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The effects of accompanying sinonasal pathologies on the success of primary dacryocystorhinostomy

Mustafa Altintas

University of Health Sciences, Antalya Training and Research Hospital, Department of Otorhinolaryngology, Antalya, Türkiye

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Abstract

Aim: In this study, the results of patients who underwent primary endoscopic endonasal dacryocystorhinostomy surgery and nasolacrimal silicone tube intubation (PEEDCR + NSTI) due to chronic dacryostenosis were evaluated retrospectively. The sinonasal pathologies accompanying these cases and their results were reviewed in the light of the literature.

Materials and Methods: The medical records of 55 patients who admitted to State Hospital Ear Nose and Throat Clinics between January 1, 2015 and December 31, 2019, were diagnosed with chronic dacryostenosis and underwent PEEDCR + NSTI surgery were retrospectively examined.

Results: Fifty-five patients were included in the study. Thirty-three of the patients (60%) were female and 22 were male (40%). Endoscopic endonasal DCR and nasolacrimal silicon tube intubation were applied to a total of 55 patients, 21 (38.18%) right eye and 34 (61.82%) left eye. Simultaneously, sinonasal pathology surgery was performed on 32 patients. 47 patients (85.5%) achieved complete recovery, while the complaint of eight patients (14.5%) continued. In our study, we found the success rate as 85.5% in primary cases. Nasal revision surgery and EEDCR + NSTI were applied to 8 patients with recurrence. While 7 of these are fully recovered, 1 patient relapsed again. Success rate after revision surgery increased to 98.2%. All of the 8 patients with recurrence were those who underwent sinonasal pathology surgery simultaneously.

Conclusion: PEEDCR + NSTI surgery is a functional treatment method that is well-tolerated and with high success in patients with lacrimal stenosis. Sinonasal pathologies were responsible for recurrences. Simultaneously, intranasal pathologies must be treated effectively.

Introduction

Dacryocystorhinostomy is a chosen procedure that opens the lacrimal sac and nasolacrimal canal into the nose in nasolacrimal duct obstruction. External surgery of nasolacrimal duct obstruction has been performed since the early 19th century. The development of endoscopic surgery with technological developments in recent years has evolved the endonasal treatment of nasolacrimal canal. Increasing knowledge about intranasal anatomy and the development of imaging methods and instruments used during surgery also increased the success rate of endoscopic surgery. At the same time, there are many advantages such as no external scars occur, lacrimal sac pump function is not impaired, lacrimal sac is not mobilized from the surrounding bone structures, other nasal pathologies can be treated, and the operation time is shorter and less morbidity is encountered. Moreover, failure rates in endoscopic surgery are reported between 5-20% [1]. The nasolacrimal system basically consists of the lacrimal gland, the lacrimal sac and the nasolacrimal duct. The major factors that increase failure rates are the complexity of nasolacrimal anatomy, being adjacent to vital organs, and frequent accompanying parasinus pathologies [2]. In this study, we retrospectively evaluated the results of primary endoscopic endonasal dacryocystorhinostomy surgery and nasolacrimal silicone tube intubation (PEEDCR + NSTI) in patients who admitted to our hospital with complaints of epiphora and lacrimation, who were diagnosed with chronic dacryostenosis and did not improve with medical treatment. We investigated the success rates of the surgery, demographic characteristics, complications and causes of failure in operated patients in the light of the literature.

Figure 1. Left lacrimal sac area.

Figure 2. External punctum dilation.

Materials and Methods

Ethical approval of this study obtained from Akdeniz University Scientific Research and Publication Ethics Committee. In our study, the files of patients who were referred to Antalya Serik State Hospital Ear Nose and Throat Clinics by the Ophthalmology Clinics between the dates of 1 January 2015 - 31 December 2019, whose routine follow-up was completed, were diagnosed with chronic dacryostenosis, were not treated with medical treatment, and were operated with PEEDCR + NSTI, retrospectively. Patients' demographic characteristics, age, gender, eye that was affected, duration of silicone tube stay, mean follow-up period, presence of additional nasal pathologies, complications and causes of failure were evaluated. We performed all of the operations under general anesthesia. Nasal cavity of the patients was decongested with cotton with adrenaline prior to the surgery. Afterwards, a mixture of 1 mL lidocaine and 1:100,000 adrenaline was infiltrated into the front end of the middle conchae and region region of the lateral nasal wall adhesion to the middle conchae (Figure 1). If there were simultaneous nasal pathologies such as septal deviation, concha bullosa, turbinate hypertrophy and thought to block the surgical site, surgical correction was performed primarily. In this study, 14 patients had endoscopic septoplasty, nine patients had endoscopic concha bullosa resection, five patients had inferior turbinoplasty, three patients had nasal polypectomy and two patients had functional endoscopic sinus surgery. During all these attempts, 0- and 30-degrees rigid telescope and monitor was used.

