Study of the histopathological changes of lacrimal sac and nasal mucosa in patients undergoing external DCR

Abstract-

Introduction-The most frequent histopathologic findings in individuals having dacryocystorhinostomy (DCR) for acquired nasolacrimal duct obstruction are chronic inflammation and fibrosis of the lacrimal sac. Although uncommon, various pathologic alterations such infections, systemic inflammatory conditions, and neoplasms like primary lacrimal system cancers, secondary invasion from neighbouring tissues, or even distant metastases, may be detected in the lacrimal sac.

Aim- To study the histopathological changes of lacrimal sac and nasal mucosa in patients undergoing external DCR.

Material and Methods- Observational prospective study conducted at Department of Ophthalmology, JNU Hospital Jaipur on 43 patients with PANDO undergoing External DCR surgery.

Results- On basis of symptoms out of 43 patients , 40 patients have symptom of watering and 3 patients have Non tender swelling and watering as symptom.In present study Left side[69.8%(n= 30) involvement was seen more than right side[30.2% (n=13).In present study HPE findings of Lacrimal Sac Mucosa revealed Chronic Non-granulomatous Inflammation of mild grade in 18 patients, Chronic Non-granulomatous Inflammation of moderate grade in 17 patients, and Chronic Non-granulomatous Inflammation of severe grade in 8 patients.In present study HPE findings of nasal Sac Mucosa revealed Chronic Non-granulomatous Inflammation of mild grade in 15 patients, Chronic Non-granulomatous Inflammation of moderate grade in 20 patients, and Chronic Non-granulomatous Inflammation of severe grade in 8 patients.

Conclusion- Histopathological evaluation of the lacrimal sac in patients undergoing DCR surgery for PANDO revealed chronic non-granulomatous inflammation. Although, no specific pathology other than inflammation was noted, routine histopathological analysis may confirm a diagnosis and also aid in diagnosis of unsuspected pathology.

Keywords- dacryocystorhinostomy (DCR), Chronic Non-granulomatous Inflammation.

Introduction- Acquired nasolacrimal duct obstruction (ANDO) is a common disease of the lacrimal passages that is most frequently caused by local nonspecific inflammation of the lacrimal sac and the nasolacrimal duct, resulting in occlusive fibrosis [1, 2]. The clinical symptoms include chronic lacrimation that is aggravated by exposure to sun, wind, or cold.[3]

Obstruction of the nasolacrimal drainage system can cause orbital infection, medial angular uncomfortable swelling, mucoid or mucopurulent discharge, epiphora, and recurrent inflammation of the lacrimal sac. [5] The majority of the time, they are either primary or secondary acquired illnesses. Lacrimal sac neoplasia, inflammatory conditions, some infections, mechanical obstruction, and trauma are secondary causes of ANDO [6]. Most lacrimal sac tumours are malignant and originate from the glandular epithelium or squamous cells [7]. A palpable mass near a lacrimal sac and bloody discharge from a lacrimal duct are indicators of a malignant tumour. Nonetheless, it is possible that up to 40% of all nasolacrimal duct tumours go undetected and are mistaken for chronic dacryocystitis or primary ANDO [8].

Clinically suspected main acquired nasolacrimal duct blockage is associated with idiopathic persistent inflammation, either with or without fibrosis (PANDO). Secondary acquired lacrimal drainage system obstruction can have a wide range of reasons, including specific inflammatory, traumatic, mechanical, or neoplastic conditions (SALDO). [9]

The most effective treatment for nasolacrimal duct (NLD) obstruction is external dacryocystorhinostomy (DCR), with a success rate of 86.4% and failure rates ranging from 4% to 13% , one such study sought to determine the reasons for external DCR failure using postoperative endoscopic and pathological assessment. [10]

The most frequent histopathologic findings in individuals having dacryocystorhinostomy (DCR) for acquired nasolacrimal duct obstruction are chronic inflammation and fibrosis of the lacrimal sac. Although uncommon, various pathologic alterations such infections, systemic inflammatory conditions, and neoplasms like primary lacrimal system cancers, secondary invasion from neighbouring tissues, or even distant metastases, may be detected in the lacrimal sac. It is uncommon, but possibly fatal, when a tumour blocks the lacrimal drainage system. When the lacrimal system is irrigated for diagnostic purposes, patients with lacrimal sac tumours may exhibit clinical symptoms such bloody reflux, visible or palpable masses, and bloody tears.[11] According to some authors, to ensure the timely diagnosis of tumors involving the lacrimal drainage system, a routine biopsy and histopathological examination of the lacrimal sac should be performed for all patients undergoing dacryocystorhinostomy (DCR) [12]"

Aim- To study the histopathological changes of lacrimal sac and nasal mucosa in patients undergoing external DCR.

Material and Methods- Observational prospective study conducted at Department of Ophthalmology, JNU Hospital Jaipur on 43 patients with PANDO undergoing External DCR surgery.

