




# Bilateral Simultaneous Endoscopic Dacryocystorhinostomy: Outcome and Impact on the Quality of Life of the Patients

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Int Arch Otorhinolaryngol 2019;23:191–195.

## Abstract

**Introduction** Bilateral simultaneous endoscopic dacryocystorhinostomy (endo-DCR) has received little attention in the literature, thus many surgeons continue to address bilateral nasolacrimal duct obstruction at two stages, rather than in the same setting.

**Objective** To evaluate the feasibility and the outcome of simultaneous bilateral Endo-DCR and its impact on the quality of life of the patients.


**Methods** We have conducted a retrospective analysis of patients who underwent bilateral simultaneous endo-DCR between March 2013 and February 2017 at our tertiary care institution. The reviewed data included clinical presentation; operative details; success rate; pre and postoperative evaluation of the symptoms of the patients, using the Nasolacrimal Duct Obstruction Symptom Score Questionnaire; satisfaction of the patients, and improvement in the quality of life, assessed by the Glasgow Benefit Inventory (GBI) questionnaire.

**Results** Out of 128 cases in which endo-DCRs were performed, 13 were bilateral (26 sides). Postoperative success was documented in 24 of the 26 sides (92.3%), with a mean follow-up duration of 16.2 months. The two failed sides were reported in the same case. The preoperative symptom score ranged between 12 and 80 (mean  $\pm$  standard deviation [SD]:  $38.23 \pm 15.7$ ). The postoperative symptom score was significantly lower (mean  $\pm$  SD:  $5.4 \pm 12.9$ ). The success rates in unilateral and bilateral cases were comparable, with no statistically significant difference. A notable improvement in the quality of life of the patients was also reported, with a mean GBI score of  $81.38 \pm 12.37$ .

**Conclusion** Our results support that a simultaneous bilateral endo-DCR is a safe procedure that offers a high success rate, spares the patient from the stress of a second surgery, provides the patient with a bilateral resolution of the symptoms, and confers an immediate improvement in the quality of life of the patients.

## Keywords

- ▶ dacryocystorhinostomy
- ▶ epiphora
- ▶ dacryocystitis
- ▶ nasolacrimal duct
- ▶ lacrimal sac
- ▶ quality of life
- ▶ endoscopic DCR

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received  
March 17, 2018  
accepted  
September 2, 2018  
published online  
February 15, 2019

DOI <https://doi.org/10.1055/s-0038-1675394>.  
ISSN 1809-9777.

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## Introduction

Nasolacrimal duct (NLD) obstruction is a common clinical problem that is caused by a variety of acquired and congenital etiologies affecting the lacrimal drainage system. Typical symptoms include epiphora and recurrent dacryocystitis.<sup>1</sup> The definitive treatment of NLD obstruction is dacryocystorhinostomy (DCR), a relatively old surgical procedure that aims to bypass the obstruction by creating a new permanent canal between the lacrimal sac and the nasal cavity.<sup>2,3</sup>

Originally, there are two different approaches to DCR: external, via skin incision, and an endoscopic approach (endo-DCR). In the last few years, endo-DCR has become the procedure of choice, since it has many advantages, including good aesthetic result, lack of external scars, preservation of the pumping mechanism of the orbicularis oculi muscle, and shorter operative time, with an overall success rate between 87 and 95%.<sup>4-6</sup>

Although NLD obstruction can affect the lacrimal drainage systems of both eyes in some patients,<sup>7</sup> it has been an established approach to perform two DCRs in separate settings to bypass one obstruction at a time.<sup>8</sup> Instead of that, a simultaneous procedure has been considered by some surgeons to correct both sides in the same operation.<sup>8,9</sup>

Physiologically, surgery has a stressful effect on the human body. Hormonal and metabolic changes occur during any surgical procedure. In addition, there are the possible complications of the procedure itself, such as hemorrhage and infection, as well as the effects of general anesthesia and its possible complications.<sup>10</sup> There is also the effect of surgery on the quality of life and on the general health of the patients. Collectively, it could be a better choice to do a simultaneous operation aiming to improve the satisfaction of the patients by minimizing hospital visits and postoperative follow-ups.<sup>11</sup> The benefits of a bilateral simultaneous surgery were also demonstrated in other procedures, such as bilateral cataract surgery.<sup>12</sup> Although the cost-effectiveness of simultaneous bilateral endo-DCR has been recently described,<sup>9</sup> the detailed outcomes of this procedure have not been clearly analyzed. The purpose of the present retrospective study was to report our experience of performing a bilateral endo-DCR in one sitting, and to document its effect on the quality of life of the patients, as well as their satisfaction with the procedure.