The surgical technique we selected included marsupialization of the lacrimal sac and superior nasolacrimal duct into the nasal cavity. The most important landmark for the localization of the lacrimal sac and duct is the maxillary line. The maxillary line starts just before the adhesion line of the frontal process of the lacrimal bone and maxilla to the lateral nasal wall of the junction line and continues at an inclined angle towards the posterior border of the inferior concha. The lacrimal sac and ductus are located lateral and posterior of the maxillary line. The upper limit of the lacrimal sac extends approximately 6 mm above the middle concha adhesion site. The operation was started with mucosal incision and elevation. Starting from 1-2 mm anterior to the adhesion of the middle turbinate to the lateral nasal wall, a mucosal incision was made through a few mm above the upper border of the lower concha and just before the nasolacrimal bulge. Following mucosal elevation, bone was excised with the help of 2 mm osteotome and Kerrison forceps, and a rhinostomy window with a size of 4-8 mm was created in the lateral nasal wall. We made bone excision from the middle of the distance between the middle concha adhesion to the lateral wall and the upper edge of the lower concha to a few mm above the middle concha adhesion. Simultaneously, the upper and lower punctae located in the medial canthus for external punctal dilatation were dilated with the Bowman probe (Figure 2). The probe was then horizontally aligned in the canaliculi and directed towards the lacrimal sac. The medial wall of the lacrimal sac was stretched into the nose with the probe inserted through the canaliculi and a vertical incision was made with a sickle knife. At this stage, purulent drainage was observed in some patients. The tip of the probe was observed endoscopically on the lateral nasal wall. Then, with the help of forceps, the medial wall of the sac was removed, and the silicone tube was inserted through the dilated upper and lower puncta and pulled through the pouch. The probes were cut off at the silicone ends and removed and the two ends of the silicone tube were tied together in the nasal cavity. We performed nasolacrimal silicone tube intubation in all of our cases. We postoperatively used topical steroids and Mitomycin C in our cases. There are studies indicating that mitomycin C prevents the development of granulation tissue and the formation of stenosis [3]. Patients were controlled for bleeding. Massive bleeding was not observed in any of our patients. Then spongestan was placed in the middle meatus. If an intervention was made in the nasal cavity, a merocele tampon was placed and the operation was terminated.

The patients were invited to the controls on the postoperative 3rd day, after the tampons were removed, at first week, first month, third month, and then quarterly. The patients were followed up between six and 18 months. Silicone tubes were removed in all patients at the end of the postoperative sixth month. Nasolacrimal irrigation was done on all patients on the 15th day after removal of the silicone tube. Nasal cavity was checked by endoscopic examination. The complete disappearance of the complaint of epiphora and fluid ejection from the iatrogenic ostium after injection of fluid from the puncture were considered as the signs of complete recovery.

Table 1. The characteristics of patients (n=55).

Characteristics	n
Sex	
F	33(60%)
M	22(40%)
Average age	
F	45.90 ± 13.45
M	48.40 ± 19.90
Laterality	
Right	21(38.18%)
Left	34(61.82%)

Table 2. Success rate of operations.

	Successful n (%)	Recurrence n (%)
Primary EEDCR	47 (85.5%)	8 (14.5%)
Revision EEDCR	7 (87.5%)	1 (12.5%)
Total	54 (98.2%)	1 (1.8%)

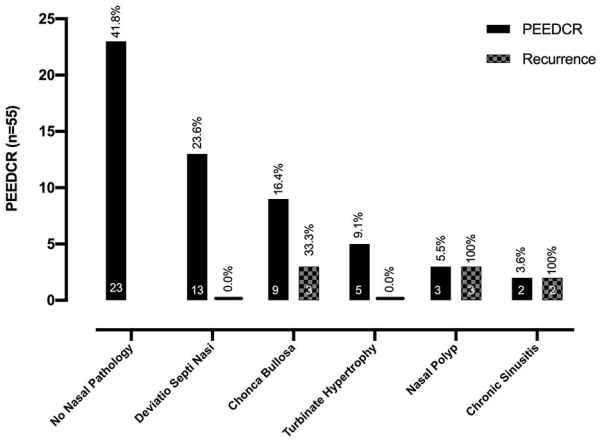

Figure 3. The number of sinonasal pathology and recurrence rate.

