Otolaryngological findings in congenital nasolacrimal duct obstruction and implications for prognosis

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Abstract

Aim—To investigate otolaryngological abnormalities associated with congenital nasolacrimal duct obstruction (CNLDO) and their effect on the prognosis.

Methods—65 consecutive cases of CNLDO were followed up with routine otorhinolaryngological examination with tympanometry.

Results—Otitis media with effusion (OME) and uvula bifida were detected in 44.6% and 9.2% of the children, respectively. Medical treatment and probing were less effective in patients with OME ($p<0.05$).

Conclusions—OME and uvula bifida are significant anomalies associated with CNLDO and the former has a marked effect on the prognosis. This finding may help to determine the patients who will need further treatment after massage and probing.

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Congenital nasolacrimal duct obstruction (CNLDO) is the most common abnormality of the lacrimal system in childhood. Abnormalities in the normal embryological development of the lacrimal system may be responsible for the clinical disease. Welham and Hughes found craniofacial defects in 6% of 142 children who underwent lacrimal surgery.¹

The lacrimal system takes root from the first pharyngeal arch during the complex development of the face. The external and middle ears arise from structures of the first and second pharyngeal arches and from the intervening pharyngeal cleft and pouch.²

Table 1 Clinical findings on otorhinolaryngological examination of patients with CNLDO (n = 65)

Clinical finding	No (%)
Otitis media with effusion	29 (44.6)
Palatal fusion defects	6 (9.2)
Uvula bifida	5
Cleft lip and palate	1
External ear abnormalities	3 (4.6)
Bilateral accessory auricle	1
Ear aplasia with facial hemiatrophy	1
Bilateral coloboma auris	1

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Table 2 Comparison of success rates after medical treatment in patients with congenital nasolacrimal duct obstruction (CNLDO) and CNLDO plus otitis media with effusion (OME)

Treatment groups	CNLDO only	CNLDO + OME
<13 months of age (medical treatment)	14/16 (87.5%)	3/8 (37.5%)
13–24 months (medical treatment and probing)	6/8 (75%)	3/9 (33.3%)
>24 months (probing)	8/12 (66.6%)	4/12 (25%)

In this report we present the clinical findings in patients with CNLDO who underwent an otorhinolaryngological examination to identify any other developmental abnormalities and their impact on the prognosis.

Patients and methods

Between October 1996 and January 1998 65 consecutive patients (35 girls, 30 boys) with CNLDO were referred for routine otorhinolaryngological examination. Their mean age at initial examination was 22.6 months (range 2–84). Suitable cases were examined with tympanometry. Middle ear function was assessed at each visit. The mean follow up period was 11.8 months (range 6–24).

Tympanometric screening was conducted using an Interacoustic Impedance Audiometer AZ7 and recorded with an Interacoustic XYT Recorder, Model AG3. Tympanograms were classified as normal or type A (pressures between 0 and –100 mm H₂O), type B (flat with –400 mm Hg pressure) which was consistent with middle ear effusion, or type C (negative middle ear pressure of 100–400 mm H₂O). Types A and C were considered a “pass” and type B was considered a “fail”,³ so patients with type B tympanograms were considered to have otitis media with effusion (OME). Tympanometric data were incomplete on some occasions because children were crying or uncooperative. The collapse of the external auditory meatus was also a problem when obtaining measurements in this age group. The tympanometric findings were always checked by otoscopic examination to confirm the diagnosis of OME.

All children were initially treated with massage and antibiotics in purulent cases. Children older than 12 months were probed under general anaesthesia after 4 weeks of unsuccessful medical treatment.⁴

Results

Otitis media with effusion (OME) was the most frequently found abnormality and was seen in 29 patients (44.6%), being bilateral in 20 (30.7%). Table 1 shows the clinical findings of otorhinolaryngological examination.

The results of treatment in patients with OME and in those without an effusion are summarised in Table 2. Patients with OME had a significantly lower response than those without an effusion ($p<0.05$, χ^2 test). Such a correlation was not seen in children with fusional palate defects or external ear abnormalities, probably because of the small number of cases (n = 9).

Discussion

Both OME and CNLDO may be considered as physiological abnormalities up to a certain age and at least 80% of patients with CNLDO can be cured by conservative management up to the age of 12–13 months.^{4–6} The real problem lies in identifying the other 20% who will need further treatment.⁴

OME has been reported to occur in about 80% of all children at some time from birth to three years of age.⁷ The primary cause of effusion is eustachian tube dysfunction. It is generally accepted that the development of the tubotympanium has a significant bearing on the susceptibility to ear infection. The critical period of tubal insufficiency extends from birth to about seven years of age.

