

Monocanalicular versus bicanalicular endoscopic assisted Ritleng intubation for treatment of congenital NLD obstruction

Walid M Abdalla*

Eye Consultants Center FZ-LLC, Dubai, United Arab Emirates

Abstract

Objective: To compare the results and complications of monocanalicular and bicanalicular Ritleng intubation under endoscopic guidance in patients with congenital nasolacrimal duct obstruction.

Methods: This prospective study was performed on 24 patients with congenital NLD obstruction in the age between (2-5 years), divided into 2 groups. Group (A) underwent monocanalicular intubation, while group (B) underwent bicanalicular intubation.

Results: 11 patients out of 12 were free of symptoms and signs in each group with equal success rate in each group (91.6%). However, more complications occurred with bicanalicular Ritleng intubation as stent displacement and punctal laceration. No unplanned silicon tube removal was needed. Corneal erosion and granuloma formation were not reported in either group.

Conclusion: Monocanalicular Ritleng intubation seems to be as effective as bicanalicular intubation for treatment of congenital NLD obstruction, but monocanalicular intubation seems to be safer, easier, shorter procedure with less complications.

Introduction

Congenital nasolacrimal duct obstruction (CNLDO) is a common problem in children, occurring in 6% or more of all newborn infants [1,2]. The usual cause is failure of canalization of the epithelial cells that form the nasolacrimal duct as it enters the valve of Hasner [3]. Spontaneous resolution occurs in 80-96% of affected infants [1,3-4]. Within the first few months of life, standard management of CNLDO includes hydrostatic massage of the lacrimal sac and use of topical antibiotics. An equally satisfactory approach is conservative management up to 9-12 months of age awaiting spontaneous resolution [5], followed by hospital-based probing for persistent obstruction.

Although it is unclear whether probing is less successful when delayed either by choice or by late presentation, most studies have concluded that the success rate of probing decreases with age. Probing could be less successful in older children perhaps because of prolonged inflammation of nasolacrimal system resulting in scarring and more severe obstructions with time [5,6-7].

Silicone intubation is a simple procedure, and a variety of instruments and modifications of technique have been devised [8,9]. The Ritleng lacrimal intubation system provides a technique for mono and bicanalicular silicone intubation without the need for the retrieval of metal probes from the inferior meatus.

Recent advances in technological progress in rigid endonasal probes have increased interest in endoscopically transnasal interventions for CNLDO. Endoscopically assisted procedures also allow further nasal interventions during the procedure, with decreased surgical time [10].

In this prospective non-randomized study, we compared endoscopically assisted monocanalicular to bicanalicular Ritleng nasolacrimal duct intubation outcomes in persistent and late presented congenital nasolacrimal duct obstruction.

Methods

Patients

Between 2007 and 2010, 24 eyes of 24 patients with congenital nasolacrimal duct obstruction were divided into two groups, 12 patients were in each group, (group A) underwent monocanalicular intubation, (group B) underwent bicanalicular intubation. 6 patients out of the 24 underwent failed probing & syringing, 4 of them were in group A, while two of them were in group B. the rest were late presentation of congenital nasolacrimal duct obstruction. All patients of group A underwent endoscopically assisted monocanalicular Ritleng intubation, while all patients in group B underwent endoscopically assisted bicanalicular Ritleng intubation.

The study was approved by the local ethic committee and an informed consent by the patients' parents was obtained.

Correspondence to: Dr. Walid M Abdalla, MD, FRCS, Eye Consultants Center FZ-LLC, Dubai, United Arab Emirates; **E-mail:** reports@eyeconsultants.ae

Key words: NLD obstruction, ritleng intubation, endoscopic guidance

Received: May 09, 2016; **Accepted:** May 27, 2016; **Published:** December 01, 2016, 2016

The diagnosis of CNLDO was based on signs and symptoms: epiphora beginning during the first weeks of life, recurrent mucopurulent discharge, crusting, and/or reflux from the lacrimal sac on pressure. The fluorescein dye disappearance test was used to confirm the diagnosis if the clinical signs did not correlate with the history. The dye disappearance test was performed by placing one drop of 2% fluorescein dye in each conjunctival cul-de-sac was examined for the presence of dye. Patients with complicating factors such as congenital dacryocystocele, acute dacryocystitis, dacryocutaneous fistula, history of trauma to the nasolacrimal system, punctual or canalicular abnormalities and craniofacial abnormalities were excluded from the study.

