Ann Med Res 2021;28(4):816-20

Annals of Medical Research

DOI: 10.5455/annalsmedres.2020.03.240

Original Article

# Comparison of endoscopic and external dacryocystorhinostomy in terms of operation success and patient satisfaction; A prospective study

Erdem Eris[1], Esra Vural[2], Zengibar Ozarslan[3], Sinan Bekmez[4], Hatun Nurcin[1], Ali Riza Cenk Celebi[5], Irfan Perente[1]

[1]Department of Ophthalmology, Beyoglu Eye Educational and Research Hospital, Istanbul, Turkey
[2]Clinic of Ophthalmology, Kayseri Education and Research Hospital, Kayseri, Turkey
[3]Department of Psychiatry, Arnavutkoy State Hospital, Istanbul, Turkey
[4]Department of Ophthalmology, S.B.U. Dr. Behcet Uz Child Diseases and Surgery Research and Training Hospital, Izmir, Turkey
[5]Department of Ophthalmology, Acibadem University, School of Medicine, Istanbul, Turkey



**Abstract**

**Aim:** To compare the results of endoscopic endonasal dacryocystorhinostomy (endonasal-DCR) and external dacryocystorhinostomy (external-DCR) and to evaluate patient satisfaction after the procedures.

**Materials and Methods:** Patients who underwent dacryocystorhinostomy (DCR) were examined prospectively. Demographic data, follow-up periods, success rates and complications were recorded. A patient satisfaction questionnaire was used for subjective evaluation.

**Results:** The mean age of external-DCR patients was 53.14± 3.41 while it was 52.05 ± 2.15 years years in patients who underwent endonasal-DCR procedure (p=0.074). The follow-up period ranged from 6 to 30 months. The success rates in the endonasal-DCR and external-DCR operations were 91.1% and 92.3%, respectively. The patient satisfaction was better in the endonasal-DCR as compared to external-DCR. Compared to external-DCR (17%), none of the endonasal-DCR patients had visible scars. The time it takes patients to return to daily routine was 12.4 ± 2.71 days in external-DCR and, 5.10 ± 0.99 days in endonasal-DCR (p<0.001).

**Conclusion:** Although the success rates are better in external-DCR, the patient satisfaction was significantly higher, and the recovery times were significantly lower in endonasal-DCR.

**Keywords:** Dacryostenosis; external dacryocystorhinostomy; endoscopic dacryocystorhinostomy; patient satisfaction

## INTRODUCTION

One of the most frequent causes of epiphora, over-watering of the eye, is obstruction of the nasolacrimal canal. This most frequently presents itself as dacryocystitis. The acquired nasolacrimal duct obstruction is mostly seen in the 6th decade of life, and 4 to 5 times more frequently in females as compared to males (1). Etiology of the obstruction commonly involves chronic inflammation of the lacrimal discharge system (2). The purpose of treating epiphora is to provide smooth flow in the tear passage. Surgical provision of the passage is unavoidable in cases of acquired nasolacrimal duct obstruction; medical treatment is useless except in inflamed dacryocystitis cases. Surgical procedures including external dacryocystorhinostomy (external-DCR), endoscopic endonasal dacryocystorhinostomy (endonasal-DCR) and transcanalicular multi-diode laser dacryocystorhinostomy (TM-DCR) have been utilized for the treatment of nasolacrimal canal obstruction. The objective of surgical treatment is to create a fistula between the lacrimal sac and the nasal cavity (3). Thus, allowing tears to flow from the lacrimal sac directly to the nasal cavity without passing through the lacrimal canal (4). Interventions including endonasal DCR, endonasal laser DCR, silicon tube intubation, endocanalicular and translacrimal laser DCR, and balloon catheter dilatation are used for the treatment of nasolacrimal canal obstructions (5-9). However, the success rates of these new techniques are not as high as the success rates of external-DCR and

**Received:** 18.03.2020 **Accepted:** 11.05.2020 **Available online:** 22.04.2021
**Corresponding Author:** Sinan Bekmez, Department of Ophthalmology, S.B.U. Dr. Behcet Uz Child Diseases and Surgery Research and Training Hospital, Izmir, Turkey, **E-mail:** sinanbekmez@gmail.com

endonasal-DCR. Although there are studies comparing the success rates of external-DCR and endonasal-DCR, post-operation DCR patient satisfaction and the recovery time after the operation until full return to daily routine life were not widely studied. Our objective in this study is to compare the success rates and the post operation satisfaction of patients who underwent external-DCR and endonasal-DCR operations.

