

Original Article

Clinical features and bacteriology of lacrimal canaliculitis in patients presenting to a tertiary eye care center in the Middle East



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Abstract

Purpose: To study the clinical features and bacteriology of canaliculitis in patients presenting to King Khaled Eye Specialist Hospital (KKESH), a major tertiary eye care center in the Middle East and compare the results to previous studies from other countries. **Methods:** In this retrospective study, a chart review was performed of 131 patients (135 eyes) diagnosed with lacrimal canaliculitis who underwent treatment between January 1983 and December 2012 at KKESH. Data were evaluated on demographics, presenting signs and symptoms, diagnostic studies, causative organisms, treatment rendered including medical or surgical interventions and rate of recurrence.

Results: There were 47 males and 84 females with a mean age of 64 years. The average duration of symptoms was 81.38 weeks. The most common presenting symptom was eye discharge (68.7%). The lower canaliculus was most commonly involved (49.6%) and 27 (20.6%) patients had upper and lower canaliculi involved. The left eye was most commonly involved in 71 patients (54.2%). Microbiological studies were available for 101 (77.1%) patients. *Streptococcus species* (48.2%) were the most commonly cultured organisms. Concretions were noted in 45 (34.4%) patients. Canaliculotomy was performed in 33 (25.2%) patients. Topical Penicillin G was the most commonly used antibiotic (65.7%). Seventeen (13%) patients had a recurrence of canaliculitis.

Conclusion: Canaliculitis is frequently overlooked and misdiagnosed as conjunctivitis. Persistence or recurrence may complicate the condition. New organisms are emerging as the most common causative agents. Canaliculotomy with removal of all concretions is still considered the gold standard of treatment to eliminate the infection and improve patient symptoms.

Keywords: Canaliculitis, Actinomyces, Concretions, Canaliculus, Canaliculotomy

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Introduction

Chronic canaliculitis is an uncommon infection usually caused by *Actinomyces* and less commonly by other organisms. It can be hard to diagnose early and complete eradication may be challenging. Although the clinical signs of canaliculitis are well-known including, erythema, pouting punctum, swelling or discharge, the condition is usually missed and therefore improperly managed.¹ High recurrence rates have resulted from conservative treatment with topical antibiotics.¹ However,

surgical intervention (canaliculotomy or punctoplasty) is associated with a higher rate of resolution.^{1–4}

Most of the studies in the literature on demographics, presenting signs and symptoms, bacteriology, diagnoses and management of the disease have come from countries outside Saudi Arabia^{1,5–9} and published studies on patients from the Middle East are rare.

The purpose of this study is to describe clinical features, investigative studies, bacteriology and treatment strategies employed for the management of canaliculitis in patients

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presenting to the King Khaled Eye Specialist Hospital (KKESH), a major tertiary eye care center in the Middle East.

Materials and methods

Medical records of all patients with canaliculitis who were examined at KKESH between January 1983 and December 2012 were reviewed. The institutional review board approved the study. From the chart review, data were collected on patient age, gender, presenting symptoms, underlying ocular or systemic diseases, duration between onset of symptoms and diagnosis, involved side and location, presence of concretion, results of the microbiologic investigation, treatment modality and outcome.

All patients were treated with conservative medical therapy (warm compress, topical antibiotics or antibiotic irrigation) or surgery (canaliculotomy with concretion removal). A broad-spectrum antibiotic was started initially then adjusted according to the culture results and sensitivities. Statistical analysis was performed with SPSS version 19.0 (IBM Corp. Armonk, NY, USA). Numerical variables including age and duration of symptoms are presented as mean (range, minimum–maximum). Other variables are presented as number of patients (percentage).

Results

There were 131 Patients (135 eyes) diagnosed with canaliculitis over the study period. There were 47 (35.9%) males and 84 (64.1%) females with a mean age of 64.48 years (range, 10–103 years). The lower canaliculus was most commonly involved in 65 (49.6%) patients followed by the upper canaliculus in 39 patients (29.8%) and 27 (20.6%) patients had both upper and lower canaliculus involvement. The left eye was most commonly involved in 71 (54.2%) patients followed by the right eye in 56 (42.7%) patients and 4 (3.1%) patients had bilateral involvement (Table 1).

The main clinical manifestation was discharge (68.7%) followed by tearing (40.5%), then concretions (34.4%) and swelling (26.7%). The interval between the onset of symptoms and the diagnosis of canaliculitis ranged between 1 week and 30 years with a mean of 81.38 weeks. Twenty-one (16%) patients had a history of blephritis. Punctal plugs were used in 3 (3.2%) patients and 3 (3.2%) patients reported the use of Honey topically as part of traditional therapy.

