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Nasal and Sinus Disorders in Patients with Primary Acquired Nasolacrimal Duct Obstruction (PANDO)

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ABSTRACT

Introduction:
To investigate the frequency of nasal and sinus problems in patients with acquired nasolacrimal duct obstruction.

Materials and Methods:
The prospective case-control study was performed on 44 patients with primary acquired nasolacrimal duct obstruction, who were referred to oculoplastic clinics for surgery, and 50 healthy controls. All patients were evaluated with nasal endoscopy by an otolaryngologist. All endoscopic data were reported, including secretion from the middle meatus, nasal deviation, presence of a mass or polyp, turbinate hypertrophy, and concha bollosa.

Results:
The mean age of the patients was 42.02±12.04 years. The majority of participants were female (70.45%). 72.7% (32/44) of the PANDO group had varying sinus and nasal disorders. Septal deviation was the most common accompanying disorder, and it was found to be in 61.4 % (27/44) of the PANDO group compared to 36% (18/50; P=0.03) of the controls. 77.77% (28/36) of patients with unilateral nasolacrimal duct obstruction had been associated with sinus and nasal disorders.

Conclusion:
Due to the high frequency of nasal and sinus disorders in patients with acquired nasolacrimal duct obstruction, otolaryngology consultation before surgery is recommended.

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Introduction

Primary acquired nasolacrimal duct obstruction (PANDO) is a clinical syndrome characterized by epiphora. Anatomical proximity between the lacrimal drainage system and the nasal and paranasal sinuses can explain the hypothesis of accompanying nasolacrimal obstruction with sinonasal disorders, which may alter surgical outcomes. The term primary acquired nasolacrimal duct obstruction (PANDO) was originally introduced by Linberg and McCormick in 1986 (1). Although the exact etiology of PANDO is unknown, chronic inflammation and fibrosis in the nasolacrimal duct have been identified as possible causes (2,3).

The lacrimal apparatus consists of two main parts: the secretory and drainage systems. A close anatomical link exists between the lacrimal drainage system and the nasal and paranasal sinuses. The bony structure of the nasolacrimal duct in the inner wall of the maxillary sinus extends downwards, opening in the inferior meatus 1.5 cm above the nasal floor (4,5). Due to this close anatomical connection, pathologic processes in the nasal cavity or sinuses can affect the nasolacrimal system (5,6). The nasolacrimal system is often obstructed in the inferior nasal meatus (2). According to reports, some abnormalities, such as concha bullosa and septal deviation, as well as paranasal abnormalities, can cause PANDO (5,6). Therefore, this study investigated the frequency of nasal and sinus disorders in patients with primary acquired nasolacrimal duct obstruction.

Materials and Methods:

This prospective study was conducted on 44 patients complaining of chronic epiphora or purulent discharge who had been referred to the oculoplastic clinic in our ophthalmology hospital.

Fifty healthy control participants with no history of epiphora were included from other departments. Patients underwent a complete ophthalmological examination, including best-corrected visual acuity, eye movement, slit lamp, and fundoscopic examination. The inclusion criteria were age twenty or more, having mucosal or purulent discharge in the regurgitation test, or nasolacrimal duct obstruction, which had been confirmed in the irrigation test. The exclusion criteria were a history of recent upper airway infection, nasal trauma, punctum and common duct obstruction, eyelid disorders such as ectropion and entropion, a history of ocular thyroid disease, and previous nasolacrimal surgery. Patients included in the study were referred to a rhinologist for nasal endoscopy to evaluate nasal and sinus conditions.

An endoscopy was performed under local anesthesia. The bilateral nasal endoscopy revealed abnormal findings such as secretion from the middle meatus, obstruction of osteomeatal complex, nasal deviation, a mass or polyp, and turbinate hypertrophy. All endoscopic data were collected, and corrective surgeries were performed if indicated.

The variables included age, sex, laterality (unilateral or bilateral lacrimal duct obstruction), and nasal endoscopic findings, including nasal deviation, polyp or mass, turbinate hypertrophy, secretion from the middle meatus, obstruction of osteomeatal complex and a history of recurrent sinusitis were reported. The sample size was estimated based on the study of Linberg et al. (7). Therefore, considering the type I error level of 0.05, P: 0.78, and d: 0.04, the final sample size was calculated (n= 31 people). However, considering the possibility of dropout, a sample size of n=44 was employed. This study was approved by the Ethics Committee of Mashhad University of Medical Sciences (ethics code No: IR.MUMS. fm.REC.1395.619).

Statistical analysis

The data analysis was conducted after coding using SPSS software version 16. Qualitative variables were described in frequency and percentage, and quantitative variables with mean and standard deviation. Also, the possible connection of each background variable with the primary variables was analyzed using the Chi-square test. In all analyses, p=0.05 was considered as the level of significance.

Results

This study was performed on 44 patients with a mean age of 42.02± 12.04 (age range

of 20-67 years). More than 70% of participants were female. 32 in 44 patients (72.7%) had varying sinus and nasal disorders. Table 1 shows the demographic characteristics of patients with sinus and nasal disorders.

