

MANAGEMENT OF EPIPHORA IN CHILDREN- PROSPECTIVE ANALYSISBalakrishnan M¹, Mohanraj K², Sowmiya K. R³, Rekha B⁴¹Associate Professor, Department of Ophthalmology, Sree Balaji Medical College and Hospital, Chormpet, Chennai.²Professor and HOD, Department of Ophthalmology, Sree Balaji Medical College and Hospital, Chormpet, Chennai.³Associate Professor, Department of Community Medicine, Tagore Medical College.⁴Senior Resident, Department of Ophthalmology, Sree Balaji Medical College and Hospital, Chormpet, Chennai.**ABSTRACT****BACKGROUND**

Lacrimation is caused by reflex over-production of tears from stimulation of the trigeminal nerve by irritation of the cornea or conjunctiva. In these cases, the excess watering is associated with symptoms of the underlying cause and treatment is usually medical. Obstructive epiphora is caused by mechanical obstruction of tear drainage. It is characterized by excessive watering which is exacerbated by a cold and windy atmosphere, and is least in a warm dry room. Most cases can be relieved by surgery. Lacrimal pump failure occurs secondary to lower lid laxity or weakness of the orbicularis muscle. Treatment is more difficult than that of obstructive epiphora.

Purpose- To study success of various methods of treatment for epiphora in children below 11 years and to compare clinical profile between children below 2 years (early onset) and children above 2 years (late onset).

Design- Prospective observational study.

MATERIALS AND METHODS

Study was conducted in 209 eyes of 167 patients (42 bilateral cases) during five years period between Jan 2010 to Jan 2015. The success of treatment was defined as complete resolution of symptoms and negative regurgitation on pressure over lacrimal sac (ROPLAS) area; Patients were followed up for 8.4 ± 2.1 months.

RESULTS

87 percent (145 of 167) cases were below 2 years and 13 percent (22 of 167) were children above 2 years. The male: female ratio was 1.3:1. Seventy five percent cases were unilateral. Cause for 92% cases were congenital nasolacrimal duct obstruction (NLDO), 6% traumatic or surgical and 2% acquired NLDO. The success rate of total 209 cases were 98% (205 eyes), 89% for sac massage, 82% for probing, 64% for external dacryocystorhinostomy (DCR). Statistically significant relation was noted between the treatment result and laterality (P-0.04), symptom severity (P-0.027), previously treated cases (P-0.024) and age. All cases below 2 years with NLDO were completely cured by sac massage and few cases with probing. No significant association was found between treatment result and sex (P-0.73).

CONCLUSION

Properly done sac massage alone for weeks to many months is best treatment for early onset NLDO in children less than 2 years. Probing was successful in 82% of children. Probing and DCR were required in older children. Mucoïd discharge and recurrent ocular infection had decreased overall treatment success. There was significant correlation between laterality, symptom severity and previous treatment.]

KEYWORDS

Epiphora, Children, Observational Study, India.

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BACKGROUND

Epiphora is excessive watering of eyes despite normal tear production due to any obstruction in lacrimal drainage pathway. Congenital nasolacrimal duct obstruction (CNLDO) is a common condition affecting 20% infants in their first year of life⁽¹⁾ and occurs due to the failure of canalization of nasolacrimal duct.⁽²⁾

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Spontaneous resolution occurs in the majority of cases by one year of life.^(1,3) Treatment usually used to revert CNLDO are sac massage, probing, probing with intubation, balloon catheterization, silicon tube intubation and external dacryocystorhinostomy (DCR). Children till the age of one are typically treated with digital sac massage which has been reported to have high success rate (77-95%).^(3,4,5,6,7) Nasolacrimal duct probing is tried generally after the age of one year,^(4,5,6) and its success rate is 77%-97% after fresh application. There is controversy regarding the effectiveness of probing at early age of less than one year and at late age of more than 3 years.^(8,9) DCR is performed in CNLDO due to craniofacial anomalies, Down syndrome and in children with failed sac massage and probing. Acquired causes for epiphora are trauma, surgery, inflammation etc. leading to NLDO, canalicular obstruction or punctal stenosis and malposition. Various studies have evaluated the role of DCR in congenital

as well as acquired cases of NLDO.^(10,11,12) Our study covers a wide range of causes of epiphora and its treatment modalities for children. This study aims at evaluating clinical profile and success rates of sac massage, probing and DCR. Other objective was to find out difference in demographic and clinical characteristics between the early onset (<2 yrs) and late onset (>2 yrs) epiphora.

