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The results of Ritleng bicanalicular silicone intubation for congenital and adult partially acquired nasolacrimal duct obstruction

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ABSTRACT

OBJECTIVE: Our aim was to evaluate the long-term results of Ritleng bicanalicular silicone intubation for congenital and adult partially acquired nasolacrimal duct (NLD) obstruction.

METHODS: We evaluated 28 eyes of the 26 patients treated with lacrimal intubation with the Ritleng method retrospectively. Patients were divided into two groups. Patients with congenital NLD obstruction (n: 16) constituted Group 1 and patients with adult partially acquired NLD obstruction (n: 10) constituted Group 2. The Ritleng probe was inserted from the canaliculus into the inferior meatus. Success was defined within two parameters: (1) Intubation of the silicone tube without complications and (2) recovery of the previous signs and symptoms and a normal fluorescein dye test.

RESULTS: Mean of the patients' ages was 2.4±1.6 years in Group 1 and 49±15 years in Group 2. The intubation was successful in all of the patients (100%) in Group 1, meanwhile in Group 2, false passage was observed in 2 patients (20%). Silicone tube was removed through the punctum in outpatient clinic conditions between 2 weeks and 3 months (mean: 2.1 months) in Group 1 and 4–6 months (mean: 5.2 months) in Group 2. Patients in Groups 1 and 2 were followed for 26±18.6–36±25 months, respectively. Previous signs and symptoms were recovered in 75% of the patients in Group 1 and the dye tests of these patients were normal. In Group 2, only two patient's symptoms were resolved (20%). For the adult patients whose symptoms were not resolved, an external dacryocystorhinostomy operation was performed.

CONCLUSION: The Ritleng lacrimal intubation system is an effective procedure for the treatment of congenital NLD obstruction for both short and long term. On the other hand, the effectiveness of the procedure is limited for the adult partially acquired NLD obstruction.

Keywords: Nasolacrimal duct obstruction; ritleng; bicanalicular silicone intubation.

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Epiphora or watery eyes are often due to inadequate drainage of tears. The most common cause of epiphora in children is occlusion of the distal end of the nasolacrimal duct (NLD) with a thin, persistent mucous membrane (Hasner membrane). Other parts of the NLD are normal. Congenital NLD obstruction is quite common and has been reported in about 6–20% of babies [1, 2]. About 90% of the cases with congenital obstruction recover spontaneously around 12 months of age [3, 4]. If the obstruction does not resolve spontaneously, surgical treatment is planned and most patients respond to conventional probing of the NLD [5]. If probing fails, it is

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thought that intubation with silicone stents is effective in the treatment of persistent NLD occlusion [6].

Epiphora frequently occurs as a result of inflammatory obstruction of NLD due to an unknown cause in adults [7]. Some of the patients have epiphora, although there is a fluid passage in the lacrimal irrigation test due to partial NLD occlusion [8, 9].

The Ritleng lacrimal intubation system enables bicanalicular and monocanalicular silicone intubation. In this system, the silicone tube is passed through the tunnel in the metal probe to the inferior meatus through the Prolene suture at its end [9–19].

This study aims to evaluate the long-term results of Ritleng bicanalicular silicone intubation in congenital and adult partial acquired NLD obstruction.

Highlight key points

- Ritleng, bicanalicular silicone intubation procedure was performed successfully in all of the eyes with congenital nasolacrimal duct (NLD) obstruction, however, the procedure was more difficult in the adult patients with acquired partial NLD obstruction, false passage was observed during intubation in two eyes.
- Patients were followed for an average of 26±18.6 to 36±25 months after the procedure.
- The Ritleng lacrimal intubation system showed effective results in the treatment of congenital NLD obstruction for both short and long term. Previous signs and symptoms recovered in 75% of the patients in this group of patients
- The effectiveness of the Ritleng lacrimal intubation procedure was limited for the adult partially acquired NLD obstruction with a success rate of only 20%.

MATERIALS AND METHODS

Twenty-eight eyes of 26 patients who underwent lacrimal intubation using the Ritleng method in our clinic were analyzed retrospectively. The patients were divided into two groups. Patients with congenital NLD occlusion (n: 16 patients, 18 eyes) constituted Group 1 and adult patients with partial acquired NLD occlusion (n: 10 patients, 10 eyes) constituted Group 2.

