Original Article

A "Clinical Tetrad" for Easy Diagnosis of Lacrimal Canaliculitis

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Abstract

Purpose: To study the clinical presentation and highlight the "diagnostic clinical features" in patients having lacrimal canaliculitis (LC).

Methods: A retrospective analysis of all patients diagnosed with primary and secondary LC was performed. A detailed slit-lamp examination of the conjunctiva, lacrimal punctum, canalicular region, and lacrimal sac was performed. Common and coexisting clinical features were highlighted. The posttreatment sequence of resolution of clinical features was also noted.

Results: Forty eyes of 36 patients (28 females, 77.78%) with a mean age of 59.5 years were included in the study. Thirty eyes (75%) had primary LC, whereas 10 had a secondary type. Previous misdiagnoses were noted in 34 (85%) eyes. The highlighting clinical features were medial eyelid edema (n = 40, 100%), pouting and hyperemia of lacrimal punctum (n = 36, 90%), yellowish canalicular hue (n = 35, 87.5%), and canalicular distention and expressible discharge (n = 32, 80%). None had features suggestive of nasolacrimal duct obstruction. Thirty-two eyes (80%) showed all four clinical features of LC, a tetrad. At a mean follow-up of 14.5 months, the complete resolution was noted in 36 (90%) eyes.

Conclusions: We propose a "clinical tetrad" of 1. medial eyelid edema, 2. pouting and hyperemia of lacrimal punctum, 3. yellowish canalicular hue and, 4. canalicular distention, and expressible discharge, for the easier clinical diagnosis of LC. The authors believe that using this clinical tetrad may be helpful for the diagnosis of LC.

Keywords: Canaliculitis, Lacrimal canaliculitis, Lacrimal tetrad, Misdiagnosis, Tetrad

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Introduction

Lacrimal canaliculitis (LC) is an inflammation of the epithelial lining of the lacrimal canalicular walls. The reported incidence of LC is approximately 2% of all lacrimal diseases.[1] Based on the etiology, LC is divided into primary and secondary varieties, the latter occurring due to inflammation caused by the material of punctum plugs or canalicular implants.[2-4] According to a Taiwanese study, primary LC is a more common entity found in >82% of LC patients.[5]

Ironically, LC remains a frequently misdiagnosed (45%–100%) disease since first described by von Graefe in 1854.[6] The clinical signs of LC include punctum pouting and mucopurulent discharge from the punctum.[1-6] Patients having LC may have watering, ocular irritation, punctal pouting, and discharge with localized conjunctival congestion. These clinical features can be seen in both primary and secondary LC. However, in the secondary variety, younger age group, female preponderance, retrieval of the plug during canaliculotomy or irrigation, and minimal recurrence rate can be the different features.[5]

Despite these well-described and popular clinical signs, LC often gets misdiagnosed.[6] The commonly reported misdiagnoses are blepharoconjunctivitis, nasolacrimal duct obstruction, and chalazion. The misdiagnoses can be attributed to the overlapping symptoms and clinical features with common ophthalmic conditions.[2-6] The misdiagnoses lead to increased patient agony and delayed specific treatment of LC.

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In remembering the clinical features of a rare disease for the long term, medical triads, tetrads, etc., have helped medical professionals for a long time.[7,8] The misdiagnosis of LC is a known phenomenon, but very few attempts have recommended methods to reduce the misdiagnosis.[1,2,9-13] Hence, the authors focused on developing an easy "clinical tool" for making the diagnosis of LC, simple, and successful. We also believe the use of this clinical tool - a tetrad may reduce the overall incidence of misdiagnoses of LC.

Methods

A retrospective review of all clinically diagnosed patients of LC from July 2014 to December 2019 at the Postgraduate Institute of Medical Education and Research, Chandigarh, India, was done. Our research adhered to the tenets laid by the Declaration of Helsinki. This study was approved by the institutional ethics committee. Proper informed consent was obtained from our patients to publish the nonidentifiable photographs in scientific journals. We included both primary and secondary LCs with a minimum follow-up of 12 months. The details of history, previous consultations, symptoms, clinical signs, documented clinical pictures, interventions, microbiology reports, and outcomes were analyzed. The exclusion criteria were a history of lacrimal surgical intervention and patients having <12 months duration of follow-up.