All procedures were performed under general anesthesia. The nasal passages were inspected with a pediatric nasal endoscope without the use of any nasal packing prior to the procedure. The inferior meatus was packed with cottonoid strips moistened with 10% Xylocaine solution. The lower and upper puncta were dilated. The upper punctum was dilated in group A as intubation was only done through it which gives better security than the lower one, while both the upper & lower puncta were dilated in group B.

The canaliculi were probed to the lacrimal sac with Bowman 00 and 0 probes. A Ritleng probe was then passed through the lower or upper canaliculus into the lacrimal sac and rotated 90 degrees of the probe was passed down the nasolacrimal duct. The Ritleng probe was turned so that the slit faced in the anteromedial direction. A thick Bowman lacrimal probe that was passed beneath the inferior turbinate was used to demonstrate metal-on-metal contact to ensure the passage of the Ritleng probe in the right place. Rigid nasal endoscopy was introduced through the nostril to visualize the tip of the probe coming out from the inferior meatus used to confirm the presence of Ritleng probe in the nasal cavity and exclude any possibility of false passage may affect the results.

The Prolene monofilament leader was introduced into the probe through the proximal funnel-shaped opening. If mild resistance was encountered in threading the Prolene leader through the probe, the use of serrated forceps to overcome the resistance with or without refraction of the prolene thread by 1 or 2 mm. As the Prolene exited the probe tip into the nasal cavity, it is often curled in the nasal cavity and spontaneously emerged from the nose.

Usually, the Prolene accumulated in the nose as a large, tangled web, making it easy to grasp with forceps or it could be seen directly in the nasal cavity. If the Prolene could not be directly visualized and grasped with forceps, retrieval of the Prolene was accomplished by using a small, blunt Ritleng hook or even a regular muscle hook beneath the ritleng probe in inferior turbinate. When retrieval of the Prolene was difficult, direct visualization of the area around the inferior meatus was performed with a nasal endoscope. No real retrieving difficulties we faced of the Prolene suture as the nasal endoscope is there to localize the thread, if direct visualization of the thread and the usage of the hook doesn't work.

Once the Prolene was removed from the nose, the probe was withdrawn from the nasolacrimal system and separated from the intubation set by sliding the thinner portion of the Prolene out through the slit of the Ritleng probe. The Prolene was pulled from the nose, drawing the silicone tubing into the nasolacrimal duct. A small amount of ophthalmic ointment placed in the medial canthus facilitated passage of the silicone stent.

This procedure was repeated for the lower canaliculus only in

group B patients and after both canaliculi were intubated, the Prolene guides were removed. The 2 ends of the silicone stents were tied in a single square knot.

Lateral intranasal fixation of the knot was done for all group B cases using 5/0 prolene suture. The ends of the tubing were cut just inside the nose after ensuring that no tension was present in the medial canthus and also ensuring that it is high enough not to be reached by infant's fingers.

- For monocanalicular intubation, no fixation to the nose, no suturing as the single one end of the silicone tube has two shoulders which will hold the stent & fix it in place under the punctual edge of any of the puncti whether the upper or the lower punctum but all cases were done in the upper one (less risk of corneal irritation).

- Postoperative antibiotic ophthalmic drops & ointment were used for 1 week.

- All stents in group A and B were removed after 3 months not exceeding 4 months, only because of patients' delay to show.

For monocanalicular intubated patients, stent removal was done in the outpatient clinic just by pulling the stent out from the punctual side under topical anesthesia, while for bicanalicular intubated patients, stents were removed in the operating room under general anesthesia. The stent loop in the inner canthus was cut out by Wiscott scissor & the knob was located in the nose and stitch node was also cut in the vestibule side then the whole stent was retrieved from the nostrill. All stents were removed intact without damage to the canaliculus.

NB. Patients with any upper lacrimal system problem were excluded.

Follow up visits were scheduled for all patients as follows, 1 week post operatively, after 3 months for removal of stent and one month after removal of the stent.

These visits spaces were completed for all patients without missing.

