

## Dacryology Update

# Lacrimal canaliculitis



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### Abstract

Canaliculitis is an uncommon, often misdiagnosed diagnosis because canaliculitis can mimic many other common ocular conditions. Canaliculitis should be appropriately diagnosed and treated to avoid recurrent inflammation and possible obstruction of the upper portion of the lacrimal system. This review will serve as a concise resource to aid in diagnosis and provide updated management options.

**Keywords:** Canaliculitis, Canaliculiths, Canaliculotomy, Epiphora, *Actinomyces israelii*

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<http://dx.doi.org/10.1016/j.sjopt.2013.11.003>

### Introduction

Canaliculitis is an inflammation of the lacrimal canaliculi caused by infection<sup>1,2</sup> or as a complication of punctal plug insertion.<sup>3–5</sup> It is often misdiagnosed<sup>6</sup> leading to a delay in diagnosis.<sup>7</sup> Thus, this diagnosis is the one that should be thought of as a potential etiology in various scenarios. We present a concise survey on clinical features, microbiological profile, workup, diagnosis, treatment outcome and recommendations for both primary and secondary canaliculitis.

### Clinical features

Canaliculitis is generally a unilateral condition.<sup>7</sup> Symptoms associated with primary and secondary canaliculitis include epiphora, conjunctivitis, eyelid matting, a swollen, pouting punctum, or purulent discharge.<sup>6,8–11</sup> (Figs. 1 and 2) Other findings include sulfur granules or canaliculiths extruded from the punctum via massage or discovered during canaliculotomy.<sup>9,10,12–14</sup>

Additional findings with cases of secondary canaliculitis include an inflammatory mass projecting from the punctum or intermittent blood-stained tears.<sup>3,5,15,14</sup> Canaliculitis should

be considered as a possible etiology with persistent or recurrent eyelid lesions, chalazia, or abscesses.<sup>16</sup>

Examination should include palpation of the medial canthal region and eyelids, slit lamp examination and lacrimal irrigation.<sup>9,17</sup> Patency of the lacrimal system is usual in canaliculitis<sup>2,18</sup>, as canaliculiths may still allow flow of saline during irrigation. Proving patency of the nasolacrimal system is important as other lacrimal outflow pathway obstructions may require a different management.<sup>9</sup> Irrigation and probing can localize the position of migrated punctal plugs in patients with a history of punctal plug placement, as it is necessary with secondary canaliculitis.<sup>19</sup>

### Diagnosis, pathology, and culture

Aside from clinical findings, isolation of the causative organism via culture or histology of concretions, punctal discharge, or tears should be attempted. Microbiologic studies include aerobic and anaerobic cultures.<sup>9</sup> In recurrent cases with negative cultures, fungal and mycobacterial cultures may also be done.<sup>16</sup> *Actinomyces israelii* is classically cited as the most common causative organism of canaliculitis.<sup>2,6,20</sup> Other recent studies, however, demonstrate higher rates of

Received 4 November 2013; accepted 4 November 2013; available online 13 November 2013.

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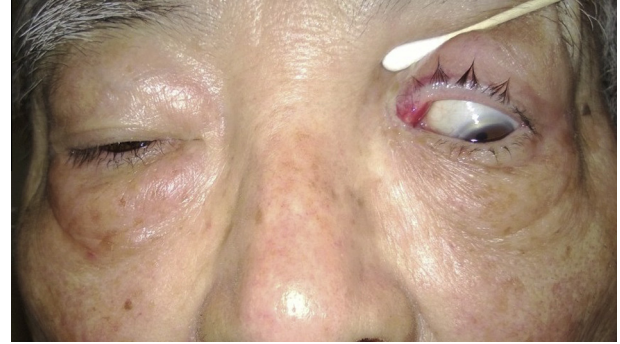
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Peer review under responsibility of Saudi Ophthalmological Society, King Saud University.



**Figure 1.** Left medial canthal purulent discharge.



**Figure 2.** Same patient in Fig. 1 with elevation of dermatochalasis and unmasking of erythematous and edematous left upper punctum and canaliculus.

streptococcal<sup>11,21</sup> and staphylococcal<sup>7,12,17</sup> species as causative organisms. Branching filaments during Gram staining are characteristic of *Actinomyces* species, albeit culturing of *Actinomyces* is difficult. This difficulty may be secondary to *Actinomyces*' anaerobic nature or the propensity for a polymicrobial etiology of canaliculitis.<sup>2,8,14,22</sup> If present, recovered canaliculus concretions are often analyzed via histopathology.<sup>8,13,17,18</sup> Characteristics of *Actinomyces* on histopathology include sulfur granules demonstrating filamentous gram positive bacteria.<sup>6,18</sup> Concretions which do not grow characteristic findings of *Actinomyces* or other organisms may simply be sterile necrotic tissue and debris.<sup>9</sup>

## Imaging

High resolution ultrasound can demonstrate canaliculus changes as well as canaliculiths. These findings in patients with suspicion for canaliculitis would solidify the diagnosis.<sup>23</sup> Data to support the use of ultrasound as a diagnostic measure are minimal at this time.

Dacroendoscopy has been described to be useful in cases of secondary canaliculitis with migrated punctal plugs. The position of the plug can greatly affect the amount of scarring, discharge, and area of occlusion. Knowledge of plug position would aid in surgical management of migrated punctal plugs and secondary canaliculitis.<sup>19</sup> Currently, the use of imaging in canaliculitis is not common place.

