

Outcomes of revision external dacryocystorhinostomy and nasal intubation by bicanalicular silicone tubing under endonasal endoscopic guidance

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Abstract

• **AIM:** To evaluate the long-term treatment outcomes in patients who underwent revision of external dacryocystorhinostomy (DCR) and nasal intubation by bicanalicular silicone tubing (BSTI) under endonasal endoscopic guidance.

• **METHODS:** Data from 28 patients with recurrent dacryocystitis were retrospectively reviewed. Revision external DCR and bicanalicular nasal intubation by silicone tubing under endonasal endoscopic guidance was performed in 28 eyes of 28 patients. The patients were evaluated with respect to the reason of recurrence, time to recurrence, time to revision, duration of follow-up and surgical success.

• **RESULTS:** Endoscopic endonasal examination detected an osteotomy-side obstruction by the excessive granulation tissue in 24 patients (86%), nasal septal deviation in three patients (10%) and nasal polyp in one patient (4%). Recurrence occurred after a mean duration of 5.3 ± 3.7 months following the first operation. The mean time between the first DCR operation and the revision DCR was 11.5 ± 9.3 months. After a mean follow-up of 14.9 ± 7.8 months, the rate of anatomic success alone was 85% (24/28); the rate of subjective success was 78% (22/28).

• **CONCLUSION:** Revision external DCR and bicanalicular nasal intubation by silicone tubing under endonasal endoscopic guidance can be recommended in patients with recurrent dacryocystitis as a surgical approach that achieves satisfactory objective and subjective success rates.

• **KEYWORDS:** recurrent dacryocystitis; revision; dacryocystorhinostomy; silicone tubing

INTRODUCTION

Nasolacrimal canal (NLC) obstruction results in infection of the lacrimal sac, thereby leading to lacrimation and ocular discharge. Lacrimal sac infection, recurring despite medication, can be surgically treated with external dacryocystorhinostomy (DCR) performed by creating an anastomosis between the lacrimal sac and the nasal mucosa. External DCR is considered the gold standard in primary cases with success rates of 90-100%^[1,2]. Despite external DCR, lacrimation and lacrimal sac infection may persist in a small number of patients. This condition called as recurrent dacryocystitis primarily results from the failure to create a bone window at an appropriate localization and size during the DCR operation, inaccurate suturation of the lacrimal sac and the nasal mucosa flaps, failure to preserve the anatomic structure and inadequate investigation of the nasal cavity abnormalities before the surgery^[3]. In cases of recurrent dacryocystitis, success rates were reported as between 50-100% following revision external DCR and bicanalicular nasal intubation by silicone tubing. Performing revision external dacryocystorhinostomy (DCR) and nasal intubation with bicanalicular silicone tubing under endonasal endoscopic guidance increases the rate of success in this patients^[4-6]. This present study investigated the efficacy of revision external DCR combined with bicanalicular nasal intubation by silicone tubing under endonasal endoscopic guidance in patients developing recurrent dacryocystitis despite undergoing external DCR. We did not detect any study in the literature, which involved revision external DCR combined with BSTI under endonasal endoscopic guidance in the treatment of recurrent dacryocystitis.

MATERIALS AND METHODS

Materials The data of 28 patients with recurrent dacryocystitis, who underwent revision external DCR due to unsuccessful external DCR between September 2007 and April 2010 were retrospectively investigated. All of the patients were referred to our clinic after their primary surgeries by different surgeons and revision surgeries were performed by one surgeon (ŞA).

The study was approved by the Ethical Committee of our university. Prior to surgery, slit-lamp biomicroscopic examination, irrigation of the lacrimal duct from the lower and upper punctum, investigation of the nasal anatomy by endonasal endoscopy and nasolacrimal system imaging by dacryocystography were performed. Revision external DCR and bicanalicular nasal intubation by silicone tubing under endonasal endoscopic guidance was performed in 28 eyes of a total of 28 patients. During the revision external DCR, the nasal mucosa, nasal septum and the bone window were assessed by endonasal endoscopic examination, and bicanalicular silicone tubing was performed with endonasal endoscopic guidance. The patients were assessed with respect to time to recurrence of complaints after the first surgery, time to revision DCR surgery, the time to removal of the silicone tubes after the surgery, duration of post-surgical follow-up and the success of surgery.

