

# CONGENITAL NASOLACRIMAL DUCT OBSTRUCTION: An Optometric Perspective

■ Rose K. Hughes, O.D.  
■ David E. FitzGerald, O.D.

## Abstract

*Congenital Nasolacrimal Duct Obstruction is a frequent occurrence in newborns. This article discusses the incidence, etiology and management of congenital nasolacrimal duct obstruction. Though surgical intervention may be needed at times, a conservative approach is often better.*

## Key Words

*Congenital Nasolacrimal Duct Obstruction, massage, probing, epiphora, mucocele, amniotocele.*

**F**requent reasons for parents to seek optometric care for their newborns or infants are excessive tearing (epiphora) or ocular discharge. One entity that can cause these clinical signs is Congenital Nasolacrimal Duct Obstruction (CNLDO). This condition occurs when the connection between the nasolacrimal duct and the nose (Valve of Hasner) fails to open. Tears normally flow from the puncta through the canaliculi, into the lacrimal sac, down the lacrimal duct, and into the nose. See Figure 1. During development, the last parts of this drainage system to canalize are the connections to the surface at the lid margin and in the nose.<sup>1</sup> Otis Paul, et al, report that up to 50% of ducts are not patent at birth; however, the membranous obstruction at the nasal end (valve of Hasner) tends to clear rather quickly.<sup>1</sup> Symptomatic CNLDO is generally stated to occur in 1.5-6% of infants.<sup>1-11</sup> However, a study by MacEwen and Young places the incidence at 20%.<sup>12</sup> In order to determine the incidence and natural history of epiphora, they followed a group of 4,792 infants throughout the first year of life. During this time, a defect in the lacrimal drainage system was present 20% of the time. They believe that the previously reported statistics are low secondary to methodological problems. The reasoning is that if newborns are not followed from birth many cases will be missed, because of the high rate of spontaneous resolution.

MacEwen and Young found that 95% of patients with CNLDO became symptomatic within the first month of life. This

would indicate that tear production, if not present at birth, develops shortly thereafter.<sup>12</sup> There are a number of clinical findings that can help with the diagnosis. First, a history of early-onset epiphora should be obtained. A discharge may be present in the absence of conjunctival hyperemia.<sup>2-17</sup>

## Diagnosis

Gentle pressure applied over the lacrimal sac may result in a mucopurulent reflux from the punctum.<sup>2-17</sup> The dye disappearance test can lead to a definitive diagnosis.<sup>6,8,9,11,12,14,16</sup> According to Katowitz and Welsh, this is done by placing one drop of 0.5% proparacaine followed by one drop of 2% fluorescein or a moistened fluorescein strip into the inferior cul-de-sac. Excess dye should be wiped away. In a dimly lit room, the child is examined with a Burton lamp or with the cobalt blue filter of the slit lamp. If tear drainage is normal, all dye should be gone within 5 minutes. The presence of dye after this time indicates a non-patent system.<sup>6</sup>

## Treatment Options

The treatment of CNLDO depends on both the presentation and the age of the child. The first line of treatment for most cases of uncomplicated CNLDO is a conservative one.<sup>1-8,10-16,18-20</sup> Massage of the lacrimal sac in a downward motion can exert hydrostatic pressure on the lower end of the lacrimal duct. This helps with drainage and, in the case of a minor blockage, may open the obstruction. This type of massage has been found by Kushner to

be more effective in treating CNLDO than gentle pressure over the sac to express pus from the punctum, or no massage at all.<sup>7</sup> Massage should be carried out four times a day, 5-10 strokes each time.<sup>7</sup> The correct method must be shown to, and demonstrated by, the parents. If discharge is present, a topical antibiotic needs to be prescribed. Two good choices are Polytrim drops every three hours or Erythromycin ointment twice a day. Both of these medications are approved for use on infants. As long as the obstruction persists, no topical medication will eliminate an infection in the lacrimal tract. However, they are useful in reducing the amount of discharge on the lid margins.<sup>6</sup> They can be prescribed for one-week duration after initial examination, and then as needed as discharge recurs. Ointment may be preferable, as it can make massage less irritating by reducing friction.<sup>6</sup>

Nasolacrimal probing can also treat CNLDO. Here, a #1 Bowman probe is used to break through the obstruction and clear the system. If successful, normal drainage will resume.<sup>19</sup> The greatest controversy in the treatment of CNLDO is at what age probing should be done and whether delay results in more complications and less effectiveness.

