Success of Probing for Congenital Nasolacrimal Duct Obstruction in Children under 10 Years of Age

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Objective: *To determine the success of probing for congenital nasolacrimal duct obstruction in children aged under 10 years.*
Design: *A retrospective study.*
Material and Method: *The medical records of all children aged under 10 years diagnosed with congenital nasolacrimal duct obstruction between 1997 and 2007 who underwent probing and irrigation under general anesthesia were reviewed. Successful probing was defined as absence of tearing and eye discharge in the affected eye at one month or more after treatment. Data obtained included age at first visit, gender, laterality of the eyes, history of previous probing, age at probing time, number of probing, and treatment outcomes. Patients were categorized into four groups according to age at treatment (0-1 year, 1-2 years, 2-3 years and 3-10 years).*
Results: *Forty-four patients were seen during the study period, 19 males and 25 females, with 29 right eyes and 30 left eyes undergoing treatments of 29 unilateral probing and 15 bilateral probing. The age at probing ranged from 10 months to 9.6 years (mean $\pm$ SD, 2.51 $\pm$ 1.82 years). Successful probing were identified in 47 out of 59 eyes (80%, 95% CI = 67 to 89%). Most successful eyes required only one probing and only two eyes needed a second probing. The success rates were 80% (8/10 eyes) in patients 0-1 year of age, 86% (18/21 eyes) in patients 1-2 years of age, 75% (12/16 eyes) in patients 2-3 years of age, and 75% (9/12 eyes) in patients 3-10 years of age.*
Conclusion: *The success rate of probing for treatment of congenital nasolacrimal duct obstruction varies, depending on the age of the child at treatment. It was higher in children under 2 years than in older children.*

Keywords: *Congenital, Lacrimal duct obstruction, Nasolacrimal duct, Probing, Epiphora*

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Congenital Nasolacrimal Duct Obstruction (CNLDO) is usually caused by a membranous block of the valve of Hasner and becomes clinically evident in 6%[1]. Most obstructions open spontaneously within 4-6 weeks after birth. Approximately 80-90% of all symptomatic congenital nasolacrimal duct obstructions present the symptoms within 1 month of age, which include epiphora, mucous discharge, or mucopurulent discharge accumulating at the lid margin and eyelashes. The physical examination shows a swollen lacrimal sac with inflammation, and opaque fluids may drain from the lacrimal punctum.

Numerous management options are available, which can be divided into conservative and surgical treatment. Conservative management includes observation, lacrimal sac massage, and topical antibiotics, and with this treatment the symptoms usually resolve spontaneously in about 90% of cases within 1 year[2-4]. When the obstruction fails to resolve with conservative measures, invasive intervention may be required, such as probing, silicone intubation, or dacryocystorhinostomy.

In the past few years, there has been some controversy concerning the best time for abandoning

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conservative management and the proper age to consider probing. When the epiphora persist for many months, the most often useful method is conservative management until 9-12 months and waiting for spontaneous resolution of the nasolacrimal duct obstruction[2-4]. If this fails, probing may be considered.

Many reports have shown that a delay in probing until after 13 months is associated with a decreasing success rate[5-7], which may be caused from chronic inflammation in the lacrimal drainage system[7]. On the other hand, other reports have shown a high success rate from probing in children older than 2 years without an age-related decline in success[5,8,9] and probing is still accepted as the most useful method for congenital nasolacrimal duct obstruction in older children.

The best age for probing is thus somewhat controversial[2,6,10], and thus the present study was conducted at Songklanagarind Hospital to evaluate the success rate of probing in all children aged under 10 years diagnosed with congenital nasolacrimal duct obstruction, divided into different age groups, to provide factual data of use in planning of future management.

Material and Method

The present study was approved by the Ethic Committee, Faculty of Medicine, Prince of Songkla University. The medical records of all children aged under 10 years diagnosed with congenital nasolacrimal duct obstruction who underwent probing and irrigation under general anesthesia at Songklanagarind Hospital in southern Thailand between 1997 and 2007 were reviewed.

