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Nasolacrimal duct obstruction with obstructive nasal deformity; is synchronous nasal surgery necessary?

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Abstract

The aim of this study was to evaluate the necessity of the simultaneous additional nasal surgery to increase success rate of the endoscopic dacryocystorhinostomy operation, in the patients with nasolacrimal duct obstruction and obstructive nasal deformity. One hundred and thirty patients with nasolacrimal duct obstruction and obstructive nasal deformity (59 were female and 71 male, age ranged between 31 and 82 years, mean=60.3 years) were included in this study. Patients with nasolacrimal duct obstruction were divided into two main groups (group A and B) and six subgroups (A1, A2, A3 and B1, B2, B3) according to the presence of obstructive nasal deformity and applied operation techniques. The success and complications rates of this groups were evaluated. The success rates of endoscopic dacryocystorhinostomy in the additional nasal surgery performed group (Group A) were not statistically significant higher than the group without additional nasal surgery (Group B). Complications rate of group A (26.08%) were statistically significant higher than group B (9.8%). In patients with complications, the average success rate of endoscopic dacryocystorhinostomy surgery (70.8%) was statistically significant lower than in patients with no complications (88.6%), respectively. Additional nasal surgery has no statistically significant effect on the success of the endoscopic dacryocystorhinostomy surgery. Developing complications was statistically affect the success rate of endoscopic dacryocystorhinostomy surgery. Due to these reasons, contrary to the general idea, we believe that, to increase the success rate of the endoscopic dacryocystorhinostomy surgery, additional nasal surgery is unnecessary in patients with nasolacrimal duct obstruction and obstructive nasal deformity.

Keywords: Nasolacrimal duct obstructions, septum deviation, concha bullosa, endoscopic dacryocystorhinostomy

Introduction

Nasolacrimal drainage obstruction (NLDO) is a common disease. Epiphora, crusty discharge, conjunctivitis, and recurrent acute or chronic dacryocystitis are the most common clinical symptoms associated with this disease. The diagnosis can be confirmed with dacryoscintigraphy and the level of the obstruction can be determined. After inconclusive and unsuccessful probing, recommended surgical procedure is “dacryocystorhinostomy (DCR)” to bypass the site of obstruction by creating a channel for the drainage of the tear from lacrimal sac into the nasal cavity directly [1]. Dacryocystorhinostomy surgery can be performed via external or internal (endoscopic, endonasal/intranasal) approach.

External DCR was first described by Toti in 1904 and clinical study for endoscopic technique was published by McDonough & Meiring in 1989 [2,3]. Over the years, endonasal endoscopic DCR (end-DCR) had been accepted as a safety process with at least equal success to the traditional external technique. End-DCR technique has advantages such as; less complication, lower morbidity rates and shorter operative time [4-6]. Over the years, modifications of the surgical technique were defined for end-DCR; laser or radio frequency assisted DCR, powered endoscopic or balloon DCR, nasal and lacrimal flap suturing, usage of stents, usage of mitomycin C or composite of the techniques [7,8].

In literature, it had been reported that the success rate of DCR surgery is associated with the concomitant nasal pathologies. Due to the nasal pathologies, adhesions in the nasal mucosa can occur after the DCR surgery and can cause failure of the surgery. According to this knowledge additional nasal surgery (add-NS) preferred in NLDO patients concomittant with obstructive nasal deformity (OND) [9-12].

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Septal deviation (SD) and concha bullosa (CB) are the most common nasal deformities that cause OND. Nasal obstruction can cause an inflammation and as a result obstruction, contraction and collection of cellular remnants and debris in the nasolacrimal lumen may occur. As long as the obstruction continues permanent inflammation, congestion, and finally scarring in the nasolacrimal lumen may cause NLDO [8].

In patients with NLDO and OND, add-NS basically performed for two reasons. First, to facilitate the end-DCR surgery and second to increase the success rate of end-DCR surgery [9-12]. The aim of this study is to evaluate the success or failure and complication rates of our patients with NLDO and OND, thus to determine the necessity of the add-NS to increase the success rate of the end-DCR in selected patients. Contrary to the general consideration in our study add-NS did not improve success rate moreover the complication rates were found statistically significant increased in patients whom performed add-NS.

