

## The osteotomy diameter in the transcanalicular laser dacryocystorhinostomy. Our experience in 192 lacrimal pathways

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### ABSTRACT

**Objectives:** We want to evaluate the influence of the size of the osteotomy on the postsurgical outcomes.

**Methods:** A retrospective study was performed in patients who underwent TCL-DCR from January 1, 2008, to March 1, 2019. The patients were divided into two groups: the patients in one group were subjected to LP surgery with an osteotomy diameter equal to 9 mm ± 1 mm (group A), and the patients in the other group were subjected to surgery with an osteotomy diameter equal to 14 mm ± 1 mm (group B).

**Results:** A total of 159 lacrimal pathways (LPs) were operated on in group A with a success rate (SR) of 66.6%. Thirty-three LPs were operated on in group B with an SR of 81.8%.

**Conclusion:** An osteotomy diameter equal to 14 mm ± 1 mm achieved better postoperative results than an osteotomy diameter equal to 9 mm ± 1 mm.

### 1. Introduction

The main reason for TCL-DCR postoperative failure is the stenosis of the ostium as a result of the scarring (ostium cicatrix). The appearance of ostium granulomas and synechiaes could also influence the poor postsurgical prognosis [1,2].

The scarring, granulomas and synechiaes could be influenced by the inflammatory mediators. Therefore, it could have a negative effect on the permeability of osteotomy and decrease the postsurgical outcomes [3].

Many authors believe that a larger osteotomy and less aggressive surgical procedure are the key to improve the postsurgical prognosis in TCL-DCR [3–5]. We hypothesize that a larger osteotomy diameter will improve the postoperative results of TC-DCR.

Our goal is to evaluate the influence of the osteotomy diameter on the postsurgical outcomes.

### 2. Methods

A retrospective study was performed in patients who underwent TCL-DCR from January 1, 2008, to March 1, 2019. The patients were divided into two groups: the patients in one group were subjected to surgery where the osteotomy diameter was equal to 9 mm ± 1 mm (group A), whereas the patients in the other group were subjected to surgery where the osteotomy diameter was equal to 14 mm ± 1 mm (group B).

The inclusion criteria were patients who did not have nasosinusoidal or eye disease, patients older than or equal to 18 years of age, and patients who underwent operations performed by the same surgical team (AR, JL, and MAR).

Patients less than 18 years of age, DCR relapse (external, endoscopic or transcanalicular), nasosinusoidal or eye disease, patients with follow-up periods less than 12 months and patients who underwent surgery performed by other surgeons were excluded. Patients in the first group with osteotomy diameters different than 9 mm ± 1 and patients in the second group with osteotomy diameters different than 14 mm ± 1 mm

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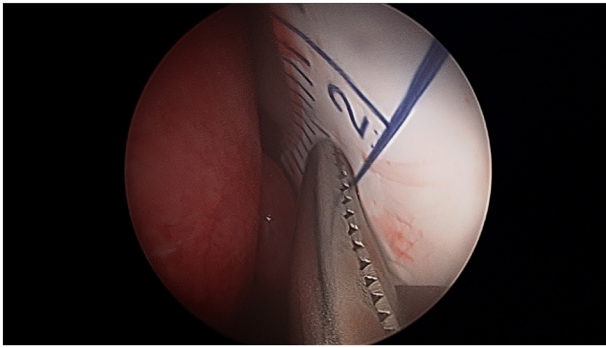


Fig. 1. Osteotomy measure.

were excluded. The whole patients were informed that they were participating in this study. The clinical trial was approved by the ethics committees of both hospitals.

The surgeries were operated under locoregional anaesthesia except for simultaneous TCL-DCR with septoplasties. The whole osteotomies were performed by laser diode (15 W). The osteotomy diameter was measured by a surgical ruler (Fig. 1).

All patients were discharged 3 h postoperatively. During the post-surgery period, tobramycin and dexamethasone eye drops were prescribed. Twenty-four hours after surgery, nasal fluticasone was recommended. The bicanalicular silicone tube was removed 12 weeks after TCL-DCR in the two groups.

Endoscopic examinations were conducted after 2, 4, 12, 24 and 48 weeks, where the lacrimal syringing was performed. The surgery was considered a “success” if the lacrimal syringing was positive 12 months postoperatively.

The Chi-square test and Yates correction were performed to determine the relationship between the SR in the two groups.

### 3. Results

During the last 10 years, 156 patients (192 LPs) underwent surgery; 159 LPs were included in group A, and 33 LPs were included in group B.

In group A, 106 LPs underwent successful operations, so the SR was 66.6%, while in group B, 27 LPs underwent successful operations, so the SR was 81.8%. No statistically significant differences were found ( $p = 0.086$ ).

During the same surgical procedure, 35 patients (70 LPs) in group A underwent bilateral TCL-DCR, and 89 patients underwent unilateral TCL-DCR.

In group B, 1 patient (2 LPs) underwent bilateral TCL-DCR, and 31 patients underwent unilateral TCL-DCR.

Three patients underwent simultaneous TCL-DCR with septoplasties in the group A. One patient underwent simultaneous TCL-DCR with septoplasty in the group B.

