



Correlation Between Irrigation Around the Silicone Tube After Endoscopic Dacryocystorhinostomy with Clinical Symptoms and Surgical Outcome

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Abstract

Purpose: To assess the value of irrigation around the silicone tubes after endoscopic dacryocystorhinostomy (endo-DCR) for nasolacrimal obstruction and its correlation with symptoms and surgical outcome.

Methods: Retrospective chart review of 36 consecutive endoscopic dacryocystorhinostomies. Demographic information was recorded, including: age, gender, affected eye, and success of surgery. All patients had documented primary acquired nasolacrimal duct obstruction (PANDO) before surgery.

Main Outcome Measures: Relation between irrigation of lower canaliculus around silicone tube at one week and three months post-endo-DCR and both clinical symptoms and surgical outcome.

Results: Strong correlation between the results of irrigation around the silicone tubes 3 months after endo-DCR and surgical outcome ($p=0.0004$). Statistical significance was also found between irrigation around the silicone tubes 3 months after endo-DCR and symptoms at the same visit ($p=0.009$). Little to no evidence of a correlation between irrigation at 1 week and surgical outcome ($p=0.567$) and between irrigation at 1 week and symptoms during the same visit ($p=0.5442$).

Conclusions: Irrigation around the silicone tubes 3 months after endo-DCR seems to be a reliable indicator of surgical outcome, and correlates well with symptoms. The same correlation cannot be made when the irrigation is done at 1 week.

Key words: Endoscopic dacryocystorhinostomy, Crawford tube, silicone tube, probe and irrigation, primary acquired nasolacrimal duct obstruction

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Received: April 02, 2013
Accepted: May 09, 2013
Arch Clin Exp Surg 2014;3: 69-72
DOI:10.5455/aces.20130509124521

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Introduction

The evaluation of the lacrimal drainage system can be divided into functional and anatomical tests. Functional tests are designed to assess tear flow under natural physiological conditions. The dye disappearance test (DDT) is a classical example of this form of physiologic evaluation. Anatomical or structural evaluations, on the other hand, can determine the level of lacrimal drainage system occlusion.

The irrigation of the lacrimal drainage system is an anatomical test most frequently performed after the DDT. The test is practical, convenient and essential in the diagnosis of nasolacrimal duct (NLD) obstruction. The value of irrigation for assessment of NLD obstruction goes beyond confirming patency, however, with information such as resistance to syringing and canalicular reflux providing a potential measure of severity of the obstruction.

After the diagnosis of NLD obstruction is made, the treatment of choice in most patients is dacryocystorhinostomy (DCR), and the use of silicone tubes to secure an open ostium is an important part of this type of reconstruction. Once the tubes are placed, irrigation around them is a common postoperative practice. To the best of our knowledge, a correlation between irrigation around the silicone tube after DCR and clinical symptoms or surgical outcome has not been reported previously.

Materials and Methods

A retrospective chart review of 36 consecutive endo-DCRs with Crawford silicone tube (Jedmed Instrument Co., St Louis, MO, USA) placements was performed. All patients had given informed consent prior to the inclusion of the study. All had documented PANDO before surgery and irrigation, and probing was performed in all 36 eyes. All were primary DCRs (reoperations were excluded). All cases were performed under monitored intravenous sedation and local anesthesia.

Firstly, the nasal cavity is packed with gauze soaked in 4% cocaine solution. The packing is removed after 5 min. Under direct visualization with a 0° or 30° rigid endoscope, local injection of 2% lidocaine with 1:100,000 epinephrine mixed 50:50 with bupivacaine 0.75% with 1:200,000 epinephrine is administered to the submucosa of the anterior middle turbinate, uncinate process, and lateral nasal wall.

The nasal cavity is repacked for an additional 5 min with 4% cocaine-soaked gauze.

We prefer to gently infracture the turbinate with a blunt periosteal elevator under endoscopic visualization if the turbinate obstructs the view of the uncinate process. The mucosa overlying the lacrimal fossa is then cauterized with a monopolar cautery set in the coagulation mode. A periosteal elevator is used next to scrape the mucosa from the underlying bone. Any remaining mucosa is removed with Takahashi forceps. A Kerrison bone rongeur is used to create an osteotomy. At this point the lacrimal sac can be identified. A sickle blade is used to open the lacrimal sac into anterior and posterior flaps. The posterior portion of the flap is then removed with Takahashi forceps.

Next, a Jones dilator is used to dilate the upper and lower puncta. Crawford silicone tubes are inserted from

the upper and lower puncta, and the free ends are tied within the nasal cavity. All procedures were performed by, or directly supervised by, one surgeon (GG). Patients were typically seen at 1 week, 4 weeks, 3 months, and 6 months postoperatively.

During 1 week and 3 months postoperative visits, the presence or absence of epiphora was documented, with the irrigation around Crawford tubes being performed. Correlations between irrigation results and clinical symptoms were tabulated. Irrigation around the Crawford tube involved flushing the lower canaliculus with 1 ml of normal saline using a 26-gauge cannula and 3ml syringe. The examiner made a note of resistance to syringing and presence of upper canalicular reflux that was subjectively graded as less than 50% or 50% or greater. Only two grades were used to minimize subjective variation among patients: less than 50%, or 50% or more saline reflux. Clinical symptoms were documented as better or no symptoms and the same or worse symptoms. Removal of Crawford tubes was performed at the 3 months visit regardless of the reflux status.

