

Comparison of Anatomical and Symptomatic Success in Transcanalicular Laser Dacryocystorhinostomy

Transkanaliküler Lazer Dakriosistorinostomi Cerrahisinde Anatomik ve Semptomatik Başarının Karşılaştırılması

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ABSTRACT Objective: Nasolacrimal duct obstruction (NLDO) patients who underwent Transcanalicular dacryocystorhinostomy (TC-DCR) were retrospectively analyzed to determine surgical success using anatomical and symptomatic outcomes. **Material and Methods:** Patient files for patients who were treated for NLDO with TC-DCR between 2012-2013 at Balıkesir University Hospital were examined and 43 patients were included in the study. Surgical and symptomatic success were evaluated. Patients symptoms, patient satisfaction, epiphora scoring and detailed ophthalmological examination findings were recorded. Anatomical success was defined by a patent nasolacrimal lavage and symptomatic success was defined by patients satisfaction and using Sahlin's epiphora score. **Results:** In our study anatomical success at the last examination was 82.2%. 26.5 % of patients had severe epiphora (grade 2 and grade 3). Leaving our symptomatic success rate at 73.5%. Epiphora is the main presenting complaint of patients with nasolacrimal duct obstruction (NLDO). Historically external dacryocystorhinostomy (EX-DCR) has been considered the gold standard treatment of NLDO, however in the last decade transcanalicular and endonasal approaches have gained popularity. As transcanalicular dacryocystorhinostomy (TC-DCR) is less invasive than EX-DCR what remains is to achieve the success rates of EX-DCR procedures. Surgical success can be defined by anatomical patency and patient satisfaction. Persistent epiphora in external DCR patients despite anatomical patency may be due to damage to the lacrimal pump system; this together with greater symptomatic relief in TC-DCR could be a reason to consider transcanalicular surgery as superior to external DCR. **Conclusion:** We feel that transcanalicular procedures may be advantageous in epiphora scoring and symptomatic findings compared to EX-DCR.

Keywords: Lacrimal duct obstruction; dacryocystorhinostomy; nasolacrimal duct; patient satisfaction

ÖZET Amaç: Nazolakrimal kanal obstrüksiyonu (NLKO) için Transkanaliküler dakriosistorinostomi (TK-DSR) ameliyatı geçiren hastalarımızda anatomik ve semptomatik başarının değerlendirilmesi. **Gereç ve Yöntemler:** Balıkesir Üniversitesi Hastanesi Göz Hastalıkları Bölümünde, 2012-2013 yılları arasında NLKO için TK-DSR ameliyatı geçiren 43 hastanın cerrahi ve semptomatik başarıları değerlendirildi. Geriye dönük hasta dosyaları taranıp hastaların semptomları, hasta memnuniyeti, epifora skorlaması ve detaylı oftalmolojik muayenesi kaydedildi. Anatomik başarı nazolakrimal lavaj bulgularına göre değerlendirildi. Semptomatik başarı hasta memnuniyeti ve Sahlin'in epifora skoru kullanılarak değerlendirildi. **Bulgular:** Bizim çalışmamızda anatomik başarı son muayenede %82.2 idi. %26,5 hastada yüksek derecede (2. ve 3. derece) epifora bulguları kaydedildi. Semptomatik başarı %73.5 olarak hesaplanmıştır. Nazolakrimal kanal obstrüksiyonunun (NLKO) ana şikâyetlerinden biri epiforadır. Eksternal dakriosistorinostomi (EX-DSR), NLKO cerrahisinde altın standart olarak görülmekteydi ancak son yıllarda transkanaliküler (TK-DSR) ve endonazal teknikler değer kazanmaya başlamıştır. TK-DSR ve endonazal teknikler daha az invaziv olup EX-DSR ameliyatındaki başarıya ulaşmak amaçlanmıştır. Cerrahi başarı anatomik açıklık ve sübjektif bulgular olarak değerlendirilebilir. EX-DSR hastalarında lakrimal pompa sistem hasar olduğuna düşünerek TK-DSR nin epifora skorlaması ve semptomatik bulgular açısından EX-DSR'ye göre daha avantajlı bir teknik olabileceğini düşünmekteyiz. **Sonuç:** Transkanaliküler tekniklerin, EX-DSR'ye kıyasla, epifora skorlaması ve semptomatik bulgular açısından daha avantajlı olabileceğini düşünüyoruz.