## MATERIALS and METHODS

Patients who underwent external-DCR and endonasal-DCR are included in this prospective study. Our study had institutional review board (approval number of the ethics committee: 2018-17/8) clearance and was performed in accordance with the tenets of the Helsinki declaration. Eighty-six patients, out of which 47 were external-DCR patients and 39 were endonasal-DCR patients, were included in the study. Lacrimal drainage systems were assessed by probing and lacrimal syringing tests. In our routine procedure, preoperative dacryocystography was performed to confirm anatomic obstructions. After being informed on the surgical techniques by the physician, the patients decided on the operation technique themselves. Demographic data like age and gender of the patients included in the study were collected. Patients with conditions that might affect the healing process (such as diabetes or collagen tissue disorders), patients missing regular control visits and patients without regular records were excluded from the study.

Written consent of the patients whose medical information used were obtained. During the operation, a wide bone window was prepared for the insertion of the silicone tube (Figure 1).

### Surgical techniques

In external-DCR, the bone was punched from the junction of lamina papyracea of the ethmoid and lacrimal bone beneath the medial canthal tendon under general anesthesia. Ethmoidal cells between the nasal mucosa and the lacrimal sac were removed. Lacrimal and Nasal mucosal flaps were made. A bicanalicular silicone tube was inserted to anastomose space. Flaps were sutured.

In endonasal-DCR, under general anestesia, nasal mucosa soaked with adequate vasoconstriction (adrenaline, 1:1000 solutions). The nasal mucosal flab over lacrimal bone was elevated. A wide lacrimal bone window was prepared. A lacrimal sac flab was elevated. A silicone tube was inserted through bone window (Figure 1).

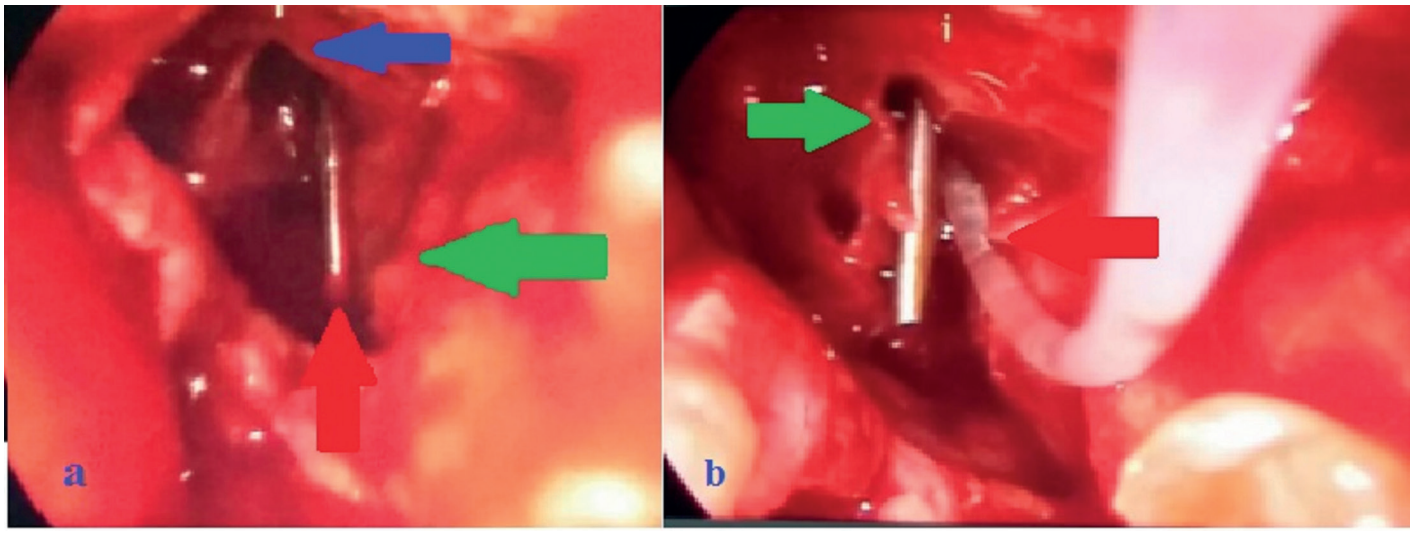


**Figure 1.** A wide bone window, prepared for inserting a silicone tube a) A wide bone window for inserting silicone tube was prepared with endoscopic endonasal dacryocystorhinostomy (green arrow) and direct visualization of lacrimal sac (blue arrow), implanted silicon tube (red arrow), b) Osteotomy was created with endoscopic endonasal dacryocystorhinostomy (green arrow), implanted silicon tube (red arrow)

