



## Determining the incidence of paranasal sinus abnormalities during nasolacrimal duct obstruction

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### ABSTRACT

**Objectives:** To determine the association between nasolacrimal duct obstruction (NLDO) and paranasal sinus abnormalities and to demonstrate the role of this association in the etiology.

**Materials and Methods:** 50 patients diagnosed with nasolacrimal duct obstruction and 38 subjects with no obstruction (control group) were included in this study at a tertiary health institution. Each patient underwent an endoscopic examination and a paranasal sinus computed tomography evaluation. Thereafter, nasal pathologies, such as concha bullosa, chronic sinusitis, septal deviation, and turbinate hypertrophy, were identified.

**Results:** Concha bullosa was detected in 26 (52%) patients with NLDO and 12 (31.6%) members of the control group. The difference between the groups was not statistically significant ( $p=0.057$ ). A statistically significant correlation was found between the presence of NLDO with septal deviation and chronic sinusitis, while no association was discovered between NLDO and turbinate hypertrophy.

**Conclusion:** We believe that the possible nasal pathologies that can accompany NLDO should be kept in mind in the evaluation of patients scheduled for surgery, and that preoperative nasal cavity evaluation should be considered for this reason.

**Key words:** Nasolacrimal duct obstruction, concha bullosa, chronic dacryocystitis, paranasal sinus abnormalities

### Introduction

The nasolacrimal duct is an anatomical structure that opens into the inferior nasal meatus. Nasolacrimal duct obstruction (NLDO) is a disease characterized by constant watering of the eyes, ocular discharge, and recurrent attacks of acute infection [1]. It exists in two forms - acquired and congenital. Acquired idiopathic stenosis is the most common cause of acquired NLDO

onset, whereas naso-orbital trauma, previous surgery of the nose and sinuses, granulomatous diseases like sarcoidosis and Wegener's granulomatosis, and infiltration of nasopharyngeal tumors may also play a role [2].

Concha bullosa (CB), or conchal pneumatization, is the most common anatomical variation of the ostiomeatal complex and consists of varying degrees of pneumatization of the middle turbinate [3]. This pneu-

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matization is located mostly in the middle turbinate, but examination of inferior turbinate pneumatization is limited to a few examples in the existing literature [4, 5]. It was first described by Santoroni in 1739 [6]. As the nasolacrimal duct opens into the nasal cavity, the relationship between NLDO and nasal pathologies has been a controversial topic for many years. Anatomical variations in the nasal cavities of patients with NLDO and the similarities between the flora of the nasal and lacrimal areas have been investigated in many earlier studies [7-9].

In the present study, the aim was to determine the role of concha bullosa in the etiology of NLDO. For this purpose, the prevalence of concha bullosa in patients with NLDO was looked at. Deviated septum, chronic sinusitis (CS), and turbinate hypertrophy (TH) were also evaluated similarly.

### Materials and Methods

After approval was granted by the Ethics Committee for Clinical Studies at the university (date: 11.09.2012; No: 2012-144), 50 patients diagnosed with NLDO at the eye disease clinic of the hospital were enrolled in this study between October 2012 and January 2013 along with 38 healthy control group members. The demographic data for the all patients was recorded. The records from the endoscopic examinations of the patients' nasal cavities and the nasal pathologies seen through paranasal sinus computed tomography (images taken within the coronal plane in 2 mm sections) were evaluated. Statistical analysis was conducted for all nasal pathology associations.

SPSS 18.0 software (SPSS Inc., Chicago, IL, USA) was used to evaluate the patients' data. Statistical analysis was performed using Fisher's exact test and the chi-square test.  $p < 0.05$  was considered statistically significant. The frequencies of the identified pathologies are based on age and sex distribution.

### Results

88 subjects, including 50 patients with NLDO and 38 healthy controls, were included in the study. The average age of the patients was  $50.6 \pm 12.0$  (17-75) in the NLDO group and  $50.97 \pm 10.21$  (33-75) in the control group. 38 (76%) of the 50 patients with NLDO were female and the remaining 12 (24%) were male. In the control group, 28 (73.7%) were female and 10 (26.3%)

were male. The age and sex distributions between the control and NLDO groups were not significantly different ( $p > 0.05$ ). 24 patients (48%) in the NLDO group had right-sided NDLO and 26 (52%) had left-sided NLDO.