Syringing of the lacrimal drainage system indicated a patent system in 67 (51.1%) patients, obstruction in 41 (31.1%) patients and data were not available in 23 (17.6%) patients. No imaging studies were used for diagnosis in any patients (Table 1).

Microbiological studies of discharge or/and concretion were available and positive for 101 (77.1%) patients. Microbiological work up was not performed for 26 patients (19.8%) and data were not available for 4 (3.1%) patients. Of the 101 patients who underwent microbiological work-up, 73 (72.3%) patients had mixed infection and 28 (27.7%) patients had infection with a single microorganism. The most common cultured organism was *Streptococcus species* (48.2%) followed by *Staphylococcus species* (42%) then *Actinomyces* (25.2%) (Table 2). The most common isolates among the group of patients who presented with concretions (34.4%)

Table 1. Clinical characteristics, modalities of treatment and outcome for 131 patients with canaliculitis.

<i>Gender</i>	
Male	47 (35.9%)
Female	84 (64.1%)
<i>Age (Mean, range)</i>	
Duration & Symptoms (Mean, range)	64.48 (10–103y) 81.38 w (1 w - 30 years)
<i>Systemic disease</i>	
DM	59 (45%)
Hypertension	35 (26.7%)
<i>Ocular History</i>	
Blephritis	21 (16%)
Punctal Plugs	3 (3.2%)
Honey use	3 (3.2%)
<i>Clinical manifestations</i>	
Discharge	90 (68.7%)
Tearing	53 (40.5%)
Concretions	45 (34.4%)
Swelling	35 (26.7%)
Erythema	32 (24.4%)
Pain	28 (21.4%)
Pouting Punctum	26 (19.8%)
Itching	22 (16.8%)
Irritation	9 (6.9%)
Burning sensation	8 (6.1%)
Foreign body sensation	8 (6.1%)
Bloody tearing	2 (1.5%)
Decrease VA	1 (0.8%)
<i>Location</i>	
Upper Canaliculus only	39 (29.8%)
Lower Canaliculus only	65 (49.6%)
Both	27 (20.6%)
<i>Laterality</i>	
Right	56 (42.7%)
Left	71 (54.2%)
Bilateral	4 (3.1%)
<i>Lacrimal irrigation</i>	
Patent	67 (51.1%)
Obstructed	41 (31.1%)
Not done	23 (17.6%)
<i>Treatment</i>	
Topical Antibiotics	131 (100%)
Antibiotic Irrigation	101 (77.1%)
Canaliculotomy	33 (25.2%)
DCR	14 (10.7%)
<i>Outcome</i>	
Recurrence	17 (13%)
Resolution	114 (87%)

were *Staphylococcus species* (53.3%) followed by *Streptococcus species* (51.1%) and *Actinomyces* (44.4%) (Table 4).

Topical antibiotics were used in all patients (100%) and antibiotic irrigation was performed in 101 (77.1%) patients. The most common antibiotic used during irrigation was Penicillin G which was used in 83 (79.8%) patients. Penicillin G was the most common topical antibiotic used in 86 (65.7%) patients followed by erythromycin in 37 (28.2%) patients. Surgical intervention (canaliculotomy) was performed in 33 (25.2%) patients either as a treatment for the initial infection or as a treatment for a recurrence.

Recurrent canaliculitis developed in 17 patients (13%). All patients with recurrent canaliculitis had clinical and symptomatic resolution after further management with all patients treated with either conservative medical therapy (warm compress, topical antibiotics or antibiotic irrigation) or surgery (canaliculotomy with concretion removal).

Table 2. Microbiologic culture of 101 patients with canaliculitis.

