Microsurgical Endonasal Dacryocystorhinostomy With Long-term Insertion of Bicanalicular Silicone Tubes

Rudolf Hausler, MD; Marco Caversaccio, MD

Objective: To assess the results of microsurgical endonasal dacryocystorhinostomy with long-term insertion of single or double bicanalicular silicone tubes in canalicular (presaccal) and ductal (postsaccal) stenosis of the nasolacrimal duct system.


Patients: Thirty-eight patients were included in the study: 19 with ductal stenosis; 28 with canalicular stenosis; and 1 (a 6-month-old girl) with congenital agenesis of the lacrimal duct system.

Intervention: Forty-seven endonasal microscopic dacryocystorhinostomies were performed on 38 patients. Bicanalicular silicone tubes were inserted, fixed in the nasal cavity, and left in place as long-term space holders. In patients with canalicular stenosis, a specially designed double bicanalicular tube was inserted for maximal dilatation of the lacrimal canals. The tubes are left in place as long as possible, ie, for months to several years. In cases in which there was recurrent obstruction following accidental tube extrusion, we simply inserted new tubes using a short-acting anesthesia.

Results: With 1 procedure, 17 (91%) of the eyes that were surgically treated for ductal stenosis became symptom free. The success rate in the cases of canalicular stenosis was 72%. In the remaining 28% of patients with recurrent obstruction, endonasal revision surgery was performed with new insertion of bicanalicular tubes. With the new tubes in place, these remaining patients have also stayed largely symptom free (length of follow-up, 8 months to 5 years [average, 3 years]).

Conclusions: The routine insertion of bicanalicular tubes as long-term spacers has proved effective and has been tolerated without problems. A new aspect of our study is that in cases of canalicular stenosis or congenital agenesis of the lacrimal duct, which generally have a poor prognosis, the patients also benefit when our specially designed long-term double bicanalicular tubes are inserted in the lacrimal ducts.

**PATIENTS AND METHODS**

Between 1992 and 1996, 47 microsurgical endonasal dacryocystorhinostomies were performed on 38 patients (22 women, 16 men) who had mostly been referred to us by ophthalmologists. Six of these patients had been surgically treated with the external Toti procedure 1 or more times before, without lasting success. The patients ranged in age from 6 months to 85 years (average age, 43 years). Obstruction of the lacrimal ducts was caused by midfacial trauma in 20 cases. In 4 cases, we were dealing with a condition that developed after a rhinological operation. In 8 cases, there had been recurrent infections of the nose or the paranasal sinuses, and in 2 cases, we found concrements in the lacrimal sac (in 1 case, the concrement was formed by an Aspergillus litihasis). One case involved an infection with atypical tubercle bacillus. In the case of a 6-month-old girl, there was bilateral agenesis of the lacrimal points and lacrimal duct system with persistent blepharoconjunctivitis. In 4 cases, the cause was unknown. A dacryocystogram was obtained in all patients, with the exception of the 6-month-old girl, either by digital subtraction, magnetic resonance imaging, or computed tomography. This enabled us to identify the exact site of the stenosis and to distinguish between canalicular and ductal stenosis of the nasolacrimal duct system.

In 28 cases, there was stenosis of the lacrimal ducts, and in 20 cases, there was stenosis of the superior and inferior canaliculi. In 19 cases, there was stenosis of the lacrimal ducts, and in 28 cases, there was stenosis of the superior and inferior canaliculi or of the common canal.

The operation is performed with the binocular operating microscope with a mobile tube with the patient under general anesthesia. The nasal cavity is kept open by a self-holding nasal speculum with a flexible tensioning arm (Karl Storz GMBH & Co, Tuttingen, Germany). We make certain that the medial canthus is also within the microscope’s field of view. The upper and lower lacrimal puncta are probed with a straight metallic excavator, which is guided of the tears by capillary force owing to its double O-shaped contour. For easier introduction, the double bicanalicular silicone tube was connected to a single metallic inserter. In the 6-month-old girl with agenesis of the lacrimal duct system, artificial canaliculi were created with the excavators approximately at the location of the natural lacrimal puncta. Patients are given perioperative intravenous antibiotic prophylaxis (eg, 1.2 g of amoxicillin and clavulanate potassium [Augmentin] 3 times in 24 hours). For several days after the operation, the eyes are treated with anti-inflammatory eyedrops (fluorometholone and neomycin sulfate [FML-Neo]). The operation is performed as an outpatient procedure or with a short hospitalization.

**RESULTS**

There were no intraoperative or immediate postoperative complications in the 48 endonasal microsurgical dacryocystorhinostomy cases except for a 12-hour moderate rise in temperature in 1 case. Ocular, orbital, or nasal injuries did not occur except in 1 case with a short transient cornea irritation and 3 cases with slight local postoperative synchia of the middle turbinate and the lateral nasal wall, which did not need further treatment. The length of postoperative follow-up ranged between 6 months and 5 years, with an average of 3 years. Approximately every 3 months, the patients were checked for lacrimal canal patency either passively by flushing or actively by proof of sodium fluorescent effect in the nose. The success of treatment was assessed according to each patient’s freedom from symptoms and discomfort and according to active or passive flushability of the nasolacrimal ducts. The bicanalicular tubes in the lacrimal ducts were tolerated by all patients, without notable problems. Occasional local inflammatory reactions, sometimes with formation of small mucosal polyps at the lacrimal puncta, were successfully treated by application of anti-inflammatory eyedrops for a few days. The tubes were left in place as long as possible. Several patients have now had the tubes for more than 3 years. On
The tubes remained in place for 9 months. Rejection of bicanalicular tubes usually occurred accidentally, eg, because of sneezing or blowing the nose, or because the patient pulled it out manually, forgetting that it really was an annular tube.