Diagnosis of congenital NLD occlusion was made based on the following criteria: A history of severe epiphora, an increase in the tear meniscus, or delay in fluorescein dye clearance. Medical treatment (topical or systemic antibiotics), lacrimal sac massage, and simple lacrimal probing were applied and failed in all patients in Group 1.

The diagnosis of adult partial NLD occlusion was made with the following criteria: A history of epiphora, absence of ophthalmic disease that could cause reflex watering, a partial passage from the lacrimal drainage system during irrigation, and a fluid discharge from the other punctum during the nasal passage.

Before the procedure, all patients or their relatives were informed about the procedure and the informed consent form was signed. Our study was conducted in accordance with the Helsinki Declaration principles and the protocol of our study was approved by the University of Health Sciences Fatih Sultan Mehmet Training and Research Hospital, Clinical Research Ethics Committee (date: 05.08.2020, number: 17073117-050.06).

All procedures associated with Ritleng bicanalicular silicone intubation technique were performed under general anesthesia. The Ritleng probe was passed through the upper and lower canaliculus to the lower meatus. The silicone bound polypropylene (Prolene) tip was taken from the inferior meatus using a nasal endoscope. It spontaneously came out of the nose in some cases. Silicone tips were knotted in one or two knots and released unfixed to the nose (Fig. 1).

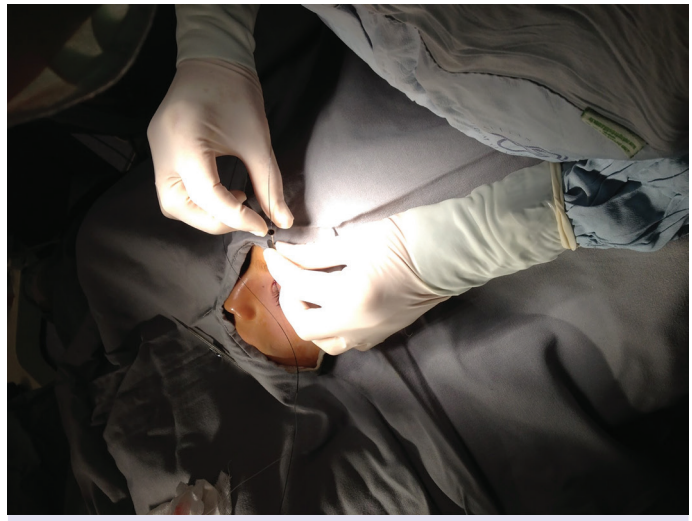

Figure 1. Ritleng bicanalicular silicone intubation technique and the passage of the Ritleng probe through the upper canaliculus to the lower meatus are seen in the figure. The silicone bound polypropylene (Prolene) tip is taken from the inferior meatus using a nasal endoscope.

Antibiotic drops were used for 1 week postoperatively. Patients and their parents were asked to prevent rubbing the patient's eye. Removal of the stent was performed under outpatient conditions in all patients. After applying topical anesthetic drops, the silicone tube was held at the

FIGURE 2. Removal of the stent with forceps under outpatient conditions in a child with congenital nasolacrimal duct obstruction is seen in the figure.

TABLE 1. Percentage of intubation success, procedure time (minutes), tube removal, and follow-up time (in months) and percentage of clinical success rates are shown according to the groups in the table

	Group 1	Group 2
Intubation success	100%	80%
Procedure time	28 min	35 min
Tube removal time	2.1 months	5.2 months
Follow-up time	26 months	36 months
Clinical success	15/18 eyes (75%)	2/10 eyes (20%)

level of the medial cantus with a straight-tipped forceps and the tip of the node was taken out of the punctum and the tube was removed (Fig. 2).

Success was evaluated with two parameters: (1) Performing silicone tube intubation without complications and (2) complete recovery of previous signs and symptoms of NLD occlusion and a normal fluorescein dye test.