Informed consents was obtained from the patients enrolled in the study after explaining the procedure to study. This study was conducted in accordance with the ethical performed and the aim of the standards stated by the Ethical Committee and was adhered to the tenets of the Declaration of Helsinki. "

Complete lacrimal drainage system examination was done including:

a. Lacrimal sac inspection to assess for the presence of mucocele or pyocele.

b. Lacrimal sac palpation to assess for the presence of lacrimal sac stones.

c. ROPLAS Test using cotton tipped applicator.

d. Fluorescein dye disappearance test (DDT) using a moistened fluorescein strip to instill fluorescein into the conjunctival sac of each eye. Patients were instructed not to wipe their eyes. Intensity of residual fluorescein stain in the conjunctival sac after 5 minutes was used to grade the tear drainage insufficiency. Excess residual stain suggested a delayed clearance and lacrimal system obstruction.

e. Syringing and probing of the lacrimal system to specify the level of lacrimal drainage obstruction.

Full history taking which included medical, surgical and ocular information , all to confirm the presence of predisposing conditions, previous history of dacryocystitis and duration and grading of epiphora according to Munk scale.

f. If irrigation reveals an obstruction in the lacrimal outflow system, diagnostic probing using Bowman's lacrimal probes was performed to confirm the level of obstruction.

Under topical anesthesia, one of the puncta was dilated, and appropriately sized lacrimal probe was gently introduced along the canaliculus till it reaches a stop. Hard stop confirmed the presence of nasolacrimal duct obstruction (NLDO) while soft stop indicated a canalicular obstruction.

Slit lamp examination was done for all patients to assess the presence of eye lid disorders causing epiphora such as entropion as well as to rule out the presence of punctal stenosis.

Biopsy specimens (posterior lacrimal sac flap measuring about 4×4 mm and nasal mucosa 5×5 mm) was fixed in 10% formalin solution in a labelled spill proof container along with the requisition form for histopathology describing the details of the patient, clinical data, procedure performed and test requested as histopathology was sent for histopathological examination in the department of Pathology in JNUIMSRC. Tissue was grossed and processed in Histokinette. Paraffin blocks of the biopsy tissue was made and thin sections of 3-5 microns was cut and put over the slides for staining by H&E stain. Sections were examined under the microscope and were evaluated for the degree of inflammation and other relevant microscopic findings.

Correlation between the clinical lacrimal variables including history of acute or chronic dacryocystitis, duration of epiphora, grading of epiphora based on Munk score, grading of DDT, presence of mucocele or pyocele, regurgitation of sac contents, probing and irrigation, intra operative sac appearance and presence of sac calculi and the histopathological findings

of lacrimal sac and nasal mucosa was done to determine the important clinical parameters that may recommend lacrimal biopsy."

Results-

Table:1 - Table showing Demographic distribution of study subjects

Parameter		No.	%
Age Category	**<40 Years**	17	39.5%
	40-49 Years	12	27.9%
	>=50 Years	14	32.6%
	Total	43	100.0 %
Sex	**Female**	27	62.8%
	Male	16	37.2%
	Total	43	100.0 %
Residence	**Rural**	25	58.1%
	Urban	18	41.9%
	Total	43	100.0 %

Table-2: Table showing baseline symptoms, signs and eye involvement distribution of study subjects

Parameter		No.	%
Symptoms	**Non tender swelling and watering**	3	7.0%
	Watering	40	93.0%
	Total	43	100.0 %
Roplas test (Pre-op)	**Positive**	43	100.0 %

	Total	43	100.0 %
Syringing test (Pre-op)	**Regurgitation-Lower Puncta**	22	51.2%
	Regurgitation-Upper Puncta	21	48.8%
	Total	43	100.0 %
Eye Involved	**Left**	30	69.8%
	Right	13	30.2%
	Total	43	100.0 %

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128 **Table-3: Table showing post-op symptoms, signs at 1 months of Study Subjects**

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Parameter		**No.**	**%**
Symptoms (post-op at 1 month)	**None**	43	100.0 %
	Total	43	100.0 %
Syringing test (post-op at 1 month)	**NLD patent**	43	100.0 %
	Total	43	100.0 %
Fluorescein DDT test (post-op at 1 month)	**Negative**	43	100.0 %
	Total	43	100.0 %
Symptoms (post-op at 3 month)	**None**	41	95.3%
	Watering	2	4.7%
	Total	43	100.0 %
Syringing test	**None**	41	95.3%

