Current Concepts in Canaliculitis

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Outline

- Case
- Diagnosis
- Management
- Current Literature
- Conclusions
73 yo WF with 6 mo h/o “stringy” mucoid discharge, redness and pain OS “It’s getting on my nerves. I’m going to go crazy!”
She has been seen by Multiple providers...

- 2 Optometrists (Therapeutic)
- 1 General ophthalmologist
- 3 Cornea specialists
- 1 Oculoplastic specialist
She has been prescribed multiple medications...

- 8/23 Tobradex QID
- 10/17 Restasis BID
- Zaditor
- Fluor-op 0.1% QID
- Systane
- Tobradex
- Lotemax
- Dexamethasone 0.1%
- 11/5 Polysporin QID
- 11/12 Doxycycline 50 mg daily
- 11/15 Ciproflox 500 mg BID
- 11/20 Vigamox QID
- 11/28 Erythromycin TID
- Doxycycline 100 mg BID
- 1/7 Lotemax qday
- Medrol dose pack
- Doxycycline qday
- Polysporin OS qhs
She has been given Multiple diagnoses...

- "Chronic conjunctivitis"
- "Keratoconjunctivitis"
- "Dry eye"
- "Dacryocystitis with conjunctivitis"
- "?Nasolacrimal duct obstruction Left"
- "CL related infection; mucous fishing syndrome; blepharitis, neurodermatitis"

Chronic complainer and eye rubber who likes to FIRE her doctors
Let’s take a look at her Exam...

- Copious mucopurulent discharge
- Chronic papillary reaction
- Punctate corneal staining
- Tender, pouting LUL punctum with scant discharge on canalicular compression
Course

- Cultures grew MSSA
- Canaliculotomy, curettage, antibiotic irrigation --> happy as a lark

(for 11 days)
Finally resolved

- Dacryocystorhinostomy with silicone intubation along with additional curettage and antibiotic irrigation
- No recurrence at 2 year follow-up
Getting from A to B

DCR with silicone intubation along with antibiotic irrigation

No recurrence at 2 year follow-up
What can we learn from this case?

- Canaliculitis is...
  - Easily misdiagnosed and the diagnosis is often delayed
  - Miserable for the patient (and for doctor)
  - Treatable but sometimes difficult to eradicate

- Cure is wonderful for the patient and gratifying for the doctor* (Canaliculitis analogous to GCA)
What do you want to know about canaliculitis?

- How do you recognize canaliculitis?
- How do you treat canaliculitis?
Recognizing canaliculitis...

- Acknowledge that it is uncommon diagnosis to make and easily misdiagnosed
- Actively look for it...recognize patterns.
- Ask more questions:
  - Who gets it?
  - What symptoms/signs and exam findings?
Primary and Secondary Lacrimal Canaliculitis: A Review of Literature

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Abstract. Canaliculitis is an uncommon inflammation of the proximal lacrimal drainage system that is frequently misdiagnosed. It classically presents with symptoms of unilateral conjunctivitis, mucopurulent discharge, medial canthal inflammation, epiphora, and a red, ointing punctum. We summarize the literature on canaliculitis published from antiquity to the modern era and explore therapeutic options. (Surv Ophthalmol 56:336–347, 2011. © 2011 Elsevier Inc. All rights reserved.)

Key words. actinomyces • actinomycosis • canaliculitis • canaliculostomy •

Freedman et al. 2011 Distinguishes Primary from Secondary Canaliculitis (punctal plugs)
Commonly misdiagnosed:

- Freedman 2011: “If the literature accurately reflects clinical practice, it would appear that it is more common to misdiagnose patients with canaliculitis than to identify this condition. Case studies of canaliculitis report percentages of patients previously misdiagnosed as 45% (Pavilack 1992), 60% (Anand 2004, Vecsei 1994), and 100% (Briscoe 2004). One study noted that 33% of patients had been previously misdiagnosed multiple times (Anand 2004)”
Why is it so easily missed?

