

A study of the relation between silicone tube removal time and results of external dacryocystorhinostomy with intubation

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Background and Objectives: External DCR is an effective and common surgical approach in treating nasolacrimal duct obstruction. To investigate the relation between the times of silicone tube removal after external dacryocystorhinostomy, related factors and success rate of surgery. **Method:** In a retrospective study, 168 patients with primary nasolacrimal duct obstruction (NLDO) which underwent dacryocystorhinostomy (DCR) with intubation were evaluated. Demographic information including age, gender, time of silicone tube remaining in the NLD, follow up period and result of the operation were recorded. The result of the surgery in first group (patients with tubes being lost before the planned time) and second group (patients with tubes being removed after the planned time) were extracted and compared. Failure of surgery was defined as symptomatic epiphoria or infection in follow up period. **Results:** From 168 patients with complete follow up in 17 cases tube was extruded or had to be removed before planned 3 month period. Success rate was 82.3% in first group and 92.1% in second group. There was no significant difference statistically between two groups ($P=0.18$). 3 people the mentioned 17 patients who were lost their tube earlier had undergone reoperation. **Conclusion:** This study shows that the time of silicone tube removal has no effect on success rate of surgery. Endoscopic evaluation of osteotomy site regarding obstruction occurrence are suggested to estimate the appropriate time of silicone tube removal.

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1. Introduction

Ophthalmological diseases have always been of great importance (Ghabili et al., 2013; Javadzadeh et al., 2012). External DCR is an effective and common surgical approach in treating nasolacrimal duct obstruction. This operation was performed by Adei Toti for the first time in 1904 (Tarbet and Custer, 1995; Shun Sin, 1997). And in this a direct anastomosis is made between lacrimal sac and nasal mucosa and the site of the obstruction in nasolacrimal duct is by passed. Numerous changes have been made in this operation since it was presented 100 years ago and this is now considered as the gold standard for the treatment of NLDO and other methods are usually compared with it. Silicone intubation as an adjuvant in EX DCR was performed for the first time by Older. Different studies have reported controversial results about the effect of intubation on the result of DCR (Older, 1982; Ciftci et al., 2005). Despite the lack of documented statistics, it seems that the trend of silicone intubation in DCR surgery has been increasing in the recent decades.

Silicone intubation and also the duration of its remaining in NLD as effective factors on the success rate of DCR surgery are still challenging. The duration has been reported to be 2-12 months in different references (Vicinzano et al., 2008)

The objective of this study is to evaluate if the silicone tube remaining time could affect DCR results and if a criterion or some criteria could be defined for the appropriate tube removal time.

2. Material and Methods

In a retrospective study, 168 patients who had undergone DCR with intubation from 2002 to 2009 and had had complete follow up were studied.

All patients had primary NLDO which was diagnosed using regurgitation test, history of dacryocystitis and scintigraphy, if needed. Patients with a history of nasal or orbital trauma or pathology, previous history of DCR, acute attack of dacryocystitis within last month and patients having canalicular obstruction were excluded from the study. Premedication was performed with midazolam (1-2 mg IV) (Sokouti et al., 2011; Agamohamdi et al., 2011) and fentanyl (1 micro/kg IV) (Sokouti et al., 2013). Anesthesia was induced with propofol (1.5-2 mg/kg) (Soleimanpour et al., 2012). Standard capnography was used for all patients (Soleimanpour et al., 2012). All patients had undergone general anesthesia and External DCR was performed with Bourgnut and Dutemps technique. Skin incisions were made 6-10 mm medial to internal canthal angle vertically downward for 12-15 mm. After separating the muscular layers, the medial

canthal ligament cut from anterior lacrimal crest with protecting the lacrimal sac, an ostium with the diameters of 15×15 mm was opened on the lacrimal bone and flaps were provided from lacrimal sac and nasal mucosa, after a metal probe passing through the lower canaliculus.

Silicone tube was inserted after dilating superior and inferior punctums, entered canicular system and Guided toward nostrils and tied in the nasal cavity.

Anterior Flaps were sutured and bridges were made with the muscular layer. Later periosteum, orbicularis oculi and then skin were sutured. Systemic antibiotics were subscribed for one week and topical antibiotics for 3 weeks. Patients were re-assessed 1 week, 1, 3, 6 and 9 months after surgery (3 and 6 months after silicone tube removal). Silicone tube was removed routinely 3 months after surgery. From 168 patients, in 17 cases silicone tube was lost before the planned time or removed due to the complications. To evaluate the surgery success rate subjective and objective symptoms were used. Surgery was considered successful by the lack of the complication such as epiphora, discharge and dacryocystitis attacks in follow up period. Regurgitation test was used for evaluating the patency of NLD but irrigation of lacrimal system was not used because it could create non-physiological conditions due to causing positive pressure while fluid injection. Statistical analyses

were done using chi-square and Mann-Whitney test and $P < 0.05$ was considered meaningful.