26 patients with NLDO (52%) and 12 members of the control group (31.6%) were found to have concha bullosa (CB). The difference between the two groups was not statistically significant ( $p = 0.06$ ).

In the NLDO group, 21 (24%) participants had septal deviation (SD) while 29 (58%) did not. In the control group, SD was seen in only 7 (18.4%) people, being absent in the remaining 31 (81.6%). A statistically significant difference was found between the incidence of SD in participants with and without NLDO ( $p = 0.02$ ).

TH was identified in 26 (52%) of the NLDO patients and 24 (48%) had no hypertrophy. It was seen in 12 (31.6%) cases in the control group. There was no statistically significant difference between NLDO presence and the incidence of TH ( $p = 0.06$ ).

CS was seen in only 5 (10%) NLDO patients, and none of the subjects in the control group had it. A statistically significant difference was found between the presence of NLDO and the existence of CS ( $p = 0.04$ ).

### Discussion

Chronic dacryocystitis is the most common cause of continuous lacrimation (epiphora) based on blockage of the eye tear ducts. It is four to five times more common in women than in men. The reason for this may be that females tend to have a narrower lumen in the bony lacrimal duct, although other endocrine factors may also be responsible. The proportion of cases in the female population in the study country has been estimated to be approximately four times more than in men [7]. In the work presented here, 38 (76%) patients diagnosed with NLDO were female. This sample was in line, therefore, with the findings of the existing literature.

As the nasolacrimal duct opens into the nasal cavity, the relationship between NLDO and nasal pathologies has been a controversial subject for a long time. Anatomical variations in the nasal cavities of patients with NLDO and similarities between the flora of the nasal and lacrimal areas have been examined in a vari-

ety of previous earlier studies [8,9]. In an analysis of 56 endoscopic endonasal dacryocystorhinostomies by Weidenbacher et al., 72% of patients had SD, 32% had CS, and 20% had TH [10]. Kallman et al. compared a NLDO group with a control group by using computerized tomography and reported a higher incidence of SD in the NLDO group [11]. Similarly, of the 50 patients examined here that had NLDO, 24% had SD, 10% had CS, and 52% had TH. Compared to the controls, there was a statistically significant difference in the presence of SD and CS in patients with NLDO; these patients were found more likely to have the conditions.

In a study by Köhler, it was suggested that, first of all, chronic infection of the maxillary sinuses and ethmoid cells, and, second, acute infection of the nasal cavity may pass from the nasolacrimal duct through Hasner's fold. This may then lead to stenosis by scar formation and chronic dacryocystitis [9]. The findings of the present study support this conclusion as the association between CS and NLDO was found to be high in terms of statistical significance.

CB, which is the most common anatomical variation of the middle turbinate, can be one-sided or may appear on both sides of the nasal cavity [12]. CB incidence generally varies from 13% to 53% [5,6]. Bolger et al. reported that there are three types of CB - real, lamellar, and bulbous types, with 15.7%, 46.2%, and 31.2% incidence, respectively. On the other hand, Tonai et al. have indicated that the incidence of the different types of CB was equal to 52%, 28%, and 19%, respectively [6,13]. Bilateral CB rates were reported to range from 45% to 61.5% [14].

Various reports exist in the literature regarding the presence of NLDO and its association with CB. In a study conducted by Habeşoğlu and colleagues, CB incidence in the side with NLDO was found to be 36.6%, whereas it was 17.1% in the healthy side. The researchers stated that this was statistically significant [15]. On the contrary, Sefi and Kallman found that there was no significant relationship between CB and NLDO in their study [11,16]. In this study, although CB presence was higher in the NLDO group when compared to the control group, the difference was not statistically significant.

In conclusion, it is believed that the possible nasal pathologies that might accompany NLDO should be

kept in mind in the evaluation of patients scheduled for surgery, and that preoperative nasal cavity examination should be considered.

#### Conflict of interest statement

The authors have no conflicts of interest to declare.

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