- Freedman et al. (2011) quotes Harrison’s Principles of Internal Medicine regarding primary canaliculitis:
  - “the most misdiagnosed disease”
  - “no disease is so often missed by experienced clinicians.”
- Rare: Estimated 2-4% historical incidence based on records reviewed for relevant symptoms (Freedman 2011)
Common misdiagnoses:

- **Think Canaliculitis** if pt presents with:
  - chronic purulent conjunctivitis
  - hordeolum
  - chalazion
  - dacryocystitis
  - blepharitis
Delayed diagnosis

- From time of onset of symptoms to time of diagnosis:
  - 15 mos (2 days - 10 years) (Lin 2011)
  - 6-36 months (Anand 2004, Briscoe 2004)
  - >10, 15, 20 years (Freedman 2011)
- Low incidence + constellation of similar symptoms to more common entities ==> delayed diagnosis
Recognizing canaliculitis...

- Acknowledge that it is uncommon diagnosis to make and easily misdiagnosed (as something more common)
- Actively look for it...recognize patterns.
- Ask more questions:
  - Who gets it?
  - What symptoms/signs and exam findings?
Who gets it?
5:1 female preponderance

Why? Menopause, Dry eye, Punctal plug use, Cosmetics?
What signs/symptoms?

- Epiphora with mucopurulent discharge
- Redness
- Swelling
- Pain

Induration and Pyogenic granuloma in association with Canaliculitis
- Chronic conjunctivitis
- Pouting punctum with purulent discharge
  - Expression of canalicular debris from direct canalicular (not sac) compression
- Focal erythema, edema, induration, pain localized to involved canaliculus

What exam findings?
What exam findings?

Pertinent negatives: Note what you don’t see with canaliculitis.

- No lacrimal sac inflammation (e.g., sac distention)
- No NLD obstruction on irrigation
What exam findings?
This is acute dacryocystitis--not canaliculitis.
What do you want to know about canaliculitis?

- How do you recognize canaliculitis?
- How do you treat canaliculitis?
Treating canaliculitis...

- Ideal treatment effects maximal rate of cure with minimal morbidity/cost
- More questions:
  - What are the major pathogens involved?
  - What are the conservative options?
  - What are the surgical options?
  - What risk factors influence recurrence rates?
What are we treating?

What are the major pathogens?
Actinomyces - branching filaments

Originally classified as ray fungus - resembled fungal mycelia. Now considered GP bacilli, obligate or facultative anaerobes
Actinomyces

- Cast-forming
- Found in normal cattle and human oral flora
- Causes chronic granulomatous infections
- “Low success rate in isolation of organisms is frequently attributed to the fastidious nature of Actinomyces, the difficulty of culturing this anaerobic organism, and high tendency for polymicrobial infection” (Freedman 2011)
- Successful culture of these organisms from concretions is 11.1% to 71.4%
Major pathogens:

- Streptococcus (21%),
- Staphylococcus (13%),
- Actinomyces (4%)
- Propionibacterium (8%)
Major pathogens:

<table>
<thead>
<tr>
<th>Organism</th>
<th># Cases (188 Total)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actinomyces</td>
<td>67</td>
<td>30.3</td>
</tr>
<tr>
<td>None Found</td>
<td>52</td>
<td>21.8</td>
</tr>
<tr>
<td>Strep</td>
<td>26</td>
<td>11.8</td>
</tr>
<tr>
<td>Staph</td>
<td>22</td>
<td>9.9</td>
</tr>
<tr>
<td>Fungus</td>
<td>11</td>
<td>4.9</td>
</tr>
<tr>
<td>Nonspecific gram(−)</td>
<td>15</td>
<td>6.7</td>
</tr>
<tr>
<td>Nonspecific gram(+)</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td>Other</td>
<td>32</td>
<td>14.4</td>
</tr>
</tbody>
</table>

**III. Clinical Presentation**

The most commonly seen clinical presentation among 29 case reports and 12 reviews (total = 280 patients) of primary canaliculitis are described. The typical patient is a post-menopausal woman who
Clinical characteristics and factors associated the outcome of lacrimal canaliculitis

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Lin et al. 2011
Clarify clinical features
Identify risk factors for recurrence & concretions
Lin et al. 2011

- 34 eyes treated in 6 year period
- Lower canaliculus (91%)
- Strep (28%), Staph (20%), Actinomyces
- No specific factor related to concretions formation
- Canaliculotomy in 74%; Conservative in 26%.
- Recurrence rate 21% (mean time to recurrence 24 mos) with no statistically significant difference in recurrence rate between surgical and conservative management.
- With multivariate analysis, male gender (50% vs 8%) and presence of concretions (56% vs 8%) were found to be independent RF for recurrence
Table 6. Lacrimal canaliculitis: current study versus published reports.