Results

Treatment was classified as successful when all three clinical signs of NLDO (epiphora, mucous discharge, and increased tear lake) were absent, and no additional surgery was required prior to the outcome visit)

These conditions were met at the outcome visits in 11 patients out of 12 in group (A), the clinical success rate was 91.6 %. Similarly in group (B), 11 patients out of 12 were totally free from the signs till the last visit with the same clinical success rate.

Both failed cases were above 4 years old and showed recurrent epiphora before and after removal of the tube.

Those 2 cases were advised to go for Dacryocystorhinostomy (DCR) operation later on. Group (A) with monocanalicular intubation has no significant complications during or after surgery.

While in group (B) the silicon tubes has been accidentally pulled out. In these patients, partially extracted tubes were reinserted under general anaesthesia and endoscopic guidance. Iatrogenic mild punctual laceration was observed in one eye in group B. False passage in the inferior meatus was avoided in both groups by the nasal endoscope. Corneal abrasions didn't occur in any patient in both groups. No granuloma formation was observed in any patient in both groups (Table 1).

Table 1. Summary of results.

Clinical Success Rate	91.6%	91.6%
Tube P. Extraction	0 %	3 cases 25%
Punctual Laceration	0 %	1 case 8.3%
FalseL	0 %	0 %
Corneal Abrasions	0 %	0 %
Granuloma Formation	0 %	0 %

Discussion

CNLDO spontaneously resolves in 80-90% of patients, thus no surgical procedure is required [1,11,12]. Probing is preferred when there is no response to conservative therapy. However it is frequently the procedure of choice for children with nasolacrimal duct obstruction in the 1st years of life and there are many different reports about the best timing of this procedure in the literature [5,6,13-16].

Some studies reported that after 1 year of age, delaying of he probing decreases the success linearly [6,13,16,17]. Katowitz and Welsh [16] reported a 33% success rate of probing for patients older than 2 years, Havins and Wilkins [13] reported a 56% rate in patients over 18 month of age, and Sturrock *et al.* [18] reported a 42% success rate in patients over 2 years of age.

Silicone intubation is an effective treatment for congenital nasolacrimal duct obstruction in children who do not respond to conservative medical treatment and simple nasolcrimal duct probing [19-24]. The stent is thought to produce nasolarimal duct patency by maintaining an opening as the edges of the membranous obstruction heal around the stent [19,20].

Silicone intubation generally avoids dacryocystorhinostomy, a more extensive operation , in infants and young children with congenital nasoacrimal duct obstruction. The success rates reported for silicone intubation range from 66% to 100%, [19,21-23] generally decreasing with age [23,25]. Our success rate in this study is comparable to previously reported results.

Silicon intubation is an accepted treatment modality for Congenital Nasolacrimal Duct Obstruction especially with patients 2 to 3 years old and above and it has a temporary stent function in the Nasolacrimal Duct [34,35]. Silicone tubes are usually left in place for a period of 3-6 months, in our study 3 months were enough to minimize the complications.

One of the main advantages of Bicanalicular intubation is being very well tolerated by the cornea due to the smoother loop the rough plate of the monocanalicular intubation. [32] The abrasions is in the inferior nasal quadrant if the tube is fixed in the inferior canaliculus. Fayet *et al.* observed only 3 (1.5%) corneal ulcers in 223 eyes with Monocanalicular Intubation (MCI) where as no corneal ulcers were observed in 1620. Bicanalicular Intubation (BCI) placements [30]. On the other hand, Engel *et al* recommend performing MCI through the Superior Canaliculus with only 2% risk of conjunctival or corneal abrasion [33] in our study. All cases in the group of MCI were performed through the upper canaliculus with no conjunctival or corneal affection. BCI group of patients also has neither corneal abrasion nor ulceration but still technical insertion of MCI and its removal is easier with less manipulation that what's needed for binacalicular intubation. This will carry also a lower risk of possible iatrogenic traumatization of the lacrimal system [31-32].

Use of a simple square knot in cases of BCI to join ends of stent was initially described by Ratiff and Meyer [22]. Intranasal fixation

of the knot to the nasal mucosa to stabilize the stent and prevent lateral displacement [24] in our study still with nasal fixation BCI show 3 cases of lateral displacement post-operatively with mandatory intraoperative removal of stent with the hazards of General anaesthesia. Bicanalicular Ritleng intubation still carries the risk of upper lacrimal system lacerations. In monocanalicular intubation, there is no intra nasal knot or nasal fixation, easier to perform with no nasal trauma, intraoperatively with shorter time.