Materials and Methods

Ethical Approval

The study was approved by the local Ethical Committee (2013/159). A written informed consent was obtained from all patients.

Study Design

In this retrospective study, 130 patients who were diagnosed as NLDO and OND were evaluated. Patients with history of nasolacrimal duct surgery or nasal surgery, maxillofacial trauma, rhinosinusitis, allergy, sarcoidosis, granulomatosis, and tumors were excluded from the study. Patients with NLDO were divided into two groups according to the add-NS. Add-NS determined as endoscopic septoplasty (end-SP) or endoscopic concha bullosa

surgery (end-CBS) for the patients.

Fifty-nine of the patients were female, 71 were male, and the age range was between 31-82 years old (mean=60.3 years) [Table 1]. During the preoperative evaluation, all patients underwent a complete rhinological and ophthalmological examination, and the NLDO was confirmed by a lacrimal irrigation study and in the some cases by dacryocystography. The superior septal deviation (moderate to severe) especially in zone 2 and 3 which complicates endoscopic intervention and also have a risk for synechiae formation postoperatively and/or concha bullosa was confirmed by endoscopic nasal examination in the asymptomatic patients, and by the paranasal sinus computed tomography (PNSCT) in the symptomatic cases that have headaches, nasal obstruction, and nasal discharge. Patients with complaints such as sinusitis or a history of previous surgery PNSCT was performed, but the patients without these complaints only endoscopic nasal examination was performed to protect the patient from unnecessary radiation risk.

All operations were performed under general anesthesia and the properties of the nasal structures, such as the lateral nasal wall, nasal septum, and nasal turbinates, were recorded in all of the cases. In all groups, postoperative topical and systemic antibiotics were given for 10 days. In the postoperative period, all patients were evaluated regularly to observe good healing. The follow-up period ranged from 12 to 28 months. Complete recovery of the complaints and the visualization of the new nasolacrimal ostium was defined as successful outcome, at least 12 months after surgery. Also, resolution of the epiphora symptom approximately 12 months postoperatively, accepted as the surgical success.

The NLDO patients were divided into two main groups and six sub-groups according to the presence of OND and the applied operative techniques. Group A; consists of 69 patients whom performed end-DCR and add-NS and Group B; consists of 61

Table 1. Demographic data of all cases

Groups	Number of Patients	Male	Female	Success Rate	Failure Rate	Complication Rate
Group A	69	37	32	86.95% (60/69)	13.05% (9/69)	26.08% (18/69)
A1	25	12	13	88% (22/25)	12% (3/25)	20% (5/25)
A2	23	13	10	86.9% (20/23)	13.1% (3/23)	21.7% (5/23)
A3	21	12	9	85.7% (18/21)	14.2% (3/21)	38% (8/21)
Group B	61	28	33	83.6% (51/61)	16.4% (10/61)	9.8% (6/61)
B1	21	10	11	90.4% (19/21)	9.5% (2/21)	9.5% (2/21)
B2	20	7	13	80% (16/20)	20% (4/20)	10% (2/20)
B3	20	11	9	80% (16/20)	20% (4/20)	10% (2/20)

patients whom performed end-DCR without add-NS. This two groups were divided into sub-groups as follows; Group A1 consists of 25 patients who diagnosed as NLDO and SD, and performed end-DCR with end-SP. Group A2 consisted of 23 patients who diagnosed as NLDO and CB, and performed end-DCR with end-CBS. Group A3 consisted of 21 patients who diagnosed as NLDO, SD, and CB and performed the end-DCR with end-SP plus end-CBS. Group B1 consisted of 21 patients who diagnosed as NLDO and SD, and performed end-DCR without end-SP. Group B2 consisted of 20 patients who diagnosed as NLDO and CB, and performed end-DCR without end-CBS. Group B3 consisted of 20 patients who diagnosed as NLDO, SD, and CB, and performed end-DCR without end-SP and end-CBS.

The success rates, failure rates, and complications rates of all groups (main group A and B, and sub-groups group A1,2,3 and group B1,2,3) was recorded and compared with each other [Table 1].

Statistics

For statistical analysis SPSS 15.0 for Windows (SPSS Inc, Chicago, IL) software programme was used. Qualitative data were compared using Chi-square test and analysis of variance was used for statistical analysis. All statistical analysis were carried out with 5% significance and $P < 0.05$ was considered statistically significant.

