

External dacryocystorhinostomy for patients of chronic dacryocystitis with chronic rhinosinusitis

Agarwal S.¹, Arora R.², Upadhyay S.^{3*}

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¹ Saurabh Agarwal, Assistant Professor, Department of Ophthalmology, Venkateshwara Institute of Medical Sciences, Amroha, Uttar Pradesh, India.

² Renu Arora, Associate Professor, Department of ENT, Venkateshwara Institute of Medical Sciences, Amroha, Uttar Pradesh, India.

^{3*} Sumit Upadhyay, Associate Professor, Department of ENT, RAMA Medical College, Hapur, Uttar Pradesh, India.

Introduction: Dacryocystitis is characterized as an inflammatory state of the nasolacrimal sac. It is typically caused by an obstruction within the nasolacrimal duct and subsequent stagnation of tears in the lacrimal sac. Stagnation of tears will provide a favorable environment for infectious organisms to propagate and proteinaceous debris to form. **Materials and Methods:** In this prospective, observational study conducted over a 5-year period (March 2011 to February 2016) in a tertiary eye care center and department of Ophthalmology and otorhinolaryngology, consecutive subjects (60 chronic sinusitis patients) were recruited with primary obstruction of the lower lacrimal drainage system due to chronic dacryocystitis who underwent external dacryocystorhinostomy (EDCR) by a single surgeon. **Results:** A total of 60 patients were included in this study, concerning the gender, there was a predominance of the female with 39 out of 60 patients (64.1%) and males were 21 patients. Age groups of 1-20 years are 3 patients (4.61%) and predominant age in the study was elderly more than 61 years old patients 40%. The clinical characteristics of chronic dacryocystitis are shown in table 3, epiphora was found in 51 patients (78.4%) and absent in 14 patients (21.5%). The discharge by the digital expression of the lacrimal sac was attained in 45 patients (69.2%) and not attained in 20 patients (30.8%). The previous history of exacerbation of chronic dacryocystitis identified as purulent discharge occurred in 5 patients (7.7%) and non-occurrence in 60 patients (92.3%). **Conclusion:** The physiopathology of the CDC is not fully known. This study reveals a possible influence of CRS on the CDC, emphasizing its action on the exacerbation of the symptoms.

Keywords: Dacryocystitis, Nasolacrimal duct, Dacryocystorhinostomy

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Introduction

Dacryocystitis is characterized as an inflammatory state of the nasolacrimal sac. It is typically caused by an obstruction within the nasolacrimal duct and subsequent stagnation of tears in the lacrimal sac. Stagnation of tears will provide a favorable environment for infectious organisms to propagate and proteinaceous debris to form. When the lacrimal sac inflames and swells at the inferomedial canthus, dacryocystitis can be appreciated clinically. Understanding the anatomy and flow of tears leads to a better understanding of dacryocystitis and potential multilevel involvement [1].

The flow of tears will usually begin with tear production by the lacrimal gland. The tears will lubricate the eye until they are collected into the superior and inferior puncta and drained into the superior and inferior canaliculi. From there, tears will drain into the common canaliculus. At this point, they will then pass through the valve of Rosenmuller into the lacrimal sac. The lacrimal sac will then collect the tears and flow down the nasolacrimal duct, pass through the distal valve of Hasner, and finally pass into the nasal cavity [2].

Diagnosis of dacryocystitis is primarily clinical based on history and physical exam findings. Cultures and gram staining can be obtained by expressing purulent material via the Crigler massage. In toxic appearing patients, particularly those with fever or acute visual changes, laboratory studies, and blood cultures should be considered. Also, consider emergent ophthalmological consultation in these cases. Strong consideration should be given to CT scan if orbital cellulitis or extensive infection is suspected. If there are anatomical concerns, a plain-film dacryocystogram (DCG) can be performed by qualified personnel. Subtraction DCG technique will potentially help improve the viewing quality of the image [3]. In chronic cases, appropriate serologic testing can be performed if systemic diseases are suspected as the underlying cause. Antineutrophilic cytoplasmic antibody testing can be performed if Wegener's granulomatosis is suspected. Likewise, antinuclear antibody (ANA) testing can be pursued if systemic lupus erythematosus is suspected [4].