## Methods

### Patients and Study Design

We have reviewed all of the patients who underwent a primary endo-DCR at our institution between March 2013 and February 2017. Patients who underwent a bilateral simultaneous procedure were further analyzed. The present study was approved by the review board of our institution prior to the commencement of the work.

The medical records of the patients have been reviewed for demographic data, etiology of NLD obstruction, medical history, duration of surgery, postoperative improvement, incidence of postoperative complications, hospitalization, duration of follow-up, as well as questionnaires to assess

the satisfaction of the patients with the bilateral simultaneous procedure and the improvement in their quality of life.

### Preoperative Assessment for Endoscopic Dacryocystorhinostomy

Prior to the surgery, all of the patients had a preoperative visit to evaluate their symptoms and underwent a clinical examination both in the rhinology and ophthalmology departments to confirm bilateral NLD obstruction and the need for DCR on both sides. The clinical examination included irrigation, probing, and nasoendoscopy. Additionally, we have performed, preoperatively, a computed tomography (CT) scan of the paranasal sinuses of all patients. The operative procedure, the postoperative risks and complications were all explained to the patients.

The symptoms of the patients were evaluated using the Nasolacrimal Duct Obstruction Symptom Score (NLDO-SS) questionnaire. The NLDO-SS questionnaire is a suitable and validated tool for subjective postoperative outcome assessment after an endo-DCR procedure.<sup>13,14</sup> It consists of eight items: five items focused on the common ocular symptoms of NLD obstruction; two items describing the conditions in the nasal cavity; and one item on the general condition (► **Table 1**). The symptoms are graded using an 11-point numeric rating scale (0 = no symptom, 10 = worst imaginable symptom). The total score for the NLDO-SS ranges from 0 to 80 points.

### Surgical Technique

All operations were performed under general anesthesia. The endo-DCR was performed using a standard surgical technique. A U-shaped mucosal incision was performed to elevate a posteriorly based mucosal flap and to expose the bony covering of the lacrimal sac. The anterior part of the uncinat process, which is a frontal process of the maxilla that forms the thick anteromedial wall of the lacrimal sac, and the lacrimal bone were both removed to create a bony opening and to expose the medial surface of the sac. The removal of thick bones was performed using a set of Kerrison rongeurs and curettes (Karl Storz, Tuttlingen, Germany), without the need of drilling in any of the cases included in the study. A probe was inserted through the upper or lower punctum and then through the common

**Table 1** Nasolacrimal Duct Obstruction Symptom Score (NLDO-SS)

NLDO-SS
Tearing
Discharge in the eye
Swelling around the eye
Pain around the eye
Change in visual acuity
Nose blockage
Nasal cavity discharge
General condition
Total score

Numeric rating scale: 0 = no symptom; 10 = worst imaginable symptom

canaliculus into the lacrimal sac to tent its medial wall. A vertical incision was then performed in the medial wall of the lacrimal sac, followed by horizontal incisions superiorly and inferiorly to create lacrimal sac flaps in an open-book fashion. The lacrimal probe was ensured to pass smoothly through the common canaliculus. The mucosal flap was then trimmed and carefully placed in close opposition to the edges of the lacrimal sac flaps to allow healing by primary intention. A silicone stent was placed if narrowing or granulation tissue was observed around the opening of the common canaliculus.

### Postoperative Assessment

All of the patients were seen postoperatively after 1 week, 3 weeks, 3 months, 6 months, and 12 months, then every 6 to 12 months thereafter. The surgical outcome was evaluated both subjectively by the resolution of the symptoms of the patients (as assessed by the NLDO-SS questionnaire), as well as objectively by confirming DCR patency during an endoscopic endonasal examination or irrigation testing. Success was defined when there were both a resolution of the symptoms of the patient, as well as patent DCR opening during the endoscopic examination or irrigation testing.

The Glasgow Benefit Inventory (GBI) questionnaire was used postoperatively to measure the improvement in the quality of life. The GBI is a validated tool to measure the quality of life of patients after interventions, and has been shown to be sensitive to otolaryngology interventions.<sup>15–18</sup> It is a widely used tool and is also applicable to DCR surgeries.<sup>19–22</sup> The questionnaire consists of 18 items: 12 related to general improvement; 3 to social improvement; and 3 to physical improvement. Each question has a numeric rating scale for responses, which were further analyzed statistically.

The satisfaction of the patients with the bilateral simultaneous procedure was assessed using a self-formed questionnaire similar to those used in other studies,<sup>12</sup> which contained the reasons of the patients for choosing the simultaneous bilateral endo-DCR, concerns about the surgery, postoperative discomfort, and whether the patient would recommend a simultaneous bilateral endo-DCR surgery to neighbors or relatives.