(post-op at 3 month)	**Regurgitation-Lower Puncta**	1	2.3%
	Regurgitation-Upper Puncta	1	2.3%
	Total	43	100.0 %
Fluorescein DDT test (post-op at 3 month)	**Negative**	41	95.3%
	Positive	2	4.7%
	Total	43	100.0 %
Symptoms (post-op at 6 month)	**None**	41	95.3%
	Watering	2	4.7%
	Total	43	100.0 %
Syringing test (post-op at 6 month)	**None**	41	95.3%
	Regurgitation-Lower Puncta	1	2.3%
	Regurgitation-Upper Puncta	1	2.3%
Fluorescein DDT test (post-op at 6 month)	**Total**	43	100.0 %
	Negative	41	95.3%
	Positive	2	4.7%
	Total	43	100.0 %

Table -4: Table showing HPE findings of Lacrimal Sac Mucosa and nasal sac mucosa

Parameter		**No.**	**%**
HPE findings-Lacrimal Sac Mucosa	**Chronic Non-granulomatous Inflammation-mild grade**	18	41.9%
	Chronic Non-granulomatous Inflammation-moderate grade	17	39.5%
	Chronic Non-granulomatous Inflammation-severe grade	8	18.6%

	Total	43	100.0 %
HPE findings- Nasal sac mucosa	**Chronic Non-granulomatous Inflammation-mild grade**	15	34.9%
	Chronic Non-granulomatous Inflammation-moderate grade	20	46.5%
	Chronic Non-granulomatous Inflammation-severe grade	8	18.6%

Table-5: Table showing surgical outcome of Study Subjects

Parameter		**No.**	**%**
Surgical Outcome	**Failure**	2	4.7%
	Successful	41	95.3%
	Total	43	100.0 %

DISCUSSION “

Illnesses of the lacrimal drainage system resulting in epiphora are prevalent in ophthalmology, with the majority being primary instances and a minority being subsequent acquired illnesses. They manifest in maturity and result from non-specific disease. Idiopathic chronic inflammation, with or without fibrosis, is seen in clinically suspected primary acquired nasolacrimal duct obstruction (PANDO). A diverse array of factors, including particular inflammatory, traumatic, mechanical, or neoplastic conditions, may resemble idiopathic inflammation in secondary acquired lacrimal drainage system obstruction (SALDO). The prevalence of unrecognised pathological abnormalities in the lacrimal sac during DCR has been documented to range from 0% to 12.5%. Assessing the prevalence of

primary lacrimal sac-specific pathology that resembles primary acquired lacrimal duct obstruction is crucial, as it influences the necessity of routine biopsy during dacryocystorhinostomy (DCR) and the potential risk of overlooking a clinically unsuspected and intraoperatively non-visible underlying specific non-neoplastic or neoplastic condition affecting the lacrimal sac in patients who do not receive routine biopsy during DCR.[13]

The risk of overlooking a spectrum of lacrimal sac originated specific pathologies particularly neoplastic malignant lesions that cause nasolacrimal system obstruction, although low still exists.

The mean age of presentation in present study study was 44.02±8.33 years. Majidaee et al [14] in their study found that mean age of patients was reported to be 48.22 years and **Harshika Rauniyar et al [13]** in their study found that mean age of patients was reported to be 46 years which is comparable to the present study. In the study done by Badhu et al[15] the mean age of patients was reported to be 27.4 ± 13.7 years and in the study by Tuladhar et al [16] the reported mean age was 34.4±12.12 years .

In present study 62.8 % (n=27) were female whereas 37.2% (n=16) were male with female i.e. majority of patients were females. This result correlates with the study conducted by Dagleish et al[17], Bharathi et al[18], Badhu et al[15], by Tucker et al[19], Anderson et al[20] , and Lee-Wing et al[21].The preponderance of female patients of PANDO could be explained by fact that females have nasolacrimal ducts of smaller length and size while the males have long and wide nasolacrimal duct . Also, the angulation of the nasolacrimal canal is more in females . Thus the chance of obstruction is more likely in females than males due to the above anatomical variation in both the gender. These anatomical factors might be a reason why this condition is more common in females.[13]

In present study Left side[69.8%(n= 30) involvement was seen more than right side[30.2% (n=13) which is in agreement with the study by Prakash et al[22], Taban et al[23]. The nasolacrimal duct and the lacrimal fossa forms a greater angle on the right side than on the left side.

The most common presenting symptom in present study was watering which is in agreement to the study done by Lee Wing et al[21], and Tucker et al[19] where epiphora was the most common presenting complain.

In present study all of lacrimal sac and nasal sac specimens revealed chronic non granulomatous inflammation which is similar to results of Mauriello et al[24] ,Lee Wing[21], Bernardini et al[25], Merkonidis et al[26], Salour et al[27], Nash et al[28]. Malignancy of Lacrimal sac is very rare and is also less likely detected , however , if the finding is missed may lead to serious consequences.

Conclusion- Histopathological evaluation of the lacrimal sac in patients undergoing DCR surgery for PANDO revealed chronic non-granulomatous inflammation. Although, no specific pathology other than inflammation was noted, routine histopathological analysis may confirm a diagnosis and also aid in diagnosis of unsuspected pathology.

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