Exclusion criteria

1. Lid malposition or abnormalities
2. Punctal or canalicular anomalies
3. Previous lacrimal drainage system surgery except probing
4. History of trauma to the nasolacrimal system

Data collection

The records of all children aged under 10 years diagnosed with congenital nasolacrimal duct obstruction at Songklanagarind Hospital during the study period were found by using the diagnostic codes H045 (Stenosis and insufficiency of lacrimal passages), Q105 (Congenital stenosis and stricture of lacrimal duct) and H042 (Epiphora).

The hospital numbers were recorded, and then the children were separated into two groups, those who had received the probing procedure (Operating code: 0943), and those who had received other procedures.

Data obtained included age at first visit, gender, laterality of the eyes, history of previous probing, age at probing time, number of probing and treatment outcomes.

Evaluation of probing results

The probing results were evaluated into two categories.

1. Successful probing was defined as absence of tearing and eye discharge in the affected eye at one month or more after treatment.

2. Failed probing was defined as persistent tearing and eye discharge in the affected eye at one month or more after treatment.

In children with bilateral CNLDO, consideration of factors that affected the probing results were individually evaluated by using the randomized probing result in the right eye to decrease the bias.

Statistical analysis

Descriptive analysis was used for reporting and explaining the probing results. For the age variable (years), mean and median were used for reporting. Percentage was used for reporting a group of variables such as age group, gender, number, and side of the eye that received probing. Statistical significance was considered as $p\text{-value} < 0.05$.

Results

Between 1997 and 2007, there were 64 children aged under 10 years diagnosed with congenital nasolacrimal duct obstruction. Sixteen of 64 subjects, about one-fourth, had been performed by other procedures: six cases of silicone intubation, three cases of external dacryocystorhinostomy, three cases of lacrimal sac irrigation, two cases of three snip procedure, one case of endoscopic dacryocystorhinostomy, and one case of canalicular dacryocystorhinostomy. Forty-eight of 64 subjects, about three-fourth, had undergone probing: four cases were excluded due to malposition lids (3 cases), and punctal and canalicular abnormality (1 case). Overall, 59 eyes of 44 children were included in the present study: 19 males and 25 females, 29 right eyes and 30 left eyes, with the surgical intervention of 29 unilateral probing and 15 bilateral probing.

Most children with bilateral CNLDO, 14 in 15 subjects (93.3%), were 0 to 3 years of age. All patients were categorized into four groups according to age at treatment: 0-1 year, 1-2 years, 2-3 years, and 3-10 years. The mean age of all children was 2.51 years (± 1.82 years). The mean ages were 0.94 years (± 0.08 years), 1.52 years (± 0.28 years), 2.40 years (± 0.26 years), and 4.95 years (± 2.11 years) in groups 1, 2, 3, and 4 respectively. Most children were under 5 years and there were only three children above 5 years. The youngest child was 10 months and the oldest child was 9 years and 10 months. The success of probing was found in these two children. Three children underwent probing from other hospitals; success was found in one child (1 years and 10 month of age) and failure was found in two children (2 years and 8 months, 8 years of age).

Successful probing were identified in 47 out of 59 eyes (80%, 95% CI = 67 to 89%). Most successful eyes underwent only one probing, with a second probing needed in only two eyes. The success rates for each group were 80% (8/10 eyes) in patients 0-1 year of age, 86% (18/21 eyes) in patients 1-2 years of age, 75% (12/16 eyes) in patients 2-3 years of age and 75% (9/12 eyes) in patients 3-10 years of age. In all 47 successful eyes, the clinical symptoms improved within 4 weeks after treatment. The follow-up time was 4 weeks to 35 months, with a mean follow-up time of 5.4 ± 9.1 months. No probing or anesthetic complications were found in any children. In the 12 eyes that failed to respond to the probing, nine received further treatment, two were probed in another hospital, one received inferior turbinate infracture, one silicone intubation, two endoscopic dacryocystorhinostomy, and three external dacryocystorhinostomy. The patients were categorized into four groups (Fig. 1) according to age at treatment (0-1 year, 1-2 years, 2-3 years and 3-10 years) and the success rates were 80%, 86%, 75%, and 75% in each groups respectively.