Results

Clinical features of the cases such as gender, age, laterality and accompanying nasal pathology were evaluated. A total of 55 patients, 33 female (60%) and 22 male (40%), were included in the study. The ages of the patients ranged between 16 and 74 years (mean age = 46.91 ± 16.55 years; female = 45.90 ± 13.45 years, males = 48.40 ± 19.90) (Table 1).

Preoperative endoscopic examinations of the patients were performed, and paranasal sinus tomography were obtained. There were accompanying nasal pathologies in 32 of cases (52.8%). In 13 patients, septum deviation (23.6%), in nine patients concha bullosa (16.4%), in five patients, turbinate hypertrophy (9.1%), in three patients, nasal polyposis (5.5%) and in two patients, chronic sinusitis (3.6%) were detected. In addition, no accompanying nasal pathology was observed in 23 cases (41.8%). Endoscopic endonasal DCR and nasolacrimal silicon tube intubation was performed in a total of 55 eyes, 21 (38.18%) right eye and 34 (61.82%) left eye. Endoscopic septoplasty was performed in 13 (23.6%) patients with simultaneous sinonasal pathology, 9 (16.4%) endoscopic concha bullosa resection, 5 (9.1%) inferior turbinoplasty, 3 (5.5%) nasal polybectomy. and 2 (3.6%) received functional endoscopic sinus surgery (Figure 3).

Tampons were removed on the postoperative day three. Patients had follow ups on postoperative week one, month one, month three and then with three-month intervals. The patients were followed up between six months and 18 months. While full recovery was achieved in 47 (85.5%) patients after the operation, it was observed that complaints continued in 8 (14.5%) of them. Sinonasal revision surgery and EEDCR + NSTI were applied to these 8 patients with recurrence. 7 of them recovered completely, while 1 had a recurrence. All of the 8 patients with recurrence were those who underwent sinonasal pathology surgery simultaneously. 3 of them were nasal polyps, 2 cases of chronic sinusitis, and 3 cases of concha bullosa. One patient with recurrence was nasal panpolyposis. The success rate after revision surgery increased to 54 patients (98.2%). In the failed case, nasal polyposis was present, and the nasolacrimal iatrogenic ostium opening was observed to be blocked by nasal polyps again (Table 2).

Discussion

This study is a study of patients diagnosed with chronic dacryostenosis and underwent PEEDCR + NSTI. Dacryocystorhinostomy can be defined as creating a direct opening from the lacrimal sac to the nasal cavity through an internal or external route to create a low-pressure lacrimal bypass system. The external approach was first described by Toti in 1904 [4], while the internal approach was described by Caldwell in 1893 [5]. The development of endoscopic surgery with help of technological developments in recent years led to evolutions in endonasal treatment of the nasolacrimal canal. Increased knowledge about intranasal anatomy and the development of imaging methods and instruments during surgery also improved the success rate of endoscopic surgery [6, 7]. At the same time, there are many advantages including no external scar formation, fully functional lacrimal sac pump, stable lacrimal sac location on surrounding bone structures, possibility of treatment of other accompanying nasal pathologies, reduced operation time and less morbidity [8]. In the study conducted by Coumou et al. including 442 case series followed over a period of approximately 10 years, it was observed that endonasal DCR is a safe and effective procedure for children and adults [9]. We performed all of the surgeries by achieving general anesthesia. In addition, as a result of the development and modernization of anesthetic agents used in achieving general anesthesia, patients prefer to undergo surgery under general anesthesia. However, there are groups who prefer local anesthesia during surgery, as well. There are factors affecting the surgical outcomes including inadequate preoperative evaluation, accompanying nose and paranasal sinus disorders, surgeon's experience of using endoscope, inadequate opening of bone ostium, scar formation in rhinostomy region, lateralization of the middle conchae, mucosal synechia, hemorrhage, prolapse