Patients were examined preoperatively and postoperatively on day 1 and months 1, 3, 6, 12 and 24. Proparacaine HCl (Alcaine 0.5% Sterile Ophthalmic Solution) 5 mg was administered and then a punctate lavage was applied to check the status of the nasolacrimal outlet. The silicon tube intubated during the operation was removed in the examination visit in the 6th month. The silicon tube was removed earlier if the epiphora complaints had started before the 6th month. After checking the nasolacrimal outlet with lavage, netilmicin sulfate + deksametazon disodium phosphate (NetilDex eye drop) q.i.d. and mometasone furoate (Nasonex nasal spray) q.i.d. were prescribed for two weeks. Surgical failure was confirmed with the clinical findings (purulent discharge or tearing) and a negative irrigation test.

The post operation satisfaction levels of the patients were evaluated by using a Likert scale questionnaire that was modified from previous studies (Table 1) (10-12). Satisfaction questionnaire was applied by an expert psychiatrist (Z.Ö) to the patients in every follow-up visit in the postoperative period. The specialist that performed operations did not know patients' answers.

**Table 1. Questionnaire for patient satisfaction**

| Satisfaction | Score |
|---|---|
| Very unhappy (with scar formation on the face and unhealed wound) | 1 |
| Unhappy (Cured but the result is not as he/she had expected) | 2 |
| No idea (neither satisfied, nor dissatisfied) | 3 |
| Happy (Expectations have been met) | 4 |
| Very Happy (Result is good beyond the expectations) | 5 |

Demographic data of the patients (age, sex, complications and follow-up periods) postoperative complications, the level of epiphora, and patients' satisfactions were evaluated.

Regarding the statistical method, definitive data will be expressed as mean ± SD and percentage. To evaluate differences between groups, independent t-tests were used for parametric data and Mann Whitney U-tests were used for the non-parametric data. Chi-square tests were used for the comparison of the data of the two groups in terms of gender and success rate. Independent T test was used to assess the follow up time. E-PICOS software (New York) was used for data analysis and p values of <0.05 were considered statistically significant.

## RESULTS

In this study, 47 patients who underwent external-DCR procedures and 39 patients who underwent endonasal-DCR procedures were evaluated.

The mean age of external-DCR patients was 53.14 ± 3.41 while it was 52.05 ± 2.15 years in patients who underwent endonasal-DCR procedure. There is not a statistically significant difference between these two groups regarding age (p=0.074). The range of follow-up for the patients ranged between 6 and 30 months. The mean follow-up period was calculated as 15 ± 2.6 months in the external-DCR group and 12 ± 2.2 months in the endonasal-DCR group (p<0.01). Of the patients included in the study, 76.8% were females and 23.2% were males; and there were 34 females and 13 males in the external-DCR group, while there were 32 females and 7 males in the endonasal-DCR group. There is not a statistically significant difference between the two groups regarding gender (p=0.28). The success rates in external-DCR and endonasal-DCR procedures was found at 43 patients (91.5%) and 36 patients (92.3%), respectively. No significant differences were found between the two groups as regards to success rate (p=0.89). The number of post-End-DCR complications was found to be smaller than the number of post-external-DCR complications. The rate of patients with visible scars on their faces in the 6th month was 17 % (8 patients), in the external-DCR group, while there were no visible scars on the face of the patients in the endonasal-DCR group. Fifty per cent of the scars seen in external-DCR patients did not bother the patients. However, remaining 50% of the patients in external-DCR group were distressed. None of the patients in both groups had extra bleeding. It was seen that the patient satisfaction was significantly better in endonasal-DCR in comparison to external-DCR (p=0.02) [Table 2]. The time elapsed for patients until a return to their routine lives is shown in Table 3.

