



Long-Term Results in Transcanalicular Laser and External Dacryocystorhinostomy

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Abstract

Objectives: This study was an examination of the long-term results of transcanalicular laser (TCL) and external (EX) dacryocystorhinostomy (DCR).

Methods: Patients who had undergone TCL-DCR or EX-DCR between 2009 and 2013 were invited for long-term follow-up in 2019. All of the patients who responded had an ophthalmic examination and were assessed using lacrimal irrigation. An intranasal evaluation was performed when the irrigation test had non-patent results. TCL procedures were performed with a diode laser (980 nm). Ostium cleansing with a suction unit and a nasal endoscope was performed in the first week. In EX-DCR procedures, an anterior flap was created and tented to the orbicularis oculi muscle. A silicon tube was implanted in both methods and removed at 4-6 months.

Results: A total of 74 EX-DCR patients were assessed. The lacrimal irrigation test was negative in 5 cases. The functional success rate was 93.2% with a follow-up of 8 years. A total of 63 patients who had undergone TCL-DCR were evaluated and the irrigation test was negative in 9 patients. The functional success rate was 85.7% with a follow-up of 7 years. The difference in the success rate was statistically insignificant with a p value of 0.09.

Conclusion: The long-term success rates of both EX-DCR and TCL-DCR were high.

Keywords: Dacryocystorhinostomy, external, laser, nasolacrimal, transcanalicular.

Introduction

Dacryocystorhinostomy (DCR) is the most commonly used method to treat nasolacrimal duct obstruction. External (EX)-DCR has been accepted as the standard therapy for over a century. With the development of endoscopic imaging, successful results have now also been achieved with transcanalicular laser (TCL) endoscopic methods (1, 2).

Eloy et al. (3) performed the first TCL-DCR in 2000, and reported successful results in 17 (58%) of 29 patients. Advantages of the TCL-DCR method are the absence of a skin incision, a shorter surgical time, and less orbital morbidity (2, 3). The cauterization effect of the laser also allows for

surgery with less bleeding than the external method (4). Although surgical procedures using an endoscope and a laser provide advantages, the expense of the surgical equipment is a disadvantage.

DCR with various techniques is generally a successful surgery; however, the ostium may close over time. Failed cases are typically related to nasal septal pathology or obstruction of the ostium with fibrotic tissue. In the literature, although results of periods of less than 1 year have frequently been studied, data of long-term success are limited.

The objective of this study was to investigate the long-term outcomes of both EX-DCR and TCL-DCR procedures.

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Methods

In this study, patients who underwent EX-DCR or TCL-DCR with the same surgeon at a single center in 2009-2013 were investigated. The EX-DCR group underwent surgery in 2009-2011 and the TCL-DCR group surgeries were performed in 2010-2013. All of the study patients had a distal nasolacrimal duct obstruction. Patients with canalicular-punctal pathology, ectropion, or entropion were not included in the study.

All of the patients in both groups were contacted by telephone in 2019 for re-examination. The participating patients had a complete ophthalmological examination and lacrimal irrigation was performed. Nasal structures were evaluated with a nasal endoscope in patients with a non-patent ostium based on the lacrimal irrigation test. Functional success was defined as anatomically patent rhinostomy and the absence of epiphora.

In the TCL-DCR cases, all of the surgeries were performed with local anesthesia and an infratrochlear and infraorbital nerve block. Topical anesthesia was applied to the nose and the eye. Canalicular dilatation was performed and the laser probe was introduced to the medial part of the lacrimal sac. A diode laser (980 nm) was advanced from the sac medial to the medial orbital wall and exited the nasal mucosa. Endoscopic laser imaging of the nasal opening was enlarged to 6x10 mm, followed by bicanalicular silicone tube intubation. In the first week, debris in the nasal ostium was removed using a suction unit and an endoscope.

In the EX-DCR cases, local anesthesia was performed as in the transcanalicular method. After a 20-mm skin incision was made 10-12 mm from the medial canthal region, the orbicularis tissue and the anterior crus of the medial canthal ligament were separated in order to reach the periosteum. A periosteal incision was made and the lacrimal crest was exposed. An aperture was formed with the help of a periosteal elevator and the aperture was expanded to 15x15 mm with a bone punch. The nasal mucosa was exposed and a single anterior lacrimal sac flap was formed. A nasal mucosa flap was created to fit this flap. The flaps were ligated with absorbable sutures after passage through both canaliculi. The flaps were suspended to the orbicularis muscle with sutures from both the nasal mucosa and the sac, to prevent collapse.

A bicanalicular silicone tube was used in all surgeries in both methods and removed after 4-6 months.

Informed consent was obtained from all of the study patients and the Helsinki Declaration guidelines were observed. Approval was granted by the Ethics Committee of Selcuk University Education and Research Hospital.

A chi-square test was used for the statistical analysis. A *p* value of <0.05 was considered significant.

Results

The mean follow-up time was 90.2 months (min-max: 85-108 months) in the EX-DCR group, and 73.2 months (min-max: 69-87 months) in the TCL-DCR group.

