RESEARCH ARTICLE

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Primary Endoscopic Dacryocystorhinostomy with or without stent tubing

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ABSTRACT

Introduction: Epiphora means excessive tearing due to outflow obstruction. Epiphora is a common complaint of patients who present to an ophthalmology or otolaryngology clinic and becomes more common in an aging population. Dacryocystorhinostomy (DCR) has been established as the prevailing procedure for acquired NLD obstruction. DCR is a surgical method that allows the direct drainage of tears from the lacrimal sac into the nasal cavity, bypassing the blocked NLD.

Methods: A prospective cohort and interventional study preliminary were conducted employing a pre-and post-test (intervention) design, both before and after implementing an interventional dacryocystorhinostomy procedure. A total 61 patients who were suffering from nasolacrimal duct obstruction and filling of a previously designed questionnaire form. Follow-up phase lasted for 6 months, during which all operated cases were reviewed by direct interviewing of the cases in 3 subsequent occasions of 1,2,and 3 months intervals postoperatively.

Results: Out of 61 cases; 52(85.2%) of them were females. The age of the participants ranged from 15-71 years with a mean age ± SD of 40.7 ± 13.5 years. About 85% of participants were younger than 55 years. The most frequently reported age group was 35-44 years constituting about 28%. Around 85% of preoperative Munk scores were of 3 and 4 while in the first, second, and 3rd visits it became0 & 1, the dacryocystorhinostomy showed an obvious improvement in the mean Munk score in preoperative assessment in comparison to post-operative one with a mean score improvement from 3.2 preoperatively to less than 0.5 postoperatively, and similar in the LAQ score from 5.6to less than 0.5.

Conclusions: This study concluded that the dacryocystorhinostomy has an obvious improvement in the mean Munk score and a positive effect in improving the lacrimal symptom score. There is no statistically significant difference between the outcome results of dacryocystorhinostomy with and without insertion of the stent. Endoscopic DCR is a safe and minimally invasive technique.

Keywords: Dacryocystorhinostomy, Epiphora, Lacrimal symptom, Munk score.

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INTRODUCTION

Epiphora means excessive tearing due to outflow obstruction. Epiphora is a common complaint of patients who present to an ophthalmology or otolaryngology clinic and becomes more common in an aging population. The reasons for the epiphora are several and much attention has been focused on the pathological processes that can lead to problematic epiphora[1-5]. The main causes of epiphora are punctal abnormalities (stenosis, agenesis, atresia), nasolacrimal duct abnormalities, canalicular abnormalities, lacrimal pump alteration, and nasal diseases[6-9].

The main lacrimal gland, the accessory lacrimal glands, and the conjunctival epithelium are responsible for producing tears. Tears are spread over the surface of the eye by blinking to establish the precorneal tear film[6].

The lacrimal drainage system is classified into the upper and lower portions for diagnostic and therapeutic reasons. In majority of cases, epiphora is due to an obstruction in the lacrimal drainage system. However, a subgroup of symptomatic patients with epiphora has a patent lacrimal drainage system. Such cases are usually termed "functional obstruction" which by definition is epiphora without detectable lacrimal drainage system obstruction[10].

Different reasons have been cited in the literature, including partial obstruction of NLD[11-13], lacrimal pump failure[14], and conjunctivochalasis occluding the punctal. Overall causes of epiphora include discontinuity of drainage apparatus, for example, conjunctivochalasis, punctum ectropion, and punctal apposition syndrome; lacrimal drainage apparatus stenosis (from punctum to the nasolacrimal duct), for example, active inflammation along the apparatus, tumors, dacryolith. sinusitis ,rhinitis, and trauma to the area (including nasoethmoid fractures or maxillary Le Fort fractures and soft tissue trauma involving the nose and/or the eyelid);excessive lacrimation , for example; lacrimal pump failure, , lacrimal gland stimulation; reflex tearness of orbicularis oculi- and immobile eyelid; open in neonates or infants[15-17].