Table 1: Basic information on PANDO patients based on a diagnosis of sinus and nasal disorders

	Sex		Age group			Type of obstruction	
	Female	**Male**	**20-40 years**	**40-60 years**	**Above 60 years**	**Unilateral**	**Bilateral**
Total frequency of PANDO (%)	31 (70.45%)	13 (29.5%)	18 (40.9%)	21 (47.7%)	5 (11.4%)	36 (82%)	8 (18%)
Sinus and nasal disorders (%)	21 (67%)	11 (84%)	15 (83%)	16 (76%)	1 (20%)	28 (77%)	5 (62%)

According to the Chi-square test, sinus and nasal disorders were not significantly related to age groups (p = 0.37). There was also no significant gender-based difference in sinus and nasal disorders (p=0.22). Among all patients, 36 (82%) had unilateral nasolacrimal duct obstruction, and 8 (18%) had bilateral obstruction. It is worth noting that among patients who had unilateral nasolacrimal duct obstruction, 23 (82%) had nasosinosal abnormality on the obstructed side. All sinuses and nasal disorders are shown in Table 2. Of 44 participants, 27 (61%) had septal deviation, 11(25%) patients had turbinate hypertrophy, and 1 (2.3%) had obstruction of the osteomeatal complex.

Results showed that the most common disorders are related to the septal deviation of the nose (61.4%).

Table 2: The frequency of sinus and nasal disorders in participants

		Nasal septum deviation	**Obstruction of middle osteomeatal complex**	**turbinate hypertrophy**		**Secretion from the middle meatus**	**Nasal polyps**		**History of rhinitis or sinusitis**
				Unilateral	**Bilateral**		**Unilateral**	**Bilateral**	
Frequency (%)	PANDO	27(61.4%)	(2.3%)1	11 (25%)	4 (9.1%)	3 (6.8%)	1 (2.3%)	1(2.3%)	0 (0%)
	Controls	18(36%)	2(4%)	3(6%)	0(0%)	2(4%)	0(0%)	0(0%)	1(2%)

Discussion

Acquired nasolacrimal obstruction is common in adult patients over 40 years of age (8,9). It is one of the most prevalent causes of epiphora. The PANDO etiologies are not completely known and are generally considered idiopathic. However, it is believed that some factors, including sex, age, smoking, and infection, could be the risk factors for the disease, which can aggravate or alleviate the pathogenesis (10,11). On the other hand, it has been shown that sex-related factors are important due to the effect of sex hormones on the nasolacrimal duct, so its prevalence is higher in women before and after menopause (12). The present study showed that PANDO is higher in women. The number of participants above 65 years of age was limited in our study, and since the disease prevalence is higher in 40-60 years than in 20-40 years, this could be attributed to the small sample size.

A study by Lee et al. (13) showed a significant association between nasolacrimal duct obstruction and problems induced by facial asymmetry, especially nasal septal deviation (on the deviated side). Maximal development of the human face and nasal septum occurs in the first decade of life, but the mean age observed for PANDO is in the fourth to fifth decade, restating the role of other factors in the pathogenesis of PANDO. However, this association is inconclusive and reflects the possible influence of embryological and developmental factors in PANDO (13). Hasmet Yazici et al. (14) also reported a significant relationship between nasolacrimal duct obstruction and nasal disorders, and in a study conducted by Singh et al., unilateral PANDO was found to be associated with ipsilateral deviated nasal septum (15).

The present study found a high frequency of nasal septal deviation, consistent with

previous research. 72.7% (32/44) of the PANDO group had varying sinus and nasal disorders. Septal deviation was the most common accompanying disorder, and it was found to be in 61.4% (27.44) of the PANDO compared to 36% (18.50; P=0.03) of controls. 77% of the unilateral PANDO is associated with sinus and nasal disorder, and 82% with ipsilateral septal deviation.

Cervelli et al. evaluated the lacrimal flow in patients with deviated nasal septum (DNS) who underwent septorhinoplasty. Pre and postoperative CT dacryocystography revealed reduced lacrimal flow in 45.8 % of the cases undergoing surgical correction of nasal septum (16). Eyigör et al. evaluate the presence of sinonasal abnormalities with computerized tomography (CT). The postoperative success rate of end-DCR procedure in patients with sinonasal abnormalities was 82.8%, increased to 92.3% in patients without additional sinonasal disease, confirming the correlation between sinonasal abnormalities and nasolacrimal outflow obstruction (17). In our study, 72.7% (32/44) of the PANDO group compared to 36% (18/50; P=0.03) controls had varying sinus and nasal disorders. 77.77% (28/36) of patients with unilateral nasolacrimal duct obstruction had been associated with sinus and nasal disorders. The current study highlights the association of PANDO with nasosinusal disorders. The diagnosis and treatment of nasolacrimal duct obstruction is important for various reasons. It is a prerequisite for many surgeries, such as cataract surgery, as nasolacrimal duct obstruction should be checked preoperatively to prevent further risks. On the other hand, the pathological proximity of sinus and nasal disorders to nasolacrimal duct obstruction should be considered to optimize the therapeutic procedure for nasolacrimal duct obstruction. The reason is based on the hypothesis that the treatment of nasolacrimal duct obstruction will not be highly effective in the presence of sinus and nasal disorders, and there will be a higher chance of recurrence. Therefore, examining the patient for sinus and nasal disorders is necessary before treating nasolacrimal duct obstruction. One limitation of this study was its small sample size.