MATERIALS AND METHODS

Prospective observational study was performed on 209 eyes of 167 patients (42 bilateral cases) aged less than 11 years who presented with complaints of watering eyes to our department, which is a tertiary eye care centre in Chennai, India. Patients were selected from those who visited the department between Jan 2010 and Jan 2015. Some patients were referred by other nearby Ophthalmologists and general practitioners and after conducting medical camps. The study was conducted in the principles of declaration of Helsinki after getting permission from institutional Ethics Committee. Proper written and signed informed consent was obtained from parents or guardians. Procedures and surgeries were done by same surgeon. Epiphora was diagnosed based on any one of the following features - a history of watering and discharge for more than 4 weeks, presence of lacus lacrimalis, raised tear meniscus, discharge and regurgitation on pressure. Hyper lacrimation and pseudo epiphora cases and those not willing for follow up were excluded from this study.

CNLDO was diagnosed based on presenting symptoms like watering, discharge, swelling and redness noticed from birth or after birth. Acute dacryocystitis was diagnosed by the presence of acute onset swelling of lacrimal sac with pain redness and tenderness. Cases with history of many recurrences and remissions of pain and swelling were diagnosed as chronic dacryocystitis. Mucocele was defined as presence of asymptomatic swelling of the lacrimal sac area. Fistula was characterized by an abnormal opening around the sac area with or without discharge. Parents with a minimum follow up of 6.3 months from the day of presentation were included in this study. The following variables were recorded from patients' history and findings: Laterality, age at presentation, gender, presenting symptoms like watering, discharge, swelling, dacryocystitis, mucocele, pyocele, regurgitation on pressure, syringing in older children, treatment modality (sac massage, probing and DCR), duration of treatment, age at the time of probing or DCR and follow-up duration. In bilateral cases, each eye was considered as an independent case to avoid selection bias.

For all cases sac massage was started immediately as treatment. Syringing was done on each visit wherever possible in cooperative children under topical anesthesia. Broad spectrum antibiotic eye drops were instilled before and after massage. Oral antibiotic and anti-inflammatory drugs were given in infected cases. Massage was done 10 times every 3 hours by properly covering mouth and nose. Sac area and method was explained to the parents and demonstrated manually and through video on each visit based on Crigler's method.⁽¹³⁾ Suitable finger and sufficient pressure was used considering the size of child. Broad spectrum antibiotic ointment was applied at night. Improper massage was the major reason for the failure of treatment for NLDO. Patients were advised to continue massage as a

routine for 1 year even after recovery from NLDO. Respiratory infections were treated promptly after referring to physician and ENT specialist whenever required. Probing was considered when there was no relief even after continuous massage continued for 6 months. Probing or DCR without prior sac massage was considered in minority of patients presenting with acute dacryocystitis and pyocele after control of infection. All patients who failed to show recovery of CNLDO after a minimum of 3 months of sac massage trial were advised to undergo probing. Probing⁽¹⁴⁾ and external DCR⁽¹⁵⁾ were performed under general anesthesia. A repeated attempt to probe was made after 3 months after which DCR was advised.

Presenting symptom and signs, associated craniofacial and ocular anomalies, treatment given and any other investigation such as computerized tomography (CT) dacryocystography (DCG) were noted. The patients were followed up for a minimum period of 6.3 months after the treatment to look for the resolution of symptoms and signs. Treatment success was defined as the absence of fluid regurgitation on pressure at lacrimal sac (ROPLAS) and complete resolution of symptom for at least 6.1 months after a procedure or during the patient's last visit to the hospital whichever was later

Statistical Analysis

SPSS (Version 11) (SPSS Inc.; Chicago, USA) was used for analysis after collection of data. Descriptive statistics were used for demographic characteristics and the data being presented as percentages, mean and standard deviation. Chi-square and fishers exact test were used to test the difference in the two proportions. P <0.05 was noted as statistically significant difference.

RESULTS

Totally 167 patients were studied. The mean age of onset of symptom was 1.3± 3 years (range -1 month to 10 yrs.). The mean age of consultation with doctor was 2.6± 2.5 yrs. (range- 1 month to 8 years). 145 patients (87%) had an early onset (< 2 yrs. of age) and 22 (13%) had late onset epiphora (> 2 yrs.). The male: female ratio in the early onset group was 1.2:1 and in late onset group was 1.4:1. Total 125 cases (75%) were unilateral. Congenital NLDO was the most common cause of paediatric epiphora seen in 92% (154/167). Trauma (iatrogenic or non-iatrogenic) was the cause of 6 % (10/167) paediatric NLDO. Acquired causes were the reason for 2% (3/167) cases of paediatric NLDO. Table-1 shows the various types of injuries causing epiphora. Congenital NLDO was the cause for 99 % of early onset group. But injuries and acquired causes were equal reasons for epiphora in late onset group.