No lateral displacement as there's no loop, the end is fixed to the canaliculus while the nasal side is free, only one canaliculus side is going to be jeopardized with no risk of punctual or canalicular laceration. Few reports compare the success rates of MCI with BCI. The success rates of BCIs for the treatment of CNLDO range from 83% to 100% [28,29]. Feyet *et al.* [30] observed complete resolution of epiphora in 67.7% with Monoka and 62.4% with BCI in their study of 120 cases.

In their study comparing MCI and BCI in 48 eyes of adults, Kashkoui *et al.* [31] achieved nearly the same complete success rate (MCI 61.5%, BCI 59%); moreover, higher partial success and lower failure rate was achieved than in the group with BCI. In our study, we found no significant differences in the success rates between the BCI (88.5%) and MCI (97.1%) groups. On the other hand, in the study of Kaufman *et al.* of 48 eyes with MCI, full and partial success was achieved in only 30 cases (78.0%), and 21 cases of premature tube removal occurred (43.7%) [32]. In the study by Engel *et al.* of 635 children with probing and MCI, the success rate was 97%, declining to 90% when surgery was performed in infants older than 24 months of age [33].

Monocanalicular intubation & Bicanalicular intubation were carrying the same success rate in our study, although the caliber of bicanalicular tube passing through the NLD is double the caliber of the monocanalicular Ritleng tube.

Conclusion

Our results indicate that both bicanalicular & monocanalicular Ritleng intubation are almost equally effective in treating lately presented congenital NLD obstruction or after failed probing, but monocanalicular Ritleng intubation is safer & easier to perform and carries less complication.

References

- MacEwen CJ, Young JD (1991) Epiphora during the first year of life. *Eye (Lond)* 5 : 596-600. [[Crossref](#)]
- SE Olitsky, LB Nelson. Disorders of the eye, in: R.E. Behrman, R.M. Kliegman, H.B. Jenson (Eds.), *Nelson Text-book of Pediatrics*, 16th ed., W.B. Saunders, Philadelphia, 2000, p. 1911.
- KL Piest, JA Katowitz (1991) Treatment of congenital nasolacrimal duct obstruction. *OphthalmolClin North Am* 4: 201-209.
- Sevel D (1981) Development and congenital abnormalities of the nasolacrimal apparatus. *J PediatrOphthalmol Strabismus*18: 13-19. [[Crossref](#)]
- TO Paul, R Shepherd (1994) Congenital nasolacrimal duct obstruction: natural history and the timing of optimal intervention. *J PediatrOphthalmol Strabismus*31: 362-367. [[Crossref](#)]
- Honavar SG, Prakash VE, Rao GN (2000) Outcome of probing for congenital nasolacrimal duct obstruction in older children. *Am J Ophthalmol*130: 42-48. [[Crossref](#)]
- Baker JD (1985) Treatment of congenital nasolacrimal system obstruction. *J PediatrOphthalmol Strabismus* 22: 34-36. [[Crossref](#)]
- Katowitz JA, Hollsten DA. Silicone intubation of the nasolacrimal drainage system. In: Linberg JV, ed. *Lacrimal Surgery*. New York, NY: Churchill Livingstone Inc; 1988:109-123.