Considering some comparisons, boys with CNLDO had a slightly better success rate than girls, children with unilateral CNLDO had a lower success than bilateral CNLDO, children with left CNLDO had better success than right CNLDO, and children under 2 years of age were more successful than older groups (more than 88%). However, these differences were not statistically significant.

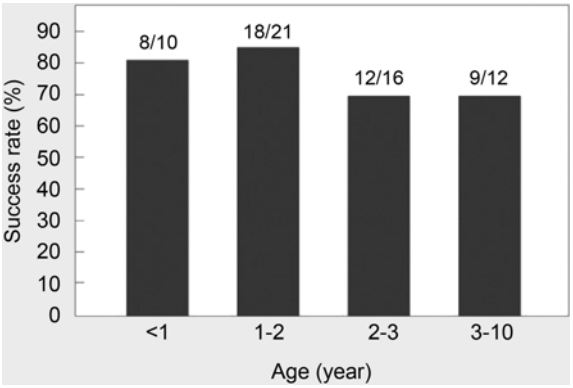

Fig. 1 Treatment successes by age at probing

Discussion

The successful probing in 59 eyes of 44 children aged under 10 years diagnosed with congenital nasolacrimal duct obstruction was 80%, similar to the 77% reported by Casady[11], better than the 69% reported by Katowitz and Welsh[7], and somewhat poorer than the 92% reported by Robb[8], which had the same inclusion criteria as the present study. The overall success in the present study was less than Robb's study[8] because there were different details in the medical records. Some records had incomplete information about the patient's symptoms such as upper respiratory tract infection or other eyelid abnormalities. The present study included failed probing children from other hospitals and two Down syndrome children without records of eyelids abnormalities. The failed probing was found in both Down syndrome children and was the cause of a lower success rate in the present study.

The success in 0 to 1 year old children was 80%, which is less than the 97% reported by Katowitz and Welsh[7] and 92% reported by Kashkouli[6]. Because of different exclusion criteria, the present study included dacryocystitis and mucopurulent discharge from lacrimal drainage system and included failed previous probing children, which gave less successful rate than other studies.

The authors' success rate in 1 to 2 year old children was 86%, similar to the 84.5% reported by Kashkouli[6] in 2002 and the 89% reported by Kashkouli[12] in 2003, and better than the 76% reported by Katowitz and Welsh[7]. The high success was found in this age group because there is still a chance for the spontaneous opening of the Hasner valve after one year[13]. The success was less than the 92% reported by Robb[8] because the follow-up time in the present study was at least one month, while Robb's study[8] had only a 7-day follow-up, and this study included

only small children, which may have affected the success rate.

The success rate in 2 to 3 year old children was 75%, less than the 96% reported by Robb[8]. This may be explained because the present study included a Down syndrome child who had failed probing, and children who had failed probing from other hospitals. It also had a longer follow-up time.

The success rate in 3 to 10 year old children was 75%, which was more than the 64% reported by Kashkouli[6], but less than 92% reported by Robb[8]. This may have been because in the older age children, most had complex that was not caused from Hasner valve obstruction[9] and therefore did not respond to probing. Because in older children, spontaneous opening of the Hasner valve is less likely than in younger children and chronic lacrimal drainage inflammation is more likely with increased scar formation, it reduces the success of probing in older age groups. Although our success rate in older age was different than Robb's[8], the success of older probing in the present study was still high. The authors recommend probing as the first choice in children older than 3 years.

Because this was a retrospective study, with a small number of patients, different criteria for successful evaluation by each doctor, and different follow-up time for each patient, all affecting the evaluation of probing results, a large prospective study with a large sample size and the same evaluating criteria and follow-up time would be useful in the future.

In conclusion, the success rate of probing for treatment of congenital nasolacrimal duct obstruction varies depending on the age at treatment. The overall success of probing was 80%, highest in children under 2 years of age (86%) and slightly reduced when probing is delayed, although the difference was not statistically significant.

