

Systematic, combined treatment approach to nasolacrimal duct obstruction in different age groups

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PURPOSE. *To report the outcome of a step-by-step treatment approach for congenital nasolacrimal duct obstruction (CNDO).*

METHODS. *Three-hundred and fifty eyes with CNDO were included in the study. A number of treatment methods were applied systematically until a successful outcome was achieved. Listed in order from simple to more complex, the following methods were used: conservative management (massage and topical antibiotics), high-pressure syringing, probing, and silicone intubation. Treatment efficacy was determined according to age (Group 1: 0-6 months, Group 2: 7-12 months, Group 3: 13-24 months, Group 4: 25-72 months) and success rates were compared.*

RESULTS. *Conservative management was applied only in children less than 1 year of age, and was successful in 91.8% of Group 1 and 60% of Group 2 eyes. The difference between these two success rates was significant ($p = 0.003$). High-pressure syringing was performed in children under 24 months of age, with success rates of 41.7% in Group 1, 33.3% in Group 2, and 12.5% in Group 3. The overall success rate for first probing in all groups was 76.1%, with a range of 69.4% to 80.9%. After second probing, the overall cure rate for the entire cohort was 88.0%, with a range of 74.9% to 94.8%. There was no real difference in probing cure rates relative to age ($p > 0.05$). Silicone intubation was indicated and performed in two eyes of Group 2 children, three eyes of Group 3, and nine eyes of Group 4. Two ducts in Group 4 eyes remained obstructed after silicone intubation.*

CONCLUSIONS. *The systematic treatment approach to CNDO, including conservative management and minimally invasive procedures such as high-pressure syringing, probing, and silicone intubation, is highly successful. In this study, the cure rate for this combined approach was 100% in youngsters under 2 years of age and 94.5% in children 2 to 6 years old. (Eur J Ophthalmol 2000; 10: 324-9)*

KEY WORDS. *Congenital nasolacrimal duct obstruction, Treatment, Probing, Silicone intubation, Syringing*

Accepted: November 15, 1999

INTRODUCTION

Congenital nasolacrimal duct obstruction (CNDO) is a frequent problem in children. Its incidence is reportedly 5% to 12% in infants (1-3), and treatment

continues to be a subject of controversy (1-8). A wide range of treatment options is available, including observation, conservative management with hydrostatic massage and topical antibiotics, high-pressure syringing, probing, silicon tube intubation, and dacryo-

cystorhinostomy. All these treatment modes are effective (6-10), but the timing of first probing for children under one year of age and the preferred method for first intervention in older children remain issues of contention (1, 2, 4-8, 11-14).

This article describes our results using a step-by-step approach to treating CNDO. Although success rates for these therapies have been published separately in many articles (2-14), our paper compares the results when all these methods are combined and used systematically.

METHODS

Three-hundred and fifty eyes of 273 children treated for CNDO between 1989 and 1998 were included in the study. Patients with genetic syndromes, craniofacial abnormalities, canalicular obstruction, congenital dacryocystoceles, and nasolacrimal duct obstruction secondary to tumor or trauma were excluded from the study group. The diagnosis of CNDO was based on a history of tearing and discharge beginning in infancy and the confirmation of these symptoms on ophthalmologic examination. In controversial cases, a fluorescein dye test was used to establish the diagnosis.

Patients were assigned to one of four groups according to their age at initial presentation (Tab. I). The treatment protocol for the four groups is presented in the flow chart in Figure 1. Patients were followed up until a successful outcome was achieved; ie. a patient in group 1 was treated conservatively until the

age of six months and if not cured then, moved on to the next step in the protocol.

Conservative management involved the Creiger maneuver (15) as the massage technique and topical chloramphenicol or gentamycin as the preferred antibiotic when necessary. In Group 1, conservative management was continued until a patient reached six months of age, and the duration of conservative treatment in Group 2 was a minimum of six weeks. The conservative approach was not used for Groups 3 and 4.

For high-pressure syringing, the lower punctum was occluded with a punctum dilator and high-pressure lavage was then performed from the upper punctum. This procedure was carried out under local anesthesia in children less than one year of age and under general anesthesia in older children. If syringing could not open the nasolacrimal duct, probing was attempted during the same session.

Probing was carried out under short-term general anesthesia that involved inhalational anesthesia and a mask, without endotracheal intubation. A #0 or #00 Bowman probe was passed through the upper punctum and one canaliculus was irrigated while the other was blocked with a punctum dilator. In unsuccessful cases, a second probing attempt was made at least one month after the first. If the second probing was unsuccessful, silicone intubation was performed during the same session, but only in patients 18 months of age or older.

