

# Association Of Naso-Lacrimal Duct Occlusion With Infective Keratitis.

Dr. Ekta Agrawal (1), Dr. Saud Deshmukh (2)

Department of Ophthalmology, Shri Vasantrao Naik Govt. Medical college, Yavatmal 445001

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## Abstract

Aim:

To estimate the prevalence of Naso-Lacrimal duct (NLD) obstruction in patients with infectious keratitis, and the need of surgical treatment by relieving the NLD obstruction in such cases.

Methodology:

The study is prospective, non-control case series.

35 eyes of 35 patients with infectious keratitis included in this study.

The lacrimal duct obstruction was determined by the lacrimal duct irrigation test/sac syringing method and the diagnosis of infective keratitis was concluded based on clinical profile, corneal staining, corneal scraping sent for microbiological examination and corneal tissue culture. For diagnosis of viral keratitis, recurrent history of corneal ulceration, positive fluorescein staining, deep corneal neovascularization and typical appearance of the cornea scar were considered.

The treatment of patients with NLD obstruction presenting with chronic Dacryocystitis was surgically performed as Dacrocystorhinostomy (DCR) or Dacrocystectomy (DCT) surgery when DCR was contraindicated.

Result:

In 35 eyes with infectious keratitis, microbiologically, 28 suffered from fungal keratitis (80%), 6 bacterial keratitis (17.14%), and 1 case of viral keratitis (2.85%). Out of the total 35 infectious Keratitis cases, 14 cases got concomitantly diagnosed with lacrimal duct obstruction and chronic dacryocystitis (40%). After local and systemic applications of anti-bacterial, anti-viral, anti-fungal and anti-inflammatory drugs for active infectious keratitis, 14 patients with chronic Dacryocystitis required DCR or DCT as definite surgical management to eradicate the source of infection.

Conclusions:

Herein, we report that the prevalence of Infective Keratitis is closely related to the occurrence of Lacrimal duct obstruction and Chronic Dacryocystitis. Whenever they are diagnosed together in association, hand to hand treatment is promptly required, wherein both medical and surgical modalities should be considered.

**Key words:** Infectious Keratitis; Naso-lacrimal Duct Obstruction; Chronic Dacryocystitis.

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## I. Introduction

Infective keratitis, an inflammation of the cornea induced by pathogens, namely fungal, bacterial, viral, protozoa, and parasites, is one of the major causes of monocular blindness, second only to that of cataract in the world<sup>1-5</sup>. It is also one of the most common medical challenges in the developing countries<sup>6,7</sup>. In China, still fungal keratitis is among the major intractable diseases due to lack of antifungal drops and poor knowledge about antifungal medications, especially in rural sector<sup>9</sup>. The major risk factors for infective keratitis are ocular trauma, contact lens wear, recent ocular surgery, pre-existing ocular surface disease, chronic dry eyes, lid deformities, reduced corneal sensation, long term use of topical steroids and topical or systemic immunosuppressives<sup>8,10-15</sup>.

Although many studies on control and treatment of keratitis and dacryocystitis have been reported in past, the relationship between keratitis and the disorders of neighbouring tissues (chronic dacryocystitis), an inflammatory disease of the lacrimal sac usually caused by lacrimal duct obstruction, haven't been systematically evaluated. Lacrimal drainage pathway comprises of upper and lower lacrimal puncta, two lacrimal canaliculi joined at common canaliculus which drains into nasolacrimal duct and finally into lacrimal sac<sup>16</sup>. Obstruction in this drainage system can be congenital or acquired, which presents with persistent epiphora and mucopurulent discharge<sup>17</sup>. Most common site of obstruction is the Naso-Lacrimal duct. Consequently, NLD obstruction patients will eventually lead to severe inflammation of the lacrimal pathway mucosal lining causing accumulation of the debris and harmful pathogens grow in the conjunctiva sac, increasing the risk of corneal

infection in the vicinity. In prolonged cases of infection of the lacrimal sac, secondary to NLD obstruction, chronic dacryocystitis is the detrimental outcome. Such cases of chronic dacryocystitis pose a potential threat of spread of infection to the intraocular tissues which is a contraindication for any intraocular surgery. Additional to accumulation of pathogens in conjunctival sac, when the lacrimal duct system is infected, the outflow of tear would be hampered, and thus the tear clearance time will be delayed. As a result, the pathogenic organisms overcome the normal flora of ocular surface, that converts the ocular surface into reservoir of infection. Hence, it is important to investigate the prevalence of lacrimal pathway obstruction in patients of infective keratitis, and to record the effectiveness of the treating NLD obstruction in conjunction with infectious keratitis.