n	
Type of injury	
Road traffic accident	4
Accidental fall from height	1
Bow and arrow injury	1
Gulli danda injury	1
Cricket ball injury	1
Post-surgical- after faciomaxillary surgery	1
Cicatricial - post thermal injury	1

Table 1. Distribution of cases with injury

Seventy five percent (125/167) cases first visited Ophthalmologist directly. Remaining cases first visited general practitioners and pediatricians directly and later referred to Ophthalmologist. Previous history of treatment was available in 80 cases (57% in early onset group of eyes and 60% in late onset group) which included sac massage in 62 cases (77%) and single trial of probing in 12 cases (15%) and multiple trial in 5 cases (6%) and 1 case (1%) of failed DCR.

The commonest symptoms in all groups including early and late onset was discharge (68%), watering (22%), itching (8%) and pain with swelling (2%). We had also selected children with complaints of watering and who were associated with craniofacial and ocular anomalies. These ocular and systemic anomalies have been listed in table-2.

	n
Down's syndrome	2
Craniosynostosis	1
Apert syndrome	1
Mild cranial anomalies	1
Total	5
Other Ocular Anomalies	
Telecanthus	6
Epiblepharon	1
Iridofundal coloboma	1
Lid coloboma	1
Total	9

Table 2. Distribution of ocular and, systemic and craniofacial anomalies with epiphora

CT- Dacryocystography was used to locate obstruction in 3 cases out of 10 cases of traumatic childhood epiphora. Prior explanation was given to parents regarding safety and allergic reaction during the investigation. All 3 cases had obstruction at sac- NLD junction as evident by collection of dye in dilated lacrimal sac.

Different types of treatment modalities utilized include sac massage in all 209 eyes, (100%), sac massage and probing in 22 eyes (10%) and sac massage, probing and DCR in 11 eyes (5%). Skin grafting was done along with DCR in a case of cicatricial NLD block after thermal injury. The treatment method given was based on the age of presentation as shown in Table-3. The mean duration of follow up was 8.4 ± 2.1 months.

Age	Sac Massage (s)	S & P	S, P & DCR
Upto 1 years	140	0	0
1-2 yrs	7	3	0
2-3 yrs	0	3	0
3- 4 yrs	0	2	0
4-5 yrs	0	2	0
5-6 yrs	0	2	0
6-7 yrs	0	2	0
7-8 yrs	0	2	1
8-9 yrs	0	1	1
9-10 yrs	0	1	2
10-11 yrs	0	0	3

Table 3. The type of successful treatment given based on the age of presentation

P-Probing, DCR - Dacryocystorhinostomy

Total success rate of treatment was 98 % (205/209) by various methods of treatment. Success rate of sac massage was 85 % (187/209). Success rate of probing was 82% (18/22) Success rate of external DCR was 64% (7/11). Few cases came back with recurrence of watering following initial success of treatment that included 22 eyes (11%) of sac massage, 4 (18%) eyes of probing and 4 (36%) cases of external DCR. These cases were considered as failed treatment cases in respective treatment method. Only 4 eyes were declared as overall failed treatment at the end. We had advised these failed cases to undergo repeat DCR with intubation or dacryocystectomy (DCT). The success rate of DCR for NLDO (congenital and acquired) was higher (74%) compared to traumatic eyes (54%). The relation between treatment result with some demographic factors was studied. They included age, sex, laterality, aetiology, symptom severity, and previous treatment history. Increasing age was a significant risk factor related with the failure of sac massage and probing. The success rate of sac massage and probing declined after 2 years of age (P< 0.05). Statistically significant association was seen between treatment result and laterality (P-0.04), symptom severity (P-0.027) and previous treatment history (P -0.024) (Table – 4). The success rate of probing in eyes undergoing a first-time treatment of syringing and probing was 90% (40/44), but the success rate in eyes with a previous failed syringing and probing was 57% (17/30) (P<0.05).

	Success	Failure
Laterality (P-0.04)		
Unilateral	108	16
Bilateral	31	11
Symptom severity (P-0.027)		
Watering	63	7
Discharge	104	34
Previous treatment history(P-0.024)		
present	106	34
absent	61	7

Table 4. Treatment results based on laterality, symptom severity and previous treatment history

DISCUSSION

Epiphora is a common problem in children. Many cases are yet to be explored other than CNLDO. We conducted prospective evaluation of pediatric patients with watering due to all reasons and compared the data between the early versus and late onset group. We analysed a large cohort of children with CNLDO and with wide range of age groups and were treated with sac massage, probing and external DCR either solitarily or sequentially.

