

Role of Allergy in Primary Acquired Nasolacrimal Duct Obstruction

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Objective: Our objective was to determine the role of allergy in primary acquired nasolacrimal duct obstruction.

Methods: A total of 41 patients were enrolled in the study, 41 of whom had primary unilateral acquired nasolacrimal duct obstruction. All patients included in the study were evaluated by anterior rhinoscopy, endoscopic nasal examination, and multiprnick skin test to reveal allergic rhinitis.

Results: Allergy incidence was found to be high in study group. This was statistically significant ($P < 0.05$).

Conclusions: Although primary acquired nasolacrimal duct obstruction seems to be an ophthalmologic problem, rhinologic problems have great importance in etiology. Detailed endoscopic examination and multiprnick skin test will reveal the possible role of allergic rhinitis. This may increase the success rate both of the conservative treatment options and of the surgical treatment.

Key Words: Rhinitis, allergic, nasolacrimal duct obstruction, skin test

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Acquired nasolacrimal duct (NLD) obstruction often occurs in the adult age group, and it is more commonly observed in women than men.¹ Although primary acquired NLD obstructions are mostly

evaluated as idiopathic, trauma, infection, inflammation, neoplasms, and mechanical factors play a role in the etiology of secondary acquired NLD obstructions.^{2,3} Although the cause of primary acquired NLD obstructions has not been fully clarified yet because of the anatomic proximity of the lateral nasal wall to the lacrimal system, it has been suggested that any diseases involving this region may lead to an NLD obstruction.⁴ It has been known that diseases of the lateral nasal wall are most commonly related to paranasal sinus diseases.⁵ In addition, some anatomic anomalies such as septal deviations and concha bullosa have also been reported as the cause of NLD obstructions.⁶

Nowadays, NLD obstructions are a field of interest both for ophthalmologists and ear, nose, and throat (ENT) physicians. However, preoperative evaluation and treatment of nasal and paranasal pathologic conditions, which may play a role in the etiology of NLD obstructions, fall directly in the interest of ENT physicians.

Allergic rhinitis, either together with sinusitis or on its own, is one of the most frequently encountered diseases among the sinonasal problems, and it is a pathologic condition that must be seriously investigated in patients with epiphora. Since before the year 1942, it was suggested that inflammatory and allergic changes in the nasal mucosa may lead to the formation of edema in this region. An edema in the nasal mucosa may block the opening of the NLD and thus hinder the drainage of tears from the eye to the nasal cavity.⁷

In the current study, our intention is to shed light to the role of allergic rhinitis in the etiology of primary acquired NLD obstructions. We also aim to emphasize the importance of a full examination of the nasal and paranasal sinuses because in our opinion, these assessments may directly affect the success of both the medical and surgical treatments.

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MATERIALS AND METHODS

This study was conducted on 41 patients (34 women and 7 men) who presented with unilateral epiphora to the Haydarpaşa Numune Hospital Ophthalmology Clinic between June 2009 and March 2010. The medical history of the patients complaining of unilateral epiphora were taken carefully, and the beginning and duration of the complaints, any ocular discharge or redness before the beginning of the complaints, any past trauma involving the eyes, and previous eye or nose surgeries that the patient had undergone before the start of the complaints were thoroughly investigated. Patients with a history of nasal or paranasal surgery at the side of the epiphora and those with any kind of eye diseases at the side of the obstruction or maxillofacial trauma were excluded from the study. An NLD lavage was applied to all the patients in our ophthalmology clinic. Lacrimal sac radiographies with lipiodol were performed in patients in whom no flow could be achieved through the NLD lavage. For this purpose, subsequent to the administration of iodine (Lipiodol Ultra Fluide, 480 mg/mL; Guerbet, Istanbul, Turkey) to the inferior punctum at the obstructed side, the patients were brought to the upright position, and the anterior and posterior sac radiographies were performed. The filling of the lacrimal sac with lipiodol

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TABLE 1. Assessment of Demographic Characteristics According to Groups

	Study Group (n = 41)	Control Group (n = 41)	P
Age, mean (SD)	43.24 (13.78)	42.41 (13.58)	0.785
Sex, n (%)			
Female	34 (82.9%)	33 (80.5%)	0.775
Male	7 (17.1%)	8 (19.5%)	—

and the presence of the obstruction at the NLD junction were the prerequisites for the patients to participate in the study. Thus, patients with canalicular blockages were excluded.

