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Original Research Paper

Opthalmology

A PROSPECTIVE STUDY TO EVALUATE THE ASSOCIATION OF PREOPERATIVE NASAL AND CONJUNCTIVAL MICROBIOLOGICAL FLORA WITH PEROPERATIVE LACRIMAL SAC ASPIRATE IN CASE OF CHRONIC DACRYOCYSTITIS AND ANTIBIOTIC SENSTIVITY

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ABSTRACT

Purpose-To evaluate the association of preoperative nasal and conjunctival microbiological flora with preoperative lacrimal sac aspirate in case of chronic dacryocystitis and antibiotic sensitivity. **Methods-** This prospective study involved 80 patients with chronic dacryocystitis complaining of watering and discharge from eye and pain, redness and swelling over area of lacrimal sac and fulfilling the inclusion criteria who presented to the Department of Ophthalmology, Maharani Laxmi Bai Medical College, Jhansi, Uttar Pradesh between July 2020 to August 2021(14 months). **Results-** In our study the overall male female ratio was 1:1.85 with highest incidence in 50-60 years of age group.The most common gram positive organism cultured in our study was Coagulase negative Staphylococcus 58.6% followed by staphylococcus aureus 41.1% and pneumococcus 14.7%.Antibiotic sensitivity test showed, gram positive organisms were most sensitive against amoxicillin-clavulanic acid 85.7%, cephalosporins 78.5% and vancomycin 92.8% followed by intermediate sensitivity against clindamycin 85.7% and moxifloxacin 71.4% and resistant against erythromycin and gentamycin.Majority of gram negative organisms were most sensitive against amikacin 88%, moxifloxacin 77% and ceftazidime 77% followed by intermediate sensitivity against ciprofloxacin 66% and erythromycin and resistant against amoxicillin, ceftriazone, vancomycin and gentamycin drug. **Conclusion-**Our study showed gram positive orgamisms being the most common cause of chronic dacryocystitis. There was strongly positive correlation (0.97) between microbiological flora isolated from lacrimal sac and nasal cavity. In our study antibiotic sensitivity testing of lacrimal sac aspirate samples concluded that amoxicillin and 3rd generation cephalosporin are the first line of drug for treatment of chronic dacryocystitis.

KEYWORDS : Chronic Dacryocystitis,lacrimal sac aspirate,antibiotic senetivity.

INTRODUCTION

The term dacryocystitis refers to series of clinical entities characterized by inflammation of lacrimal sac. Signs and symptoms may differ according to etiology of clinical picture[1].

Dacryocystitis has higher incidence among people living in tropical countries with poor hygienic conditions[2].It may be inflammatory or non-inflammatory, neoplastic, foreign bodies, dacryoliths, infective (bacterial, viral and fungal), non infective (atonic), acute or chronic form[3].

The lacrimal apparatus comprises

- Main lacrimal gland
- Accessory lacrimal glands
- Lacrimal passages; puncta, canaliculi, lacrimal sac and nasolacrimal duct

Chronic dacryocystitis

It has multifactorial etiology leading to vicious cycle of stasis and mild infection of long duration. Occurs in infants and adults, men and women (having higher incidence in women because of narrow nasolacrimal duct). It is more common in women of low socio-economic status with poor personal hygiene. Causative organisms are saprophytic, commensal organism from conjunctival cul-de sac or from nasal cavity.

Role of culture:

Culture of samples taken from infected area i.e mucopurulent material found at the bottom of conjunctival sac or from secretion obtained by squeezing lacrimal sac at level of lacrimal punctum, or puncture and aspiration of lacrimal sac can also be done. We believe puncture and aspiration of lacrimal sac should be considered as technique of choice.

For direct inoculation, following culture media are recommended: blood agar, chocolate agar, Sabouraud dextrose agar , medium for anaerobic microorganisms (Schaedler) and thioglycolate broth. The inoculated media was also sent immediately to laboratory for further processing[4].