RESULTS

The mean age of the patients was 2.4±1.6 years in Group 1 and 49±15 years in Group 2. The female/male ratio was 10/6 in Group 1 and 6/4 in Group 2. Intubation was successful in all eyes in Group 1 (100%), however, false passage was observed in two patients in Group 2 (20%). Prolene tips came out spontaneously from the nose in 4 eyes (25%) in Group 1 and 2 eyes (20%) in Group 2. It was taken by nasal endoscopy in the other patients. Average operation time was 28 min (15–35 min) in Group 1 and 35 min (20–45 min) in Group 2. The procedure was more difficult and the operation time was longer in adult patients with partial NLD obstruction.

The silicone tube was removed from the punctum in outpatient clinic conditions between 2 weeks and 3 months (2.1 months on average) in Group 1 and between 4 and 6 months (5.2 months on average) in Group 2.

The silicone tube was prolapsed from the punctum in 3 eyes (18.75%) in the pediatric age Group 1 or 2 weeks after the operation, so the tube had to be removed before the scheduled time. The tube was unintentionally dislocated laterally during sleep in one patient and daily activities in two patients. Patients were followed up for an average of 26±18.6 and 36±25 months in Groups 1 and 2, respectively. No patient developed complications related to silicone stents.

Clinical success results: Previous symptoms and findings improved in 75% of the cases in Group 1 and the fluorescein dye test was normal in these cases. Three patients whose complaints continued after intubation in Group 1 were 2, 5, and 6 years old. The complaints did not recur at the end of the follow-up period in three patients whose tubes were removed earlier than planned at the 1st and 2nd weeks and the procedure was considered successful. There was an improvement in findings and dye test in only two cases in Group 2 (20%) (Table 1). External dacryocystorhinostomy (DCR) operation was performed in adult patients who did not show an improvement. Success rates were lower in Group 2 than in Group 1.

DISCUSSION

The lacrimal excretory system is formed by the indentation of the surface epithelium on the nasal side in the 2nd month of pregnancy. The center of this epithelium is atrophied to form a passage from the nasal end of the lid margins into the nasal cavity opening just below the lower nasal concha. This excretory system can be blocked at any point. Membranous obstruction close to the opening of the duct into the nose is the result of the incomplete formation of the canal and is the most common cause of obstruction [10]. The methods used in congenital NLD occlusion are massage, medical treatment, and lavage performed with pressure and probing, respectively. Silicone intubation can

increase the success rates in cases that do not respond to probing. The stent takes part in maintaining the patency while the reticulated occlusion around it heals [6].

The results of silicon intubation in congenital and acquired lacrimal system drainage problems are described before in the literature [6, 9–19]. Silicone is a soft and inert material. Crawford, Guibar, Quickert, and Ritleng sets can be used for silicone intubation [10, 11, 15]. The silicone tube is usually attached or adhered to the metal probe in these sets. Although hard probes facilitate passage through the lacrimal drainage system, they can cause damage to the canaliculi and nasal mucosa. Narrow nasal space makes it difficult to take metal probes from the nose, especially in the pediatric age group. The Crawford intubation set is preferred because of the softer structure of the metal probe and the extended olive shape of its tip; however, it may be difficult to take it from the lower meatus with a narrow and oblique angle in the nose like other metal probes [15, 20]. The silicone tube is passed through the tunnel in the metal probe to the lower meatus with the help of a Prolene suture in Ritleng intubation system. The Prolene is folded in the lower meatus and its removal is less traumatic than the metal probe [15].

Successful intubation rates with the Ritleng set vary between 94% and 100% in studies [9–19]. Pe et al. [15] reported that intubation was successful in all cases if the Crawford system is used in case of failure with the Ritleng system. In our study, intubation was successful in all patients with congenital obstruction (Group 1). Our high success rate may be due to the removal of the Prolene tip with nasal endoscopy in all cases.

Clinical success rates in the complete recovery of signs and symptoms of previous NLD obstruction reported in congenital NLD obstruction vary between 66% and 100% [6, 9–19] and success rates decrease with age [12]. The presence of distal NLD stenosis that can be felt during probing other than the membranous occlusion in the distal Hasner valve may cause this in older children [21]. Our success rate was 75% in line with the literature and the patients whose complaints continued after intubation were in the more advanced age group.