During the visit at 6 months, success of the surgery was determined by the patient's lack of symptomatic epiphora (i.e., the patients were directly asked whether they had continued tearing) and/or infection. Failure was accepted as symptomatic epiphora and/or infection at long-term follow-up.

Demographic information on all 36 cases was recorded, including age, gender, affected eye, and presence of concomitant ocular disease.

The Fisher exact test was used to compare all correlations. P values ≤ 0.05 (1-sided) were considered statistically significant. The strength of association was also measured by an odds ratio, and confidence intervals were used to indicate the reliability of the results.

Results

The study group included 36 eyes of 36 patients diagnosed as having PANDO. The average age of the patients was 66.3 years. 27 eyes were of females (75%). 24 of the endoscopic DCR were performed on the left side (66.6%). Success of the surgery was determined by the patient's lack of symptomatic epiphora and/or infection in 32 patients at the 6 months visit (88.8%).

There was little to no evidence of an association between surgical outcome (successful endo-DCR) at 6

Table 1: P-value of correlation between irrigation around the silicon tube of the lower canaliculus and the surgical outcome and symptoms.

	Correlation between 1 week and 3 months (p-value)	Correlation between 1 week and 6 months (p-value)	Correlation between 3 months and 6 months (p-value)
Surgical Outcome	0.229	0.567	0.0004
Symptoms	-	0.544	0.009

months and results of irrigation (no reflux) at 1 week post-endoscopic DCR ($p = 0.567$, odds ratio 1.22, 95%-CI 0.15–8.798) (Table 1).

Little to no evidence of an association was found between the results of irrigation at 1 week post-endo-DCR and patients' reported symptoms at the same visit ($p = 0.544$, odds ratio 1.18, 95%-CI 0.223–6.008) (Table 1).

A statistically significant correlation was found between the successful surgical outcome at the 6 months visit and the results of irrigation at 3 months post-endoscopic DCR: 33 cases (91%) without reflux ($p = 0.0004$, odds ratio infinity, 95%-CI 3.31–infinity).

There was no evidence that the results of irrigation at 1 week post-endo-DCR are associated with the results of irrigation after 3 months ($p = 0.229$, odds ratio 2.096, 95%-CI 0.15–8.798) (Table 1).

Finally, there was a strong association between results of irrigation 3 months post-endo-DCR and the patient's reported symptoms at the same visit ($p = 0.009$, odds ratio 9.265, 95%-CI 1.35–112.16) (Table 1).

Discussion

The standard surgery for the obstruction of a lacrimal tract is dacryocystorhinostomy in which the lacrimal sac is directly connected to the nose by either an external approach or endoscopic approach. McDonogh and Meiring were the first physicians who used endoscopes in transnasal dacryocystorhinostomy in 1989; since then it has become a popular and successful intervention with some technical modifications [1]. Quickert was the first to develop silicone stents to establish continuous flow to secure an open ostium [2]. Silicone tubes are non-irritative, flexible and suitable materials, which are safely used in DCR, but the ideal time to remove them after intraoperative placement is still controversial [3-5].

Irrigation around the silicone tubes after DCR is a common procedure, which is theoretically used to evaluate possible surgical outcomes and to prevent mucosal occlusions. To the best of our knowledge, a correlation

between the postoperative results of irrigation around the tubes and the surgical and clinical outcomes has not been reported previously.

Our results support the existence of an association between irrigation around the Crawford tubes at 3 months after endo-DCR and surgical outcome at the 6 months visit. This relation was statistically significant ($p=0.0004$). Moreover, during the 3 months visit, the results of the irrigation were statistically correlated with symptoms at the same visit ($p=0.009$). These findings suggest the use of irrigation around the silicone tube during the third postoperative month as a possible predictive tool for surgical outcome, but the value of such a tool cannot be established solely on retrospective data.

The study also showed little to no relation between irrigation around the tubes at 1 week after endo-DCR and surgical outcome at the 6 months visit. Also, no statistical correlation between irrigation at 1 week post-surgery and clinical symptoms was found during the same visit. A possible explanation for this observation will be the presence of post-operative inflammation, which can affect the results of irrigation during the first week after the surgery. It is well accepted that the process of inflammation, mucosal healing, and fibrosis are generally completed within the first two postoperative months [6].

Our study also showed a higher number of affected females, which is consistent with previous reports of elderly females being more prone to developing PANDO in comparison with males. An anatomically narrower nasolacrimal duct had been proposed as a possible cause of this observation [7-9].

Although the results of this study suggest a statistically significant correlation between irrigation around the tubes at the 3 months visit and surgical outcomes and clinical symptoms, the results are a product of a nonrandomized retrospective observational study and, therefore, are subject to limitations. Large-scale prospective studies are needed to ascertain these associations.

Declaration of interests

The authors report no conflict of interests. The authors alone are responsible for the content and writing of this paper.

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