## Medical management

Various types of medical management have been used to treat canaliculitis. Warm compresses, local massage, and topical and systemic antibiotics are common therapies.<sup>9</sup> Irrigation or syringing is also used.<sup>15,22</sup> Generally speaking, medical management, namely antibiotics, may temporarily improve symptoms, however, recurrence or persistence of disease is common.<sup>2,9,12,21,24</sup> Obstruction may block antibiotics from eradicating bacteria from its source especially when concretions and stones are present since they can be the nidus of infection.<sup>2,10</sup>

Recurrence with medical management is also common in secondary canaliculitis. In such cases, punctal plugs may require removal.<sup>3</sup> Antibiotics shown to have symptomatic improvements from primary and secondary canaliculitis include systemic penicillin,<sup>7</sup> topical neomycin, polymyxin, or bacitracin.<sup>9</sup> Syringing via antibiotics such as cefazolin has also been noted to be successful.<sup>22</sup> If possible pharmacological

choice should be dictated by culture and isolation of causative organism.

## Surgical management

Surgical management is generally considered a definitive treatment for canaliculitis.<sup>8-10,17,21</sup> Curettage of stones after dilation of the punctum is a method that is generally effective in primary canaliculitis. Punctoplasty can be performed to allow passage of curette; however, one study concluded that dilation alone was sufficient to allow passage of curette.<sup>10</sup> Topical antibiotic therapy with punctoplasty and canaliculus curettage is considered the gold standard of treatment because punctal dilation with expression of drainage and canaliculiths alone often leads to persistence or recurrence of disease.<sup>7</sup>

Canaliculotomy while more invasive, allows more direct access to the canaliculus. Canaliculotomy involves use of a local anesthetic and a horizontal incision through the posterior surface of the canaliculus. Surrounding necrotic epithelium<sup>9</sup> and stones are removed with curettage, sent for histopathologic and microbiologic studies, and the canaliculus can be irrigated with antibiotic solution.<sup>13</sup> The incision made can be left open or closed with or without stent placement depending on the patient.<sup>17</sup> The majority of patients with primary canaliculitis treated with canaliculotomy report complete resolution.<sup>8,9,12</sup> Complications of the surgery include scarring and dysfunction of the lacrimal pump,<sup>25</sup> the need for intubation or stent placement, recurrent infection, or need for reoperation.<sup>11,13,26</sup> Additionally strictures, obstruction, continued epiphora, and mattering after canaliculotomy have been reported.<sup>17</sup> In contrast to canaliculus strictures, canaliculus dilation may also develop.

Recent studies reviewed techniques, such as canaliculoplasty with intubation to avoid post-caliculotomy sequelae. This technique successfully cures the disease process, avoids risk of scarring of the lacrimal system sometimes caused by punctotomy/caliculotomy, and prevents stasis in the canaliculus system that can lead to recurrence.<sup>25</sup> Another successful technique involves punctum sparing canaliculotomy with monocalicular intubation in treating canaliculitis. The goal of this method is to offer an alternative that may avoid punctal trauma and scarring leading to more normal post-procedure canaliculus anatomy.<sup>27</sup>

Treatment of secondary canaliculitis includes broad spectrum topical and oral antibiotics as well as removal of

plug. The manufacturer of SmartPlug™ (Medennium, Inc., Irvine, CA, USA) also recommends irrigation of the nasolacrimal duct which has been shown to aid in resolution of secondary canaliculitis. Irrigation without removal of plug may lead to obstruction more distally in the nasolacrimal pathway with potential for more permanent obstruction.<sup>3</sup> In one subset of punctal plug users, all patients who were diagnosed with canaliculitis required canaliculotomy and punctal plug extraction.<sup>24</sup> Thus, if conservative management fails to lead to resolution, canaliculotomy with removal of plug can be performed similar to the procedure noted for primary canaliculitis.<sup>24,26</sup> Dacryocystorhinostomy with intubation<sup>3</sup> or placement of Jones tubes<sup>24</sup> are more invasive options.

## Prognosis

Many factors may affect long term resolution of primary canaliculitis including low index of suspicion which can delay appropriate diagnosis and management of canaliculitis.<sup>12</sup> As with many conditions, management progresses from medical to surgical with the aim to achieve the resolution of the condition for the patient in the least invasive fashion possible. Conservative methods can initially be a successful albeit recurrence rates in the literature are noted as high as 33% with medical management alone versus recurrence of 16% in the surgical intervention group.<sup>21</sup>

In secondary canaliculitis, conservative measures generally do not result in complete resolution. Thus, definitive therapy is canaliculotomy with plug removal. Patients who have punctal plugs placed should be made aware of this risk prior to placement.<sup>24</sup>

## Summary

Epiphora, chronic or recurrent unilateral conjunctivitis, pouting punctum, yellow discharge or canaliculiths are all presentations of canaliculitis. If discharge or concretions are present, microbiological or histopathological investigation should be conducted from expressed materials. The utility of various imaging is being further investigated. First line treatment is conservative medical therapy with more invasive therapy reserved for conservative treatment failure. Canaliculotomy is ultimately considered the definitive therapy for both primary and secondary canaliculitis.<sup>28</sup>

## Conflict of interest

The authors declared that there is no conflict of interest.

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