<table>
<thead>
<tr>
<th>Gender (M/F)</th>
<th>Mean age (year, range)</th>
<th>Involved canaliculus (upper/lower/both)</th>
<th>Concretion (%)</th>
<th>Most common organism</th>
<th>Management/Outcome</th>
<th>Follow-up (months)</th>
</tr>
</thead>
</table>
| Pavilack and Frueh  
(n = 11) | 3/8 | 51 (10–84) | 4/6/1 | 11 (100) | -- | Simple curettage: 45% cured after single treatment 91% cured within two treatments | -- |
| Vecsei et al.  
1994 (n = 40) | 15/25 | 52.3 (26–82) | 28/12/0 | -- | Fungi (27.4%)  
Staphylococcus sp. (25.3%)  
Actinomyces (23%) | Conservative (20 cases): 20% cured; 80% recurrent  
Canaliculotomy (20 cases): 80% cured  
Conservative treatment (six cases): 100% recurrent  
Canaliculotomy: 100% cured | 3 |
| Anand et al.  
(n = 15) | 2/13 | 69.6 (45–87) | 1/13/1 | 5 (33) | Culture positive in 66.6%  
Staphylococcus sp. (26.6%)  
Actinomyces (13.3%) | -- | 26 |
| Marthin et al.  
(n = 8) | 3/5 | 67.5 (28–87) | -- | -- | Culture positive in 37.5%  
37.5% Gram positive rods  
Nocardia (42%)  
Corynebacterium (33%)  
Staphylococcus sp. (25%) | -- | -- |
| Mohan et al.  
(n = 12) | -- | 48 (31–70) | 4/8/0 | -- | -- | Topical antibiotic (five cases): 60% cured Intracanalicular antibiotics (nine cases): 100% resolved after a mean of 4.5 irrigations | 12 |
| Current study  
(n = 34) | 10/24 | 64 (30–89) | 3/25/6 | 9 (26) | Culture positive in 84%  
Streptococcus sp. (28%)  
Staphylococcus sp. (20%)  
Actinomyces (16%) | Conservative 33% recurrent  
Canaliculotomy 16% recurrent | 18 |
How are we treating?  
Conservative and Surgical options?
Treatment options:

- Conservative management: warm compresses, digital massage, topical and systemic antibiotics, antifungals, corticosteroids, non-surgical procedures

- Empiric treatment with topical antibiotics alone is not sufficient (only transiently alleviates symptoms).

- Must perform intracanalicular antibiotic (or iodine) irrigation to eradicate the infection.
Digital massage
Treatment options:

- Repeated intracanalicular antibiotic irrigation (Cefazolin) with topical antibiotic irrigation advocated with repeat if not clinically improved by 48 hours: this required average of 4.5 (1-8) irrigation treatments. All patients treated without surgery. (Mohan et al. 2008)

- Others argue that irrigation may not only be unnecessary but also may be damaging by forcing concretions into more distal portions of the canaliculus. (Serin 2007)
Treatment options:

- However, it is widely reported that medical therapy is rarely effective in clearing canalicular infections (Freedman 2011)

- Surgical canaliculotomy and canalicular curettage necessary (Pavilack 1992; Vecsei 1994)
Treatment options:

- “Concretions present may prevent antibiotics from eradicating bacterial source by virtue of obstruction of flow and protection of bacteria within stones. Thick mucopurulent and particulate discharge and abscess-like accumulation of infected debris are responsible for resisting penetration of topical and systemic antibiotics. Canalicular stasis and infection.” (Lin 2011)

- 33% recurrence rate with conservative treatment (Lin 2011)
Concretions
aka dacryoliths, sulfure granules, casts
Dacryoliths/concretions

Reservoirs of bacteria; yellow, cheese-like granules, considered the pathologic hallmark of Actinomyces canaliculitis.
Treatment options:

- Pavilack and Frueh (1992) advocate canalicuara curettage (initially with punctoplasty, later with just punctal dilation): 45% success (55% reop rate)