Results

Clinically, all of the cases had epiphora, and additional complaints included nasal congestion (n=66, 50.7%), headache (n=42, 32.3%), burning (n=38, 29.2%), swelling (n=21, 16.1%), and redness over the lacrimal sac (n=12, 9.2%), respectively. There were SD in 87 (66.9%) and CB in 84 (64.6%) patients.

End-DCR and add-NS were performed to 69 patients (Group A), whereas end-DCR without add-NS were performed to 61 patients (Group B). The distribution of the patients in groups were as followed. In Group A (n=69); group A1 (n=25), group A2 (n=23), and group A3 (n=21). In group B (n=61); group B1 (n=21), group B2 (n=20), and group B3 (n=20).

The success rates of end-DCR surgery in main groups were 86.95% (60/69) in group A and 83.6% (51/61) in group B. In sub-groups success rate of the surgery was found as; 88% (22/25) in group A1, 86.9% (20/23) in group A2 and 85.7% (18/21) in group A3. As well as 90.4% (19/21) in group B1, 80% (16/20) in group B2, and 80% (16/20) in group B3 [Table 1].

The success rates of end-DCR surgery in main groups and sub-groups were compared with each other and also in the same diagnostic groups (A vs B, A1 vs. B1, A2 vs. B2, and A3 vs. B3). Although, the mean success rates of all end-DCR and add-NS group (mean A group and sub-groups A1, A2, A3) were higher than end-DCR without add-NS group (mean B group and sub-groups B1, B2, B3), the results were not found statistically significant by the analysis tests ($p > 0.05$).

The failure rate of end-DCR surgery in the main groups were 13.05% (9/69) in group A and 16.4% (10/61) in group B. In sub-

groups; 12% (3/25) in group A1, 13% (3/23) in group A2, and 14.2% (3/21) in group A3. Besides, 20% (4/20) in group B1, 9.5% (2/21) in group B2, and 20% (4/20) in group B3. The failure rates of end-DCR surgery in the main groups and sub-groups were compared with each other and also in the same diagnostic groups (A vs B, A1 vs. B1, A2 vs. B2, and A3 vs. B3). Although, the mean failure rates of the all mean group A and A1, A2, A3 sub-groups were less than the mean group B and B1, B2, B3 sub-group, but the results were not found statistically significant by the analysis tests ($p > 0.05$).

Complications were seen in 18 patients (18/69, 26.08%) in group A. The complications were intraoperative or postoperative bleeding (n=4), granulation tissue formation around the silicone tube (n=4), synechiae between middle concha and lateral wall (n=3), nasal mucosa defect (n=2), cacosmia (n=2), and facial pain (n=3). In group B, complication were seen in 6 patients (6/61, 9.8%). The complications were intraoperative or postoperative bleeding (n=1), granulation tissue formation around the silicone tube (n=2), synechiae between middle concha and lateral wall (n=2), cacosmia (n=1) were detected. Serious complications such as orbital fatty tissue prolapse, cerebrospinal fluid leaking, diplopia and loss of vision were not observed in none of the patients. Complications rates of group A (26.08%) were found statistically significantly higher than group B (9.8%) ($p < 0.05$) [Table 2].

Table 2. A summary of the success rate versus demographic data

Complications	Group A	Group B
Intraoperative bleeding	2	1
Postoperative bleeding	2	-
Granulation tissue	4	2
Synechiae	3	2
Nasal mucosal defect	2	-
Cacosmia	2	1
Facial pain	3	-
Total	26.08% (18/69)	9.8 % (6/61)

The average success rate of end-DCR surgery was 70.8% (17/24) in patients with complications, whereas 88.6% (94/106) in patients with no complications, respectively. According to the results statistically significant differences were found between patients with or without complications ($P < 0.05$). As a result, complications were found to be a factor that affect the success rate of end-DCR surgery, statistically.

Discussion

The nasolacrimal drainage system serves as a conduit for tear flow from the external eye to the nasal cavity. This system begins at the punctum and terminates with the NLD at the level of the inferior meatus in the nasal cavity. Because the lacrimal system has a closer relationship with the lateral nasal wall, diseases of the sinonasal region may result in NLDO. In the literature there are many studies about the important effects of the nasal septum and total nasal resistance on the improvement of the nasomaxillary structures, which include the nasolacrimal system [11,13,14].