### 4. Discussion

During the last 10 years, we achieved SR values after TCL-DCR similar to those shown in the medical literature [1,6,7].

Between 2008 and 2011, we performed osteotomies where the diameter was equal to  $9 \text{ mm} \pm 1 \text{ mm}$  because many expert surgeons had published SRs above 80% when the osteotomy diameter was measured to be between 7 and 9 mm [6,8,9].

Since 2011, medical literature results have shown better SRs when the osteotomy diameter is larger than 11 mm; thus, we changed our method of measuring the osteotomy diameter. So, the group B was composed of patients whose osteotomy diameter was  $14 \text{ mm} \pm 1 \text{ mm}$  [1,10].

We observed that the use of a larger osteotomy diameter in group B

was the key to improving our SR. We found no statistically significant difference between the two groups because the sample B was small.

We also observed that the performance of the osteotomy between the root and the anterior part of the middle turbinate was crucial for improving the SR in group B. All the osteotomies in group B were performed between the root and the anterior part or the middle turbinate. These arguments were corroborated by SY Kim et al. in 2013 and D Espuch (thesis) in 2015 [4,5].

The SR after TCL-DCR during the first 8-week postoperative follow-up period varied between 95% and 100%, but later, the SR decreased until the 6-month postoperative period. The SR decreased slightly between the 6- and 12-month postoperative periods.

We must be aware that follow-up periods of less than 12 months and non-objective diagnostic tests may create biased results [1,6].

We believe that TCL-DCR requires a long learning curve of many years to achieve a less aggressive surgery with minimal damage to the endonasal mucosae. Therefore, extensive surgical experience of more than 15 years for performing TCL-DCR will positively influence the TCL-DCR postoperative results. This hypothesis has been shared by many authors, such as Piedrola et al. in 2008 and Nuhoglu et al. in 2012 [1,6].

### 5. Conclusion

The patients whose osteotomy diameters were equal to  $14 \text{ mm} \pm 1 \text{ mm}$  achieved better postoperative outcomes than patients whose osteotomy diameters were equal to  $9 \text{ mm} \pm 1 \text{ mm}$ , although we need a larger sample to find a statistically significant difference. We believe that the osteotomy diameter is one of the key factors to achieve a successful postoperative result.

### Ethical committee statement

This manuscript has been approved by the Ethics Committee of Morales Meseguer Hospital (Dra Ana Amores) and Los Arcos del Mar Menor Hospital (Dr José Valverde).

### Declaration of competing interest

The authors have no financial disclosures or conflicts of interest. This manuscript has not been submitted previously.

### References

- [1] Nuhoglu F, Gurbuz B, Eltutar K. Long-term outcomes after transcanalicular laser dacryocystorhinostomy. *Acta Otorhinolaryngol Ital* 2012;32(4):258–62.
- [2] Joshi RS. Conventional dacryocystorhinostomy in a failed Trans-canalicular laser-assisted dacryocystorhinostomy. *Indian J Ophthalmol* 2011;59(5):383–5.
- [3] Raposo A, Garcia-Purriños F, Piqueras F, Martínez-Martínez MLL, Lajara J. Anatomical variants and bilateral lacrimal pathways surgery. Avoiding unnecessary surgery. *Eur Arch Otorhinolaryngol* 2017;274:3135–8.
- [4] Kim SY, Paik JS, Jung SK, Cho WK, Yang SW. No thermal tool using methods in endoscopic dacryocystorhinostomy: no cautery, no drill, no illuminator, no more tears. *Eur Arch Otorhinolaryngol* 2013;270(10):2677–82.
- [5] Espuch D. Correlación anatómica y radiológica en la cirugía lagrimal con láser en cadáver [Thesis]. Alicante. From: <https://dialnet.unirioja.es/servlet/tesis?codigo=64443>; 2015.
- [6] Piedrola D, et al. Endonasal versus trans-canalicular endoscopic dacryocystorhinostomy using diode laser. Surgical techniques and outcomes. *Acta Otorrinolaringol Esp* 2008;59(6):283–7.
- [7] Nacaroglu I S, Oğreden S, Yılmaz A, Atalay K, Kirgiz A. Comparison of outcomes of conventional transcanalicular laser dacryocystorhinostomy and modified transcanalicular laser dacryocystorhinostomy. *Videosurg Miniinv* 2018;13(3):401–6.
- [8] Alañón FJ, Alañón MA, Martínez A, Cárdenas M. Transcanalicular dacryocystorhinostomy technique using diode laser. *Arch Soc Esp Ophthalmol* 2004;79:325–30.
- [9] Ali M, Psaltis AJ, Wormald PJ. Dacryocystorhinostomy ostium: parameters to evaluate and DCR ostium scoring. *Clin Ophthalmol* 2014(8):2491–9.
- [10] Balikoglu-Yilmaz M, et al. Prospective comparison of 3 dacryocystorhinostomy surgeries: external versus endoscopic versus transcanalicular multidiode laser. *Ophthalm Plast Reconstr Surg* 2015;31(1):13–8.