A total of 118 patients underwent EX-DCR, and 74 patients responded to the request for a long-term follow-up examination. The mean age of the patients evaluated in this group was 54.7±9.1 years (min-max: 30-79 years). Five patients complained of tearing. The lacrimal irrigation test was negative in all 5 patients. The 8-year functional success rate was 93.2%.

Among 123 patients who underwent TCL-DCR, 63 patients were examined for the study. The mean age of the patients evaluated was 57.8±8.4 years (min-max: 46-80 years). Nine patients reported tearing. The lacrimal irrigation test was negative in all 9 patients. The 7-year functional success rate was 85.7%.

Although the success rate in the EX-DCR group was higher than that of the TCL-DCR group, the difference was not statistically significant (*p*=0.09).

When the patients in both groups with a negative irrigation test (*n*=13) were evaluated with an endoscope, in all cases, fibrotic tissue was the cause of the ostium closure. In 7 of these cases, synechia was present between the lateral nasal mucosa and the concha, while in 6 cases, synechia was observed between the lateral nasal mucosa and the septum.

Discussion

Failure in both EX-DCR and TCL-DCR procedures is generally due to the closure of the created ostium by granulation tissue or synechia between the middle turbinate and the septum. Some studies have examined the use of additional endonasal intervention or antifibrotic agents to prevent the development of granulation tissue and synechia (5, 6).

In the literature, the success rate of EX-DCR is 86-95.4% in the first year, 92.4-98.9% in the second year, and 71-97% in the third and fourth years (Table 1) (7-18).

There are very few studies reporting results for 5 years or more. In a study by Alnawiesh et al., (1) the success rate of EX-DCR was reported to be 83% with a 5-year follow-up. Erdol et al. (19) reported on 387 patients with 69 months of follow-up. The success rate of 98.4% was one of the highest in the literature. They noted that reasons for the high success rate included only minor wound complications due to the advantage of the direct visualization of the operation site, adequate osteotomy size, and a smooth anastomosis between the nasal mucosa and lacrimal sac. Mansour et al. (16) reported a declining success rate in EX-DCR patients of 89% in the first year, 79% in 2-3 years, and 71% in 4-5 years. In a study by Heichel et al. (18) with

Table 1. Studies of external and transcanalicular dacryocystorhinostomy

	External dacryocystorhinostomy		Transcanalicular laser dacryocystorhinostomy		
	Duration (months)	Success (%)	Duration (months)	Success (%)	
Yeniad	3	89.4	Yeniad	3	84.2
Mourya	7	95.4	Kaynak	3	85.4
Derya	12	86	Mourya	7	90.1
Hartikainen	12	91	Drnovsek	12	83.3
Deka	13	98.9	Kaynak	12	63.3
Kazanci	16	92.4	Yildirim	18	84.4
Warren	32	93	Alañón	20	90.7
Yuksel	33	97	Kaynak	24	60.3
Heichel	48	94.4	Plaza	36	88
Mansour	55	71	Nuhoglu	42	95.2
Alnawiesh	60	83	Dogan	60	75.0

a mean follow-up of 4 years (range: 1-12 years), a 94.4% success rate was reported.

This study examined the long-term results of 2 previous DCR studies (20, 21). In the EX-DCR study, the 6-month success was 97.4%, and it declined to 93.2% in the 8th year. The eighth year success rate, however, was still high (20). Tenting the anterior anastomosis to the orbicularis muscle may have been the primary reason. The use of a silicone tube and a 15x15 osteotomy may also be factors in the high success rate.

The success rate of TCL-DCR in the literature varies between 63.3%-90.1% in the first year, 60.3%-90.7% in the second year, and 88%-95.2% in the third and fourth years (Table 1) (2, 4, 7, 8, 22–26). There are few studies with long-term follow-up of TCL-DCR. Yildirim et al. (25) reported an 84.4% success rate with a follow-up of 18 months. They recommended bicanalicular silicone tube intubation to increase success. To our knowledge, there is only 1 study with a follow up of 5 years. Dogan et al., (27) reported on a follow-up of 60 months with a 75% success rate, which was lower than that of other studies in the literature. The authors hypothesized that the longer follow-up time contributed to the lower success rate. Kaynak et al. (24) reported a success rate of 60.3% at 2 years of follow-up. They reported that the lower success rate was related to not thoroughly removing the debris.

In the previously mentioned TCL-DCR study (20), the 6-month success rate was 95.1%. The current findings were a seventh year success rate in the TCL-DCR patients of 85.7%. The long-term success rate is still high in comparison

with the results of study of Dogan et al. (27). In our study, ostium cleaning performed in the postoperative first week and bicanalicular silicone tube implantation may have been important factors leading to a higher success rate.

Conclusion

In conclusion, the number of patients in this study is comparable to that of the studies in the literature. The surgeries were performed by a single surgeon and long-term results were assessed. Both EX-DCR and TCL-DCR demonstrated high long-term success.

Disclosures

Ethics Committee Approval: The Ethics Committee of Selcuk University Training and Research Hospital provided the ethics committee approval for this study (2014/95).

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Involved in design and conduct of the study (HIY); preparation and review of the study (HIY, MO); data collection (MO); and statistical analysis (HIY).

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