Anahtar Kelimeler: Lakrimal kanal tıkanıklığı; dakriosistorinostomi; nazolakrimal kanal; hasta memnuniyeti

Acquired nasolacrimal duct obstruction (NLDO) is a common disorder with a female predominance.¹ Epiphora is the main complaint in patients with (NLDO).² Historically external dacryocystorhinostomy (EX-DCR) has been considered the gold standard treatment of NLDO. Toti first defined the EX-DCR procedure in 1904, with modifications being made over the years.^{3,4} However in the last decade transcanalicular and endonasal approaches have gained popularity.⁵ These procedures preserve the physiology of the lacrimal duct system and are a viable alternative to external procedures.⁶ The advantages of endoscopic dacryocystorhinostomy over EX-DCR are better hemostasis, lack of scarring, shorter operating time and protection of the lacrimal pump mechanism.⁷ Transcanalicular multidiode laser surgery is a relatively newer method for treating NLDO.⁸ As transcanalicular endoscopic dacryocystorhinostomy (TC-DCR) is a less invasive technique with shorter operating time on average⁹ than EX-DCR what remains is to achieve the success rates of EX-DCR procedures. In this study we aimed to determine surgical success in TC-DCR patients using anatomical and symptomatic outcomes.

MATERIAL AND METHODS

Patient data for patients who were treated for NLDO with TC-DCR between the years 2012 and 2013 at Balıkesir University were examined and after a process of elimination 45 eyes of 43 patients were included in the study. Approval was given by our Institutional Ethics Committee and the study adhered to the tenets of the declaration of Helsinki. Informed consent was obtained from the patients. Inclusion criteria were as follows:

- i) Patients over 18 years of age
- ii) Patients with acquired NLDO
- iii) Patients in whom TC-DCR were performed between 2013-2014.

Exclusion criteria were previous surgery for NLDO, trauma and acute dacryocystitis.

TC-DCR TECHNIQUE

Surgery was performed under local anaesthesia using a multidiode laser (ORBEAM 980-30K™) de-

vice. Surgery was performed by a single ophthalmologist (AY) together with a single Ear Nose and Throat (ENT) specialist (HY). Vasoconstriction was achieved by packing the nasal cavity with cotton sponges soaked in 4% lidocaine and epinephrine (1/100,000), which was left in place 10 min before surgery. Canalicular dilatation was performed, and a transcanalicular diode laser probe of 600 µm fiber optic (silicafluopolymer) was inserted. Nasal endoscopy to visualise the tip of the laser probe was performed throughout the procedure. The middle turbinate was deviated medially with a periosteal elevator to in order to protect the middle turbinate from laser shots and for adequate visualization. The light of the laser probe was trans nasally observed, just lateral and superior to the middle turbinate. A 600 nm diode laser was applied through the transcanalicular approach with 500 msec multi-pulse mode at 8-10 W creating an adequate sized osteotomy. Carbonized tissues were removed. The patency of the lacrimal canal was checked with lacrimal irrigation. Bicanalicular silicone stents were inserted in all patients.

POSTOPERATIVE CONTROL AND ASSESSMENT

Patients were examined post operatively at day 1, day 15, and the first, third, six month and one year post operatively. Oral antibiotic prophylaxis (amoxicillin + clavulanic acid 1000 mg b.i.d.), analgesics and anti-inflammatory drugs (Flurbiprofen, SR 100 mg) were prescribed for the first week post-operatively. Topical antibiotic drops 5 times/day (Okacin, Novartis Ophthalmics AG, Hettlingen, Switzerland) and topical steroid drops 4 times/day (fluoromethalone) were prescribed for the first two week post operatively. Topical decongestants (xylometazoline hydrochloride 1 mg b.i.d.) were prescribed post operatively for three days and topical steroid nasal sprays (fluoromethalone acetate 0.1% 2 times/day) together with saline nasal washout were used for the first month. Silicone tubing was removed after 3 months of follow up. Patients were telephoned approximately one year after the surgical procedure and epiphora scores, patient satisfaction and discharge were questioned. Epiphora score was graded using Sahlin's scoring system: 'Grade 0', no epiphora; 'Grade 1', minimal epiphora

TABLE 1: TC-DCR patients epiphora grading (Sahlin Score).