of silicone tube, conjunctiva and corneal erosion [10, 11]. As a surgical technique, while opening bone ostium between the lacrimal sac and the nasal cavity in PEEDCR + NSTI, laser can be used in addition to surgical tools such as micro motors, rongeur, gouge forceps, hammer [12, 13]. In our cases, we created nasolacrimal opening by using rongeur (Kerrison forceps) and gouge-hammer. When we look at the literature, we see that the success rates of endoscopic dacryocystorhinostomy vary between 85% and 95% according to the technique used and the surgeon performing. While the lowest success rate was reported as 63% by Hartikaienen et al. [14], the best result was reported by Sprekelsen and Barberan with 96% [7]. In a study by Onerci et al. [15], they found the success rate of endoscopic endonasal dacryocystorhinostomy as 94.4%. In our study, we found the success rate as 85.5% in primary cases. Sinonasal revision surgery and EEDCR + NSTI were applied to 8 patients with recurrence. While 7 of them recovered completely, 1 patient relapsed. Success rate after revision surgery increased to 98.2%. In our study, we performed different endoscopic surgeries simultaneously to 32 of the cases (52.8%). Endoscopic septoplasty in 13 (23.6%), endoscopic concha bullosa resection in nine (16.4%), inferior concha turbinoplasty in five (9.1%), nasal polypectomy in three (5.5%) and functional endoscopic sinus surgery in two (3.6%) of the patients with accompanying nasal pathology were performed. All 8 patients with recurrence were those who underwent sinonasal pathology surgery simultaneously. 3 of them were nasal polyps, 2 cases of chronic sinusitis, and 3 cases of concha bullosa. While 7 of them recovered completely, 1 patient relapsed. This patient, who had recurrence, had panpolyposis. Inadequate cleaning and frequent recurrence of nasal polyps and sinusitis have been observed to cause infectious and mechanical adhesions around the nasolacrimal canal and sac. In the same way, if enough wound care and dressing is not done after concha bullosa surgery, synechia are seen. Sinonasal pathologies were responsible for recurrences. Simultaneously, intranasal pathologies must be treated effectively. Therefore, patients with nasolacrimal duct obstruction should be evaluated preoperatively in terms of sinonasal pathologies. Weidenbecher et al. found septal deviation in 72%, chronic sinusitis in 32%, turbinate hypertrophy in 20%, and nasal polyposis in 14% of patients in the preoperative examination of 56 patients who underwent endoscopic endonasal dacryocystorhinostomy due to lacrimal stenosis [16]. Nasolacrimal silicone tube is placed to prevent the rhinostomy created by dacryocystorhinostomy from closing in the early period due to scar tissue. There are publications stating that silicone tube does not affect the success rate. Kang et al. reported in their systematic review that silicone intubation for endoscopic DCR did not affect the success rate, as a result of their systematic examination [17]. We placed nasolacrimal silicone tube in all of our cases. Boush et al. found that the silicone tube that remained for a long time was more successful in terms of response than those removed early [18]. Onerci et al. reported that silicone tubes should be removed before three months and that long-term tubes may cause granulation tissue [19]. Similarly, Karaca et al. reported that they removed the silicone tube within 2-4 months in their own clinic and that prolonged intubation caused nasal inflammation, fibrosis and canalicular laceration [20]. In some publications, it is recommended that the silicone tube should remain for a long time, while in other publications it has been reported that prolonged intubation can lead to granulation tissue formation [21]. In our study, the mean duration of intubation was six months. We used topical steroids and Mitomycin C after surgery in our cases. There are studies that mitomycin C prevents the granulation tissue formation and the development of stenosis [3, 22].

Conclusion

PEEDCR + NSTI is a functional treatment method that is well tolerated by patients and has a high success rate. Sinonasal pathologies were responsible for recurrences. Simultaneously, intranasal pathologies must be treated effectively. Therefore, patients with nasolacrimal duct obstruction should be evaluated preoperatively in terms of sinonasal pathologies. It is increasingly preferred due to its various advantages such as no external scar, lacrimal sac pump function is not impaired, the lacrimal sac is not mobilized from the surrounding bone structures, other accompanying nasal pathologies can be treated, the operation time is shorter, and the morbidity is less.