Of the 19 patients who were surgically treated for ductal stenosis, 17 (91%) became free of discomfort or improved considerably. The remaining 2 patients again developed some epiphora owing to recurrent stenosis, but they did not want to undergo a second procedure. In the 19 patients with ductal stenosis, the initial bicanalicular tube was removed or extruded spontaneously between 6 and 12 months after surgery. Of the 28 patients with canalicular stenosis, 20 (72%) became symptom free after 1 procedure. In 7 patients with canalicular stenosis, there was a relapse, with epiphora and recurrent local canalicular infections developing several days to weeks after rejection or removal of the tube. In these patients, endonasal revisional surgery was performed with a fresh insertion of 2 parallel long-term bicanalicular silicone tubes in the ducts. Because of recurrent symptoms with recurrent canalicular stenosis, 2 patients even had tubes inserted for a third time. With the tubes in place, these patients have remained largely symptom free.

The 6-month-old girl with congenital agenesis of the lacrimal duct system and chronic blepharoconjunctivitis and epiphora became symptom free after the insertion of bilateral bicanalicular silicone tubes. The tubes were pulled out by the child after about 1 year and had to be replaced. The child is now 4 years old. On the left side, the tubes were removed 1 year ago, without recurrence, and the lacrimal flow problem seems to have resolved. On the right side, new double bicanalicular tubes had to be inserted. The child is presently symptom free, with no tubes on the left side and double bicanalicular tubes in place on the right side.

**COMMENT**

In contrast to the classic external dacryocystorhinostomy as described by Toti, the microscopic endonasal method is a minimally invasive procedure with no negative cosmetic effects. Compared with the endoscopic operating technique with rigid optical equipment, which is restricted to a monocular view, the use of a binocular microscope has the advantage of giving an overall spatial view of the entire operational area, ie, of the nasal cavity, including the medial half of the eye, and the lacrimal points. This provides an additional safety factor. Adjusting the main nasal cavity with a self-holding nasal speculum enables the surgeon to work with both hands. A further comfort factor for the surgeon is a microscope equipped with a mobile tube. The operation can thus be performed comfortably in a sitting position using the same operating technique and practically the same instruments as for microscopic transcanal ear surgery.

Our success rate of 91% for operations on ductal stenosis corresponds to the findings of other authors, who report success rates of between 82% and 94%. At 72% for cases of presaccal stenosis, the success rate was not
quite as high. Still, when compared with the results reported in the literature, this is also a good result. In cases of presaccal stenosis in which the prognosis is not favorable, the success rates are generally only 30% to 45%. However, good results have also been achieved, eg, the 94% success rate reported by Wielgosz et al. Considering that all of our patients who had revision surgery again became symptom free after their tubes were reinserted, our results even surpass Wielgosz and colleagues’ high success rate.

In our view, the good results of our series of canalicular stenosis operations are not so much attributable to the operating technique as to our routine practice of inserting a long-term spacer by means of our newly designed double bicanalicular silicone tubes. The double O-shaped contour not only produces a maximal dilatation of the canaliculi, but it also allows a natural aspiration of tear liquid by capillary force (Figure 2). There were no harmful side effects from long-term inlay of bicanalicular silicone tubes.

A further advantage of the endonasal procedure is that in the few cases of recurrent obstruction, revision surgery can be performed using a short-acting anesthetic, with no external scar formation. Long-term bicanalicular tubes are inserted freshly so that the patients soon become symptom free again. In persistent cases, one could even imagine leaving the bicanalicular tubes in permanently. Indeed, several of our patients have been wearing the tubes in their lacrimal ducts for more than 3 years now. This changes the concept of the operation: dacryocystorhinostomy with single or repetitive insertion of bicanalicular tubes thus resembles the classic procedure used for treatment of effusion in the tympanic cavity by transtympanic ventilation tubes. Long-term drainage and repetitive or even permanent insertion of tympanostomy tubes may be necessary in this otological condition as well.

CONCLUSIONS

Microscopic endonasal dacryocystorhinostomy is a minimally invasive procedure with no skin incision. One advantage of this technique over an endoscopic operation with optical equipment is the binocular overall spatial view of the entire operation site. The tubes are well tolerated by the patients and permit drainage of the nasolacrimal ducts for months and even years. As an added benefit, there are also good postoperative results with the insertion of double bicanalicular tubes in cases of canalicular (presaccal) stenosis and in congenital agenesis of the lacrimal ducts.

Accepted for publication October 21, 1997.

Presented in part at the annual meeting of the Swiss Society for Oto-Rhino-Laryngology–Head and Neck Surgery, Leukerbad, Switzerland, June 22, 1995; at the annual meeting of the German Society for Oto-Rhino-Laryngology–Head and Neck Surgery, Aachen, Germany, May 21, 1996; and at the International Congress of the G. Portmann Institute, Knokke-le Zoute, Belgium, May 23, 1997.

The double bicanalicular silicone tube used in this study was designed by R. Häusler.

Reprints: Rudolf Häusler, MD, Department of Otologic-Laryngology–Head and Neck Surgery, Inselspital, University of Bern, CH-3010 Bern, Switzerland.

REFERENCES