



# First-Onset Dacryocystitis: Characterization, Treatment, and Prognosis

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## ABSTRACT

**Introduction:** To assess the risk of recurrent dacryocystitis after first-onset dacryocystitis and to obtain a demographic profile and treatment characteristic for patients with first-onset dacryocystitis.

**Methods:** A retrospective study was performed on patients who had first-onset dacryocystitis during the years 2010–2013. Patients were followed up for 3 years. The analysis focused on the recurrence of dacryocystitis, demographics, medical treatment, and choice of lacrimal surgery.

**Results:** The inclusion criteria were met by 52 patients. Of these 15 (29%) had one or more recurrence of dacryocystitis, and 18 patients (34.6%) underwent lacrimal surgery. The mean age was 51.6 years (median 55.5, range 0–93). The female-to-male ratio was slightly under 3:1 (73.1%). The most frequent medical treatment was flucloxacillin capsules combined with chloramphenicol eye drops or ointment.

**Conclusions:** The majority of patients with first-onset dacryocystitis had no further episodes of dacryocystitis. Some patients experienced recurrent and complicated infections

requiring surgery and were thus a significant burden on the healthcare services. Various surgical options were used to clear the nasolacrimal obstruction causing dacryocystitis. Dacryocystorhinostomy was the most common procedure and showed excellent success rate.

**Keywords:** Dacryocystorhinostomy; First-onset dacryocystitis; Nasolacrimal duct obstruction; Retrospective study

### Key Summary Points

The majority of patients with first-onset dacryocystitis have no further episodes of dacryocystitis.

Dacryocystorhinostomy is the most common procedure to treat patients experiencing further lacrimal problems after an episode of first-onset dacryocystitis.

## INTRODUCTION

Dacryocystitis is a common disease at the ophthalmic emergency room. A prerequisite for dacryocystitis is an obstruction at the nasolacrimal duct often of unknown etiology;

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however, it may be secondary to infection, inflammatory conditions such as sarcoidosis or Wegener's granulomatosis, trauma, dacryolith, or neoplasm [1–3]. Stagnant fluid in the lacrimal sac and subsequent bacterial growth lead to infection that causes erythema, swelling, and tenderness over the lacrimal sac. If left untreated, it can lead to complications such as orbital abscess, cellulitis, necrotizing fasciitis, or even meningitis [4].

The spectrum of bacterial pathogens may differ between acute and chronic dacryocystitis, and also with geographical region [5]. The most frequently isolated bacterial organisms are *Staphylococcus* species [6]. Other common pathogens are gram negative bacteria such as *Escherichia coli*, *Haemophilus influenzae*, or *Pseudomonas* species [7]. The infection is usually treated with systemic and/or local antibiotics. Systemic treatment has better penetration and is therefore more important. Surgical drainage is often indicated when an abscess is present [8].

Lacrimal surgery is required if the nasolacrimal obstruction results in chronic epiphora or recurrent dacryocystitis [4]. The most basic procedure is nasolacrimal duct probing and a stent can be inserted to reduce the risk of restenosis, which is removed after 6 months. Dacryocystorhinostomy (DCR) is performed in patients with epiphora and previous dacryocystitis, or if probing and intubation of the lacrimal drainage system fails [9]. In DCR, an anastomosis is surgically made between the lacrimal sac and the nasal mucosa. The approach can be either external with a skin incision and dissection to the lacrimal sac or transnasal using an endoscopic technique [10, 11].

The endoscopic approach has advantages such as less impact on the surrounding tissues, shorter operation time, less intraoperative bleeding, absence of external skin scarring, preservation of the orbicularis pump action, and shorter recovery period [9, 12]. The disadvantage of endoscopic DCR is the high cost of equipment and instrumentation. Advantages of external DCR are the unimpaired view of the surgical area, the possibility of lacrimal sac biopsy if neoplasm is suspected, and higher surgical success rates [9], although the

endoscopic DCR technique has been developed and now has almost the same success rate. Previous studies have shown success rates of external DCR of about 90%, while that with the endoscopic approach is somewhat lower [9, 13].

Dacryocystectomy is used in isolated cases, e.g., to treat chronic infections in older patients with compromised tear production and underlying dry eye [14, 15]. The procedure is less invasive than DCR and the risks, such as bleeding, are lower than in DCR, which may be important in some elderly patients with comorbidities.

Many studies have been carried out on the effectiveness of various surgical procedures on lacrimal stenosis; however, no information could be found in the literature on the risk of recurrent dacryocystitis after first-onset dacryocystitis. The aim of this study was thus to investigate the risk of a recurrence of dacryocystitis after a first-onset dacryocystitis, and the demographic characteristics and treatment of patients with first-onset dacryocystitis at a tertiary eye care center in southern Sweden.

## METHODS

### Ethics

The study was approved by the Regional Ethics Committee in Lund, Sweden, and complied with the principles of the Declaration of Helsinki.

### Procedure

Patients with a first-onset dacryocystitis treated at the Skane University Hospital during the years 2010–2013 were included in this retrospective study. The diagnosis was required to be clearly documented in patient records as first-onset dacryocystitis. The follow-up period was 3 years. Patients were identified by searching the hospital's medical records using ICD10 diagnosis code H043 (acute and unspecified inflammation of lacrimal passages). The Skane University Hospital is one of the largest in

Sweden with an estimated population of 1.9 million in 2020. The hospital receives almost all patients in need of lacrimal surgery who live in its catchment area.