**Table 2. Frequency of satisfaction scores**

| | External-DCR patients (n) | | | Endonasal-DCR patients (n) | | |
|---|---|---|---|---|---|---|
| **Sex** | **Male** | **Female** | **Total** | **Male** | **Female** | **Total** |
| **Very unhappy** | 0 | 0 | 0 | 0 | 0 | 0 |
| **Unhappy** | 0 | 0 | 0 | 0 | 0 | 0 |
| **No Idea** | 0 | 7 | 7 | 0 | 0 | 0 |
| **Happy** | 5 | 20 | 25 | 3 | 17 | 20 |
| **Very happy** | 8 | 7 | 15 | 4 | 15 | 19 |
| **Total** | 13 | 34 | 47 | 7 | 32 | 39 |

* External-DCR: external dacryocystorhinostomy, Endonasal-DCR: endoscopic endonasal dacryocystorhinostomy

**Table 3. The time for patients to return to their routine lives**

| | External-DCR patients | | | Endonasal-DCR patients | | |
|---|---|---|---|---|---|---|
| | **Male** | **Female** | **Total** | **Male** | **Female** | **Total** |
| **Time to return to routine lifetime** | 11.00 ± 2.64 days | 12.94 ± 2.64 days | 12.4 ± 2.71 days | 4.28 ± 0.95 days | 5.28 ± 0.92 days | 5.10 ± 0.99 days |

* External-DCR: external dacryocystorhinostomy, Endonasal-DCR: endoscopic endonasal dacryocystorhinostomy

## DISCUSSION

The gold standard in the treatment of nasolacrimal duct obstruction is accepted as the external dacryocystorhinostomy described by Toti (12). The popularity of new procedures increased from time to time because of the worries of patients about scars left on their faces and also with the purpose of reducing complications (12).

When the success rates of the external-DCR and endonasal DCR are compared; Simon et al. reported in a retrospective cohort study with a mean follow-up period of 7 months, endonasal-DCR was more successful with a significant statistical difference (endonasal-DCR 84%, external-DCR 70% P=0.03) (11). In another study, it was found that the success rates in external and endonasal DCR were comparable (90% and 88%, respectively) (12). Mishra et al. (13) also had similar results. Hartikainen et al. (14) found that endonasal DCR was more successful as compared to external-DCR based on dacriocystograms. The different results of the success rates for both operation techniques may be because of the differences in talents of the different surgeons. In our study, all operations were done by the same surgeon and success rates of external-DCR and endonasal-DCR were 91.5% and 89.8%, respectively, but there were no significant differences between the two groups. Also, in endonasal-DCR groups, we preferred to open a wide bone window by using an osteotome (Figure 1). We thought that it could increase our operational success in endonasal-DCR group.

The main reason for dissatisfaction in the patients that underwent DCR operations were post-operative relapse, inflammation, infection, scarring, and hospitalization time. Punctum injury and increased canalicular inflammation were not seen in any of the patients in our study. However, punctum injury related to the silicone tubes has been reported in the literature (10). Beigi et al. (15) have shown in their animal experiments that the silicon tube intubation did not increase canalicular inflammation. There is no consensus on the use of intubation with a silicon tube in DCR. We applied the silicon tube intubation to all patients in both groups and removed the silicon tube during the control visit in the 6th month.

Complications related to external-DCR are scarring due to skin incision, wound infection, ectropion secondary scar formation and deformation of the medial canthus ligament (16). In our study, ectropion secondary scar formation was not seen in any of the groups. Devoto et al. reported that the scars after external-DCR were invisible in 44% of the patients 6 months later, and the minimal scar remained in 47% of the patients and the medium-level scar remained in 9% of the patients (17). Ibrahim et al. (18) preferred the endonasal approach based on the results of their study revealing no scars, no bruising, and no swelling in the eyelids despite the high success rate in external-DCR group. In our study, while some of the patients in external-DCR (17%) had some scars, none of the endonasal-DCR patients had a visible scar in the 6th month.

Somuk et al. (10) reported that there were no statistically significant differences in terms of operation success and patient satisfaction between external-DCR and endonasal-DCR groups. In our study, there was no statistically significant difference in operation success but satisfaction from the operation was significantly higher in endonasal-DCR group. High satisfaction is probably the result of the short follow up period in endonasal-DCR group. Also, contrary to Somuk's study, our study was a prospective study, all operations were performed by the same specialist and patients' satisfaction was evaluated by a psychiatrist other than the surgeon. This could be important because patient's satisfaction answers could change when the satisfaction scale is performed by the surgeon.

The main shortcoming of our study is that the follow up times are different. But, our study has a lot of strengths. The main strengths of this study are that all patients were operated on by the same surgeon and patients' satisfaction was assessed by an expert psychiatrist. Other strengths were being prospective in nature and having a large number of participants. This study adds to the current literature by including the recovery times of the patients and the patient satisfactions with regards to the different types of DCR surgery.