Silicone intubation was performed under general anesthesia using a silicone intubation set with a retrieval device (Catalog no. 5151 or 5013, Visitec Company,

TABLE I - DEMOGRAPHIC CHARACTERISTICS OF PATIENTS INCLUDED IN THE STUDY AND THE RESULTS OF TREATMENT

	Group 1	Group 2	Group 3	Group 4	Total
Age range (months)	0-6	7-12	13-24	25-72	0-72
Mean age (months±SD)	3.2 ± 1.1	8.4 ± 1.6	16.8 ± 3.1	37.2 ± 12	10.8 ± 2.8
No. of patients	110	98	34	31	273
No. of eyes	146	120	48	36	350
No. of eyes cured with massage (%)	134 (91.8)	72 (60.2)	ND	ND	206 (58.9)
No. of eyes cured with high-pressure syringing (%)	5 (3.4)	16 (13.3)	6 (12.5)	ND	27 (7.7)
No. of eyes cured on first probing (%)	6 (4.1)	24 (20)	34 (70.1)	25 (69.4)	89 (25.4)
No. of eyes cured on second probing (%)	1 (0.7)	6 (5)	5 (10.4)	2 (5.5)	14 (4)
No. of eyes cured with silicone intubation (%)	-	2 (1.6)	3 (6.2)	7 (19.4)	12 (3.5)
Failure (%)	-	-	-	2 (5.5)	2 (0.6)

* Not done

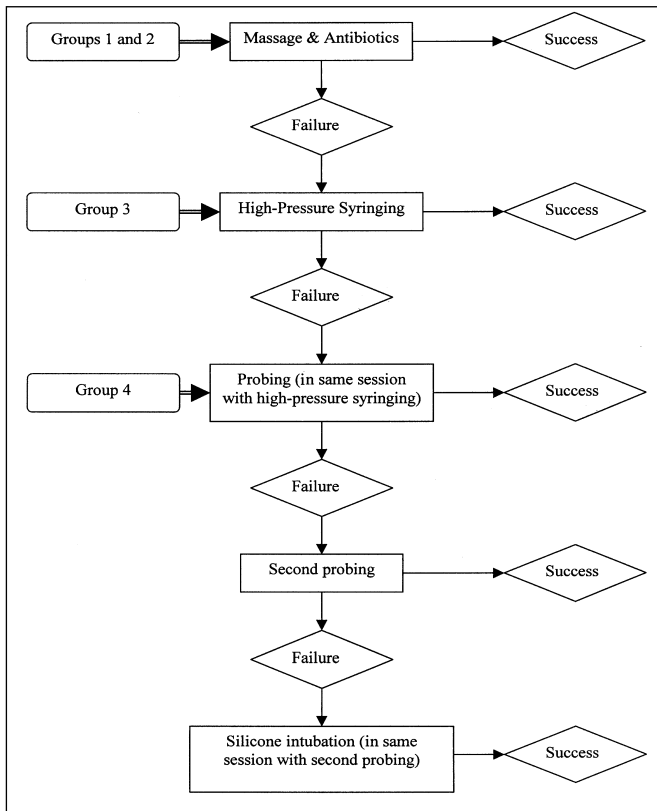


Fig. 1 - Flow-chart illustrating the treatment protocol.

Warwickshire, UK). The technique was carried out bicannicularly, under direct visualization with intranasal endoscopy. Patients with turbinate hypertrophy underwent inferior turbinate fracture, and a mucosal incision was made over the distal end of the nasolacrimal canal in cases where it was impossible to perforate the mucosa with a probe. No intranasal fixation was used, and the two ends of the silicone tube were tied together and left in place for 6 - 8 months. The tube was then removed under topical anesthesia during an office visit.

All groups participated in follow-up exams at one week, one month, and three months after treatment. The criteria for success were the resolution of epiphora and disappearance of tear reflux on applying pressure to the lacrimal sac.

RESULTS

The results of the treatment protocol are summarized in Table I. Statistical analysis was done only on

the massage, syringing, and probing data since relatively few eyes required silicone intubation. The cure rate for massage therapy was 91.8% in Group 1 and 60.2% in Group 2. Chi-square analysis showed that the massage cure rate was significantly higher in Group 1 than Group 2 ($X^2 = 8.86$, 1 degree of freedom, $p = 0.003$).

The following cure rates represent the ratio of successfully treated eyes to the number of eyes in particular stage of the flow chart separately.

The cure rates for high-pressure syringing were 41.6% (5/12), 33.3% (16/48), and 12.5% (6/48) for Groups 1, 2, and 3, respectively. There was no significant difference between Groups 1 and 2 ($X^2 = 0.293$, 1 degree of freedom, $p = 0.59$), but the Group 3 syringing cure rate was significantly lower than in the two younger groups ($X^2 = 7.56$, 2 degrees of freedom, $p = 0.023$).

Combining the results for all ducts probed during the first year of life (Groups 1 and 2), the cure rate was 76.9% for first probing. The first probing cure rate was 80.9% for Group 3, 69.4% for Group 4, and 76.1% for the entire cohort. After second probing, the cure rates rose to 94.8% for Groups 1 and 2, 92.8% for Group 3, 74.9% for Group 4, and 88.0% for the entire cohort. Chi-square analysis showed no significant differences in probing cure rates relative to age ($X^2 = 10.57$, 6 degrees of freedom, $p = 0.103$).

