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Quick Response Code:	Website: www.annalsafrmed.org
	DOI: 10.4103/1596-3519.134412
	PMID: *****

Pattern and outcome of surgical management of nasolachrymal duct obstruction in children: A five year review

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Abstract

Objective: To determine the pattern of naso-lachrymal duct obstruction (NLDO) and outcome of dacryocystorhinostomy (DCR) in children in Aminu Kano Teaching Hospital Kano, over a 5-year period.

Patients and Methods: The clinic and theater registers were used to retrieve the records of all patients below the age of 15 years who presented with NLDO. The information obtained included age, sex, duration, and types of clinical signs at presentation cause of obstruction and outcome of DCR. Successful outcome is defined as patent naso-lachrymal duct 1 year after surgery. All the patients had external DCR with stent inserted into the lachrymal sac and anchored to the columella and left *in situ* for 6 weeks. Fortnightly for three visits then at 2 months intervals. At each visit, the patient had lachrymal punctal cannulation and irrigation with normal saline to ensure free drainage.

Results: There were 17 patients, 9 males and 8 females (M: F = 1.1: 1). Two patients (11.8%) had bilateral disease and 15 (88.2%) were unilateral. The patients' ages ranged between 2 and 10 years. The commonest presenting features were tearing and discharge. In 14 patients (82%) tearing started from birth though patients presented much later. Congenital NLDO occurred in 82%, and in the remaining 18%, obstruction was caused by depressed nasal fracture. Fifteen patients (88%) had successful outcome of DCR at 1-year follow-up. The commonest complication noted was stent extrusion before 6 weeks in 17.6% of cases.

Conclusion: NLDO was mostly of congenital origin and was characterized by delayed presentation. Patients have good outcome with external DCR.

Keywords: Children, dacryocystorhinostomy, naso lachrymal duct, obstruction

Résumé

Objectif: Pour déterminer le modèle de naso -lacrymal conduit l'obstruction (mise) et le résultat de dacryocystorhinostomy (DCR) chez les enfants en Aminu Kano hospitalo-universitaire Kano, sur une période de 5 ans.

Patients et Méthodes: Les registres de la clinique et le théâtre ont été utilisés pour récupérer les enregistrements de tous les patients âgés de moins de 15 ans qui a présenté avec mise. Les informations obtenues inclus âge, sexe, durée et types de signes cliniques à cause de la présentation d'obstruction et de textes issus de la DCR. Résultat positif est défini comme brevet conduit naso-lacrymal 1 an après la chirurgie. Tous les patients avaient DCR externe avec stent inséré dans le sac lacrymal et ancré à la columelle et à gauche sur place pendant 6 semaines. Tous les quinze jours pour trois visites puis à 2 mois des intervalles. Lors de chaque visite, le patient avait ponctuels lachrymal canulation et irrigation avec une solution saline normale afin d'assurer le libre écoulement.

Résultats: Il y avait 17 patients, 9 mâles et 8 femelles (M:F = 1.1: 1). Deux patients (11,8 %) avaient une maladie bilatérale et 15 (88,2 %) ont été unilatérale. Âge des patients varie entre 2 et 10 ans. Les fonctionnalités présente plus fréquentes ont été déchirer et décharge. Chez 14 patients (82 %) déchirure a commencé dès la naissance si patients présentés beaucoup plus tard. Congénitale mise a eu lieu à 82 %, et dans les 18 % restants, obstruction a été causée par une fracture nasale déprimée. Quinze patients (88 %) avaient aboutissement du DCR au suivi d'un

an. La complication la plus fréquente a noté était stent extrusion avant 6 semaines dans 17,6 % des cas.

Conclusion: mise a été pour la plupart d'origine congénitale et a été caractérisée par la présentation tardive. Les patients ont de bon résultat avec DCR externe.

Mots-clés: Conduit lacrymal d'enfants, DCR, naso, obstruction

Introduction

Tear fluid is essential for normal physiological function of the eye and adnexia. Tears leave the eye via the two lachrymal puncta through the canaliculus and then drain through the inferior nasal meatus, lateral and below the inferior turbinate. The opening of the naso lachrymal duct (NLD) is partially covered by a mucosal fold (valve of Hasner).^[1] At birth, the lower end of the NLD (near the valve of Hasner) is frequently non-canalized but become patent during the first few weeks of life. Persistence of the membrane at valve of Hasner is the most common cause of congenital obstruction. Obstruction of free flow of tears results in stasis and infection which in rare instances could lead to orbital cellulitis.^[2] Congenital naso lachrymal duct obstruction (NLDO) is a common problem in the first years of life; it is, however, associated with high rate of spontaneous resolution in over 90% within the first year of life.^[3] There is no population-based data on incidence of NLDO in our environment. The common mode of management for patients who presented early (during the first year of life) includes hydrostatic massage and application of topical antibiotics.^[4] External dacryocystorhinostomy (DCR) offers good results with long-term success recorded.^[5] Other therapeutic measures employ the naso-endoscopic techniques. The study determined the pattern of NLDO and outcome of DCR in children.