Organism	No. (%)
<i>Streptococcus species</i>	63 (48.2%)
Strept viridans	32 (24.4%)
Strept constellatus	8 (6.1%)
Strept pneumoniae	5 (3.8%)
Strept Gamma Hemolytic	5 (3.8%)
Strept anginosus	3 (2.3%)
Strept group F	2 (1.5%)
Strept oralis	2 (1.5%)
Strept gordonii	1 (0.8%)
Strept intermedius	1 (0.8%)
Strept Dysagglactea	1 (0.8%)
Strept Melliri	1 (0.8%)
Strept mitis	1 (0.8%)
Other Streptococcus	1 (0.8%)
<i>Staphylococcus species</i>	55 (42%)
Coagulase negative staph	34 (26%)
Staph Aureus	13 (9.9%)
Staph Epidermidis	5 (3.8%)
Staph Hominis	2 (1.5%)
Staph Hemolyticus	1 (0.8%)
<i>Actinomyces</i>	33 (25.2%)
<i>Corynebacterium species</i>	20 (15.3%)
Corynebacterium Amycolatum	3 (2.3%)
Corynebacterium Prepinquum	2 (1.5%)
Corynebacterium Striatum	2 (1.5%)
Corynebacterium Macginleyi	1 (0.8%)
Corynebacterium Accolels	1 (0.8%)
Other Corynebacterium	11 (8.4%)
<i>Eikenella corrodens</i>	20 (15.3%)
Gram +ve bacilli resembling <i>Corynebacterium</i>	16 (12.2%)
<i>Haemophilus Influenza</i>	15 (11.5%)
<i>Pseudomonas aerogenosa</i>	6 (4.6%)
<i>Peptostreptococcus Micros</i>	5 (3.8%)
<i>Sphingomonas Paucimobills</i>	4 (3.1%)
<i>Morgaunlla Morgunii</i>	3 (2.3%)
<i>AeroCoccus Viridans</i>	3 (2.3%)
<i>Citrobacter Fraudii</i>	2 (1.5%)
<i>Klebsiella pneumoniae</i>	2 (1.5%)
<i>Serratia Marcescus</i>	2 (1.5%)
<i>Haemophilus Parainfluanza</i>	2 (1.5%)
<i>Haemophilus Para phorphilos</i>	1 (0.8%)
<i>Klebsiella Oxytoca</i>	1 (0.8%)
<i>Enterococcus fecalis</i>	1 (0.8%)
<i>Prevotella Disians</i>	1 (0.8%)
<i>Gomella Bergeri</i>	1 (0.8%)
<i>Gomella Morbillorum</i>	1 (0.8%)
<i>Vellonella Species</i>	1 (0.8%)
<i>AeroCoccus Species</i>	1 (0.8%)
<i>Fusobacterium Specis</i>	1 (0.8%)
<i>Pasteurulla Species</i>	1 (0.8%)
<i>Enterobacter Cloacea</i>	1 (0.8%)
<i>Escherichia coli</i>	1 (0.8%)
<i>Escherichia Vulneris</i>	1 (0.8%)
<i>Propicibaeterium Aenes</i>	1 (0.8%)
<i>Proteus Mirabilis</i>	1 (0.8%)
<i>Prevotella Oralis</i>	1 (0.8%)
<i>Bacterioides Uerolyticus</i>	1 (0.8%)
<i>Fusobacterium Varium</i>	1 (0.8%)
<i>Saprophytic Neisseria</i>	1 (0.8%)
<i>Micrococcus</i>	1 (0.8%)
<i>Lactobacillus Acidophilus</i>	1 (0.8%)

Discussion

Lacrimal canaliculitis usually remains undiagnosed for a long period of time because it is rare and has variable presentation. Patients present with discharge, tearing or a pouting punctum sometimes with a picture similar to chronic conjunctivitis, inflamed chalazion or acute dacryocystitis leading to unnecessary interventions which may delay appropriate treatment.^{1,5,8}

The average duration of symptoms until diagnosis was 81.38 weeks (1 week – 30 years) and ranged from 2 days to 10 years in other studies reflecting the difficulty in diagnosis for ophthalmologists.^{10–12} Most of our patients were females (64.1%) a finding consistent with other studies (63%-78%).^{1,7,10} This could be related to hormonal influence during menopause which decreases tear production and reduces protection against infections.¹ It could also be related to the application of makeup which

occludes the canaliculus thus promoting bacterial growth.¹³

The lower canaliculus was most commonly involved (49.6%), a finding consistent with other studies (55–87%).^{5,8–10} Concretions were present in 34.4% of the cases in the current study which is higher than 26% reported in a cohort of Chinese patients.⁵ The differences between studies could be due to smaller sample size and shorter duration of the study period compared to our study (34 patients vs. 131 patient respectively; 4 vs. 29 years respectively). The cause of concretion formation remains unclear, however, several factors may contribute to its formation including tear film stasis or chronic inflammation.¹⁴

Several imaging modalities (dacryocystography and ultrasound biomicroscopy) had been used to aid in the diagnosis of canaliculitis. However, a detailed clinical evaluation is sufficient to diagnose most cases.^{15,16} The diagnosis of canaliculitis in the current study was based on clinical findings alone similar to previous studies.^{1,2,8,17}

Although *Actinomyces* is considered the most common causative agent of canaliculitis, there is a recent change in the microbiological profile with other microorganisms emerging as the most common agents including: *Streptococcus species* (48.2%) (current study); *Streptococcus species* (28%)⁵; *Staphylococcus species* (39%)⁶; *Staphylococcus species* (26.6%)¹⁰; *Fungi* (27.4%) [1]; *Nocardia* (42%)⁹; *Streptococcus species* (21%)¹⁸ (Table 3).