### Statistical Analysis

The statistical analyses were performed using the SPSS Statistics for Windows, Version 22.0 (IBM Corp., Armonk, NY, USA). The demographics data, symptoms, and GBI scores of the patients were calculated using SPSS descriptive statistics. The symptom scores were compared pre and postoperatively, as well as between bilateral and unilateral cases, using the independent samples Mann-Whitney U test. Success rates in bilateral and unilateral cases were compared using the chi-squared test. The significance level was set at  $p < 0.05$ .

### Results

A total of 128 endo-DCRs were performed over the study period at our institution. Out of these, 13 cases were bilateral (10.2%), with a male to female ratio of 1:2.25 (4 males, 9 females), and the mean age at surgery was 45.3 years old (range: 23–65 years

old). There was a history of epiphora in all the 26 sides of the 13 patients. Recurrent dacryocystitis was also observed in 18 sides (69.2%). A concomitant limited endoscopic septoplasty was required in three patients. The total duration of the surgery ranged between 120 and 180 minutes (mean: 155.8 minutes). Silicone stents were used in 18 sides. The decision to insert a silicon stent was made if there was stenosis of, or granulation tissue around, the common canaliculus.

None of the patients experienced any intraoperative complications. After the surgery, all of the patients were routinely discharged from the hospital on the same day. The postoperative complications reported were all minor and included periorbital bruising on one side, and limited intranasal synechiae on two sides.

Postoperative success was documented in 24 out of the 26 sides (92.3%) with a mean follow up time of 16.2 months (range: 6–42 months). All of the successful cases had resolution of both their epiphora and chronic dacryocystitis, in addition to patent DCR opening during the endoscopic endonasal examination. The two failed sides were reported in the same case: on one side, the common canaliculus was extremely narrow and stenting through its opening failed after several attempts; on the other side, stenting of the narrow common canaliculus was successful, yet failure also occurred due to the formation of fibrous tissue and to the closure of the opening site of the lacrimal sac. The preoperative symptom scores of the patients for each side ranged between 12 and 80 (mean  $\pm$  standard deviation [SD]:  $38.23 \pm 15.7$ ), with no significant difference in the symptom score between the right and left sides ( $p = 0.7$ ). The postoperative symptom scores ranged between 0 and 50 due to the presence of one failed case (mean  $\pm$  SD:  $5.4 \pm 12.9$ ). A reduction in the symptom scores of the patients was reported for each of the eight symptoms, with a significant decrease in the total score ( $p < 0.001$ ) (–Table 2).

We have also compared these results to the outcomes in our series of 115 unilateral endo-DCRs performed during the same study period. A successful outcome was reported in 104 patients (90.4%), with no significant difference compared with the bilateral group ( $p = 0.76$ ). The mean preoperative total symptom score in the unilateral cases was  $33.6 \pm 13.9$ , which significantly decreased postoperatively to 4.28

**Table 2** Results of the preoperative and postoperative symptom score of the patients

	Preop (mean)	Postop (mean)	<i>p</i> -value
Epiphora	8.42	0.77	0.000
Discharge	5.69	0.00	0.000
Swelling	7.19	0.92	0.000
Pain	6.73	1.12	0.000
Change in vision	1.27	0.31	0.096
Nasal blockage	2.12	0.58	0.025
Nasal discharge	2.35	0.96	0.026
General condition	4.46	0.38	0.000
Total	38.23	5.04	0.000

( $p < 0.000$ ). No significant difference was found between the bilateral and unilateral Endo-DCR groups in the total symptom scores, neither pre- or postoperatively ( $p > 0.05$ ).

All of the bilateral simultaneous endo-DCR patients completed their GBI questionnaire. Out of a maximum of 90 points, the patients' lowest score was 54, and the highest score was 90 (mean  $\pm$  SD:  $81.38 \pm 12.37$ ). Ninety-two percent of the patients (92.3%) were satisfied with having a simultaneous bilateral endo-DCR. The most common reasons for satisfaction were: resolution of symptoms in both eyes at the same time (69.23%), limited transportation to the hospital and distance between the hospital and the patient's residence (38.46%), and minimal hospital visits and follow-ups (23.07%).

Forty-six percent of the patients had no concerns about the bilateral simultaneous procedure. Five patients were concerned about anesthetic complications, while four patients were concerned about the postoperative complications from having surgery in both eyes. Postoperatively, five patients reported bilateral ocular discomfort. However, 12 patients (92.3%) responded that they would recommend the simultaneous bilateral endo-DCR surgery to neighbors and relatives.