Degree		%
0	No epiphora	34.2
1	Mild epiphora (outdoors, under challenge)	39.5
2	Moderate epiphora (outdoors, without challenge)	7.9
3	Severe epiphora (indoors and outdoors)	18.4

outdoors, but only with wind or cold; 'Grade 2', troublesome epiphora outdoors, but not indoors; 'Grade 3', epiphora indoors and outdoors. Overall satisfaction with the procedure was graded, by the patient, between '1' (dissatisfied) and '2' (average) '3' (satisfied) and '4' (thoroughly satisfied).⁴ Patients were called in for an examination by a single blind observer (NT). On examination lacrimal irrigation was performed and any other causes for epiphora ie. blepharitis, meibomitis, eyelid abnormalities such as ectropion and entropion were noted. In our study anatomical success was defined by anatomical patency and symptomatic success by patient satisfaction and epiphora scoring.

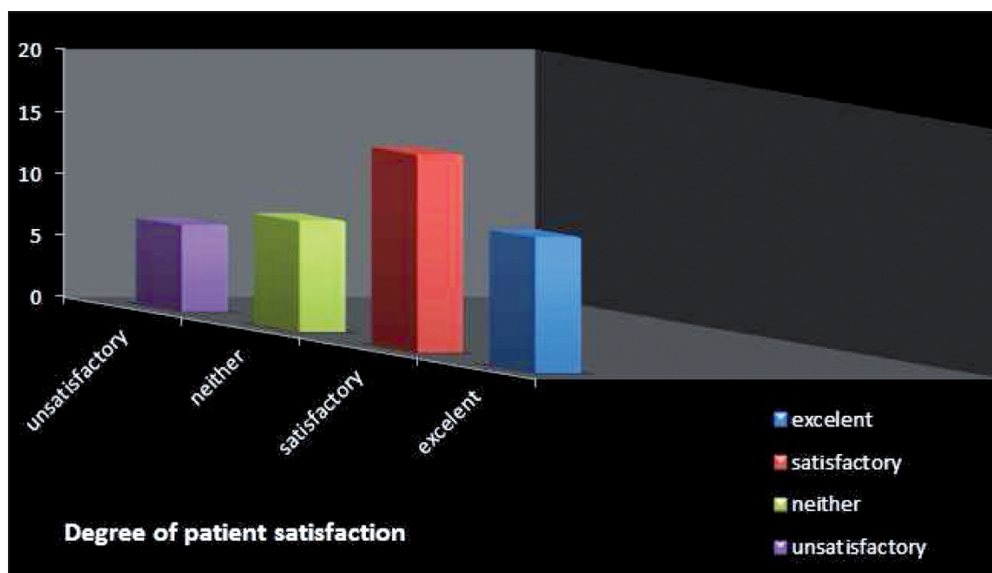
RESULTS

45 eyes of 43 patients were included in the study. The mean age of patients at surgery was 54.2± 16

years. The male to female ratio was 2:15. Obstruction of the right side was found in 14 cases (31%), 29 had left side (65%) and 2 cases (4%) had bilateral nasolacrimal duct obstruction. Mean follow up was 9 months with a range of 6-12 months. 8 patients had failure on lacrimal irrigation (17.7 %). The anatomical success rate at the last examination was 82.2%. 34.2 % of patients had no epiphora (Grade 0); 39.5 % of patients reported mild epiphora (Grade 1); 7.9% of patients had moderate epiphora (Grade 2) and 18.4 % of patients had severe epiphora (Grade 3) (Table 1). The mean overall satisfaction score for these patients was 2.6 with 11 patients rating surgical success as excellent (4), 16 patients as satisfactory (3) 9 patients rated the surgery as average (2), 7 patients were dissatisfied (1) (Figure 1). Epiphora scores were correlated with lacrimal lavage patency and were found to be correlated. All patients with failure had discharge. Two patients with patent lacrimal systems on irrigation and no epiphora symptoms were unsatisfied with the surgery.

DISCUSSION

Although a number of studies in this field have been carried out the question still remains as to which form of surgery is more beneficial for patients and which form of surgery has better out-