Ethics approval

Approval was obtained from the clinical research ethics committee of Akdeniz University Faculty of Medicine. No: 13.05.2020/335

References

1. Woog JJ, Kennedy RH, Custer PL, Kaltreider SA, Meyer DR, Camara JG. Endonasal dacryocystorhinostomy: a report by the American Academy of Ophthalmology. Ophthalmology. 2001 Dec;108(12):2369-77.
2. Wormald PJ, Kew J, Van Hasselt A. Intranasal anatomy of the nasolacrimal sac in endoscopic dacryocystorhinostomy. Otolaryngol Head Neck Surg. 2000 Sep;123(3):307-10.
3. Zilelioğlu G, Uğurbaş SH, Anadolu Y, Akiner M, Aktürk T. Adjunctive use of mitomycin C on endoscopic lacrimal surgery. Br J Ophthalmol. 1998 Jan;82(1):63-6.
4. Totti A. Nuovo metodo conservatore di cura radicale delle supporazioni chroniche del sacco lacrimale. Clin Med. 1904;10:385-9.
5. Cadwell G. Two new operations for obstructions of the nasal duct with preservation of canaliculi, and an incidental description of a new lacrimal probe. N York MJ. 1893;57:581.
6. Kamel R, El-Deen HG, El-Deen YS, El-Hamshary M, Assal A, Farid M, et al. Manometric measurement of lacrimal sac pressure after endoscopic and external dacryocystorhinostomy. Acta Otolaryngol. 2003 Jan;123(2):325-9.
7. Sprekelsen MB, Barberán MT. Endoscopic dacryocystorhinostomy: surgical technique and results. Laryngoscope. 1996 Feb;106(2 Pt 1):187-9.
8. Nussbaumer M, Schreiber S, Yung MW. Concomitant nasal procedures in endoscopic dacryocystorhinostomy. J Laryngol Otol. 2004 Apr;118(4):267-9.
9. Coumou AD, Genders SW, Smid TM, Saeed P. Endoscopic dacryocystorhinostomy: long-term experience and outcomes. Acta Ophthalmol. 2017 Feb;95(1):74-8.
10. Piane R, Romano L, Nuti D, Romano F, Passàli D. [Endonasal dacryocystorhinostomy: a personal experience]. Acta Otorhinolaryngol Ital. 1999 Oct;19(5):255-9.
11. Levin PS, StormoGipson DJ. Endocanalicular laser-assisted dacryocystorhinostomy. An anatomic study. Arch Ophthalmol. 1992 Oct;110(10):1488-90.

12. Mortimore S, Banhegy GY, Lancaster JL, Karkanevatos A. Endoscopic dacryocystorhinostomy without silicone stenting. J R Coll Surg Edinb. 1999 Dec;44(6):371-3.
13. Rudolf H, Marco C, Marc J. External dacryocystorhinostomy versus endonasal laser dacryocystorhinostomy: a letter to editor. Ophthalmology. 1999;106:647-8.
14. Hartikainen J, Grenman R, Puukka P, Seppä H. Prospective randomized comparison of external dacryocystorhinostomy and endonasal laser dacryocystorhinostomy. Ophthalmology. 1998 Jun;105(6):1106-13.
15. Onerci M, Orhan M, Ogretmenoğlu O, Irkeç M. Long-term results and reasons for failure of intranasal endoscopic dacryocystorhinostomy. Acta Otolaryngol. 2000 Mar;120(2):319-22.
16. Weidenbecher M, Hosemann W, Buhr W. Endoscopic endonasal dacryocystorhinostomy: results in 56 patients. Ann Otol Rhinol Laryngol. 1994 May;103(5 Pt 1):363-7.
17. Kang MG, Shim WS, Shin DK, Kim JY, Lee JE, Jung HJ. A Systematic Review of Benefit of Silicone Intubation in Endoscopic Dacryocystorhinostomy. Clin Exp Otorhinolaryngol. 2018 Jun;11(2):81-8.
18. Boush GA, Lemke BN, Dortzbach RK. Results of endonasal laser-assisted dacryocystorhinostomy. Ophthalmology. 1994 May;101(5):955-9.
19. Onerci M. Dacryocystorhinostomy. Diagnosis and treatment of nasolacrimal canal obstructions. Rhinology. 2002 Jun;40(2):49-65.
20. Karaca U, Genc H, Usta G. Canalicular laceration (cheese wiring) with a silicone tube after endoscopic dacryocystorhinostomy: when to remove the tube? GMS Ophthalmol Cases. 2019;9:Doc35.
21. Shah H, Sharma S, Suri N, Patel A. Comparison of surgical outcome in endoscopic dacrocystorhinostomy with and without silicon stent placement. Nat J Med Res. 2013;3(1):34-7.
22. Selig YK, Biesman BS, Rebeiz EE. Topical application of mitomycin-C in endoscopic dacryocystorhinostomy. Am J Rhinol. 2000 May-Jun;14(3):205-7.