## Discussion

The clinical presentation of NLD obstruction varies among patients. Some detectable symptoms can be annoying, such as blurred vision and orbital pain consequent to epiphora and recurrent dacryocystitis. These symptoms can cause minor inconveniences for some individuals, but they are extremely troublesome for others and may significantly deteriorate their quality of life.<sup>22</sup>

Classically, performing DCR is the optimum intervention. Previous studies indicate that DCR relieves the symptoms and improves the quality of life of the patients.<sup>19–21</sup> However, this goal cannot be achieved in patients with bilateral NLD obstruction undergoing one DCR at a time, no matter how successful the surgery is, and the patients can remain unsatisfied because of the persistent annoying symptoms in the unoperated eye, until the other surgery is performed.

Our analysis was based on three parameters: the assessment of the surgical outcome using both the NLDO-SS and an objective evaluation, the assessment of the improvement in the quality of life of the patients using the GBI questionnaire, as well as the assessment, through a questionnaire, of the satisfaction of the patients with the simultaneous procedure. The results confirmed the significant improvement of the symptoms of the patients using a validated symptom score. These scoring systems provide a better quantification of the improvement of the patients and of the degree of any residual symptoms, if any. Recently, additional lacrimal symptom questionnaires have been validated to provide this advantage in the quantification of the lacrimal symptoms of the patients and their impact on their social life.<sup>23,24</sup> These questionnaires should be of great benefit in future studies dealing with DCR, as well as in comparing the outcome after different procedures. Our results also highlight the improved quality of life after the intervention. Additionally, most patients were satisfied with the simultaneous bilateral endo-DCR due to several reasons,

including symptom resolution on both sides in one setting, hospital follow-up for both sides at the same time, and the absence of need of another surgery.

The success rate in the present study was 92.3%, which is in line with those reported in previous studies with primary endo-DCR,<sup>25</sup> and is also comparable to the 90.4% success rate in our series of unilateral cases. Therefore, it appears that the bilateral simultaneous procedure does not have a negative effect on the surgical outcome. In all of the cases described in the present study, the bone over the lacrimal sac was removed using Kerrison rongeurs and curettes (Karl Storz, Tuttlingen, Germany), without the need for drilling, a technique that may reduce the operative time of endo-DCR.<sup>26</sup>

The intraoperative complications of endo-DCR may include orbital injury hematoma in the lamina papyracea, and even endophthalmitis.<sup>27</sup> Nevertheless, both endoscopic sinus surgery and DCR can be complicated by orbital injuries;<sup>28,29</sup> nevertheless, endoscopic sinus surgery is performed bilaterally whenever indicated. Therefore, it is reasonable to consider a bilateral endo-DCR whenever necessary. Indeed, studies including simultaneous bilateral external DCRs have also been performed with no reports of unfavorable complication rates.<sup>8</sup> Although none of our patients suffered intraoperative ophthalmic injuries, we suggest that the staging of the procedure be considered intraoperatively in the event of ophthalmic injury while operating the first side, in order to avoid potential bilateral visual complications, which may include corneal injury during manipulations, or inadvertent orbital penetration with fat exposure in the surgical field, which could be potentially contaminated by purulent contents of the chronically inflamed lacrimal sac.

One of the limitations of the present study is the absence of a control group consisting of patients submitted to a staged procedure. This is due to the retrospective nature of our study, and to the fact that we have started performing the bilateral simultaneous approach early in our setup for treating patients with bilateral disease, with encouraging results. Nevertheless, the present study documents our experience and the outcome of the patients submitted to the simultaneous bilateral approach.

Another limitation of the present study is the small sample size attributed to the already low incidence of bilateral disease, which is also seen as a limitation in the recent studies on bilateral DCR.<sup>8,9,30</sup> Therefore, we believe that publishing this experience is necessary to contribute to the body of the work on this subject. Additionally, the current study uniquely addresses the quality of life as well as the stratification in this subset of patients.

## Conclusion

Simultaneous bilateral endo-DCR appears to be safe, with a high success rate, sparing patients from the stress of a second surgery and offering a significant improvement in their quality of life.

### Note

The present study has been accepted for oral presentation in the 27<sup>th</sup> Congress of the European Rhinologic Society, which took place in London between April 22<sup>nd</sup> and 26<sup>th</sup>, 2018.

### Acknowledgment

We would like to thank Dr. Somaya Hanafi & Dr. Mai Hosny, Oculoplastic Surgery, Ophthalmology Department at KAMC-HC, for their invaluable efforts in perioperative evaluation of patients.

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