## II. Methodology

This is a prospective non-control case study done in a Tertiary Eye care Hospital – Shri Vasantnao Naik Govt. Hospital in Yavatmal district of central Maharashtra.

Written informed consents were obtained from all study patients in accordance with the declaration of Helsinki.

Study sample size = 35 eyes (35 patients) with infective keratitis (28 Fungal, 6 Bacterial, 1 Viral)

Duration of study = The cases included were enrolled and followed consecutively from 10<sup>th</sup> March 2021-9<sup>th</sup> February 2022.

Exclusion = Non-infective corneal ulceration like Mooren's ulcer, Marginal keratitis/Peripheral ulcerative keratitis, Interstitial keratitis.

This study was approved by the ethics committee of Shri Vasantnao Naik Govt. Medical College, Yavatmal.

Patients included in this study were diagnosed as Infectious keratitis based on detailed clinical history, typical appearance of the ulcer morphology and corneal scars, corneal neovascularization, slit-lamp microscopic examination findings in cornea and anterior segment, confocal microscopy (CFM), corneal scraping sent for microbiological evaluation (smears made on 10% KOH mount), also confirmation of diagnosis established with positive culture report of bacteria or fungi for diagnosis of bacterial or fungal keratitis respectively.

Chief clinical symptom reported in corneal ulcer patients was appearance of a lesion in the black part of eye associated with painful redness, teary eyes, photophobia, also blurry vision or sometimes drastically diminished vision in advanced cases. Case with presence of the multiple arborizing dendritic pattern of epithelial ulceration with terminal bulbs (budding pattern) that shows positive response to topical and systemic antivirals suggestive of diagnosis of active viral keratitis.

All diagnosed infectious corneal ulcer cases were screened for NLD obstruction by Lacrimal sac syringing/ lacrimal irrigation test before starting any medical treatment for keratitis. Lacrimal irrigation test consisted of punctum dilation with Nettle's Punctum dilator under topical pro-paracaine 0.5% eye drop, lacrimal sac massage, followed by irrigation of normal saline by lacrimal canula through both upper and lower canaliculus to determine NLD obstruction. Cases diagnosed of NLD obstruction presented with prolonged history of persistent epiphora or mucopurulent discharge and excoriation around eye due to continuous eye discharge. Few cases reported past history of episode of acute painful swelling in lacrimal sac area followed by pus discharge from the same suggestive of lacrimal abscess.

As surgical management being the treatment of choice for chronic Dacryocystitis, when infection could not be controlled by the medicines alone, it was performed in cases of chronic Dacryocystitis associated with Infective Keratitis after the pain of ulcer subsided and patient is stable to undergo DCR or DCT surgery.

### Results

Infectious keratitis diagnosed in 35 eyes of 35 patients were included in this study with 21 patients with left eye infected (60%), 14 patients with right eye infected (40%). The patients age ranged from 21 to 70 years old, averaged 45yrs old. Out of total 35 patients, 21 patients were males (60%) and 14 patients were females (40%) (Table 1).

On studying the pathogenic organisms as causative agent in the above 35 infective corneal ulcers, 28 cases established as fungal corneal ulcers (80%), 6 as bacterial corneal ulcers (17.14%), and in one remaining case, fluorescein staining of ulcer came positive suggestive of Viral keratitis (2.85%) (Table 1).

