in the respiratory tract, nasal mucosa and ocular surface. The thorough understanding of the connection between nasal mucosa and ocular surface may influence the therapeutic approach and may improve the patients' quality of life.

Key words: allergic conjunctivitis, allergic rhinitis, ocular allergy, neurogenic compounds.

INTRODUCTION

Allergic conjunctivitis is one of the most common conditions (1). In most cases, this condition does not require treatment, and the absence of the allergen in the immediate environment is usually sufficient to make the condition stop. However, there are cases when therapeutic control is extremely difficult, and the complications that may occur due to cornea involvement

may seriously impair the patients' visual function (2,3).

Unlike allergic conjunctivitis, although it is not a medical condition with negative prognosis, allergic rhinitis impairs the overall quality of life of millions of patients (4). Patients suffering from allergic rhinitis often come to the doctor complaining of conjunctivitis symptoms (pruritus, congested conjunctiva, excessive

tearing). Considering that the eye conjunctiva resembles the nasal mucosa, the same allergens that trigger rhinitis may also be involved in the allergic conjunctivitis mechanism (5). The earlier the diagnosis is set, the more the quality of life of the subjects will be improved. In order to diagnose allergic rhinitis and conjunctivitis accurately, we need to understand the connection between the two conditions.

Traditionally, the tests run for the allergic symptoms focused mostly on nasal symptoms, yet, a certain number of researches conducted lately have pointed out the important place occupied by ocular condition prevalence.

Qiao *et al.* (2008) examined a group of 738 children suffering from conjunctivitis and allergic rhinitis, 352 of whom had seasonal conjunctivitis, 272 perennial conjunctivitis, and 114 vernal keratoconjunctivitis (6). Other research also confirmed a 92% association between allergic rhinitis and allergic conjunctivitis (6,7).

Singh *et al.* (2010) conducted a research on the adult population of the USA, their research including no less than 20.010 patients. Over 40% of the subjects reported at least one eye allergy episode over the preceding 12 months. Thus, the subjects aged 50 and over experienced ocular symptoms more often, whereas those younger than 50 exhibited higher occurrence rates of the two allergic conditions, namely rhinitis and conjunctivitis, occurring either together, or consisting merely of isolated nasal symptoms ($P < 0.001$) (8).

In another research conducted on British children living in rural areas, more precisely on subjects whose parents had reported "hay fever", the diagnosis was confirmed by doctors in 63.6% of the cases, unlike the children whose parents reported ocular allergy symptoms, only 5.8% of whom had a confirmed medical diagnosis of

allergic conjunctivitis. For comparison purposes, bronchial asthma was confirmed in 99.1% of the cases, in association with the eczema diagnosis which was certain in 88.3% of the cases (9). We would therefore like to draw the allergists' attention on the need to also address allergic conjunctivitis in order to treat and improve ocular symptoms.

ANATOMIC AND PHYSIO-PATHOLOGICAL ASPECTS

Being located between the ocular surface and the nose, the nasolacrimal duct is a direct physical connection of these two anatomical structures. Its main function is to drain the tears from the ocular surface. The tears are drained at the lacrimal punctum, they reach the lacrimal sac and then the nasolacrimal duct. 75-80% of the tears flow into the nasolacrimal system. Gravitation, capillary attraction in the lacrimal punctum and the blinking reflex maintain the forces required for tear drainage (10,11). (fig.1, A and B)

The nasal cavity is the narrowest section of the respiratory tract. The nasolacrimal duct opens into the inferior meatus. Most of the goblet cells which secrete mucus are found into the posterior nasal cavity.

The two conditions have the same physio-pathological mechanism. The human body reaction when exposed to an allergen consists of inborn or acquired hypersensitivity reactions. Type I hypersensitivity involves IgE-mediated mast cells and basophil cells. The most common allergens involved that were studied were dust mites and fungi which populate house dust (6,12). Ig-E-mediated allergic conjunctivitis usually accompanies allergic rhinitis, and the World Allergy Organization suggested the term rhino-conjunctivitis. Nevertheless, the extent of the superposition of the two pathological conditions has not yet been accurately determined due to the

complexity of the inter-relations between them (13).

The neurogenic system is another anatomic inflammation path. Signal transmission within the neurogenic system may be direct or indirect. As far as direct transmission is concerned, there is progression of an electromagnetic potential through the neurogenic fibers. Indirect transmission consists of the transmission of a biochemical message through biochemical messengers. A high number of neurogenic compounds have been identified in the respiratory tract, the nasal mucosa and the ocular surface. Such compounds are tachykinin peptides (substance P and neurokinin A), neuropeptide Y, vasoactive intestinal peptide, calcitonin peptide (gene-related).