Paranasal sinuses have an intricate relationship with the ocular adnexa and orbit [5]. The bony lacrimal fossa (LF) and lacrimal drainage system are closely related anatomically to the ethmoid sinuses [6].

The ethmoid air cells develop after birth, become radiologically recognizable by age 2 years, and attain adult dimensions by 12 years of age [7]. There is a well-known anatomical relationship between the fundus of the lacrimal sac and agger nasi, which is a part of the anterior ethmoid air cells (AEACs) [8]. Few papers have reported contiguous pathologies involving the lacrimal drainage system and the sinuses. However, very few have specifically studied the relationship of sinuses, specifically EACs, with the LF and its subsequent influence on dacryocystorhinostomy (DCR) [9]. The anatomical relationship between the bony LF and the AEACs is categorized into three types. In category I, sinuses are behind the posterior lacrimal crest, in category II, the AEACs are in front of the posterior lacrimal crest but behind the suture at the anterior edge of the lacrimal bone, and in category III, the sinuses extend into the frontal process of the maxilla, anterior to the lacrimal bone suture [10].

For a successful dacryocystorhinostomy, it is important to make an adequate ostium into the nose. Indeed, it is recommended that all bone between the lacrimal sac and the nasal mucosa be removed, such that no bone is left within 5 mm of the common canaliculus. Thus, following dacryocystorhinostomy, the sac and duct should no longer exist as separate anatomical structures but instead be incorporated into the nose [11]. For this to be achieved the surgeon has to be able to identify his or her exact anatomical location at all steps of the operation. One cause for failure of a dacryocystorhinostomy is making an opening into an ethmoidal sinus rather than the nose and anastomosing the lacrimal sac to ethmoidal sinus mucosa. In this study, it was observed how frequently, when making the ostium, and ethmoidal sinus was initially entered using a standard dacryocystorhinostomy technique? The current study also compared nasal and ethmoidal mucosa and found that the difference easily enables a surgeon to identify his or her anatomical location. This information should help prevent the inadvertent suturing of sac mucosa to ethmoidal mucosa.

Materials and Methods

Setting: Tertiary eye care center and department of otorhinolaryngology,

Duration and type of study: Prospective, observational study conducted over a 5-year period (March 2011 to February 2016)

Sampling Methods: Consecutive subjects (60 chronic sinusitis patients) were recruited with primary obstruction of the lower lacrimal drainage system due to chronic dacryocystitis who underwent external dacryocystorhinostomy (EDCR) by a single surgeon.

Inclusion criteria: Included all the patients with chronic rhinosinusitis, who had symptoms for with primary obstruction of the lower lacrimal drainage system due to chronic dacryocystitis who underwent EDCR.

Exclusion criteria: Exclusion criteria include nose trauma and other etiologies that could entail secondary chronic dacryocystitis (tumors of the lacrimal drainage system, granulomatous diseases as Sarcoidosis and Wegener’s Granulomatosis, previous history of radiotherapy of the face and thyroid, and others). Chronic dacryocystitis was defined clinically as mild inflammation associated with discharge for a period longer than 2 weeks.

The chronic rhinosinusopathies (CRS) were defined as chronicle, allergic, non- infectious, and lasting more than 12 weeks.

Data Collection: Regarding the exams, all patients were subjected to inspection, biomicroscopy, palpation, and digital expression of the lacrimal sac; fluorescein disappearance test; and probing and lacrimal system irrigation. Computed tomography (CT) was performed to rule out extrinsic causes of obstruction of the lacrimal drainage system and also to identify the presence of CRS.