- Lee et al. (2009) advocate 1-snip punctoplasty and canalicular curettage combined with antibiotics as a minimally invasive and effective procedure (88.3% success rate). Recommends complete removal of concretions and avoidance inducing canalicular stricture through careful manipulation
Punctum-Sparing Canaliculotomy for the Treatment of Canaliculitis

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Purpose: Canaliculitis is an uncommon condition presenting with epiphora, medial eyelid swelling, pouting punctum, and punctal discharge. Surgical treatment with canaliculotomy with incision of the punctum is the treatment of choice when medical management fails. The risk of epiphora and functioning of the healed canaliculus is unknown. We describe a modification to the standard technique by leaving the punctum intact, incising the canaliculus along its full extent, and intubating the upper system with a silicone monocanicular stent.

Methods: The lower punctum is dilated, and a Bowman probe inserted into the canaliculus. A no. 11 Bard-Parker blade is used to incise the canaliculus along its full extent, beginning

We describe a modification to this technique by leaving the punctum intact, incising the canaliculus along its full extent, and intubating the upper system with a silicone monocanicular stent.

Surgical Technique. A 70-year-old woman presented to our office with symptoms of left eye irritation and discharge. Findings on examination were consistent with left-sided lacrimal canaliculitis involving both the upper and lower canaliculi: pouting punctum, discharge, and erythema of the medial canthus. Expression of small canalicular stones and discharge from the upper and lower canaliculi

Khu and Mancini (2012)
Punctum-sparing canaliculotomy, curettage
Dacryoliths
Complications to treatment?

- Risks of canaliculotomy:
  - canalicular luminal narrowing or scarring
  - lacrimal pump dysfunction
  - canalicular fistula formation
  - failure to treat stones lodged deeper in the lacrimal system
  - need for further surgery

- Dilation only with curettage - effective in primary canaliculitis; low risk of scarring the canaliculus, pump function preserved by avoiding canaliculotomy (Pavilack and Frueh 1992)
Antibiotic irrigation

- Technique: Irrigate with patient sitting upright and leaning forward to allow egress out the nose and not the nasopharynx

- Antibiotics used: Aqueous penicillin G (100,000 Units/mL), Cefazolin (Fortified 50 mg/mL), trimethoprim sulfate, polymyxin B, moxifloxacin.

- povidone iodine (1%)
What about SmartPlugs?

- Prevalence of secondary canalicularis SmartPlugs:
  - 4.73% per plug placement
  - 7.23% per patient (Hill et al. 2009)
Management of Complications after Insertion of the SmartPlug Punctual Plug

A Study of 28 Patients

SmartPlug Study Group*

Purpose: To characterize and describe the management of complications seen in patients who have undergone insertion of the SmartPlug permanent punctal plug.

Design: Retrospective case series.

Participants: Patients who experienced complications after SmartPlug insertion and were treated by 1 of 18 ophthalmic plastic and reconstructive surgeons between January 2004 and October 2005.

Methods: Presenting symptoms and signs and the management of complications were analyzed.

Main Outcome Measures: Prevalences of canaliculitis and dacrocystitis, tearing at presentation, and outcome of conservative and/or surgical management of the SmartPlug complications.

Results: Twenty-eight patients were included in the study; 13 had bilateral involvement. On initial presentation, 18 patients had inflammation, including 17 with canaliculitis and 1 with recurrent acute dacrocystitis. Ten patients had little or no inflammation; all 10 had tearing of the involved eye(s). In 5 patients, complications resolved after office irrigation of the lacrimal drainage system; in a sixth patient, silicone intubation was performed as well. Canaliculotomy was performed in 13 patients (bilateral in 3) and combined with silicone intubation (3 patients). Canaliculotomy was planned in an additional 2 patients. Canaliculitis in 1 patient responded to a course of oral antibiotics; the plug was massaged out of the punctum in a retrograde fashion in another patient. In still another patient, the plugs expressed themselves at the time of planned canaliculotomy. In 4 patients, dacrocystorhinostomy (DCR) with silicone intubation was necessary. Two additional patients refused further treatment including DCR and canaliculotomy; both were lost to follow-up.