The lymphatic system is very rich in the eye conjunctiva and in the lacrimal system. One may come across words like eye-related lymphatic system, conjunctiva-related lymphatic system, tear-related lymphatic system, tear drainage-related lymphatic system. The nose-related lymphatic system is located in the nasal cavity. Both the eye-related lymphatic system and the nose-related lymphatic system are part of the mucosa-related lymphatic system. Thus, certain cells may play an important role in the mutual communication method. Such cells are represented by lymphocytes T (natural-killers, cytotoxic cells, Th1, Th2), lymphocytes B and macrophages (14).

THERAPEUTIC CONSIDERATIONS

Due to their neurogenic mechanism, nose sprays have proven their neurogenic impact on the eyes. We wonder whether the effect also works the other way around. It seems that anti-histaminic medication administered in the eyes diminished rhinorrhea by 77%, eight hours after its administration (15). Considering the role of

the nasolacrimal system of draining the tears in the nasal cavity, the effect of the treatments is bidirectional. Nevertheless, there are researches that prove that anti-histaminic agents have a beneficial muscarinic effect on the nasal mucosa as they diminish the amount of mucus. At the same time, they diminish the tear film on the ocular surface and trigger a surge in inflammatory factors and eye pruritus (16).

Another drawback may be the intraocular pressure increase caused by sprays containing corticosteroid agents administered in the nose, especially in glaucoma patients (17).

Along with the anatomical complexity of the innervation and vascularization of the eye and of the nasal cavity, aspects related to the neurogenic inflammation and lymph system create confusion among researchers in this field, and the overlapping of allergic reactions within the two pathological conditions remains a challenge worth studying in the future.

CONCLUSIONS

The inflammatory factors may reach the nasal and eye conjunctival mucosa through the nasolacrimal duct, lacrimal system or indirectly through the flood flow.

The allergic reaction may activate or inhibit cells like mast cells, basophil cells, eosinophils, etc., by stimulating their blood migration. The neuronal network (sensorial, sympathetic, parasympathetic) leads to the release of neuropeptides triggering neurogenic inflammation.

When the communication relation between the ocular and nasal systems is better understood, we will be able to improve allergic conjunctivitis and allergic rhinitis therapy.

Therefore, in our opinion, there is a stringent need to define a common protocol by means of which any specialist who

detects a particular type of allergy should be able to recommend their patients tests to

identify the other allergic conditions.

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Figure

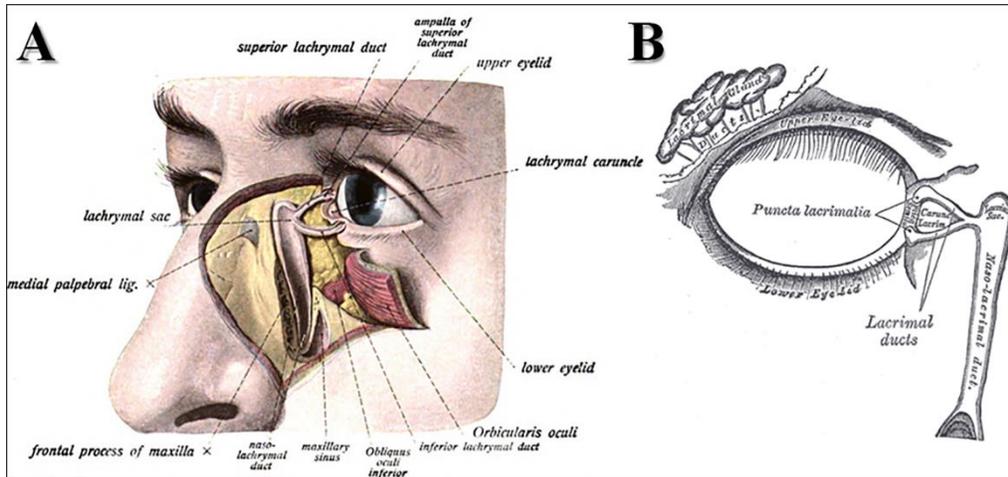


Figure 1. A. The lacrimal apparatus shown through dissection on the left side (18); **B.** Lacrimal apparatus scheme (19) (public domain).