Methods

Surgical technique The patients were operated under general anesthesia. Infiltration anesthesia was applied around the lacrimal sac with 2mL of Lidocaine HCl 20 mg/mL and Epinephrine HCl 0.0125mg/mL (Jetokain 20mg/mL-Adeka). Epinephrine 0.1% (Adrenalin 1mg/mL-Galen) and lidocaine HCl 2% (Jetmonal 20mg/mL-Adeka) were applied into the nose, using a cotton applicator. A 2-cm skin incision was performed on the region 11mm medial to the internal canthus. Blunt dissection was performed on the subcutaneous and orbicularis muscle. Internal canthal ligament was cut to reach the anterior lacrimal crest. The sac was deviated to the lateral using periosteal elevators. The osteotomy site of the first operation was revealed by endonasal endoscopy. This area was closed with the nasal mucosa and granulation tissue (Figure 1). Using Kerrison punch under endonasal endoscopic guidance, the site was enlarged to a mean size of 15×15mm with the borders at the posterior lacrimal crest, the inferior orbital edge at the lower part and the sac fundus at the upper part. The scar tissue surrounding the osteotomy and over the nasal mucosa was excised. A large flap was created from the nasal mucosa. A silicone tube was inserted into both canaliculi and tied into the nose. The lacrimal sac flap and the nasal mucosa flap were sutured with 6/0 polyglactin (Ethicon-Vicryl Polyglactin) to create anastomosis. The subcutaneous

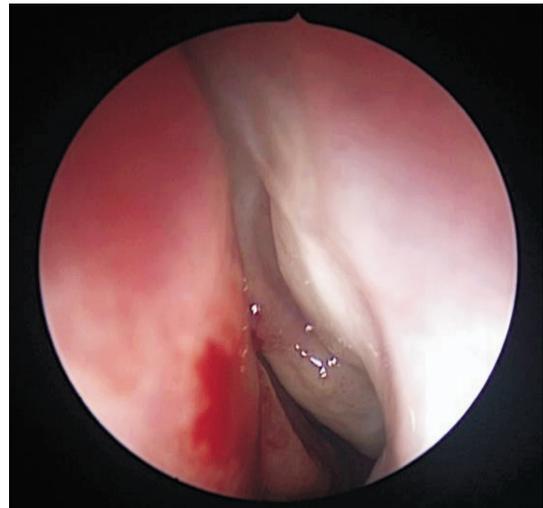


Figure 1 Endonasal endoscopic examination performed 6 months after the primary external dacryocystorhinostomy shows the osteotomy site is completely closed by hypertrophic nasal mucosa.

region and the skin were sutured with 6/0 polyglactin and the operation ended. After the surgery, prednisolone sodium phosphate 1% (Pred-Forte-Abdi İbrahim) eye drop and ciprofloxacin 0.3% (Ciloxan-Alcon) eye drop were used four times daily for 15 days. The patients underwent examination one day, one week, one month, three months and six months after the surgery. The nasolacrimal system was evaluated anatomically by lacrimal drainage system irrigation and functionally by a fluorescein dye disappearance test. An open lavage in the nasolacrimal duct irrigation indicated anatomic success while absence of congestion in the fluorescein dye disappearance test indicated anatomic and functional success together.

RESULTS

The mean age of 28 patients included in the trial was 40.2 ± 14.8 years. Sixty-four percent ($n=18$) of the patients were female and 35% ($n=10$) were male. The right eye was involved in 15 of the patients while the left eye was involved in 13 (Table 1). There was no passage of radio-opaque material to the lacrimal sac in any of the patients at lacrimal duct scintigraphy before the surgery. Intraoperatively, 24 of the 28 patients were detected to have a bone window that was not of appropriate size and localization and an osteotomy site obstructed with excessive granulation tissue. There was no residual lacrimal sac in any of the patients to cause Sump syndrome in our study. Three cases were detected to have advanced deviation in the nasal septum caudal site and secondary synechia; one patient was detected to have a closed osteotomy site due to a nasal polyp (Table 2). Following the first surgery, recurrence had developed after a mean of 5.3 ± 3.7 months, after one month at the earliest and 16 months at the latest. The mean time between the first surgery and the revision DCR was

Revision external dacryocystorhinostomy

Table 1 Demographic and clinical characteristics of the patients

Age (mean±SD) (Range)	40.2±14.8 (18-65)
Gender	Female: 64%(n=18) Male: 35%(n=10)
Affected Eye	Right: 54%(n=15) Left: 46%(n=13)
The time between first operation and recurrence (months)	5.3±3.7
The time between first operation and revision (months)	11.5±9.3
Revision DSR follow-up time (months)	14.9±7.8
Anatomical success	(%85) (24/28)
Combination of anatomical and functional success	(%78) (22/28)

Table 2 The causes of failure in the primary dacryosistorhinostomy (DCR) surgery

Causes of failure	N	%
Clogged with excessive granulation tissue and bone to shrink the osteotomy side	24	86
Obstruction due to nasal septal deviation	3	10
Hypertrophic nasal polyps and nasal mucosa	1	4

11.5±9.3 months. Among patients undergoing revision DCR and silicone tubing due to recurrent dacryocystitis, four were detected to have their drainage system obstructed again during the irrigation of the nasolacrimal duct and two patients were detected to have excessive fluorescein congestion during the fluorescein dye disappearance test despite an open drainage. Fluorescein dye test and epiphora were positive only in 6 of 28 patients after surgery and subjective success rate was 78%. The rate of anatomic success alone was 85% (24/28); the rate of anatomic success together with functional success was 78% (22/28). In these patients, endoscopic endonasal examination revealed closed osteotomy. In all other patients, endoscopic endonasal examination revealed an open osteotomy site and the irrigation of the nasolacrimal system showed a non-obstructed drainage system. None of the patients developed an intraoperative complication that could affect the course of the operation. The patients, who were detected to have nasal septum deviation and polyp, were operated by an otorhinolaryngologist during the same session (endoscopic septoplasty, polypectomy). During the creation of the bone window and the excision of the granulation tissue, the nasal mucosa hemorrhages were stopped by 2% lidocaine HCl-soaked cushions. The tubes spontaneously came out on the first day in one patient, at one week in one patient and at one month in one patient. In the other patients, the silicone tubes were removed after a mean of 6.0 ±1.9 months. Five patients developed postoperative infection and hemorrhage. Cases with unsuccessful revision DCR included those by silicone tubing coming out early and those developing complications such as postoperative hemorrhage and infection.