We focused our research on the "common clinical features" having a diagnostic value for LC. The baseline clinical examination included a slit-lamp analysis of the conjunctiva, eyelid margin, punctum, and lacrimal canaliculus. A torchlight examination of the eyelid and lacrimal sac region was also noted. The lacrimal parameters recorded on our "clinic pro forma" include punctum size, position, shape, vascularity, and discoloration. We use uniform targeted pro formas during clinical examination of patients in our oculoplastics clinic. Hence, our retrospective study has homogenous and standardized patient details and data.

The normal diameter of the lacrimal punctum was considered 0.3–0.5 mm.[14] The diameter of >0.5 mm was considered a dilated punctum, and <0.3 mm was taken as a stenosed lacrimal punctum. Its position was taken as normal if placed into lacus lacrimalis without being visible or pouting; round or oval shapes were considered normal, without dilated and tortuous vascularization (hyperemia) and discoloration.[14] The lacrimal canaliculus evaluation included conjunctival surface, vascularity, and canalicular distention with expressible canalicular discharge. The regurgitation on pressure over the lacrimal sac (ROPLaS) test was performed in all. According to our clinic protocol, we do not perform lacrimal irrigation in a clinically suspected patient of canaliculitis.

The expressed secretions or concretions were sent for a microbiological workup in all cases. The procedure for the treatment of canaliculitis included manual punctum dilatation + canalicular curettage/milking + intracanalicular injection of antibiotics. A single-snip punctoplasty was performed in patients having narrower puncta, not allowing the evacuation of inspissated concretions. The ointment azithromycin 1% was loaded in a 2 cc syringe (with Luer lock), and a straight cannula was mounted for injection. The cannula was inserted into the distal portion of the affected canaliculus, and the "thread" of ointment was injected inside the affected canaliculus while withdrawing the cannula out of the canaliculus. In addition, the monocanalicular stent was used in a case-based manner, i.e., with bilateral or both upper and lower canaliculitis. The monocanalicular stenting was performed in an attempt to prevent postcurettage canalicular stenosis or obstruction.

The outcomes of LC were recorded as a complete or incomplete success based on the resolution of clinical symptoms and posttreatment examination findings at 12 weeks of follow-up. Complete success was defined as total resolution of epiphora and discharge with the absence of medial eyelid edema, punctum pouting, and expressible canalicular discharge. The most common presenting features were compiled in all patients of LC to deduce the clinical tool – a "tetrad" for easier diagnosis of LC.

Results

We analyzed the records of 36 (40 eyes) patients diagnosed with LC. The majority (n = 34, 85%) of eyes were misdiagnosed before presenting to us. Of them, 24 (60%) were misdiagnosed by ≥ two general ophthalmologists. The misdiagnoses included chronic conjunctivitis in 12, nasolacrimal duct obstruction in 10, and chalazion in two. The dacryocystorhinostomy surgery was advised for seven eyes. The demographics, patient details, and clinical features are described in Table 1.

The common clinical features in our patients included medial eyelid edema [Figure 1a] (n = 40, 100%), pouting and hyperemia of lacrimal punctum [Figure 1b] (n = 36, 90%), canalicular distention and expressible discharge [Figure 1c and d] (n = 32, 80%), and a yellowish hue over the canaliculus [Figure 1c] (n = 35, 87.5%). Thirty-two eyes (80%) showed a "clinical tetrad" of the findings mentioned above. The clinical pictures of this tetrad are compiled and described in Figures 1 and 2 with legends. One eye had a coexistent punctum granuloma [Figure 2c] with other features of LC.