Dacryocystorhinostomy (DCR) has been established as the prevailing procedure for acquired NLD obstruction. DCR is a surgical method that allows the direct drainage of tears from the lacrimal sac into the nasal cavity, bypassing the blocked NLD. There are two main types of DCR, namely external DCR and endonasal DCR[18].

DCR boasts impressive success rates, ranging from 70% to 90%, the existing body of literature suggests a disparity between the objective success rate assessed through anatomical patency and symptomatic success[19,20].

There are situations where patients experience troublesome epiphora despite the DCR site being open and their clinical examination revealing no abnormalities. This situation is commonly referred to as "epiphora" following a successful DCR procedure[19,21].

Addressing epiphora poses a complex challenge and a range of surgical techniques have been attempted to alleviate this condition, such as secondary silicone tube intubation, lid-tightening procedures, palatoplasty, and DCR with Jones tube[22].

AIM

This study aims to determine whether there is a significant difference in the outcome of DCR between those patients with stents and those without stents.

The objectives of this study are to determine:

1. Mean Munks score preoperative and postoperative.

2. Mean lacrimal score preoperatively and postoperatively.

3. Whether there is a statistically significant difference between the outcome results of dacryocystorhinostomy with and without insertion of the stent

METHODS

A prospective cohort and interventional study preliminary were conducted employing a pre-and post-test (intervention) design, both before and after implementing an interventional dacryocystorhinostomy procedure. The research took place in an ENT department of Rizgari Teaching Hospital (tertiary health care facility), most of the patients were referred to ENT department after they had been seen by an ophthalmologist, and nasal examination and nasal endoscopy were done for all patients. The study spans a duration of one year. The timeline was divided as follows: 1/11/2021 to 31/12/ 2022 were allocated for preparation, conducting the pre-intervention test, and analysing any shortcomings then from 1st Jan. to 31st Mar 2023 were dedicated to preparing materials. This was achieved through scheduled face-to-face interviewing of a total of 61 patients who were suffering from nasolacrimal duct obstruction and filling out a previously designed questionnaire form. The follow-up phase lasted for 6 months, during which all operated cases were reviewed by direct interviewing of the cases on 3 subsequent occasions of 1, 2 and 3 months intervals postoperatively.

In addition to the demographical data like age, sex, date of operation and site, of a total 61cases, each underwent an assessment of a nasolacrimal duct obstruction by nasal endoscopy and also calculating both Munk score (the severity of epiphora symptoms) and Lacrimal symptom score (the sum of three scores concerning the eye symptoms) and the social impact of each case separately as baseline data. Munk score of each case was obtained by calculating the sum of the numbers of each most appropriate frequent dabbing that best describes the patient situation, as a result a score of 1-5 was obtained for each patient (0 representing no obstruction and 5 representing a constant continuous obstruction).

Another important data collected was Lacrimal symptom score which was calculated by adding the total numbers

of most appropriate symptoms of each patient as a result a score of a weight 0-14 was obtained (zero representing no symptom and 14 representing the most severe symptom).

The reassessment of the patients have been done 1 month, 2 months, and 3 months following the operation by using the same tool (Munk score and Lacrimal symptom score) and registering it to the questionnaire. The reassessment was carried out by the researcher via direct interviewing.

Children, revision DCR patient with chronic sinusitis and polyposis were excluded from the study.

A significance level of $p \leq 0.05$ and a 95% confidence interval (95% CI) were considered for the analysis. The statistical package for social sciences (SPSS, version 24) was employed for data analysis.

The study protocol was approved by the Research Ethics Committee of the Kurdistan Higher Council of Medical specialties (Protocol no.0000, approval date: 21/08/2022) **Form**.

Grade	**Munk Scale**
0	No epiphora
1	Epiphora requiring dabbing less than twice a day
2	Epiphora requiring dabbing 2-4 times a day
3	Epiphora requiring dabbing 5-10 times a day
4	Epiphora requiring dabbing more than 10 times a day
5	Constant epiphora

Lacrimal Q score (sum of three total scores): ☐

Problems with each eye separately.
For each of the four problems (watery eye, pain, sticky eye or swelling), put a tick in the box next to the statement which best describes the situation over the last eight weeks.
Use the left hand column for the eye, and the right hand column for right eye.