DISCUSSION

External DCR represents a highly successful surgical method in the treatment of chronic dacryocystitis secondary

to NLC obstruction. In external DCR, anastomosis is created between the lacrimal sac and the nasal mucosal flaps, thereby enabling the lacrimal sac to open into the middle meatus. Can et al achieved a success rate of 95% by applying this technique in a series of 500 cases [7]. The rates of failure after the primary operations were reported to range between 0% and 23%^[8,9]. Endoscopic endonasal DCR or revision external DCR can be performed in cases of external DCR recurring following the primary operations^[10,11]. In cases of recurrent dacryocystitis, the rates of success achieved by endonasal DCR were reported between 43% and 86%^[12-14]. In recurring patients, the success rates were reported between 85% and 92% in cases where the surgery involved revision external DCR^[4,5]. The success rate of our patients was between 78-85%. This is consistent with the literature. Based on these results, the success rate of the external approach is higher than that of endoscopic endonasal method in recurrent cases undergoing revision, similar to the primary cases^[15].

In patients with recurrent dacryocystitis, revision external DCR with silicone tube has been reported 60-80% success^[16,17]. The combined application of bicanalicular silicone tube and external DCR was reported to increase success by 12%^[18]. In our trial, revision external DCR combined nasal intubation with bicanalicular silicone tubing under endonasal endoscopic guidance also increased success. Success rates have been over 80%.

Before the revision DCR, the reason for failure in the patient should be explicitly demonstrated. The punctums, the lower and upper canaliculi, the common canalicule, the lacrimal sac and the nasolacrimal canal should be carefully examined. The level of obstruction and the status of the healthy canaliculi should be demonstrated by computed tomography or dacryocystography^[18]. Recurrence may occur early or late after the external DCR operation. Early recurrence mostly represents the inaccurate anastomosis of the lacrimal sac and the nasal mucosa flaps and failure to excise the bone window at appropriate topography and size, Sump syndrome (residual lacrimal sac after DCR) while late recurrence represents development of hypertrophic granulation tissue due to residual lamella in the bone window, periosteal development and nasal mucosa. There was no residual lacrimal sac in any of the patients to cause Sump syndrome in our study.

The bone window and the nasal mucosa should be evaluated by intraoperative endoscopic endonasal examination in 20 cases with recurrent dacryocystitis, an obstruction characterized by excessive scarring in the canalicular segment or the anastomosis site occurs, differently from the primary DCR patients. In revision DCR, first the scar tissue should be cleaned with the help of endonasal endoscope to reveal the bone window. Subsequently, the bone window is

mostly enlarged and a mucosal anastomosis is created between the nasal mucosa flap and the lacrimal sac^[21-23]. The most common reasons for recurrence, as indicated by the preoperative and intraoperative endoscopic endonasal examination, included a closure of the bone window by the hypertrophic nasal mucosa with the granulation tissue (24/28)(86%), thickening of the nasal septum (3/28)(10%) and nasal polyp (1/28)(4%) in our cases. To increase the revision external DCR success, the nasal septum and nasal polyp were treated by an otorhinolaryngologist during the same session.

To increase the success in cases of revision DCR, revision DCR combined with mitomycin C and intubation by silicone tubing may be performed. A trial reported a success rate of 73% for revision external DCR and silicone tube application in cases with recurrent dacryocystitis and a rate of 77% for external DCR and silicone tube intubation combined with mitomycin C. No statistically significant difference was observed^[24]. Based on long-term experience, external DCR was demonstrated to be a highly successful operation that achieved the same rates of success in the recurrent cases when combined with bicanalicular silicone tube intubation^[7]. In our trial, mitomycin C was not used. Long-term anatomical and functional success was that over 80%.

In conclusion, we performed bicanalicular silicone tube intubation together with external DCR due to the fact that all our patients had recurrent dacryocystitis. After a follow-up of 14 months, the rate of anatomic success alone was 85% and the rate of anatomic success together with functional success was 78%. The reason for recurrence following external DCR should be explicitly demonstrated by preoperative and intraoperative endoscopic endonasal examination in recurrent chronic dacryocystitis patients. Revision external DCR and bicanalicular nasal intubation by silicone tube under endonasal endoscopic guidance may be recommended as a surgical approach that achieves a satisfactory objective and subjective success rates.

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