Other than lacrimal sac aspirates, conjunctival swab and nasal swabs were also taken and sent for microbiological examination to indentify microrganisms present in these sites and study association of microbial flora at these sites with lacrimal sac.

Lacrimal sac aspirate was also sent for antibiotic sensitivity testing using Kirbybauer method to identify and start specific antibiotic and improve outcome.

Management:

Adult patients in early stages are treated by conservative measures like probing and lacrimal syringing. In patients with partial nasolacrimal duct obstruction balloon catheter dilatation can be done known as balloon dacryoplasty.

In most of the patients not responding to conservative measures surgical treatment is required. Definitive treatment of case of chronic dacryocystitis is dacryocystorhinostomy surgery. It is performed either endoscopically or externally with similar response by both techniques

MATERIALS AND METHODS:

This study was prospective analysis of 80 cases of chronic dacryocystitis that reported to Department of Ophthalmology at Maharani LaxmiBai Medical College, Jhansi from July 2020 - August 2021(14 months duration).

Inclusion Criteria:

All patients complying to study protocols and giving written consent in prescribed format were included in study.

- Age ≥ 18 years to ≤ 70 years.
- All patients who are known cases of or newly diagnosed

with acquired primary chronic dacryocystitis with canalicular and nasolacrimal sac or duct obstruction.
- Patients with mucopurulent material reflux (positive ROPLAS) at time of presentation.
- Patients with evidence of obstruction on probing and irrigation.
- Patients with confirmed RTPCR negative report for COVID -19

Exclusion Criteria
- All patient < 18 years and > 70 years of age
- All patients who underwent dacryocystorhinostomy previously were excluded as lacrimal sac aspirate analysis could not be conducted in them.

The patients who have received either topical or systemic antibiotics in past one week during their visit to hospital were excluded.

Patients of acute dacryocystitis, mucocele, common canalicular obstruction, dacryolith or history of previous trauma.
- Patients with nasal polyps, gross nasal septal deviation, atrophic rhinitis, and paranasal suppuration.
- Patients with hypersecretion from ocular surface disease, epiphora from lid laxity or malposition, facial nerve weakness.
- Other ocular disorders contraindicating surgery like conjunctivitis, acute uveitis, retinal detachment or retinal vascular disorders.
- Patients with debilitating systemic diseases ke diabetes, hypertension or any chronic disorders.
- Patients unfit for surgery due to deranged pathological parameters (including bleeding disorders)
- Pregnancy or lactating mother

Roplas:
Regurgitation on pressure over lacrimal sac area.A steady pressure was applied over lacrimal sac area and reflux of mucopurulent discharge indicates chronic dacryocystitis with obstruction at lower end of nasolacrimal duct. Regurgitated material was sent for microbiological examination

Syringing
- Topical anesthetic was instilled, lower punctum dilated with Nettleship's punctum dilator and irrigating solution, injected in lacrimal passage
- If saline passes freely into nose or throat it indicates patent nasolacrimal system.
- In complete NLD obstruction the fluid regurgitates through either same punctum or upper punctum depending on level of obstruction.
- In partial NLD obstruction there in combination of saline reflux through upper punctum and fluid passing into patient's throat.
- In functional block saline passes freely into nose or throat but under increased hydrostatic pressure suggesting lacrimal pump failure.

Figure 1: Showing procedure of syringing

Conjunctival swab:
Under aseptic condition, lower eyelid of the infected eye was retracted downwards to expose culde sac and swab was taken from inferior fornix and sent for microbiological examination.

Nasal swab:
A swab stick was inserted parallel to floor of nose and sample was taken from inferior nasal meatus and sent for microbiological examination.

Lacrimal aspirate;
- Antiseptic was applied to area of puncture, with 20 G needle, orienting slightly below the horizontal, lacrimal sac was punctured in the area below the medial canthal ligament at time of dacryocystorhinostomy surgery just before making flaps.Sample collected in the syringe was sent to laboratory for micobiological examination.