In a retrospective review evaluating the intubations performed on a total of 168 eyes with congenital NLD occlusion between 2005 and 2014, the success rate in patients with bicanalicular application was 78.75%, while it was reported as 93.18% in patients who underwent monocanalicular application [22]. On the other hand, in a review and meta-analysis in which the intubations performed on cases with congenital NLD occlusion between 2007 and 2013 were examined, it was found that balloon dacryocystoplasty and silicone intubation had similar success rates (79.8% vs. 77.8%) and it has been reported that monocanalicular and bicanalicular intubation achieved similar success rates (88.3% vs. 88.0%) [23]. We used bicanalicular intubation method for all of the congenital cases and had similar results.

Tying the silicone tube to the nose with a single knot without fixing described by Ratliff and Meyer [16]; enables the tube to be taken out of the punctum without the need for additional anesthesia in the pediatric age group in polyclinic conditions. The problem with these patients is that the tube is pulled out of the punctum involuntarily during eye rubbing or scratching. It was reported that 17.5% of the patients who were intubated with the Guibor set without intranasal fixation had tube dislocation (7/40) and repeated intubation was required only in one patient. Pe et al. [15] reported persistent epiphora if the tube is removed as early as 1 week. Karadayi et al. [16] reported that tubes should be tied with a single knot when it is difficult for children to cooperate; they also state that fixation of the tubes to the nose by tying with multiple knots is more appropriate in terms of preventing prolapse in those with whom cooperation can be established. The tube was tied with one or two knots in our cases and fixation was not applied to the nose. The tube was removed from the punctum in outpatient clinic conditions in all cases. The tube was removed earlier than planned due to the lateral shift of the tube at the 1st and 2nd weeks in three eyes (Group 1). These patients did not complain of epiphora in the follow-up visits.

The reasons for adult acquired NLD occlusions are age-related stenosis and low-level infection. The stenosis increases the stasis and infection in the sac and canal and causes the existing stenosis to increase by creating a thickening of the mucous wall. Providing a mechanical transition at an early stage can break this cycle [24].

The most common method used in symptomatic adult NLD occlusion is external or endoscopic DCR operation. Less invasive methods such as endocanalicular and translacrimal laser external DCR, balloon catheter dilatation, and polyurethane stents [22, 25, 26] were also reported in the literature.

Silicone intubation can also be used in patients with adult partial NLD occlusion. The advantage of this system is that it does not prevent the DCR surgery from being performed in case of failure. The main surgical

principle is to achieve success with minimal trauma. Aritürk et al. [18] applied intubation with the Crawford system in a group of adult patients with total occlusion and reported successful results in 52.9% (9/17) of patients in the early and late stages. Furthermore, Angrist and Dortzbach [19] reported good results in 73.9% of adult patients with partial NLD occlusion and 22.2% in patients with complete duct obstruction.

Bleyen et al. [9] reported a success rate of 52% with only silicone intubation and 40% with balloon dacryocystoplasty combined with silicone intubation in adult patients with partial NLD occlusion. Yazici et al. [26], on the other hand, placed the polyurethane NLD stent in adult primary acquired NLD occlusion with the aid of Ritleng probe retrogradely under fluoroscopy and reported the total success rate as 82%.

Karadayi et al. [16] reported the success rates in the silicone intubation method they used in lacrimal system occlusions in children and adults, the difficulties they encountered during the application and while removing the tubes, and their solutions. They reported the success rate as 93.9% in children and 65.2% in adults. Silicone intubation was performed in patients with bilateral functional NLD occlusion (two cases) as well as in the occlusions at the distal common canaliculus (four cases) or the nasolacrimal canal tip (11 cases) in their study. The success rate in adult patients was much lower in our study, as low as 20% in our cases. In addition, the procedure took much longer in adult patients and intubation was more difficult. We did not perform an inferior concha fracture in our cases and that may also have a role in our decreased success rate.

As a result, the Ritleng lacrimal intubation system is an effective early and long-term method in congenital NLD obstruction. Its effectiveness is limited in adult partial NLD occlusion.

Ethics Committee Approval: The University of Health Sciences Fatih Sultan Mehmet Training and Research Hospital, Clinical Research Ethics Committee granted approval for this study (date: 05.08.2020, number: 17073117-050.06).

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