In cases of more complicated obstructions, such as a mucocele, or amniotocele, there is little question that early aggressive intervention is crucial. A mucocele forms when the lacrimal sac swells due to the pumping of amniotic fluid into the sac. This occurs in utero and is the result of the action of the lacrimal pump mechanism. Consequently, the drainage system is closed at both openings, i.e., at the lid margin and in the nose. Mucus accumulates in the distended sac and may lead to infection. In some cases, decompression can be achieved by simply applying external pressure to the sac. If this fails, probing of the canaliculi is necessary and, rarely, a stab incision of the sac may be needed. Delay in opening the nasolacrimal system in these cases can lead to a dacryocystitis.<sup>14</sup>

The real controversy revolves around cases of simple CNLDO, where epiphora and perhaps discharge are the only symptoms. In their study, MacEwen and Young report that 96% of CNLDO cases resolved spontaneously within the first year of life.<sup>12</sup> This in and of itself is a strong argument for delaying probing. On the other

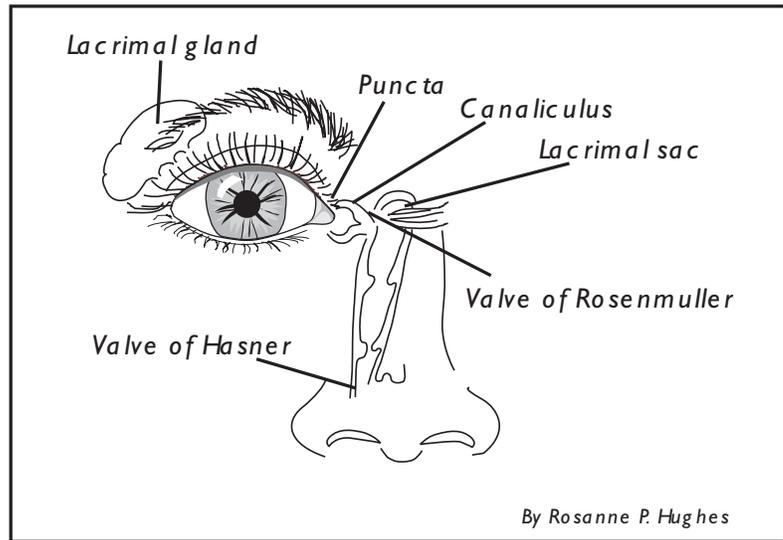


Figure 1.

hand, there are those who argue that the symptoms of tearing and discharge are uncomfortable to the child and upsetting to the parents,<sup>6,9</sup> It has also been put forth that prolonged infection of the nasolacrimal system increases the risk of inflammation and fibrosis with a resultant decrease in the success of probing.<sup>2,6,9</sup> In addition, some authorities maintain that probing done before 1 year of age, especially in the earlier months of life, can be done in-office without anesthesia.<sup>9,18</sup>

Considering that the air/precorneal tear film interface is the largest refractive element in the visual system, some suggest that the persistent discharge and thick tear film, along with the use of antibiotic ointment, might cause significant image degradation and interfere with visual development. This argument has been made, but not proven: Ellis, MacEwen and Young failed to find any statistically significant increase in amblyopia or ametropia in children with CNLDO.<sup>13</sup>

A study by Zwaan examined the failure rates of probing in three categories.<sup>11</sup> Group 1 consisted of children below 1 year of age. Thirty-seven probings were done, with a failure rate of 3%. Group 2 was made up of children between the ages of 1 and 2 years old. Of 43 probings, the failure rate was 12%. In Group 3, children over the age of 2 years, 30 probings resulted in a failure rate of 7%. The differences in failure rate among the three groups were not statistically significant. el-Mansoury, et al performed probings on 138 eyes in children over the age of 13 months.<sup>4</sup> They ranged in age from 13

months to 7 years, with an average age of 22 months. Of these, 93.5% were cured after the first probing. Mannor, et al reports that success of probing is negatively correlated with age.<sup>14</sup> However, they report a 92% success rate at 12 months and an 89% success rate at 24 months, which is still quite high.

Robb performed probings on 107 eyes in children between the ages of less than 6 months to more than 24 months, with the oldest child being 5 years old.<sup>20</sup> Under 6 months of age, all three of the eyes probed were successfully cleared. Between 6-12 months, only two of 39 eyes required a second probing. In the children between 12-18 months, 44 were probed. Three required a second probing and two of these subsequently required a dacryocystorhinostomy (DCR). Between 18-24 months, eight were probed with only one requiring a second probing. Thirteen were probed at greater than 24 months. Two had second probings followed by a DCR. His study clearly shows that late probing is an effective tool in treating CNLDO.

There is also a convincing theory as to the somewhat decreased success of late probing for CNLDO. Perhaps those patients whose CNLDO didn't spontaneously resolve within their first year or life, or on whom conservative measure did not alleviate the epiphora or discharge, have more severe obstructions. Had probing been done earlier in these cases, perhaps it still would have been unsuccessful.<sup>1,10,17</sup>

In reviewing these often conflicting studies, there are a number of problems encountered when attempting to draw a

conclusion. In the case of probing, there is the problem of defining success and failure. Often success is simply defined as the resolution of symptoms<sup>10,16,20</sup> and this information is obtained, in some cases, simply via a phone call.<sup>9,11,20</sup> In other studies, failure is reported because of continued epiphora; however a dye disappearance test is not performed to determine whether the system is, indeed, still obstructed.<sup>4,15</sup> There is also the debate as to whether persistent tearing, only in the case of upper respiratory tract infections or cold weather, constitutes a success or a failure. This is open to discussion and there is no uniform agreement.