Congenital NLDO was the commonest cause in our study followed by post traumatic NLDO. Ninety-nine percent cases below 1 year were due to congenital NLDO. In late onset cases both congenital and acquired cases were almost equally prevalent. Commonest cause of trauma was due to road traffic accident which resulted in medial canthus and sac area injuries. These were mostly avulsion injuries typically associated with a triad of telecanthus, epiphora and ptosis as also reported by Priel et al.⁽¹⁶⁾ The location of the site of obstruction before treatment is important in traumatic cases.

CT –DCG is a useful diagnostic tool in clinically challenging cases of traumatic epiphora. It helps to (1) find out the level of obstruction;(2) note whether the obstruction is complete or incomplete, intrinsic or extrinsic to the duct and (3) find out the cause of obstruction.⁽¹⁷⁾ CT-DCG was done in post-traumatic cases and revealed that the commonest site of obstruction was sac-NLDO junction.

There was greater symptom severity in late onset group with 77% cases presenting discharge, 19% with watering and 4% eyes with lacrimal sac area swelling. This may be explained by the prolonged inflammation leading to greater symptoms and signs. The results of probing with or without silastic intubation reported in other studies range from 55% to 96%.^(18,19,20,21,22,23,24) The success rate of probing in our study was 82 %. This lower rate may be due to inclusion of some complicated cases like previously failed cases and associated with craniofacial anomalies. Additional procedures like inferior turbinate fracture repair, intubation DCR, endoscopic DCR, Silastic intubation were not done in this study cases.

All patients decided for external DCR underwent DCR without intubation and without endoscopy. These factors might be the cause for less success rate for DCR (64%) on comparing with other studies ^(25, 26). Even though less number of DCR done in our study, post traumatic DCR cases had less success rate than non-traumatic cases which was almost

equal to other studies.^(10,12) There was higher success rate in early onset groups (88%) than in late onset group (73%)

There was statistically significant association between treatment result and laterality (P-0.04), symptom severity (P-0.027) and previous treatment history (P-0.024). Honavar etal reported reasons predictive of failure of probing such as age > 36 months, bilateral affection, failed conservative therapy, failed earlier probing, dilated lacrimal sac, and firm obstruction.⁽²⁰⁾ Mannor etal found a significant association between success of probing with age and symptom severity but not with a previous treatment history⁽²⁷⁾ but Kashkouli et al found no association with laterality or presence of infection.⁽²³⁾ Repka etal found an association with laterality and symptom severity.⁽¹⁹⁾

NLDO which is common in first year of life resolve spontaneously or after sac massage.⁽²⁸⁾ In unresolved cases, probing is used in most cases. Success rate was decreasing on increasing age. Several studies have found a significant increase in the failure rate in those patients undergoing probing after the age of 12 months.^(27,20,23,29,30) Table 5 shows the success rate of probing reported in several studies. Resolution of symptoms can also be attributed to spontaneous resolution in children less than one year. It is not possible to differentiate whether the success in this age group was due to spontaneous resolution or solely due to intervention in the absence of control group.

Study	Number of Eyes	Success Rate of Simple Probing as per the Age		
		0-12 months	13-24 months	>24 months
Katowitz and Welsh ⁽³⁰⁾	572	97%	69%	33.3%
Zwaan ⁽³¹⁾	110	97%	88%	92%
Robb ⁽²²⁾	280	98% from 0 to 24 months		
Mannor et al ⁽²⁷⁾	142	92%	89%	69%
Honavar et al ⁽²⁰⁾	60	All patients>24 months age		
Maheswari ⁽²¹⁾	84	88.1%		80.1%
Kashkouli et al ⁽²⁹⁾	207	92%	85%	65%
Repka et al ⁽¹⁹⁾	955	78%	79%	79%
Lee et al ⁽²⁴⁾	138	Overall success rate of 86% (average age of 12.4 months)		
Present study	Number of eyes	12-23 months	24-35 months	≥36 months
Balakrishnan et al	22	100%	100%	40%

Table 5. Success rate of probing in previous studies

The strength of our study is the heterogeneity in patient population giving a chance to evaluate various factors associated with treatment results. Many factors such as variable follow up, low socio-economic status, low literacy rate, infection status, minor anatomical variation could not be analysed which could have changed the outcome. Other lapses are non-utilization of all objective tests for lacrimal patency and various other treatment modalities.

CONCLUSION

Sac massage and probing is successful in CNLD in majority of cases in our study and its success declines with a progressive increase in age. Sac massage as a primary treatment prior to probing may be successful in some older children as well and, as it does not negatively impact outcome if probing is worth a try. Traumatic and other secondary causes contribute significantly to the aetiology of the older age group. Treatment failures are related to age, increasing symptom severity and previous history of treatment.

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