Figure 2: Showing procedure of lacrimal sac aspiration

Microbiological analysis
- Material obtained was inoculated directly onto surface of solid media such as; blood and chocolate agar(bacterial culture), Sabouraud's-dextrose agar(fungal culture) and into liquid media like brain-heart infusion broth and thioglycollate-medium.
- Inoculate was smeared onto clean, sterile labelled glass slides for 10% potassium hydroxide wet mount, Gram stain, Giemsa stain, Ziehl-Neelsen acid-fast stain, and Kinyoun's acid-fast stain.

Antibiotic sensitivity test
- Standardized bacterial inoculums for susceptibility testing were prepared from 4–5 well isolated colonies of same morphological type in 5ml of peptone water.
- Broth culture was allowed to incubate at 37°C until a slightly visible turbidity appeared, and turbidity of inoculum was compared with 0.5 Macsarland standard.
- Standardized bacterial inoculum was inoculated on Mueller–Hinton agar using a sterile, swab evenly over entire surface of agar plate to obtain uniform inoculums (Kirby Bauer method)
- Blood agar was used for Streptococci and fastidious bacteria.
- Inoculated plates were allowed to dry for 3–5min.
- Antibacterial impregnated discs were applied with gap of 24mm between them and plates were incubated at 37□C within 15min after applying these discs.
- After 16–18h of incubation, plates were examined and diameter of zones of complete inhibition was measured by ruler.
- Zone diameter for individual antimicrobial agent was translated into sensitive and resistant categories by referring to interpretative chart as per recommendation of NCCLS.

The study was followed in accordance with **Ethical Standards Committee** on human experimentation (institutional or regional) and abides by tenets of **Declaration of Helsinki (1975 and 2000 revision)**. Necessary permission from **Institutional Ethical and Research Committee** was obtained thereby.

Statistics:

Table 1:Organisms isolated from various sites

	Lacrimal isolates		Conjunctival isolates		Nasal isolates	
	No	%	No	%	No	%
Gram positive	**34**	**58.6%**	**31**	**67.3%**	**38**	**61.2%**
Coagulase-negative staphylococcus	14	41.1%	12	38.7%	16	42.1%
Staphylococcus aureus	8	23.5%	7	22.5%	11	28.9%
Pnuemococcus	5	14.7%	3	9.6%	6	15.7%
Streptococcus pyogenes	4	11.7%	3	9.6%	2	5.2%
Corynebacterium diptheriae	0	0	2	6.4%	0	0
Other gram +ve	3	8.8%	4	12.9%	3	7.8%
Gram nevative	**21**	**36.2%**	**13**	**28.2%**	**24**	**38.7%**
Pseudomonas aeruginosa	9	15.5%	3	6.5%	14	22.5%
Klebsiella	4	6.8%	6	13%	5	8%
Proteus mirabilis	2	3%	0	0	1	1.6%
E coli	3	5.1%	1	2.1%	2	3.2%
H . influenza	1	1.7%	1	2.1%	1	1.6%
Other gram –ve	2	3%	2	4.3%	1	1.6%
Fungus	**3**	**5.1%**	**2**	**4.3%**	**0**	**0**
Aspegillus flavus	1	1.7%	1	2.1%	0	0
Candida parapsilosis	2	3%	1	2.1%	0	0

Correlation coefficient was calculated by Excel 2019 to analyse strength of linear relationship between isolates from different sites.

RESULT:

A total of 80 patients who fulfilled the inclusion criteria were selected for this study, out of which 5 patients were excluded(drop outs) at initial stage of study.

Finally 75 patients were included in this study. In total, **75 eyes of 75 patients were included in study.**

Age; Highest incidence was found in 50-60 years age group.