Evaluation of Allergies

All patients were inquired about the presence of symptoms such as nasal discharge, nasal obstruction, sneezing, itchy nose, cough, postnasal discharge, or headache; all of which are suggestive of infection or allergy. Then, all the patients underwent detailed endoscopic examinations. Because in our opinion a diagnosis of allergic rhinitis based solely on a symptom questionnaire would be unreliable, we have also performed allergy skin tests on all the patients. Although there are other methods used to diagnose allergic rhinitis, the prick test was preferred because it is a rapid and non-invasive method that does not involve any radiation exposure and is commonly applied in our clinic to patients with rhinologic complaints. For the purposes of our study, the multitest method using sterile and disposable plastic applicators was chosen for the skin tests, and original multitest allergen extracts and test applicators manufactured by the Center Laboratories (New York, NY) were used. Each one of these applicators features 4 test heads with 2 parallel arrays and each test head contains 9 plastic microneedles. These microneedles are 1.9 mm long, with a 2 × 2-mm surface area. The solutions we used had a weight/volume concentration of 1:10 to 1:20 and were applied by loading a drop of antigen extract into the holes on the applicator. The allergen mixtures in each hole of the test applicator contained a predetermined number of allergens of the same group. Antihistaminic and anticholinergic drugs were discontinued 7 days before the scheduled skin test. The test was applied on a veinless and hairless skin area between the elbow pit and wrist in the forearm. After this area was disinfected with alcohol, the applicator containing the allergen was pressed on the skin. The arms of the patients were observed after being kept static for a period of 20 minutes. The results were evaluated according to the criteria presented by Aas and Belin⁸ and scored in comparison with positive (histamine) and negative (saline) controls.

Any weal caused by an allergen, which was at least 50% larger than the weal caused by histamine, was accepted as positive.⁸⁻¹⁰ After the evaluation was completed, a hydrocortisone cream was applied to the test area to prevent the progression of a possible reaction. Medication and equipment that could be required in case of an anaphylactic reaction were also kept on standby.

TABLE 2. Distribution of Allergy Status According to Groups

	Study Group (n = 41)		Control Group (n = 41)	
	n	%	n	%
Allergy (–)	12	29.3	33	80.5
1 allergen	13	31.7	6	14.6
2 allergens	11	26.8	1	2.4
>2 allergens	5	12.2	1	2.4

TABLE 3. Evaluation of Groups According to Allergy Status

Allergy	Study Group (n = 41), n (%)	Control Group (n = 41), n (%)	P
Yes	29 (70.7)	8 (19.5)	0.001**
No	12 (29.3)	33 (80.5)	

**P < 0.05 using the Chi-squared test.

Because applying the multiprnick skin test to individuals without any complaints seemed unethical to us, we enrolled as our control group 41 patients who had previously applied to our polyclinic owing to other complaints and had undergone multiprnick skin tests within the last 2 years. Although the members of the control group were enrolled randomly from the allergy clinic files, care has been taken to match the age and sex characteristics of the control group to the study group. The control group consisted of 41 patients (34 women [82.9%] and 7 men [17.1%]), and their ages ranged between 15 and 65 years (mean [SD] age, 42 [13.61] y).

Statistical Analysis

The NCSS 2007 and PASS 2008 Statistical Software (NCSS, Kaysville, UT) was used for the statistical analysis of the results obtained from the study. Descriptive statistical methods were used to evaluate the study data (mean [SD]). The Chi-squared test and Fisher exact test were used for the comparison of the qualitative data. Results were assessed with a 95% confidence interval, and statistical significance was established with a value of P < 0.05.

RESULTS

Table 1 shows the demographic characteristics of the study and control groups. No statistically significant difference was observed between the groups according to the age distribution of the patients (P > 0.05). There was no statistically significant difference between the groups in the sex distribution of the patients either (P > 0.05).

Allergies were detected in 29 patients (70.7%), whereas no allergies were observed in 12 patients (29.3%). Among these 29 patients who presented allergy symptoms, the reaction was caused by a single allergen in 13 patients (31.7%), whereas 2 allergens were responsible in 11 patients (26.8%), and 5 patients showed allergies to more than 2 allergens (12.2%). On the contrary, although no allergies were detected in 33 patients in the control group (80.5%), allergic reactions to a single allergen were observed in 6 patients (14.6%), allergic reactions to 2 allergens were observed in 1 patient (2.4%), and allergic reactions to more than 2 allergens were observed in 1 patient (2.4%) in this group (Table 2).

There was a statistically significant difference observed between the groups in allergy incidence (P < 0.05) (Table 3).

DISCUSSION

The lacrimal drainage system begins at the punctums located medially to the eyelids and terminates with the NLD at the level of the inferior meatus in the nasal cavity.¹¹

In acquired dacryocystitis cases, obstructions are commonly located at the inferior part of the nasolacrimal system. The nose and paranasal sinuses are commonly associated with the pathogenesis of the dacryocystitis owing to their close relationship with the NLD.¹²

An inflammation in the sinuses or the nasal mucosa may spread to the lumen of the NLD and cause a functional obstruction of the outflow, thus leading to an increased tear lake and acute and chronic inflammatory changes in the surrounding mucosa. Over

time, the inflammation-induced fibrosis of the canal transforms the functional obstruction of the outflow into a full anatomic obstruction.¹³ This theory is compatible with the pathologic changes observed during the development of the primary acquired NLD obstruction described by McCormick and Lindberg.¹⁴ In this study evaluating the nasal structures of the patients with NLD obstructions, chronic inflammation, mild mucosal glandular hyperplasia, and mucosal thickening were identified during the histopathologic examination.¹⁴

In many previous studies,^{13,15–17} significant associations were found between the NLD obstruction and sinonasal diseases. The presence of any sinonasal anomalies also affects the surgical success rate. It was reported in a study¹⁵ that the postoperative success rate in patients with sinonasal anomalies was found as 82.8%, whereas it was 92.3% in patients without evidence of sinonasal anomalies. It is also believed that sinonasal pathologic conditions play an important role in the development of complications, such as synechia or granulation tissue formation, which are the prominent factors leading to failed dacryocystorhinostomy operations.^{13,18} For these reasons, the preoperative diagnosis and treatment of nasal pathologic conditions may reduce the need for surgery or increase the success rate of the performed surgeries.