**FIGURE 1:** TC-DCR patient satisfaction score.

comes. Studies reported no significant difference in surgical success between TC-DCR, endoscopic techniques and EX-DCR.¹⁰⁻¹³ Determining surgical success is difficult because of a lack of standardization. As the main complaint that patients present with is epiphora symptomatic improvement is believed to be superior to anatomical patency in determining surgical success.^{9,14-16} In a study by Hii et al. no significant difference was found between endoscopic-DSR and EX-DSR with regards to surgical outcome or cost, he stated that each case should be managed individually and the choice of surgery be assessed according to patient preference nasal pathology and surgical skill.¹⁷ Our study showed similar anatomical and symptomatic outcomes with previous studies.^{9,18} To evaluate patient satisfaction we used a questionnaire similar to that used by Sahlin and Rose rating the patients satisfaction with surgery on a scale from 1 to 4.¹⁰ In our study two patients had anatomically patent systems but were dissatisfied with surgery; this further cements the theory that symptomatic relief in NLDO post-surgery is complex. McCormick et al found epiphora scoring to be a poor predictor of patency. Studies comparing subjective and objective outcomes of external dacryocystorhinostomy surgery have found discrepancies between the two.¹⁹ Delany and Khooshabeh found that in their EX-DCR patients only 38 percent of patients were asymptomatic despite a patent nasolacrimal duct.²⁰ Similarly Tarbet et al.'s EX-DCR outcomes showed that 62% of patients with patent nasolacrimal ducts had persistent epiphora, and Sahlin and Rose found that in their EX-DCR patients epiphora symptoms persisted in 50 percent of patients despite nasolacrimal patency.^{7,10} Fayers et al. showed a functional success of 69% compared to an anatomical success of 74% in EX-DCR.¹⁵ Thus there seems to be a discrepancy between subjective and objective symptoms in patients with EX-DCR compared to TC-DCR with greater symptomatic improvement in TC-DCR supported by long term results of TC-DCR patients in Zenk et al's study with subjective success of 81.8% compared to the anatomical success of 79.4%.¹⁶ Similarly in a study by

Yeniad et al. in patients undergoing simultaneous TC-DCR and EX-DCR objective outcomes were significant between the two groups with a higher success rate in the EX-DCR group (89.4%) whereas there was no significant difference between subjective outcomes although in the follow up period subjective success was higher in the TC-DCR group.^{9,15} In our study our anatomical success was 82.2 % symptomatic success measured by our epiphora score was 73.5%. As we used Sahlin's scoring system to evaluate epiphora, compared to a 50% symptomatic relief among Sahlin's patients treated with EX-DCR, TC-DCR provided more symptomatic relief in our study. In EX-DCR the reason for the discrepancy between anatomical success and symptomatic complaints might be due to injury to the medial canthal structures with subsequent lacrimal pump failure. As previously mentioned TC-DCR and endoscopic methods protect the lacrimal pump function we propose that the persistent epiphora in EX-DCR patients despite anatomical patency may be due to the damage to the lacrimal pump system due to damage to the medial canthal structures. We believe that transcanalicular surgery is superior to EX-DCR in symptomatic outcomes. This study had some limitations a larger patient group and a longer follow up period are needed, TC-DCR results from our clinic could be compared to EX-DCR results to support our theory.

CONCLUSION

Our symptomatic outcomes in TC-DCR while low compared to anatomical patency were similar to results in previous studies of symptomatic relief after TC-DCR. Compared to epiphora results in Sahlin's study our symptomatic outcomes were significantly higher. Endonasal or transcanalicular procedures may be advantageous in epiphora scoring and symptomatic findings, this might be due to the lacrimal pump dysfunction caused by EX-DCR. If TC-DCR has greater symptomatic relief it can be considered the superior modality of surgery as the main goal is quality of life improvement.

Conflict of Interest

Authors declared no conflict of interest or financial support.

Authorship Contributions

Idea/Concept: Constructing the hypothesis or idea of research and/or article: Nesime Setge Tiskaoğlu, Alper Yazıcı, Sıtkı Samet Ermiş, **Design: Planning methodology to reach the Conclusions:** Nesime Setge Tiskaoğlu, Alper Yazıcı, Esin Söğütlü Sarı, **Control/Supervision: Organizing, supervising the course of progress and taking the responsibility of the research/study:** Nesime Setge Tiskaoğlu, Alper Yazıcı, **Data Collection and/or Processing: Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments:**

Nesime Setge Tiskaoğlu, Mukkades Yüceur, Kübra Tinç, **Analysis and/or Interpretation: Taking responsibility in logical interpretation and conclusion of the results:** Nesime Setge Tiskaoğlu, **Literature Review: Taking responsibility in necessary literature review for the study:** Nesime Setge Tiskaoğlu, **Writing the Article: Taking responsibility in the writing of the whole or important parts of the study:** Nesime Setge Tiskaoğlu, **Critical Review: Reviewing the article before submission scientifically besides spelling and grammar:** Sıtkı Samet Ermiş, Alper Yazıcı, Esin Söğütlü Sarı, **References and Fundings: Providing personnel, environment, financial support tools that are vital:** No financial support, **Materials: Biological materials, taking responsibility of the referred patients:** Sıtkı Alper Yazıcı, Samet Ermiş.

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