While many reports have shown that late probing can be effective, there is somewhat of a decrease in success with increasing age. The high rate of spontaneous resolution within the first year is a strong argument for conservative management during this time. However, the decrease in spontaneous resolution after this time, with the documented decrease in effectiveness of probing, would seem to suggest that to wait past the age of one year may put the child at risk for future complications.

## Conclusion

The diagnosis of uncomplicated CNLDO is made based upon history, clinical appearance of a teary eye and, if possible, the dye disappearance test. If the child is under 1 year of age, and discharge is present, a topical antibiotic should be prescribed for one week and then as needed. The child should be seen after 1 week and the followed every six to eight weeks to monitor for resolution. If the condition worsens, the patient should be seen more frequently. Parents need to be educated on the proper method of massage and should be made aware of the high rate of spontaneous resolution within the first year. This will often make them more patient and willing to comply with conservative management. However, if the child is 1 year of age or older and the problem persists, referral to a pediatric ophthalmologist for nasolacrimal probing is appropriate.

Many optometrists entered the profession to help others, to "fix" whatever was wrong with the patient. However, the human body has a miraculous ability to heal itself, and sometimes it is best to allow this to happen.

## References

1. Otis PT, et al. Congenital nasolacrimal duct obstruction: natural history and the timing of optimal intervention. *J Pediatr Ophthalmol Strabismus* 1985; 22(1):34-6.
2. Baker, JD. Treatment of congenital nasolacrimal system obstruction. *J Pediatr Ophthalmol Strabismus* 1985; 22(1):34-6.
3. Chesi C, et al. Congenital nasolacrimal duct obstruction: therapeutic management. *J Pediatr Ophthalmol Strabismus* 1999; 36(6):326-30.
4. el-Mansoury J et al. Results of late probing for congenital nasolacrimal duct obstruction. *Ophthalmol* 1986; 93(8):1052-4.
5. Goldblum TA, et al. Office probing for congenital nasolacrimal duct obstruction: a study of parental satisfaction. *J Pediatr Ophthalmol Strabismus* 1996; 33(4):244-7.
6. Katowitz JA, et al. Timing of initial probing and irrigation in congenital nasolacrimal duct obstruction. *Ophthalmol* 1987; 94(6):698-705.
7. Kushner BJ. Congenital nasolacrimal system obstruction. *Arch Ophthalmol* 1982; 100(4):597-600.
8. Nucci P, et al. Conservative management of congenital nasolacrimal duct obstruction. *J Pediatr Ophthalmol Strabismus* 1989; 26(1):39-43.
9. Stager D, et al. Office probing of congenital nasolacrimal duct obstruction. *Ophthalm Surg* 1992; 23(7):482-4.
10. Yap EY, et al. Outcome of late probing for congenital nasolacrimal duct obstruction in Singapore children. *Int Ophthalmol* 1997; 21(6):331-4.
11. Zwaan J. Treatment of congenital nasolacrimal duct obstruction before and after the age of 1 year. *Ophthalmic Surg Lasers* 1997; 28(11):932-6.
12. MacEwen CJ, et al. Epiphora during the first year of life. *Eye* 1991; 5:596-600.
13. Ellis JD, et al. Can congenital nasolacrimal duct obstruction interfere with visual development? A cohort case control study. *J Pediatr Ophthalmol Strabismus* 1998; 35(2):81-5
14. Mannor GE, et al. Factors affecting the success of nasolacrimal duct probing for congenital nasolacrimal duct obstruction. *Am J Ophthalmol* 1999; 127(5):616-7.
15. Peterson R, et al. The natural course of congenital obstruction of the nasolacrimal duct. *J Pediatr Ophthalmol Strabismus* 1978; 15(4):246-50.
16. Robb RM. Success rates of nasolacrimal duct probing at time intervals after 1 year of age. *Ophthalmol* 1998; 105(7):1307-9.
17. Sturrock SM. Long-term results after probing for congenital nasolacrimal duct obstruction. *Br J Ophthalmol* 1994; 78(12):892-4.
18. Maini R, et al. The natural history of epiphora in childhood. *Eye* 1998; 12:669-71.
19. Hevelston EM, et al. *Pediatric Ophthalmology Practice*. St. Louis: C.V. Mosby, 1980.
20. Robb RM. Probing and irrigation for congenital nasolacrimal duct obstruction. *Arch Ophthalmol* 1986; 104(3):378-9.

Corresponding author:

Rose K. Hughes, O.D.  
SUNY State College of Optometry  
100 East 24th Street  
New York, NY 10010

Date accepted for publication:  
April 7, 2000