Patients and Methods

The outpatient's clinic and theater registers of Aminu Kano Teaching Hospital Kano, over a 5-year period (from 2003 to 2007), were used to obtain the list of all children below the age of 15 years who had surgery for NLDO during the review period. The patient's folders were retrieved and the following information extracted: Patient's age, sex, age at onset, and common presenting signs, laterality, cause of NLDO, surgical operation performed (DCR), and outcome of surgery (patent NLD 1 year after DCR). All the patients had basic eye and nasal examination to rule out other causes of tearing such as congenital glaucoma and nasal lesions. Preoperative management included routine investigations such as electrolytes and urea, full blood count and differentials, swab microscopy, culture, and sensitivity. All the patients

had attempted lachrymal punctum cannulation and irrigation with unsatisfactory results. All the patients had external DCR. The steps involved cleaning and draping followed by a medial canthal incision of about 2 cm made deep to the bone. The periosteum was elevated to expose the lachrymal sac. After elevation of the sac off the fossa, a bore was used to edge the opening until nasal mucosa was exposed. An opening was made in the lachrymal sac to create anterior and posterior lips on the medial side of the sac. A similar incision was made on the nasal mucosa to create anterior and posterior lips. The punctum was irrigated with saline to observe free communication with the wound. A stent (no. 16 Foley's catheter) was inserted through the nose and guided into the lachrymal sac. Both posterior lips of the sac and nasal mucosa were sutured and then the two anterior lips were sutured. The wound closed in layers (2/0 nylon to skin). The stent was anchored to the columella. Nasal cavity was gently packed with antibiotic-soaked gauze. The patients were placed on systemic ceftriaxone, analgesic (doses given per kilogram body weight) and topical lomefloxacin (Okacin[®]) eye drops four times a day. Patients were discharged after 5 days and seen fortnightly for three visits and at 2 months interval, subsequently. The stent was removed after 6 weeks. Punctal irrigation was performed to established free flow through the DCR during follow-up visits.

Results

There were 17 patients who presented during the study period. Two patients (11.8%) had bilateral disease and 15 (88.2%) were unilateral. The NLDO occurred on the right side 9 times and left side 10 times. There were nine males and eight females (M: F = 1.1:1). The patient's age range was 2-10 years. The outpatient's clinic and theater registers of Aminu Kano Teaching Hospital Kano, over a 5-year period (from 2003 to 2007), were used to obtain the list of all children below the age of 15 years who had surgery for NLDO during the review period 10 years. A total of 65% were between the age of 2 and 5 years [Table 1]. The commonest clinical signs at presentation were tearing, tearing with discharge, discharge, and medial canthal swelling [Table 2]. Fourteen patients (82%) had symptoms that started from the first year of life. In three patients (18%), the duration of symptoms was 1-3 years and these were the post-traumatic cases. Eight patients were requested to do swab microscopy culture and sensitivity, five

Table 1: Age and sex distribution of 17 children with nasolacrimal duct obstruction

Age group in years	Sex		Total (%)
	Male	Female	
2-5	6	5	11 (65)
6-9	2	3	5 (29)
10	1	0	1 (6)
Total	9	8	17 (100)

Page | 132

Table 2: Common presenting clinical signs among the children with nasolacrimal duct obstruction

Clinical sign at presentation	Number (%)
Tearing	9 (53)
Tearing+discharge	6 (35)
Discharge	2 (12)
Swollen medial canthus	2 (12)

results were available. Two cultures grew *Klebsiella* species sensitive to augmentin, one culture showed *Proteus vulgaris* sensitive to ciprofloxacin and there was no growth in the remaining two samples. The patient's eye and nasal examinations were essentially normal. No patient had computed tomography (CT) scan. Fourteen patients (82%) had congenital NLDO and had DCR. Three patients (18%) had NLDO secondary to depressed nasal fracture and these had reduction of the fracture in addition to DCR. One year after surgery, the lachrymal drainage apparatus was patent in 15 patients (88%) Two patients with posttraumatic NLDO had blocked drainage. One was managed conservatively with antibiotics and irrigation. The second patient had revision of the procedure due to blockage by fibrous tissue. The commonest complication observed was extrusion of the stent before 6 weeks and these was observed in three patients (17.6%). Infection occurred in two patients (11.8%).