As an alternative to surgical intervention, repeated antibiotic irrigation has been suggested for treating chronic canaliculitis.⁹ However, canaliculotomy with concretion removal combined with topical antibiotic therapy is still considered the gold standard for the treatment of canaliculitis.^{1,8}

Punctal plugs are frequently placed for the treatment of dry eyes. Several studies have reported canaliculitis as a complication of punctal plugs (8–61%).^{19,20} In the current study, three patients (3.2%) developed canaliculitis after plug placement. The 1st patient with culture positive *Haemophilus Influenza* had two recurrences which completely resolved with conservative therapy. The 2nd patient had culture positive *Haemophilus parainfluenza* which was treated with conservative therapy. The 3rd patient had culture positive *Actinomyces* which was completely eradicated with surgical

Table 4. Microbiological profile of 45 canaliculitis patients (34.4%) with concretions.

Organism	No. (%)
<i>Staphylococcus species</i>	24 (53.3%)
<i>Streptococcus species</i>	23 (51.1%)
<i>Actinomyces</i>	20 (44.4%)
<i>Haemophilus species</i>	8 (17.8%)
<i>Corynebacterium species</i>	6 (13.3%)
Gram +ve bacilli resembling <i>Corynebacterium</i>	5 (11.1%)
<i>Morgaunlla Morgunii</i>	2 (4.4%)
<i>AeroCoccus Viridans</i>	2 (4.4%)
<i>Serratia Marcescus</i>	2 (4.4%)
<i>Sphingomonas Paucimobills</i>	2 (4.4%)
<i>Vellonella Species</i>	1 (2.2%)
<i>Pseudomonas aerogenosa</i>	1 (2.2%)
<i>Pasteurulla Species</i>	1 (2.2%)
<i>Enterobacter Cloacea</i>	1 (2.2%)
<i>Prevotella Disians</i>	1 (2.2%)
<i>Gomella Bergeri</i>	1 (2.2%)

intervention. A previous study reported canaliculitis in 13 (76.5%) patients after SmartPlug placement.²⁰ These patients required canaliculotomy and/or silicone intubation for treatment.²⁰

An incidental finding was noticed in 3 (3.2%) patients who have been using honey topically as traditional therapy in their eyes. All patients had mixed infection with the same organisms: *Actinomyces*, *Staphylococcus aureus*, *Eikenella corrodens*, *Streptococcus Constellatus* and *Aerococcus Viridans*. The 1st patient had two recurrences which were successfully managed with repeated conservative therapy alone. The 2nd and 3rd patients had complete recovery with conservative management and surgical intervention, respectively, with no recurrences.

In summary, canaliculitis is frequently overlooked and misdiagnosed as conjunctivitis. Persistence or recurrence may complicate the condition. The microbiological profile of canaliculitis is changing with other organisms (*Streptococcus* and *Staphylococcus*) isolated as the most common causative agents. Canaliculotomy with removal of all concretions is still considered the gold standard of treatment to eliminate the infection and improve patient symptoms.

Table 3. Comparison of the current study with previously published reports.

Study group	No. of patients	Concretions (%)	Most common organism	Management	Outcome
Vecsei et al. (1994)	40	-	Fungi (27.4%), staphylococcus (25.3%)	Conservative treatment (20); Canaliculotomy (20)	20% Resolved/80% resolved
Anand et al. (2004)	15	5(33)	Staphylococcus (26.6%), actinomyces (13.3%)	Canaliculotomy	100% Resolved
Mohan et al. (2008)	12	-	Nocardia (42%), corynebacterium (33%)	Topical antibiotic & cefazolin irrigation	100% Resolved
Lee et al. (2009)	30	-	Strept. Viridans (36%)	1-snip punctoplasty & curettage	83.3% Resolved with 1 curettage, 6.6% resolved with repeat curettage
Zaldivar et al. (2009)	23	-	Streptococcus (21%)	Conservative or surgical intervention	100% Resolved
Lin et al. (2011)	34	9 (26)	Streptococcus (28%), staphylococcus (20%)	Conservative (9) & canaliculotomy (25)	66% Resolved/84% resolved
Kaliki et al. (2012)	74	-	Staphylococcus (39%)	Punctal dilation + canalicular expression (51) punctoplasty + canalicular curettage (41)	59% Resolved with single expression, 10% resolved with repeat expression 98% resolved with single curettage, 2% resolved with repeat curettage
Current study	131	45 (34.4%)	Streptococcus (48.2%), staphylococcus (42%)	Conservative or surgical intervention	87% Resolved/13% recurrent resolved with repeat intervention

Conflict of interest

The authors declared that there is no conflict of interest.

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