The ROPLaS test was negative in all 40 eyes. Canalicular concretions with discharge were noted in 23 (57.5%) eyes, whereas only discharge was seen in 17 eyes. Blood staining of concretions or discharge was noted in 10 eyes. A gritty sensation during canalicular curettage was noted in all patients. The microbiology yield was positive in 62.5% (25 eyes), with the majority showing a growth of *Actinomyces israelii* (n = 14, 56%), followed by *Staphylococcus aureus* (n = 8, 32%).

Under local anesthesia, lacrimal punctum dilatation + canalicular curettage + intracanalicular antibiotic ointment was the procedure performed for the treatment of LC in 36 (90%) eyes, whereas 4 (10%) eyes required additional single-snip

Table 1: The demographics and clinical presentation of patients having lacrimal canaliculitis

Factors	Number (%)
Number of patients (eyes)	36 (40)
Gender	
Females	28 (77.8)
Males	8 (22.2)
Mean age at diagnosis (years)	59.5±8.3
Laterality	
Unilateral	32 (88.9)
Bilateral (eyes)	4 (8)
Site	
Inferior canaliculus	22 (55)
Superior canaliculus	18 (45)
Symptoms	
Epiphora	37 (92.5)
Redness	34 (85)
Discharge	16 (40)
Pain	10 (25)
Eyelid	
Medial eyelid edema	40 (100)
Punctum	
Size	
Normal	16 (40)
Dilated	22 (55)
Stenosed	2 (5)
Position	
Pouting	36 (90)
Normal	4 (10)
Shape	
Oval	27 (67.5)
Round	11 (27.5)
Slit-shaped	2 (5)
Vascularity (hyperemia)	
Increased	36 (90)
Normal	4 (10)
Discoloration	
Yellowish	28 (70)
Normal	12 (30)
Canaliculus	
Surface	
Elevated and distended	33 (82.5)
Vascularity	
Increased	31 (77.5)
Normal	9 (22.5)
Distention and expressible discharge	
Present	32 (80)
Absent	8 (20)
Yellowish canalicular hue	
Present	35 (87.5)
Absent	5 (12.5)
Type of canaliculitis	
Primary	30 (75)
Secondary	10 (25)
Punctum plugs	8
Radiotherapy to face	2

Figure 1: The tetrad of lacrimal canaliculitis. (a) The left medial upper eyelid shows edema (arrow) with matting of eyelashes, conjunctival inflammation (arrow), and discharge. The lacrimal sac region is normal. (b) The right upper punctum shows classical pouting, redness, and canalicular distention with expressible canalicular discharge. (c) The left lower canalicular region shows a yellow hue, dilatation, and mild inflammation. The punctum appears normal (unusual). (d) The right lower punctum shows expressible canalicular discharge (yellow sulfur-like granules)

punctoplasty [Figure 2a and b]. No intraoperative complication was encountered. None of the patients had lacrimal canalicular diverticulum. Intraoperatively, lacrimal irrigation was avoided in all patients. The mean follow-up was 14.5 months, with total resolution of clinical features in 34 (85%) eyes mandating complete success. Six (15%) eyes showed partial success in which four had punctum and canalicular obstruction, and two had persistence of canalicular distention with reduced expressible canalicular discharge. The medial conjunctival congestion persisted for 6–8 weeks in four eyes.

Monocanalicular stents were used in eight eyes (four patients with bilateral involvement), of which the stent prolapse was noted in five cases. Overall, 8 (20%) had punctum and canalicular obstruction after the intervention to treat LC [Figures 2d and 3a-d]. They had clear fluid epiphora of mild intensity and were not motivated for undergoing further surgical procedures. The reduced symptoms could be explained by the compensatory tear drainage by the opposite patent lacrimal punctum and canaliculus.