Conclusion

Despite the high prevalence of nasal and sinus disorders in patients with acquired nasolacrimal duct obstruction, seeking consultation with an otolaryngology specialist before lacrimal duct surgery is recommended to increase the chances of a successful surgery.

References

1. Dikici O, Ulutas H. Relationship Between Primary Acquired Nasolacrimal Duct Obstruction, Paranasal Abnormalities and Nasal Septal Deviation. J Craniofac Surg May/Jun 2020;31(3): 782-786. doi: 10.1097/SCS. 0000000000006108.
2. Gul A, Aslan K, Karli R, et al. A possible cause of nasolacrimal duct obstruction: narrow angle between inferior turbinate and upper part of the medial wall of the maxillary sinus. Curr Eye Res 2016; 41:729–733
3. McCormick A, Sloan B. The diameter of the nasolacrimal canal measured by computed tomography: gender and racial differences. Clin Experiment Ophthalmol 2009;37: 357–361.
4. Tatlisumak E, Aslan A, Co ¨mert A, et al. Surgical anatomy of the nasolacrimal duct on the lateral nasal wall as revealed by serial dissections. Anat Sci Int 2010; 85:8–12
5. Ali MJ, Paulsen F. Etiopathogenesis of primary acquired nasolacrimal duct obstruction. Ophthal Plast Reconstr Surg 2019;35:426–433
6. Berger G, Balum-Azim M, Ophir D. The normal inferior turbinate: histomorphometric analysis and clinical implications. Laryngoscope 2003; 113: 1192–1198
7. Linberg JV, McCormick SA. Primary acquired nasolacrimal duct obstrustion. A clinicopathologic report and biopsy technique.Ophthalmology 1986; 93: 1055 1063.doi:10.1016/s 01616420 (86)33620-0.
8. Yazici H, Bulbul E, Yazici A, et al. Primary acquired nasolacrimal duct obstruction: is it really related to paranasal abnormalities? Surg Radiol Anat 2015; 37:579–584 13.
9. Janssen AG, Mansour K, Bos JJ, Castelijns JA. Diameter of the bony lacrimal canal: normal values and values related to nasolacrimal duct obstruction: assessment with CT. Am J Neuroradiol 2001; 22:845–850
10. Haroon Y, Saleh HA, Abou-Issa AH. Nasal soft tissue obstruction improvement after septoplasty without turbinectomy. Eur Arch Otorhinolaryngol 2013;270:2649–2655 15.
11. Kapusuz Gencer Z, Ozkiris¸ M, Okur A, et al. The effect of nasal septal deviation on maxillary sinus volumes and development of maxillary sinusitis. Eur Arch Otorhinolaryngol 2013;270:3069–3073

12. Chakravarti A, Naglot S, Dhawan R. Outcome of endoscopic sinus surgery in patients with symptomatic chronic rhinosinusitis with minimal changes on computerised tomography. Indian Journal of Otolaryngology and Head & Neck Surgery. 2011;63(4):359-63.
13. Lee JS, Lee H, Kim JW, Chang M, Park M, Baek S. Association of facial asymmetry and nasal septal deviation in acquired nasolacrimal duct obstruction in East Asians. The Journal of craniofacial surgery. 2013;24(5):1544-8.
14. Yazici H, Bulbul E, Yazici A, Kaymakci M, Tiskaoglu N, Yanik B, et al. Primary acquired nasolacrimal duct obstruction: is it really related to paranasal abnormalities? Surgical and radiologic anatomy : SRA. 2015;37(6):579-84.
15. Singh S, Aliam M.Sh, Ali M.J, Naik M.N Endoscopic intranasal findings in unilateral primary acquired nasolacrimal duct obstruction. Saudi J Ophthalmol Jul-Sep 2017;31(3):128-130. doi: 10.1016/j.sjopt.2017.05.013.
16. Cervelli V, Gravante G, Colicchia GM, Grimaldi G, Bottini D.J, et al. Asymptomatic lacrimal flow abnormalities in patients with septal deviations and turbinate hypertrophy. Aesthetic Plast Surg 2008;32:72–6. DOI: 10.1007/s00266-007-9009-6
17. Eyigör H, Unsal AI, Unsal A. The role of accompanying sinonasal abnormalities in the outcome of endonasal dacryocystorhinostomy. Am J Rhinol. 2006 Nov-Dec;20(6):620-4. doi: 10.2500/ajr.2006.20.2944. PMID: 17181105.