Overall, silicone intubation was required in 14 eyes and was successful in 12. Two eyes in Group 4 were considered treatment failures and dacryocystorhinostomy was planned for these cases.

DISCUSSION

Most CNDO cases resolve with observation and conservative management during the first year of life, and some may resolve spontaneously in later years (1, 6, 14). In persistent cases, success can usually be achieved with syringing and probing treatments, though silicone intubation is indicated if repeated probing fails (1, 5, 7-9, 11-14, 20-23). Many previous studies have discussed success rates for conservative management, syringing, probing, and silicone intubation as separate entities (2-14, 20-28). However, we felt it would be useful to investigate a systematic, combined approach to CNDO therapy, starting with conservative management and gradually progressing to the more

invasive procedures. The aim was to compare success rates using this step-by-step approach.

The cure rates for conservative management were 91.8% in Group 1 and 60% in Group 2, supporting the well-documented fact that success with this mode of therapy decreases with age. Previous studies have reported success rates between 85% and 96% in the first 12 months (6, 18, 19, 29). Our results for Group 1 concurred with these findings, and we believe that success with conservative management would very likely be enhanced if probing were delayed until the end of the first year. Similarly, it is our contention that success with conservative management would be better in Group 2 children if the accepted period for this approach was extended.

However, since there is no agreement regarding the timing of probing, we agree with early probing since long-term epiphora is annoying to the parents and child, and can increase the risk of acute dacryocystitis (5, 8, 29).

We chose to attempt high-pressure syringing before probing, and probed only in cases that did not respond to syringing. High-pressure syringing is a minimally invasive procedure that can be performed under topical anesthesia in children under one year of age. This technique could actually be considered a modified form of conservative treatment, for two reasons: its purpose is to clear duct obstruction with high-pressure saline injected through the nasolacrimal puncta, and it is simply an exaggerated form of the hydrostatic massage used in conservative management. If syringing is considered under the heading of conservative management, the success rates in our study rise to 95.2% and 73.3% for Groups 1 and 2. Even in Group 3, where conservative treatment was not performed, high-pressure syringing yielded a success rate of 12.5%.

Probing was indicated and performed in 4.8% of eyes in Group 1, 26.7% in Group 2, 87.5% in Group 3, and all eyes in Group 4. Stager et al (5) reported a 92.4% cure rate for in-office probing during the first 12 months of life, and Katowitz and Walsh (8) noted a 95.9% cure rate for probing done during an infant's first 13 months. Our 94.8% cure rate for probing in the first year of life is comparable.

Although there has been controversy regarding the benefits of probing, particularly in older children, recent research indicates that the success rate is not

related to the patient's age (7, 13, 30, 31). El Mansoury et al (13) reported a success rate of 100% in children between 13 months and seven years of age after two probings. Robb (7) reported a 92% cure rate with probing in children older than one year of age and found no significant association between probing cure rate and age. Kushner (32) reported a 70% cure rate with probing in children between 18 and 48 months, while Katowitz and Welsh (8) noted a 55% rate in children over one year old. In our study, the probing cure rate for children over 12 months of age (Groups 3 and 4) was 84.6%.

The different cure rates may be the result of many factors, including surgical technique. However, some CNDO cases involve more complex etiologies, and these are less likely to resolve spontaneously with conservative management. In addition, these patients are given poorer odds for success with probing (31). It follows that series involving larger numbers of complex CNDO cases will yield lower success rates with simple probing. In our series there were no significant differences in probing success rates among the four age groups, so we suggest that probing should be the treatment of choice for children 2-6 years old. Also, we believe that a second probing should always be attempted before silicone intubation.

Silicone intubation was required in only two of 120 eyes in Group 2, three of 48 eyes in Group 3, and nine of 36 eyes in Group 4. In Groups 2 and 3 all silicone intubations were successful, while in Group 4 this method was unsuccessful in two eyes. In a previous study, the success rate for silicone intubation was 97% for children under two years of age, and other published series reported success rates between 87% and 95% (9, 33-36).

The need for nasal endoscopic visualization during silicone intubation is debatable (37, 38), and some authors use this technique only in complex cases (1). We routinely use endoscopic visualization, and believe that it improves success and reduces intraoperative complications.

On overall assessment, the step-by-step, combined treatment protocol used in our group of 350 CNDO eyes left only two ducts with persistent obstruction. This series was of a significant size and included a wide range of ages at presentation, and the success rate with this systematic strategy was excellent. Dacryocystorhinostomies were planned for the two cas-

es in which other therapy failed. This negligible failure rate is proof of the success that can be obtained using a systematic approach of conservative management and minimally invasive procedures to treat CNDO.

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