## CONCLUSION

After endonasal-DCR operations, the period until patients return to routine life was significantly shorter and patient satisfaction was significantly higher when compared with external-DCR operations. With this study, we hope to draw attention to patients' worries about DCR operations. Other techniques should be studied in further studies.

*Conflict of interest : The authors declare that they have no competing interest.*

*Financial Disclosure: There are no financial supports.*

*Ethical approval: Our study has the approval of the institutional ethics committee review board (ethics committee approval number: 2018-17 / 8).*

## REFERENCES

1. Lee DW, Chai CH, Loon SC. Primary external dacryocystorhinostomy versus primary endonasal dacryocystorhinostomy: a review. Clin Exp Ophthalmol 2010;38:418-26.
2. Lee-Wing MW, Ashenhurst ME. Clinicopathologic analysis of 166 patients with primary acquired nasolacrimal duct obstruction. Ophthalmology 2001;108:2038-40.
3. Grob SR, Campbell A, Lefebvre DR, et al. External Versus Endoscopic Endonasal Dacryocystorhinostomy. Int Ophthalmol Clin 2015;55:51-62.
4. Whittet HB, Shun-Shin GA, Awdry P. Functional endoscopic transnasal dacryocystorhinostomy. Eye (Lond) 1993;7:545-9.
5. Massaro BM, Gonnering RS, Harris GJ. Endonasal laser dacryocystorhinostomy. A new approach to

nasolacrimal duct obstruction. Arch Ophthalmol 1990;108:1172-6.
6. Christenbury JD. Translacrimal laser dacryocystorhinostomy. Arch Ophthalmol 1992;110:170-1.
7. Schlachter DM, Richani K, Black EH. Diode Laser-Assisted Endocanalicular Dacryocystorhinostomy: A Prospective Study. Ophthalmic Plast Reconstr Surg 2016;32:183-6.
8. Blanco Mateos G, Santos Perez J. Endonasal dacryocystorhinostomy: a new perspective in the treatment of nasolacrimal obstruction. Arch Soc Esp Oftalmol 2004;79:99-101.
9. Saha R, Sinha A, Phukan JP. Endoscopic versus external approach dacryocystorhinostomy: A comparative analysis. Niger Med J 2013;54:165-9.
10. Somuk BT, Alim S, Sapmaz E, et al. Comparison of endoscopic and external dacryocystorhinostomy results and analysis of patients' satisfaction. Turk Arch Otorhinolaryngol 2016;54:99-104.
11. Ben Simon GJ, Joseph J, Lee S, et al. External versus endoscopic dacryocystorhinostomy for acquired nasolacrimal duct obstruction in a tertiary referral center. Ophthalmology 2005;112:1463-8.
12. Cokkeser Y, Evereklioglu C, Er H. Comparative external versus endoscopic dacryocystorhinostomy: results in 115 patients (130 eyes). Otolaryngol Head Neck Surg 2000;123:488-91.
13. Mishra AK, Nilakantan A, Mishra S, et al. Comparison of balloon dacryocystorhinostomy with conventional endonasal endoscopic dacryocystorhinostomy for relief of acquired distal nasolacrimal drainage obstruction and its impact on quality of life: A prospective, randomized, controlled study. Med J Armed Forces India 2018;74:255-63.
14. Hartikainen J, Antila J, Varpula M, et al. Prospective randomized comparison of endonasal endoscopic dacryocystorhinostomy and external dacryocystorhinostomy. Laryngoscope 1998;108:1861-6.
15. Beigi B, Westlake W, Chang B, et al. Dacryocystorhinostomy in south west England. Eye (Lond) 1998;12:358-62.
16. Huang J, Malek J, Chin D, et al. Systematic review and meta-analysis on outcomes for endoscopic versus external dacryocystorhinostomy. Orbit 2014;33:81-90.
17. Devoto MH, Zaffaroni MC, Bernardini FP, et al. Postoperative evaluation of skin incision in external dacryocystorhinostomy. Ophthalmic Plast Reconstr Surg 2004;20:358-61.
18. Ibrahim HA, Batterbury M, Banhegyi G, et al. Endonasal laser dacryocystorhinostomy and external dacryocystorhinostomy outcome profile in a general ophthalmic service unit: a comparative retrospective study. Ophthalmic Surg Lasers 2001;32:220-7.