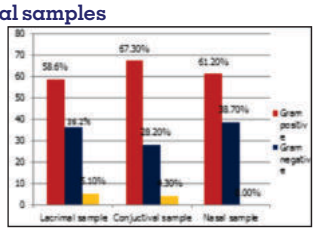
Gender: 65.3% females and 34.6% males were affected with Male:Female ratio 1:1.85

Result of culture report of various samples;

Out of 75 samples collected from lacrimal, conjunctival and nasal samples 22.6%, 38.6% and 17.3% samples were sterile respectively.

Out of 75 samples taken 58%, 46% and 62% lacrimal, conjunctival and nasal samples respectively showed growth on culture.

Graph 1: Group of organisms isolated from lacrimal, nasal and conjuctival samples



For each gram positive organisms ; n*=34, 31, 38 for lacrimal , conjunctival and nasal isolates

For each gram negative organisms ; n*=21,13, 24 for lacrimal , conjunctival and nasal isolates

For each fungal organisms ; n*=3, 2, 0 for lacrimal, conjunctival and nasal isolates

Correlation coefficient calculated from Table1;

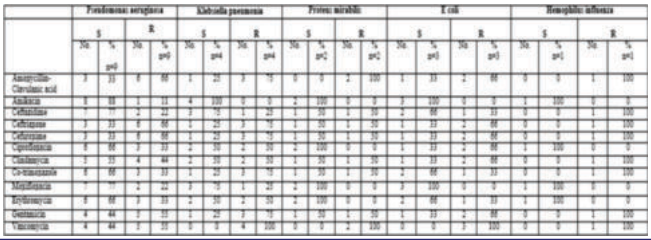
1. Between lacrimal sac isolates and nasal isolates= 0.974979
2. Between lacrimal sac isolates and conjunctival isolates= 0.907076

Table 2:Antibiotic sensitivity results of Gram positive organisms cultured from lacrimal sac aspirate

	Coagulase-negative staphylococcus				Staphylo-coccus aureus				Pneumococcus				Streptococcus pyogenes			
	S	R	S	R	S		R		S		R		S		R	
	No.	% n=14	No.	% n=14	No.	% n=8	No.	% n=8	No.	% n=5	No.	% n=5	No.	% n=4	No.	% n=4
Amoxycillin-Clavulanic acid	12	85.7	2	14.2	6	75	2	25	4	80	1	20	3	75	1	25
Amikacin	10	71.4	4	28.5	6	75	2	25	3	60	2	40	1	25	3	75
Ceftazidime	11	78.5	3	21.4	5	62.5	3	37.5	3	60	2	40	2	50	2	50
Ceftriaxone	11	78.5	3	21.4	5	62.5	3	37.5	3	60	2	40	3	75	1	25
Cefuroxime	11	78.5	3	21.4	5	62.5	3	37.5	3	60	2	40	3	75	1	25
Ciprofloxacin	9	64.2	5	35.7	4	50	4	50	4	80	1	20	4	100	0	0
Clindamycin	12	85.7	2	14.2	6	75	2	25	2	40	3	60	2	50	2	50
Co-trimoxazole	9	64.2	5	35.7	4	50	4	50	2	40	3	60	1	25	3	75
Moxifloxacin	10	71.4	4	28.5	5	62.5	3	37.5	4	80	1	20	4	75	1	25
Erythromycin	6	42.8	8	57.1	3	37.5	5	62.5	3	60	2	40	2	50	2	50
Gentamicin	6	42.8	8	57.1	3	37.5	5	62.5	2	40	3	60	1	25	3	75
Vancomycin	13	92.8	1	7	7	87.5	1	12.5	3	60	2	40	2	50	2	50

R-Resistant, S-Sensitive, %S-Percentage sensitive, %R-Percentage Resistant.

Table 3: Antibiotic sensitivity results of Gram negative organisms cultured from lacrimal sac aspirate



R-Resistant, S-Sensitive, %S-Percentage sensitive, %R-Percentage Resistant.