Discussion

LC is a frequently misdiagnosed disease entity that symptomatically mimics common ophthalmic diseases.[2,3,9-13] The diagnosis demands a high index of suspicion and a careful clinical examination. However, general ophthalmologists tend to misdiagnose LC for blepharoconjunctivitis, nasolacrimal

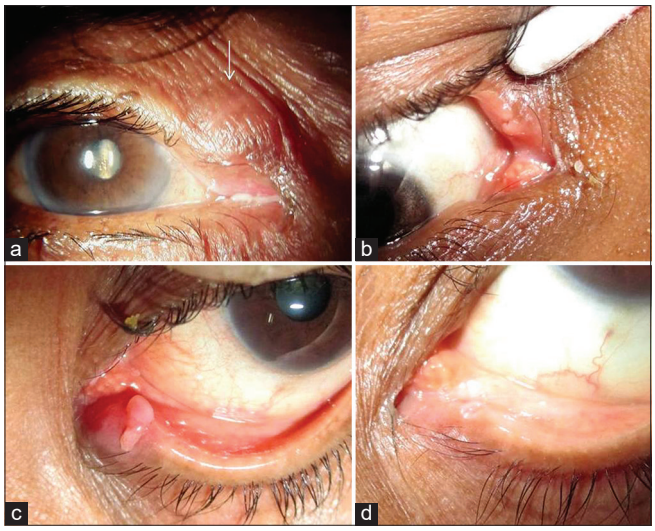

Figure 2: Spectrum of canaliculitis. (a) Right upper medial eyelid edema (white arrow) with pouting of the visible lacrimal punctum. (b) Postoperative 6 weeks, shows normal punctum with resolved medial eyelid edema. Sequelae of slit punctoplasty are noted. (c) Left inferior canalicular granuloma, medial eyelid edema, and canalicular edema. (d) Postoperative 8-month follow-up shows complete resolution of lacrimal canaliculitis

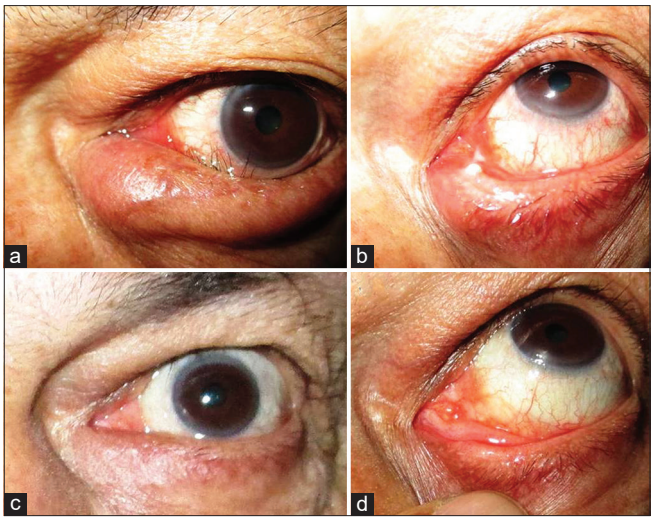

Figure 3: A representative case of lacrimal canaliculitis. (a) The left lower eyelid shows localized medial edema with mild conjunctival inflammation. The lacrimal sac region is normal. (b) The expressible canalicular discharge is noted over the punctum during canalicular milking. (c) Two months postoperative canalicular curettage, the medial eyelid edema and conjunctival inflammation are resolved. (d) The punctum appears normal and the expressible canalicular discharge is also resolved

duct obstruction, and a chalazion. We know that in the absence of a timely, correct diagnosis, and appropriate management, LC often recurs. In a study featuring awareness about canaliculitis, Balıkoğlu Yılmaz *et al*. have concluded that LC often gets overlooked and misdiagnosed.[15] Hence, they recommended careful examination for LC in each patient with chronic conjunctivitis and lacrimal infections. Kaliki *et al*. reported a median diagnostic delay of 6 months (range, 1–60) in primary LC patients.[2]

In the literature, pouting and hyperemia of lacrimal punctum are considered a classical signs of LC.[1-6,9-15] The pouting and hyperemia of the lacrimal punctum occur secondary to the inflammation of the canalicular epithelium.[2,4,11] This edematous epithelium causes the vertical canaliculus to swell up, which clinically appears as a "volcano" [Figure 1b]. The punctum overlying the vertical canaliculus appears as the "vent" of the volcano. In our study, this characteristic finding was noted in 90% of the eyes.