3. Results

In the study, 168 patients who were diagnosed with primary nasolacrimal duct obstruction and performed DCR with intubation and had complete follow up were enrolled in the study. Of all patients, 125 people (74.4%) were females and 43 people (25.5%) were males. Age of the patients ranged from 26 to 78 with the mean age of 49.2 +/-3.5 years. Overall success rate was 91.07% in our patients. In 17 patients tubes were lost before the planned time or were removed due to the complications. Table 1 demonstrates the approximate tube lost time.

Among the patients with pretime tube lost, 3 had continuous epiphora and discharge and all were reoperated. The success rate was 82.3% in this group. The rest of the patients remained asymptomatic in spite of tubes being lost earlier than the planned time and success rate was 92.1% in this group. The difference between two groups was not statistically significant ($P=0.18$). In this group, there were 6 males (35.3%) and 11 females (64.7%). The mean tube removal time was 103 days in the group without surgical failure and 39 days in the group with pretime tube lost.

Table 1. Time, cause and surgical results of patients with pretime tube loss

CASE	SEX	AGE	TUBELOSS TIME	TUBELOSS CAUSE	SURGICAL RESULTS
1	F	32	7	EXTRUSION	FAILURE
2	F	54	13	EXTRUSION	SUCCESS
3	M	38	18	EXTRUSION	FAILURE
4	F	35	25	EXTRUSION	SUCCESS
5	M	42	26	EXTRUSION	SUCCESS
6	F	48	29	EXTRUSION	SUCCESS
7	F	35	33	REMOVAL	SUCCESS
8	M	39	35	EXTRUSION	SUCCESS
9	M	44	39	EXTRUSION	SUCCESS
10	F	58	42	EXTRUSION	FAILURE
11	F	60	45	REMOVAL	SUCCESS
12	F	29	48	EXTRUSION	SUCCESS
13	F	39	52	EXTRUSION	SUCCESS
14	M	42	53	REMOVAL	SUCCESS
15	F	55	56	EXTRUSION	SUCCESS
16	F	65	59	REMOVAL	SUCCESS
17	F	38	85	REMOVAL	SUCCESS

4. Discussion

EX DCR is a popular procedure in treating nasolacrimal duct obstruction. The success rate of this surgery has been reported as 62-99% in different studies. Some factors affecting DCR surgery results are: age, gender, the duration of acute or chronic dacryocystitis before operation, common canalicular obstruction, rhinostomy or anastomosis site obstruction by fibrous tissue or scar (Fayet et al., 2004; Allen and Berlin, 1989; Marti et al., 1998; Aziz Khan et al. 2010; Onaran and Yilmazbas, 2011). The failure of DCR surgery which is presented by epiphora, discharge and acute or chronic dacryocystitis all can appear at long term follow up. The main cause of failure in this surgery is the closure of ostium by bone or membrane formation (Fayet et al., 2004). One of the methods to prevent DCR failure is silicone intubation which is associated with numerous complications such as punctum erosion, granuloma formation and mucopurulent discharge (Anderson and Edwards, 1979; Reddy et al., 2005).

Although there have been many studies on efficacy-safety of silicone intubation, controversial results have been reported (Bazzazi and Samavati, 2007, Kashkouli et al., 2003; Nawaz et al., 2008; Saiju et al. 2009). Usually these controversial results are effected by multiple factors which eliminating them from this studies as confounding factors was not possible. Also very few clear cut criteria are found in ophthalmology references regarding the indications of using silicone tubes and the required time for the tubes to remain in the nasolacrimal duct. 18. DCR is a surgery with old background and without high technical complexities and the abundant controversies over it are ponderable.

Like most surgeons we also employ silicone tube in nearly all DCRs and believe that the more the silicone tube is in place, the higher the success rate is. However adding intubation to the routine DCR did not increase our surgery success rate statistically but it psychologically assures the patient that the lacrimal duct is open and it has also been shown that pretime tube lost increase subjective complains of the patients (Bazzazi and Samavati, 2007). The limited carried out studies confirm results of our study. Vicinanza et al. showed that early stent extraction or removal was not found to affect surgical outcome significantly (Vicinazo et al., 2008). But some studies suggest that eliminating silicone tube from routine DCR, in spite of not having any advantage statistically, is not acceptable. We followed the 17 patients whose silicone tubes were lost earlier than the planned 3 month period endoscopically. Osteotomy site obstruction occurred in all 3 patients who needed reoperation but not in the rest of the patients.

We should look for an evaluation method for the least effective time of silicone tube in NLD. The study which is being carried out in our hospital is about the endoscopic follow up of osteotomy site regarding the time of granulation tissue formation and the answer to the question that if silicone tube prolongs this time.

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