● Watery eye	Left		Right
No Watery eye problem	☐	0	☐
The eye waters occasionally , mainly outdoors	☐	1	☐
Troublesome watering of the eye , indoors and outdoors , some days	☐	2	☐
Troublesome watering of the eye most days	☐	3	☐
Troublesome watering of the eye every day	☐	4	☐
● Pain in or around the eye : soreness of eyelids			
No pain	☐	0	☐
Some pain or soreness but has not sought medical advice or treatment	☐	1	☐
Pain or soreness , has used prescription eye drops	☐	2	☐
Painful and swollen (lacrimal abscess) .requiring antibiotics or surgical drainage	☐	3	☐
● Sticky eye			
No problem with sticky eye	☐	0	☐
The eye is sometimes sticky in the morning	☐	1	☐
The eye is sticky every day in the morning	☐	2	☐
The eye is sticky or mucous discharge throughout the day	☐	3	☐
There is infected discharge leaking through the skin of the lower eyelid (fistula)	☐	4	☐
● Swelling or lump at the medial canthus (mucocele)			
No swelling or lump	☐	0	☐
Swelling present , but only intermittently	☐	1	☐
Swelling present all the time	☐	2	☐
(scoring : use number in central column) Total scores for each eye	☐		☐

RESULTS

Out of 61 cases; 52(85.2%) of them were females. The age of the participants ranged from 15-71 years with a mean age ± SD of 40.7 ± 13.5 years. About 85% of participants were younger than 55 years. The most frequently reported age group was 35-44 years constituting about 28%. Around 85% of preoperative Munk scores were of 3 and 4 while in the first, second, and 3rd visits 0 & 1 in more than 90% of cases (**Table 1)**.

Mean Munk score and mean lacrimal symptom score

In general, the dacryocystorhinostomy showed an obvious improvement in the mean Munk score in preoperative assessment in comparison to post-operative one with a mean score improvement from 3.2 preoperatively to less than 0.5 postoperatively. Furthermore, this procedure (dacryocystorhinostomy) showed a similar effect in improving the lacrimal symptom score from 5.6 to around and even less than 0.5. Details are shown in (**Table 2)**.

This improvement was clearly due to the absolute effect of the procedure and not due to chance as firstly, the significance level was < 0.005 for all preoperative and postoperative compression parameters, and secondly, the 95% confidence interval of all preoperative and postoperative compression parameters skip the zero value which in turn support the exclusion of chance effect on this result. Details are shown in (**Table 3)**.

Except for the first visit (a very small difference p=0.048), all the other preoperative & and postoperative comparison parameters show significant difference between the outcome results of dacryocystorhinostomy with and without insertion of stent all the biostatistical significance levels were > 0.05 (**Table 4**).

Table 1: Socio-demographic data/ Munk score.

Socio-demographic characteristics					No. (%)
Gender (n=48)				Male	9 (14.8)
				female	52(85.2)
Age group (years)				15-24	7 (11.5)
				25-34	15 (24.6)
				35-44	17 (27.9)
				45-54	12 (19.6)
				>55	10 (16.4)
Side				Left	34 (55.7)
				Right	27 (44.3)
Stent				Without stent	30 (49.2)
				With stent	31 (51.8)
		Preoperative No (%)	1st visit No (%)	2nd visit No (%)	3rd visit No (%)
Munk score	0	0(0)	52(85.5)	49(80.3)	47(77.1)
	1	2(3.3)	5(8.2)	9(14.7)	7(11.5)
	2	7(11.5)	1(1.6)	0(0)	5(8.2)
	3	28(45.9)	1(1.6)	2(3.1)	1(1.6)
	4	24(39.3)	2(3.1)	0(0)	0(0)
	5	0(0)	0(0)	1(1.6)	1(1.6)

Table 2: Mean Munk score and mean lacrimal symptom score.