**Table 1. General Information of 35 eyes of 35 patients with Infectious Keratitis.**

	Patient count	Right eye affected	Left eye affected	Male cases	Female cases
FUNGAL	28 (80%)	11	17	15	13
BACTERIAL	06 (17.14%)	02	04	05	01
VIRAL	01 (2.85%)	01	00	01	00
TOTAL	35	14 (40%)	21 (60%)	21 (60%)	14 (40%)

Among 35 diagnosed infective corneal ulcer cases, 14 patients also got diagnosed with NLD obstruction with chronic Dacryocystitis (40%), out of which 10 were right sided (71.42%), 4 were left sided (28.57%) and 9 male cases (64.28%), 5 female cases (35.71%) (Table 2).

**Table 2. General Information of 14 cases with Lacrimal Duct Obstruction and chronic Dacryocystitis.**

	Patient count	Right eye affected	Left eye affected	Male cases	Female cases
FUNGAL	13 (92.85%)	09	04	08	05
BACTERIAL	01 (7.14%)	01	00	01	00
VIRAL	00	00	00	00	00
TOTAL	14	10 (71.42%)	04 (28.57%)	09 (64.28%)	05 (35.71%)

Among the 14 cases diagnosed of NLD obstruction with chronic Dacryocystitis, 13 cases were complicated with fungal keratitis (92.85%) and 1 case found associated with bacterial keratitis (7.14%) (Table 2).

Analysis of data:

Statistical software, STATA 8.1 used for statistical analysis. Correlation between the Infective Keratitis and NLD block with Chronic Dacryocystitis was determined statistically by using the Pearson's chi-square test and  $P < 0.05$  was considered to be statistically significant.

### III. Discussion

It is well known fact that there are plenty of commensal organisms in the conjunctiva sac inhabiting the eye as ocular flora typically coagulase-negative staphylococci<sup>19,20</sup>, but we were still unable to prove that the prevalence of certain fungi and bacteria found in dramatically higher number in the conjunctival sac and fornices of patients diagnosed with the Naso-lacrimal duct occlusion disease that leads to chronic Dacryocystitis<sup>21</sup> because no published records in the past suggests a definite co-relation between infectious keratitis and NLD obstruction with chronic Dacryocystitis, though lacrimal drainage pathway abnormalities were listed as a risk factor for infective keratitis in many publications. Naso-lacrimal duct obstruction disturbs the tear film dynamics and hence delay the microbial clearance, alter the normal microbial flora and thus, make ocular surface especially cornea liable to infection by both Gram-positive and Gram-negative organisms typically, Staphylococci are associated with chronic dacryocystitis<sup>25,26</sup>. Similarly, many fungal species have been found associated with chronic dacryocystitis in studies conducted in China<sup>25</sup>. Also, a study done by Li G et al where 3 fungal corneal ulcer cases had concurrent nasolacrimal duct obstruction in which two cases were female patients and one was male patient<sup>23</sup>. Significant association of fungal corneal ulcer with naso-lacrimal duct obstruction was observed in study done by Sun X et al<sup>24</sup>. Also, a study conducted by Yashaswani S.R. from Gulbarga Karnataka, concluded that out of 40 cases of fungal corneal ulcer, 38 cases (95%) showed patent nasolacrimal duct and 2 cases (5.0%) diagnosed with naso-lacrimal duct obstruction<sup>27</sup>.

This prospective study not only establishes the causation of chronic Dacryocystitis in infective Keratitis, but also focus on importance to diagnose and to treat the source of infection in conjunction with the treatment of serious infectious keratitis. Alarmingly, study data show that 40% of the cases with infectious keratitis were also suffering from Naso-lacrimal duct system abnormality, including chronic Dacryocystitis. This established prevalence is obviously higher than that found in normal population with any Lacrimal drainage system abnormality. A population-based study by Woog MD reported the average annual incidence rate was 0.03% of lacrimal duct system disease above the age of 5 years<sup>22</sup>, suggesting that patients with such infectious keratitis have significantly higher prevalence of lacrimal drainage system abnormality than that in healthy population. Thus, it is imperative to early diagnose the lacrimal duct obstruction which can be the source of corneal infection and accordingly corneal ulcer can be controlled more effectively. It is equally important to prioritize the treatment of infectious keratitis by giving appropriate drugs and keeping a track on drug sensitivity, also important to timely consider the need of corneal debridement and even keratoplasty if needed in later stages.

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