Surgical Procedure: The patients were instructed to a standard EDCR under general anesthesia. The medial canthal area was injected subcutaneously with 2% lidocaine with 1:100,00 adrenaline. The skin was incised, followed by dissection till the periosteum of the frontal process of the maxillary was found. An osteotomy of 1.5–2 and 1.5–2 cm was made, and the lacrimal sac and mucosa were opened to originate anterior and posterior flaps. The wound was closed with a 6.0 polyglactin suture. Postoperatively, patients were treated with topical dexamethasone, polymyxin B sulfate, and neomycin sulfate, three times a day for 10 days, and oral amoxicillin and clavulanate (650 mg) twice a day for 5 days.

Ethical consideration and permission: Before starting the study, ethical approval taken from IEC

Statistical Analysis: All the data arranged in an Excel sheet and analysis as a percentage

Results

A total of 60 patients were included in this study.

Table 1: Distribution by gender.

Gender	No. of patients	Percentage (%)
Male	23	35.4
Female	42	64.6
Total	65	100

In table 1, concerning gender, there was a predominance of the female with 39 out of 60 patients (64.1%) and males were 21 patients.

Table 2: Distribution of age group.

Age in years	No. of patients	Percentage (%)
1-20	3	4.61
21-40	16	24.61
41-60	20	30.7
>61	26	40
Total	65	100

In table 2, the frequency of age groups of 1-20 years is 3 patients (4.61%) and predominant age in the study was elderly more than 61 years old patients 40%.

Table 3: Clinical characteristics of chronic dacryocystitis.

Epiphora	Rhinosinusitis	
	No. of patients	Percentage (%)
Present	51	78.4
Absent	14	21.5
Total	65	100

The clinical characteristics of chronic dacryocystitis are shown in table 3, epiphora was found in 51 patients (78.4%) and absent in 14 patients (21.5%)

Table 4: Digital expression of the lacrimal sac.

Digital expression of the lacrimal sac	Rhinosinusitis	
	No. of patients	Percentage (%)
Positive	45	69.2
Negative	20	30.8
Total	65	100

In table 4, the discharge by the digital expression of the lacrimal sac was attained in 45 patients (69.2%) and not attained in 20 patients (30.8%).

Table 5: Exacerbation of chronic dacryocystitis.

Exacerbation of the chronic dacryocystitis	Total Rhinosinusitis	
No. of patients	Percentage (%)	
Present	5	7.7
Absent	60	92.3

In table 5, the Previous history of exacerbation of chronic dacryocystitis identified as purulent discharge occurred in 5 patients (7.7%) and non-occurrence in 60 patients (92.3%)

Table 6: Summarizes the specific data from the rhinosinusopathies.

Exacerbation of the chronic dacryocystitis	Epiphora	Digital expression of lacrimal Sac	Exacerbation of the chronic dacryocystitis
n=51 (%)	n=45 (%)	n=5 (%)	
Chronic rhinosinusities (involving maxillary sinus)	33 (64.7)	28 (62.3)	3 (60)
Chronic rhinitis	18 (35.3)	17 (37.7)	2 (40)
Total	51 (100)	45 (100)	5 (100)

Table 6, summarizes the specific data from the rhinosinusopathies found among the chronic dacryocystitis features.

Discussion

Dacryocystitis represents an infection within the lacrimal sac. Although postoperative dacryocystorhinostomy wound infection is quite rare, such infection is associated with an increased risk of surgical failure. The final postoperative intranasal ostium size following ext-DCR averages 1.8 mm in diameter [12]. The primary anatomic cause of dacryocystorhinostomy failure has been observed to be the formation of intranasal soft tissue adhesions [13]. It, therefore, seems reasonable that the presence of bacterial colonization and increased inflammation may contribute to the closure of the nasal ostium via stenosis and adhesion formation. Evidence has shown that postoperative dacryocystorhinostomy patients treated with antibiotic therapy have significantly lower rates of postoperative wound infections [14]. Whether all patients undergoing dacryocystorhinostomy require systemic antibiotics is debated. A recent large study of 697 external dacryocystorhinostomy found that prophylactic intravenous antibiotic therapy at the time of surgery may be of benefit only in cases associated with a history of mucocele, mucopyocele, or frank dacryocystitis because these cases were found to have a higher rate of positive intraoperative culture [15].