Kitajiri *et al* suggest that the greatest development in the mid cartilaginous and pharyngeal portions of the eustachian tube may be related to growth of the anterior part of the face, including the maxilla.⁸ Patients with OME have been shown to have a deviated facial pattern in the craniofacial skeleton. This pattern is described as cessation in displacement of the nasomaxillary complex.⁹ Vertical vector of nasomaxillary growth is a major feature of human facial development.¹⁰ Anatomical abnormalities in the tubal structures may result in functional tubal obstruction.⁹ Arrest of the craniofacial growth of the nasomaxillary region may lead to an incomplete nasolacrimal canal or a bony obstruction between the nasolacrimal canal and the inferior meatus. Since both OME and CNLDO have multifactorial aetiological factors—such as superimposed infections and genetic predisposition—a direct relationship between them may not appear clearly in all cases.

Age is the only prognostic factor that has so far been found to predict the success of probing. It is well documented from previous studies that probing in children under 13 months of age has a success rate of 90% which decreases in children aged 18 months or more.⁴ Some authors believe that patients in whom probing fails represent a group of children with abnormal anatomy.¹¹ Robb found that 41% of children who required dacryocystorhinostomy in a series had some form of craniofacial dysostosis. He also concluded that altered anatomy was more important than the time of probing in determining the patients in whom probing would fail. OME in children with CNLDO may represent this altered anatomy, which influences both the eustachian tube and nasolacrimal duct.

Bilateral middle ear effusion was reported to be the most important risk factor in predicting

chronic OME¹² and was present in 30.7% of our patients with CNLDO. This suggests that patients with CNLDO are at risk of developing chronic OME. Parents should be warned to look for ear problems and susceptible children should be followed up by an ENT specialist.

A high prevalence of OME has been reported in children with developmental anomalies affecting the midface and cranial base. This is best documented in children with palatal clefts in whom the prevalence of the disease approaches 100%. Developmental events responsible for such anomalies may also adversely affect the development of the auditory tube and nasolacrimal duct. Six of our patients had both palatal fusion defects and CNLDO. Whitaker *et al*¹³ reported an 11% incidence of nasolacrimal obstruction in 100 patients with facial cleft and concluded that a high incidence of associated anomalies would be expected because of the parallel developmental times involving the face, palate, and lacrimal apparatus.

Our preliminary study shows a negative correlation between the response to medical treatment and probing and the presence of OME in patients with CNLDO. This finding may be important for identifying patients who will need more complicated treatment for CNLDO.

- 1 Welham RAN, Hughes SM. Lacrimal surgery in children. *Am J Ophthalmol* 1985;**99**:27–34.
- 2 Sadler TW. *Langman's medical embryology*. 6th ed. Baltimore: Williams & Wilkins, 1990:297–327.
- 3 Jerger J. Clinical experience with impedance audiometry. *Arch Otolaryngol* 1970;**92**:311–24.
- 4 Katowitz JA, Welsh MG. Timing of initial probing and irrigation in congenital nasolacrimal duct obstruction. *Ophthalmology* 1987;**94**:698–705.
- 5 Paul TO. Medical management of congenital nasolacrimal duct obstruction. *J Pediatr Ophthalmol Strabismus* 1985;**22**:68–70.
- 6 Nelson LB, Calhoun JH, Menduke H. Medical management of congenital nasolacrimal duct obstruction. *Ophthalmology* 1985;**92**:1187–90.
- 7 Teele DW, Klein JO, Rosner B. Epidemiology of otitis media during the first seven years of life in children in greater Boston: a prospective cohort study. *J Infect Dis* 1989;**160**:83–94.
- 8 Kitajiri M, Sando I, Takahara T. Postnatal development of the eustachian tube and its surrounding structures. *Ann Otorhinol Laryngol* 1987;**96**:191–8.
- 9 Kemaloğlu YK, Göksu N, Özbilen S, *et al*. Otitis media with effusion and craniofacial analysis. II: 'Mastoid-middle ear-Eustachian tube system' in children with secretory otitis media. *Int J Pediatr Otorhinolaryngol* 1995;**32**:69–76.
- 10 Enlow DH. *Facial growth*. Philadelphia: WB Saunders, 1990.
- 11 Robb RM. Probing and irrigation for congenital nasolacrimal duct obstruction. *Arch Ophthalmol* 1986;**104**:378–9.
- 12 Daly K, Giebink GS, Le CT, *et al*. Determining risk for chronic otitis media with effusion. *Pediatr Infect Dis J* 1988;**7**:471–5.
- 13 Whitaker LA, Katowitz JA, Randall P. The nasolacrimal apparatus in congenital facial anomalies. *J Maxillofac Surg* 1974;**2**:59–63.