Allergic rhinitis, singly or together with sinusitis, is one of the most commonly encountered problems among sinonasal disorders, and it is a pathologic condition that should be seriously investigated in patients with epiphora.

Allergy is a functional disorder of the immune system, and there is usually more than 1 mechanism involved in the process. The main pathophysiology of nasal allergies is the antigen–antibody reaction and the ongoing tissue changes related to this reaction.¹⁹ Substances that cause allergies usually originate from the air. Histamine and other vasoactive substances lead to edema formation and tissue swelling through vasodilatation.²⁰

According to the clinical observations of Kubba et al,²¹ rhinitis is a very rarely diagnosed cause of epiphora. Inflammation of the nasal mucosa can lead to epiphora by causing an inflammation around the NLD orifice.²¹ In this study, allergic rhinitis findings were detected in 22 (23%) of 94 patients with unilateral NLD obstructions. These 22 patients were misdiagnosed to have mechanical NLD obstructions at the beginning, only to be discovered later to have acquired unilateral epiphora secondary to nasal allergies. Eight (36%) of these patients had previously undergone nasolacrimal surgery, but they continued to complain of epiphora. The unilateral epiphora symptoms decreased in 20 of these 22 patients after they were administered nasal sympathomimetics, antihistaminics, and/or nasal steroids. The results of this study demonstrated that the nasal changes seen in nasal allergies might be significantly associated with the development of acquired unilateral epiphora. They reported that the epiphora might ameliorate simply through the treatment of the rhinitis, and thus, some surgical interventions may become unnecessary in the long-term.²¹ McNeill et al²² have detected a regression both in the symptoms and in the nasal endoscopic examination findings of 8 of 11 patients with epiphora after the treatment with nasal steroids.

Allergy positivity was observed in 70.7% of the patients in our study—a ratio that was statistically significant ($P < 0.01$). Allergy positivity against 2 or more substances was identified in 16 (55.1%) of 29 patients. As a reference, the prevalence of allergic rhinitis in our country ranges between 19% and 20%.^{23,24}

Although most patients with NLD obstructions either primarily present to an ophthalmologist or they are referred to the ophthalmologist by other physicians, only a limited number of them are referred to ENT physicians. In parallel to various other studies, our study also has shown that although primary acquired NLD obstruction seems as an ophthalmologic problem, rhinologic

pathologic conditions also play an important role in its etiology. Therefore, patients with primary acquired NLD obstructions should undergo a detailed endoscopic nasal examination by an ENT physician. Because it is not possible to objectively assess the allergy status of these patients, the multipricket test, which we find a simple and rapid method to apply, may be performed after the detailed allergy inquiry. But this is certainly a controversial subject, and other comprehensive studies are needed to show the importance of allergy testing. Nowadays, surgery is the chosen method of treatment in NLD obstructions. The surgical treatment involves an endoscopic dacryocystorhinostomy applied by ENT physicians and the external dacryocystorhinostomy applied by ophthalmologists. We are of the opinion that the medical or surgical treatment of rhinologic disorders must go hand-in-hand with these surgical treatment options applied in cases of epiphora with symptoms of NLD obstruction. Especially in recurring cases, the reason for recurrence should be investigated in depth because we believe that the existing and untreated rhinologic diseases gain importance in these patients. All of these approaches may minimize the rate of failure of the treatment subsequent to the surgery.

In the studies conducted up to date, the importance of allergic rhinitis in patients with bilateral NLD obstructions was given a particular importance. In our study, allergy positivity was found significantly higher in patients with unilateral epiphora. Allergic rhinitis causes bilateral epiphora rather than unilateral epiphora.²⁰ Therefore, we think that unilateral NLD obstructions in patients with allergic rhinitis may be explained with a coexisting anatomic anomaly and/or sinusitis. This point is in fact one of the limitations of our study: healthier and more accurate conclusions could be reached by the presentation of sinusitis and/or anatomic abnormalities that might be present in patients with allergy. In addition, we also believe that the evaluation of the epiphora in allergy-positive patients may supply more valuable information after the allergy is medically treated. For this reason, there is a need for studies with a larger number of patients with both unilateral and bilateral NLD obstructions, where the nasal pathologic conditions accompanying the allergy are documented and the patients are reevaluated after the treatment.

As a result, patients with primary NLD obstructions must be preoperatively evaluated by an ENT physician. This may increase the success rate of both the conservative treatment options and of the surgical treatment.

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