9. Crawford JS (1990) Intubation of the lacrimal system. *OphthalPlastReconstrSurg*21:90.
10. Rice DH (1990) Endoscopic intranasal dacryocystorhinostomy results in four patients. *Arch Otolaryngol Head Neck Surg*116: 1061. [[Crossref](#)]
11. Paul TO (1985) Medical management of congenital nasolacrimal duct obstruction. *J PediatrOphthalmol Strabismus* 22: 68-70. [[Crossref](#)]
12. Maini R, MacEwen CJ, Young JD (1998) The natural history of epiphora in childhood. *Eye (Lond)*12: 669-671. [[Crossref](#)]
13. Havins WE, Wilkins RB (1983) A useful alternative to silicone intubation in congenital nasolacrimal duct obstructions. *Ophthalmic Surg*14: 666-670. [[Crossref](#)]
14. Robb RM (1998) Success rates of nasolacrimal duct probing at time intervals after 1 year of age. *Ophthalmology* 105: 1307-1309. [[Crossref](#)]
15. Yüksel D, Ceylan K, Erden O, Kiliç R, Duman S (2005) Balloon dilatation for treatment of congenital nasolacrimal duct obstruction. *Eur J Ophthalmol*15: 179-185. [[Crossref](#)]
16. Katowitz JA, Welsh MG (1987) Timing of initial probing and irrigation in congenital nasolacrimal duct obstruction. *Ophthalmology* 94: 698-705. [[Crossref](#)]
17. Mannor GE, Rose GE, Frimpong-Ansah K, Ezra E (1999) Factors affecting the success of nasolacrimal duct probing for congenital nasolacrimal duct obstruction. *Am J Ophthalmol*127: 616-617. [[Crossref](#)]
18. Sturrock SM, MacEwen CJ, Young JD (1994) Long-term results after probing for congenital nasolacrimal duct obstruction. *Br J Ophthalmol*78: 892-894. [[Crossref](#)]
19. Dortzbach RK, France TD, Kushner BJ, Gonnering RS (1982) Silicone intubation for obstruction of the nasolacrimal duct in children. *Am J Ophthalmol*94: 585-590. [[Crossref](#)]
20. Durso F, Hand SI Jr, Ellis FD, Helveston EM (1980) Silicone intubation in children with nasolacrimal obstruction. *J PediatrOphthalmol Strabismus*17: 389-393. [[Crossref](#)]
21. Pashby RC, Rathbun JE (1979) Silicone tube intubation of the lacrimal drainage system. *Arch Ophthalmol*97: 1318-1322. [[Crossref](#)]
22. Ratliff CD, Meyer DR (1994) Silicone intubation without intranasal fixation for treatment of congenital nasolacrimal duct obstruction. *Am J Ophthalmol*118: 781-785. [[Crossref](#)]
23. Leone CR Jr, Van Gemert JV (1990) The success rate of silicone intubation in congenital lacrimal obstruction. *Ophthalmic Surg*21: 90-92. [[Crossref](#)]
24. Kraft SP, Crawford JS (1982) Silicone tube intubation in disorders of the lacrimal system in children. *Am J Ophthalmol* 94: 290-299. [[Crossref](#)]
25. Welsh MG, Katowitz JA (1989) Timing of Silastic tubing removal after intubation for congenital nasolacrimal duct obstruction. *OphthalPlastReconstrSurg*5: 43-48. [[Crossref](#)]
26. Freitag SK, Woog JJ (2000) Congenital nasolacrimal obstruction. *OphthalmolClin North Am*13:705-718.
27. Pashby RC, Hurwitz JJ. Pediatric lacrimal diseases. In: Hurwitz JJ, editor. *The lacrimal system*. 1. Philadelphia: Lippincott Raven; 1996:pp. 237-244.
28. Fayet B, Bernard JA, Assouline M (1993) Bicanicular versus monocanicular silicone intubation for nasolacrimal duct impotency in children: a comparative study. *Orbit*12:149-156.
29. Kashkouli MB, Kempster RC, Galloway GD, Beigi B (2005) Monocanicular versus bicanicular silicone intubation for nasolacrimal duct stenosis in adults. *OphthalPlastReconstrSurg*21: 142-147. [[Crossref](#)]
30. Kaufman LM, Guay-Bhatia LA (1998) Monocanicular intubation with Monoka tubes for the treatment of congenital nasolacrimal duct obstruction. *Ophthalmology* 105: 336-341. [[Crossref](#)]
31. Engel JM, Hichie-Schmidt C, Khammar A, Ostfeld BM, Vyas A, et al. (2007) Monocanicularsilastic intubation for the initial correction of congenital nasolacrimal duct obstruction. *J AAPOS*11: 183-186. [[Crossref](#)]
32. Dortzbach RK, France TD, Kushner BJ, Gonnering RS (1982) Silicone intubation for obstruction of the nasolacrimal duct in children. *Am J Ophthalmol*94: 585-590. [[Crossref](#)]
33. Aggarwal RK, Misson GP, Donaldson I, Willshaw HE (1993) The role of nasolacrimal intubation in the management of childhood epiphora. *Eye (Lond)*7: 760-762. [[Crossref](#)]