The present study exhibits the importance of the diagnosis of rhinosinusopathies in patients with chronic dacryocystitis since the lacrimal drainage system drains the tear into the nasal cavity.

In the present study patients with chronic dacryocystitis and chronic rhinosinusitis were 65, predominating female patients 42 and 23 males. In a case series of 152 patients with NLDO who underwent EDCR, previous episodes of dacryocystitis were observed in 60 patients (19 males and 41 females) and the mean age was 67±15 years [16]. Furthermore, it has been acknowledged that idiopathic dacryostenosis is more common in females, mainly after menopause [17].

Moreover, in the present study predominant age was elderly more than 61 years old patients 40%. According to Dolman PJ et al found 118 females and 48 males and the mean age was 60.7 years (range, 21-93 years) [18].

While the present prospective study included only with patients identified with chronic dacryocystitis subjected to EDCR. In a retrospective interventional case series study by Wormald PJ, 196 patients with indicative main acquired nasolacrimal duct obstruction (PANDO) and common canalicular obstruction who had been submitted to endoscopic dacryocystorhinostomy (EnDCR) was evaluated, resultant in 20 patients (10.2%) with the past history of CRS with no history of acute or chronic dacryocystitis [19].

In the present study, exacerbation of chronic dacryocystitis was more frequent. In another study, the different methodologies employed between the two studies could be one of the possible causes of four studies to present a smaller total sample and a higher percentage of patients with CRS, although the absolute number of patients affected was similar (20–22 patients) [20]. Warren JF et al carried out an updated literature review of cilia dysfunction in CRS which concluded that patients with CRS had a decrease of the mucociliary clearance [21]. Moreover, other studies have stated this decrease after EDCR and EnDCR [22].

According to Paulsen and colleagues evaluated the pathophysiology of primarily acquired dacryostenosis through the tissue specimens from the human nasolacrimal ducts of 36 patients that underwent EnDCR within a framework of primarily acquired dacryostenosis. They stated that inflammation from the eye or the nose leads to swelling of the mucous membrane, rearrangement of the connective tissue fibers, reactive hyperemia from the malfunction of the subepithelial cavernous body, and transitory obstruction of the lacrimal path.

Additionally, repeated isolated dacryocystitis could originate a total fibrous closure of the lacrimal duct [23].

In the present study, found 20 out of 65 patients with CRS preoperatively by CT. The use of CT in patients with symptoms of tearing associated with nasolacrimal duct obstruction (NLDO) was analysed by Choi and colleagues. In their study found 39 (17.8%) out of 218 patients with both maxillary and ethmoidal sinuses. As most cases of NLDO have unrecognized source, this exam has been suggested by many authors. Those outcomes re-emphasize the use of CT to evaluate patients with chronic dacryocystitis [24,25].

Limitation of the study

Our sample size was small and limited observational parameters. So, a more comprehensive study with large sample size and a long period of time. That would be more informative and beneficial.

Conclusion

The physiopathology of the CDC is not fully known. This study reveals a possible influence of CRS on the CDC, emphasizing its action on the exacerbation of the symptoms.

What does the study add to the existing knowledge?

The use of CT in patients with symptoms of tearing associated with nasolacrimal duct obstruction (NLDO) will be the useful and possible influence of CRS on the CDC.

Author's Contribution

Dr. Saurabh Agarwal: Verified the analytical methods and supervised the findings of the work.

Dr. Renu Arora: Conceived the idea and performed the procedure and data collection.

Dr. Sumit Upadhyay: Discussed the final results and prepared the manuscript.

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