In dacryocystitis patients, obstruction is generally located at the inferior part of the nasolacrimal system. The nasal structures such as the nasal septum and turbinates are normally associated with the pathogenesis of dacryocystitis, owing to their closer relationship with the NLD [1,3,9]. An inflammation of the intranasal mucosa may affect the NLD orifice and cause a blockage of the tear drainage, consequently leading to inflammatory changes in the mucosa. During the course of time, canal fibrosis due to the inflammation may lead to complete anatomic obstruction [15-17]. This theory is similar to the histopathological changes observed during the improvement of the primary acquired NLDO described by Lindberg [18]. Also, McCormick et al., found chronic inflammation, glandular hyperplasia and mucosal thickening in the nasal structures during the histopathological examination of patients with NLDO [19].

The pathogenesis of NLDO has been still unclear despite extensive existing knowledge on management. It has been informed that any diseases of this region may result in a NLDO [17]. Some anatomic abnormalities or variations of the lateral nasal wall, such as SD and CB, have also been reported as the cause of NLDO. The rate of anatomic variation in nasal structures has been reported to be between 64.9% and 86% [11,20]. In literature, concomitant nasal surgeries in end-DCR ranged from 10% to 47% for SP, up to 4% for turbinectomy, 1.5% to 5.9% for middle turbinoplasty [9-11,21]. Also, Kalmann et al. reported that radiologic findings favor of one or more rhinologic abnormalities or sinus disease in 87% of patients with NLD obstruction and in 63% of the control group [15]. Similarly, Habesoglu et al. observed higher incidence of sinonasal pathologies at a rate of 95.1% in the group of NLD obstruction and 58.5% in the control group [11]. In our study, the frequency of SD was found to be 66.9% in the NLDO patients similar to the literature findings.

The incidence of CB has been detected to be between 13.2% and 72.2%. This rate was reported to be between 13.2-50% in healthy people, and between 33.8-72.6% in symptomatic NLDO patients [20,22,23]. In our study, the frequency of CB was found to be 64.6% in the NLDO patients. CB may lead to mucosal edema, obstruction of the ostiomeatal unit and finally sinusitis. The type of CB, could be lamellar, bullous, or extensive, becomes an important factor in the development of these pathologies [20,22-25]. In our cases, as parallel to the literature, bulbous and extensive types were commonly seen.

Although there are many reports about associations between the NLDO and sinonasal diseases, there is only one study about the postoperative success rate in NLDO patients with sinonasal abnormalities in the literature [9-12,26]. Eyigor et al., found the postoperative success rate of the end-DCR surgery in patients with sinonasal abnormalities was 82.8%, whereas the rate increased to 92.3% in patients without sinonasal diseases [26]. In addition, sinonasal pathologic conditions play an important role in improvement of complications like synechia or granulation tissue formation, which are important factors affecting the success rates in DCR surgeries [26]. Similarly, in our study complications rates were found statistically significantly higher in patients with additional sinonasal pathologic conditions (Group A). In addition, we found that, the average success rate of end-DCR surgery 70.8% (17 of the 24 cases) in patients whom developed complications,

whereas success rate increased up to 88.6% (94 of the 106) in patients without complications. These results were found statistically significant. According to the results of our study, we considered that the complications affect the success rate of end-DCR surgery.

According to the results of the present study, we found that add-NS has no statistically significant effect on the success of the end-DCR. Conversely, increased complication rates in end-DCR and add-NS decreases the success rate of the surgery. In our patients combined surgery led more complications and the success rate of end-DCR surgery didn't increase as expected. Therefore, contrary to general opinion we concluded that, to improve success rate of end-DCR surgery, add-NS is unnecessary in patients with NLDO and OND.

Finally, further prospective studies, with a larger number of patients with NLDO and OND are needed to clarify necessity of add-NS in NLDO patients.

Conflict of interests

The authors declare that they have no competing interests.

Financial Disclosure

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Ethical approval

The study was approved by the Inonu University Ethical Committee (2013/159).

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