Variable		Mean ± SD
Munk score (n=61)	Preoperative	3.20 ± 0.77
	1st visit	0.30 ± 0.86
	2nd visit	0.33 ± 0.77
	3rd visit	0.41 ± 0.92
Lacrimal symptom score (n=61)	Preoperative	5.62 ± 3.01
	1st visit	0.41 ± 1.02
	2nd visit	0.54 ± 1.37
	3rd visit	0.52 ± 1.07

Table 3: Comparison of pre and postoperative munk core.

Mean	Paired T test	95% CI		Sig. level (p.value)
		Lower	Upper	
MS0 – MS1	18.163	0.16	2.582	0
MS0 - MS2	18.613	0.154	2.561	0
MS0 - MS3	18.371	0.152	2.483	0
LSS0 – LSS1	12.368	0.421	4.37	0
LSS0 - LSS2	11.583	0.439	4.204	0
LSS0 - LSS3	12.515	0.407	4.283	0

Table 4: Correlation of insertion of stent with the result of dacryocystorhinostomy.

Mean	Independent T test	95% CI		Sig. level (p.value)
		Lower	Upper	
MS0 – MS1	-2.01	-0.77	0.001	0.048
MS0 - MS2	-0.25	-0.5	-0.001	0.802
MS0 - MS3	-0.8324	-0.5	0.389	0.802
LSS0 – LSS1	-0.8391	-0.63	0.261	0.802
LSS0 - LSS2	-0.8324	-0.63	0.119	0.141
LSS0 - LSS3	-1.5003	-0.81	0.117	0.139

DISCUSSION

Recently the topic of advancements in modern powered drills and endoscopic instruments has revolutionized the approach to surgery for dacrocystisis and epiphora, making it increasingly favored by patients due to its favorable outcomes and absence of visible external scarring. In this study, mean age was 40.7, and Sherwani reported a similar result 45.8%[23].

Also another study in Iran the mean age of Patients undergoing dacryocystorhinostomy surgery was 48.2[24]. The prospective design of our study enabled us to evaluate the patient's severity of epiphora (using the Munk score) shortly before surgical intervention, the dacryocystorhinostomy showed an obvious improvement in the mean Munk score in preoperative assessment in comparison to post-operative one with a mean score improvement from 3.2 preoperatively to less than 0.5 postoperatively, a similar result was obtained in another study carried out in Ukrain[25].

Dacryocystorhinostomy showed a similar effect in improving the lacrimal symptom score from 5.6 to around and even less than 0.5 (5 score improvement), much more effect was observed by Wong in his study in the USA with a total 7 score improvement this similar and more effect was obtained because of the difference in study design and sample size, on the other hand, another study by Sahlin27 showed a lesser effect of the procedure in improving the lacrimal symptoms (50% improvement)[26,27]. Patients with epiphora due to minor nasolacrimal duct stenosis, open DCR produces had marked improvement or cure of symptoms in 50%. The lacrimal drainage capacity was well within the normal range in few patients with persistent postoperative lacrimal symptoms, suggesting that other factors (such as hyper secretion) may be significant in this group of patients with 'functional block.

There was no statistical difference between the insertion of the stent and not the insertion of the stent in improving their condition postoperatively which was in agreement with other studies [28-30].

Although stents were implemented to maintain the channels' patency, their presence can lead to blockage due to granulation tissue formation. Stents left in place for over 3 months have been linked to a higher incidence of obstruction. Additionally, stents can cause damage to the punctum and canaliculus. In this study, there was no significant difference between stent and no stent which there was less invasive intervention dealing with the canaliculi and puncta of the eye granting better results and fewer complications[31,32].

CONCLUSION

This study concluded that the dacryocystorhinostomy: Has an obvious improvement in the mean Munk score. Has a positive effect in improving the lacrimal symptom score. There is no statistically significant difference between the outcome results of dacryocystorhinostomy with and without insertion of the stent. Endoscopic DCR is a safe and minimally invasive technique Close follow-up immediately after surgery is crucial to reduce the failure rate. Regular post-operative check-ups are essential, as any issues like synechia or granulation tissue can be corrected, thereby increasing the success rate.

RECOMMENDATION

Not to insert the stent in dacryocystorhinostomy procedures as it has no effect postoperatively. Perform more studies to clarify other aspects of this procedure.

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