DISCUSSION:

In our study chronic dacryocystitis was more common in females than males 1:1.85 due to narrower nasolacrimal duct. Most common gram-positive organism cultured in our study was Coagulase-negative Staphylococcus 58.6% followed by staphylococcus aureus 41.1% and pneumococcus 14.7%.

Similar incidence was reported by Bharathi MJ et al[5], in cases of chronic dacryocystitis, Coagulase-negative Staphylococcus(563 of 1275;44.2%) followed by Staphylo coccus aureus(138 of 1275;10.8%) and Streptococcus pneumoniae (111 of 1275;8.7%) were found to be predominant bacterial pathogens.

In our study we observed positive correlation between microbiological floras isolated from various sites. Although there was positive correlation between lacrimal sac isolates and both nasal and conjunctival isolates but lacrimal sac and nasal cavity isolates showed more strongly positive correlation(0.97) than lacrimal sac and conjunctival fornix isolates(0.90). This implies that in most cases nasal flora was responsible for lacrimal sac infection.

The analysis of antibiotic sensitivity test showed, that gram-positive organisms were most sensitive against amoxicillin-clavulanic acid 85.7%, cephalosporins class of drugs 78.5% and vancomycin 92.8% followed by intermediate sensitivity against clindamycin 85.7% and moxifloxacin 71.4% and resistant against erythromycin and gentamycin Majority of gram-negative organisms were most sensitive against amikacin 88%, moxifloxacin 77% and ceftazidime 77% followed by intermediate sensitivity against ciprofloxacin 66% and erythromycin and resistant against amoxicillin, ceftriazone, vancomycin and gentamycin drug.

Pradeep A.V et al[6] in his study concluded that vancomycin, amikacin, 3rd generation cephalosporins and amoxyclav were most effective antibiotics against Gram-positive isolates (100%, 89%, 83% and 78% sensitivity respectively). Penicillin and erythromycin are commonly used agents against Gram positive pathogens. However, penicillin (72% resistance) and erythromycin (75% resistance) were least reliable antibiotics among all antibiotics tested. Vancomycin and amikacin being parenteral drugs can be reserved for severe cases. Amoxyclav and 3rd generation cephalosporins can be used as first line of antibiotics in the management of chronic dacryocystitis Bharathi et al[7], reported all Gram-positive cocci was most frequent isolated from ocular infections and were most sensitive to moxifloxacin and Gram-negative were most sensitive to amikacin and gatifloxacin.

CONCLUSION:

Even though chronic dacryocystitis presents in all age group, it presents more commonly in fifth and fourth decade and this point is important for clinician to keep in mind while making diagnosis and planning surgical treatment keeping chances of failure of surgery and cosmesis in mind. In our study out of all 3 sites lacrimal, conjunctival and nasal maximum number of organisms were isolated from nasal site followed by lacrimal sac.Majority of cases showed gram-positive orgamisms being the most common cause of chronic dacryocystitis. Among gram-positive; coagulase negative staphylococcus was causative organism in most of the cases followed by staphylococcus aureus. Though there was a positive correlation between lacrical sac isolates and both nasal and conjunctival isolates but lacrimal sac and nasal cavity isolates show more strongly positive correlation(0.97) as compared to lacrimal sac and conjunctival fornix isolates(0.90).This implies that in most of the cases nasal flora was responsible for lacrimal sac infection and therefore before taking patient for surgery clinician should treat local nasal infection to prevent chances of complication and recurrence. Chronic dacryocystitis is common in patients with recurrent sinusitis and rhinitis. Thus chronic dacryocystitis patient should undergo complete ocular and nasal examination to rule out local causes responsible for chronicity.In our study antibiotic sensitivity testing of lacrimal sac aspirate samples concluded that amoxicillin and 3rd generation cephalosporin are first line of drug for treatment of chronic dacryocystitis.Finally definitive treatment of case of chronic dacryocystitis is dacryocystorhinostomy surgery. It is performed endoscopically or externally with similar response by both techniques.

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