A simple torchlight examination of the medial canthus may reveal localized medial eyelid edema in the nonciliated region of the upper or lower eyelids [Figure 1a]. This finding is reasonably different from the lacrimal sac region swelling secondary to nasolacrimal duct obstruction.[6] The higher incidence of nasolacrimal duct obstruction, similar clinical features, and anatomical proximity of the lacrimal sac to the horizontal canaliculus, often confuse LC with nasolacrimal duct obstruction.[1-6,9-17] Therefore, recognizing the correct location of the swelling makes a massive difference in diagnosing the correct entity. We found the medial eyelid edema to be universal (100%) for all of our patients.

The expression of discharge from the punctum on canalicular pressure (canalicular milking) is often a helpful pointer toward LC.[4,6,10] If the expressible discharge includes yellow sulfur granules, it is usually suggestive of an actinomyces infection.[12,13] However, this finding may get misinterpreted as a positive ROPLaS test. As the nasolacrimal duct is not affected in LC and is patent, the ROPLaS is negative in LC. Therefore, correct localization of the anatomical site (eyelid) for applying pressure becomes vital for the correct interpretation of canalicular distention with expressible canalicular discharge [Figure 1d]. We noted this sign in 80% of the eyes, and we advocate the microbiological workup of contents with additional pathology of the concretions. Histopathology may reveal classic "sunray appearance" in the concretions made up of actinomycotic colonies.[16]

A yellowish hue over the canalicular region also points toward the presence of LC.[6] This yellowish appearance is visible from the conjunctival side of the canaliculus due to the collection of inspissated discharge and concretions inside the lumen [Figure 1b and c]. The hue becomes more prominent in chronic cases where the conjunctival inflammation has reduced. We observed the yellowish hue over the canalicular region in 87.5% of the eyes.

We describe a clinical tetrad of LC, including medial eyelid edema, pouting and hyperemia of lacrimal punctum, yellowish hue over the canaliculus, and canalicular distention with expressible canalicular discharge. To remember the clinical features of an uncommon disease for the long-term, medical triads, tetrads, etc., have helped medical professionals.[7,8] Thus, the proposed clinical tetrad may serve as a brief practical "mental checklist" for general and specialty-trained

ophthalmologists. The authors also believe that this clinical tetrad can improve the rate of detection and diagnosis of this frequently under-recognized disease entity.

The secondary LC may occur due to the distal migration of punctum plugs (18%), intracanalicular plugs (82%), or as an inflammatory response to the lacrimal stents.[5] The tear-flow stasis or obstruction may provide a reservoir for the growth of microorganisms.[5] Associated canalicular mucosal injury may increase the chances of LC. Overall, the clinical features of primary and secondary LCs are similar, but more female prevalence and different microbiological profiles.[5] The secondary LC can also present as an acute sterile canaliculitis.[16,17]

Gogandy *et al*. in a large study (131 patients) reported the most common symptom of LC as eye discharge (68.7%). They found regional swelling in 26%, erythema in 24%, and pouting punctum in 19% of patients.[18] A study by Zhang *et al*. described the primary clinical sign of pouting punctum in 75%, palpable thickened canaliculus in 50%, and punctal regurgitation of canalicular contents under expression in 31.3% of eyes.[19]

The retrospective design and lack of a control arm are the limitations of our study. However, we believe the origin of triads and tetrads needs hindsight, and this kind of attempt is the first of its kind in improving the diagnosis of LC. The authors strongly propose a prospective study designed to find a positive predictive value of this tetrad and its application, which can approve its effectiveness.

In a nutshell, a single and isolated clinical feature of LC may provide an incomplete picture of the disease and increase the chances of misdiagnosis and delayed management. A clinical tetrad may improve the rate of diagnosis for a frequently underdiagnosed entity like LC. It may also prevent frequent misdiagnosis and help in the institution of proper and timely management of LC.

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Conflicts of interest

There are no conflicts of interest.

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