Conclusions: Canaliculitis, acute dacrocystitis, and tearing may be seen in patients who have had SmartPlugs and may be managed by removal of the plug. A trial of topical and oral broad-spectrum antibiotics followed by retrograde massage of the plug through the canaliculus may be helpful should plug removal be deemed appropriate. If conservative measures fail, canaliculotomy with removal of the plug may be considered; DCR may be necessary. Although lacrimal irrigation may resolve the problem, irrigation also may dislodge the plug from its canicular position and cause permanent obstruction of the lacrimal drainage system. Ophthalmology 2006; 113:1859–1862 © 2006 by the American Academy of Ophthalmology.
SmartPlug Study Group

- Conservative therapy first
- Topical/PO antibiotics
- Retrograde massage with CTA for plug removal

Surgical management
- Canaliculotomy
- DCR
SmartPlug Study Group

- Silicone intubation of canalicular or NLD scarring
- Recommended AGAINST irrigation if inflammatory signs due to risk of worsening obstruction

How SmartPLUG is designed to work:
- Your eye care professional gently places SmartPLUG into the punctum.
- Inside the punctum, the plug shrinks in length and expands width, adjusting itself to fit the punctum.
- Once in place, SmartPLUG becomes a virtually undetectable soft gel.
- The innovative design and material of SmartPLUG minimize irritation to sensitive tissues.

**SmartPLUG cannot be rubbed out.** (Your eye care profession may remove it by irrigating your tear duct with a saline solution)

- Inserting SmartPLUG is a simple process that takes just minutes, yet SmartPLUG is designed to provide long lasting relief of dry eye symptoms.

SmartPLUG — Restoring Comfort to Dry Eye Sufferers.

Caution: Rx

Click here for a printable, readable PDF of the SmartPLUG Product Monograph.

Click here for a listing of articles written about the SmartPLUG product.
SmartPlugs

- Hill et al. 2009 called for a moratorium on SmartPlugs
- “It is the authors’ opinion that future use of SmartPlugs should be discontinued. Ophthalmologists who choose to use SmartPlugs should warn their patients of the signs and symptoms of canaliculitis and have a higher index of suspicion for canaliculitis when symptoms of irritation and discharge develop post-SmartPlug placement.”
SmartPlug-induced canaliculitis
Expressed SmartPlug/Concretion
Canaliculus from SmartPlug and silicone plugs
Canaliculus Like a Pez dispenser
My approach: history

- Think canaliculitis until proven otherwise when pt presents with:
  - longstanding, recurrent ocular infections
  - multiple medication regimens and providers
- Ascertain history regarding dry eye and punctal plug use
My approach: exam

- Examine punctum and look for purulent drainage at rest and also with compression of canaliculus with a cotton-tipped applicator (CTA)
- Ensure this is not an acute or chronic dacryocystitis
- Perform diagnostic probing of canaliculi and lacrimal system irrigation to rule out NLD obstruction (* caution with potential history of migrated silicone or intracanalicular punctal plug)
My approach: treatment

- If plug suspected by history, attempt to “milk” plug out with CTA’s or flush it out in retrograde fashion by irrigating through opposite canaliculus and providing resistance to outflow through lacrimal sac by applying digital pressure.

- topical antibiotic drop and/or ointment until surgical intervention can be scheduled (usually continue whatever antibiotic regimen pt is already taking).
My approach: treatment

- Canaliculotomy with curettage (to remove any punctal plug foreign bodies and dacryoliths) and antibiotic irrigation under local anesthesia
  - Penicillin-G - my first choice
  - povidone iodine - next choice if PCN allergic
- Polysporin ophthalmic ointment BID postop
- RTC 2 weeks
My approach: treatment

- If recurrent, consider dacryocystorhinostomy with further curettage and repeat antibiotic irrigation intraoperatively
Summary

- Canaliculitis is often misdiagnosed or delayed in diagnosis.
- Consider canaliculitis in older females presenting with chronic conjunctivitis.
- Treatment is effective although multiple treatments are sometimes necessary.
- Surgical curettage with removal of dacryoliths or should be undertaken along with antibiotic irrigation.
- Punctal plug foreign bodies should be removed surgically if unable to be expressed by massage.
Thank you for your attention

Any Questions?