Discussion

Our study shows that averages of three children were treated with NLDO annually during the period reviewed. There is no gender predilection. Most of the patients had congenital NLDO. This condition may affect up to 20% of new borne but over 90% resolves spontaneously within 1 year as such most respond to conservative measures.^[3] Some reports indicate that symptoms of epiphora could arise from incomplete punctual canalization. In a series of 22 patients with mean age of 82.4 months, membranectomy restored anatomical patency in 100% and relief of symptoms in 91%.^[6] In our study, trauma was the second cause of NLDO. In a study of 14 children with naso-orbitoethmoidal fracture mostly from trauma due to road traffic accident, external DCR with intubation and mitomycin C was found to be effect in those who had delayed surgery.^[7] In

this study, patients with traumatic obstruction tend to present earlier than those with congenital NLDO. Diagnosis is usually established based on presentation and clinical evaluation. High cost of CT scan has precluded its use in our setting. The commonest sign was tearing and in some cases with discharge as a result of secondary microbial infection. Although the commonest organism colonizing the conjunctiva is *Staphylococcus epidermidis*,^[8] *Klebsiella* species and *Proteus* were the common organisms isolated. Our patients presented late perhaps after failure of conservative measures such as hydrostatic massage and probing which are more likely to yield positive results in younger children.^[9] Our patients presented late probably because these procedures failed to achieve favorable results. Increase in age is associated with decrease in success rate of probing beyond the age of 1 year.^[10] Nasal endoscopy to view the area of outflow at the lower end of the NLD can be used to guide the progress of probing.^[11] This is applicable where the children are seen early, and such facilities are not available in our hospital. Failure of probing may be caused by inflammation and fibrosis in the lacrimal drainage apparatus.^[12] Probing is an initial procedure without compromising subsequent surgical treatment if unsuccessful.^[13,14] Probing may be associated with false passage formation, traumatic stenosis, and failure. Patients with posttraumatic obstruction are more likely to have fibrous tissue reaction resulting in further obstruction and are unsuitable for probing. Our patients had external DCR with 88% success rate at 1-year follow-up; 84%-90% success rate is reported at 3.6 months follow-up.^[5] In Tanzania, external DCR was said to have recorded an 84.4% cure rate for epiphora and 90.9% cure rate for discharge.^[15] Other surgical options includes transilluminating intranasal DCR which has the advantages of avoidance of skin incision, reduced bleeding, shorter duration of surgery, and quicker recovery.^[16] Our study shows that DCR yields good results in children with NLDO. The procedure is more successful in congenital NLDO than posttraumatic cases. Extrusion of the stent is a common complication; hence, the need to anchor it well during surgery. Silicone stents are not available, this explain the need to improvise with Foley's catheter. Mechanical endonasal DCR which has 95% anatomical success and similar to external DCR involves creation of a large ostium is an improvement on the endonasal technique.^[17] Endonasal DCR showed a 94.9% success rate and offers better cosmesis and excellent results in treating NLDOs.^[18] Similarly, endoscopic intranasal surgery showed a 92.72% success rate without recorded early and late complications and is a suitable modality of treating congenital NLDO.^[19] Endonasal DCR can be performed as a primary or revision procedure in cases of failed external

DCR with favorable outcome.^[20] Some studies suggest that outcome of endoscopic DCR is similar to that of external DCR. Endocanalicular diode laser DCR is an effective treatment for pediatric patients with congenital NLDO and offers shorter operative time with less morbidity.^[21] Another option is endonasal laser (ENL-DCR) which employs potassium-titanyl-phosphate laser.^[22] Equipment required for most of these modern surgical methods is unavailable in our setting. The patients in this study are still being monitored to ensure no relapse of symptoms. Studies have revealed surgical success may fall with time. An 84% success rate at 3.6 months fell to 70% at 3 years due to restenosis.^[5] Common canalicular block has also been blamed for some DCR failures. Congenital NLDO was the commonest seen in children in this environment. The patients presented late precluding the use of conservative therapeutic options. External DCR remains a valuable therapeutic option in children with NLDO in our setting. The study is a retrospective review of children seen in a tertiary referral hospital and may not necessarily reflect the general situation in the community. Congenital NLDO was most common and respond favorably to external DCR.

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Cite this article as: Abdu L, Salisu AD. Pattern and outcome of surgical management of nasolacrimal duct obstruction in children: A five year review. Ann Afr Med 2014;13:130-3.
Source of Support: Nil, **Conflict of Interest:** None declared.