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ผลสำเร็จของการแยงท่อน้ำตาอุดกั้นแต่กำเนิดในเด็กอายุน้อยกว่า 10 ปี

กอบลาภ ธงทอง, เพ็นนี สิงหะ, ทิพวรรณ เลียบสื่อตระกูล

วัตถุประสงค์: *เพื่อหาความสำเร็จของการแยงท่อน้ำตาอุดกั้นแต่กำเนิดในเด็กอายุน้อยกว่า 10 ปี*
รูปแบบวิธีวิจัย: *การศึกษาแบบย้อนหลัง*
วัสดุและวิธีการ: *ศึกษาเวชระเบียนของเด็กอายุน้อยกว่า 10 ปีที่ได้รับการวินิจฉัยเป็นภาวะท่อน้ำตาอุดกั้นแต่กำเนิด ระหว่างปี พ.ศ. 2540 ถึง พ.ศ. 2550 และได้รับการแยงและชะล้างท่อน้ำตาภายใต้การดมยาสลบ ผลสำเร็จของการแยงและชะล้างท่อน้ำตาคือ การไม่พบน้ำตาและขี้ตาในตาข้างที่ได้รับการแยงท่อน้ำตาภายหลัง ติดตามการรักษาอย่างน้อย 1 เดือน โดยรวบรวมข้อมูลดังนี้ เพศ อายุที่มารับการตรวจรักษาครั้งแรก จำนวนตาและข้างที่ได้รับการแยงท่อน้ำตา ประวัติได้รับการแยงท่อน้ำตามาก่อนอายุที่ได้รับการแยงท่อน้ำตา จำนวนครั้งของการแยงท่อน้ำตาและผลการรักษา โดยศึกษาผลสำเร็จใน 4 กลุ่มอายุที่ได้รับการแยงท่อน้ำตาดังนี้ 0-1 ปี 1-2 ปี 2-3 ปี และ 3-10 ปี*
ผลการศึกษา: *มีเด็กทั้งหมด 44 คน ที่มีภาวะท่อน้ำตาอุดตันแต่กำเนิดเป็นเด็กชาย 19 คน เป็นเด็กหญิง 25 คน เป็นตาขวาทั้งหมด 29 ตา เป็นตาซ้ายทั้งหมด 30 ตา รักษาด้วยการแยงท่อน้ำตาข้างเดียว 29 คน แยงท่อน้ำตาทั้งสองข้าง 15 คน อายุที่ได้รับการแยงท่อน้ำตามีตั้งแต่ 10 เดือน จนถึง 9 ปี 5 เดือน อายุเฉลี่ยที่ได้รับการแยงและชะล้างท่อน้ำตาเท่ากับ 2.51 ปี (SD $\pm$ 1.82) พบผลสำเร็จของการรักษาด้วยวิธีการแยงและชะล้างท่อน้ำตาโดยรวมในเด็กทุกคนเป็น 80% (47/59 ตา, 95% CI เท่ากับร้อยละ 67 ถึง ร้อยละ 89) ส่วนใหญ่ของตา ที่แยงท่อน้ำตาสำเร็จได้รับการแยงท่อน้ำตา 1 ครั้ง มี 2 ตาที่ได้รับการแยงท่อน้ำตา 2 ครั้ง โดยแบ่งผลสำเร็จเป็นกลุ่มอายุได้ดังนี้ อายุ 0-1 ปี เท่ากับ 80% (8/10 ตา) อายุ 1-2 ปี เท่ากับ 86% (18/21 ตา) อายุ 2-3 ปี เท่ากับ 75% (12/16 ตา) และอายุ 3-10 ปี เท่ากับ 75% (9/12 ตา)*
สรุป: *ผลสำเร็จของการแยงและชะล้างท่อน้ำตาอุดตันแต่กำเนิดมีความหลากหลายขึ้นกับช่วงอายุที่ได้รับการแยงท่อน้ำตา โดยพบผลสำเร็จของการแยงท่อน้ำตาสูงที่สุดในเด็กก่อนอายุ 2 ปี และยังคงสูงอยู่เมื่อทำการ แยงท่อน้ำตาในเด็กที่อายุมากขึ้น*