The exclusion criteria were dacryocystitis during this period, with the first-onset infection earlier, or cases where the clinical description was not consistent with acute dacryocystitis. Patients who died during the 3-year follow-up period were also excluded.

The following factors were analyzed:

- Recurrent dacryocystitis
- Age (mean, median, and range)
- Gender (female-to-male ratio)
- Choice of antibiotic treatment: including dose and duration
- Recurrent infections, defined as a new episode of dacryocystitis a minimum of 1 month after completed treatment of a previous episode
- Lacrimal surgery: type of operation, need for reoperation
- Cultures: number of cases in which cultures were taken, and bacteria isolated
- Surgical drainage: number of cases of abscess justifying incision

Data were entered in a MS Excel™ spreadsheet (version 2016) and analyzed using PSPP (version 1.4.1). Mann–Whitney *U* test was used to investigate differences in the data that did not follow a normal distribution. A statistically significant difference was defined as  $P < 0.05$ .

## RESULTS

A total of 52 patients with first-onset dacryocystitis during 2010–2013 met the inclusion criteria and were included in the study. It was a mix of patients with different etiologies, such as congenital nasolacrimal duct obstruction (CNLDO) and primary acquired nasolacrimal duct obstruction (PANDO). The mean age of these patients was 51.6 years (median 55.5, range 0–93), and the standard deviation was 28.4 years. The female-to-male ratio was slightly below 3:1 (73.1%).

The mean duration of antibiotic treatment during infection was 13.7 days (median 10). The

choice of antibiotics varied; the most common treatment was flucloxacillin capsules combined with chloramphenicol eye drops or ointment (Tables 1 and 2).

Incision of the lacrimal sac due to the presence of an abscess was performed in eight of the patients (15.4%). Cultures of purulent discharge were taken in 15 of the patients (29%). All these patients were antibiotic-free when cultures were taken. *Staphylococcus aureus* was the most frequently isolated bacterium (8/15 cases). One culture showed the growth of *H. influenzae*, while the remaining six cultures showed no bacterial growth.

Fifteen patients (29%) suffered one or more recurrences of dacryocystitis. Most new infections occurred during the first year of follow-up, where the number of episodes averaged 0.29. The averages during the second and third years of follow-up were 0.15 and 0.17 infections per year, respectively. During the follow-up period, 18 patients (34.6%) underwent lacrimal surgery because of chronic epiphora and/or recurrent infections. Nine patients underwent DCR, seven probing and intubation, and two dacryocystectomy (Table 3). The recurrence of nasolacrimal duct obstruction and need for revisional surgery occurred in one patient who had previously undergone DCR. The remaining eight patients who underwent DCR did not present any further problems with the lacrimal system. Three of the patients undergoing only probing and intubation had a recurrence of epiphora, but not dacryocystitis, after 2–3 years.

Additional analysis was performed to compare the group of patients treated solely with antibiotics and that who also underwent surgical procedures. The latter group had a higher average age, duration of treatment, and number of recurrences in the first year of follow-up (Table 4). Further analysis of the group that had undergone surgical procedures showed differences in age and recurrences of infection (Table 5). Statistically significant differences were found between the group undergoing probing and intubation and the DCR group in age, but not recurrence of dacryocystitis (Mann–Whitney two-sided test, 0.03, 0.09). The two patients who underwent dacryocystectomy were older, had more healthcare contacts and

**Table 1** Medical management of acute dacryocystitis using systemic treatment

Medical management, systemic treatment	Number of patients ( <i>n</i> ) and (%) <i>N</i> = 52
Orally administered flucloxacillin (500 mg × 3)	1 (1.9%)
Orally administered flucloxacillin (750 mg × 3)	24 (46.2%)
Orally administered flucloxacillin (1000 mg × 3)	3 (5.8%)
Orally administered amoxicillin (100 mg × 3)	1 (1.9%)
Orally administered amoxicillin (500 mg × 3)	1 (1.9%)
Orally administered amoxicillin + clavulanic acid (500/125 mg × 3)	1 (1.9%)
Orally administered clindamycin (150 mg × 3)	1 (1.9%)
Orally administered clindamycin (300 mg × 2)	9 (17.3%)
Orally administered clindamycin (300 mg × 3)	2 (3.9%)
Orally administered clindamycin (600 mg × 3)	1 (1.9%)
Orally administered methylpenicillin (1 g × 3)	3 (5.8%)
Orally administered trimethoprim + sulfamethoxazole (400/80 mg 2 × 2)	1 (1.9%)
Orally administered doxycycline (100 mg × 1)	1 (1.9%)
Intravenously administered cefotaxim (1 g × 2)	1 (1.9%)
Intravenously administered benzylpenicillin (1 g × 3 + tobramycin 100 × 3)	1 (1.9%)
No systemic treatment	1 (1.9%)

**Table 2** Medical management of acute dacryocystitis using topical treatment

Medical management, topical treatment	Number of patients ( <i>n</i> ) and (%) <i>N</i> = 52
Chloramphenicol drops or ointment (1 × 3–6)	25 (48.1%)
Fusidic acid ointment (1 × 2)	8 (15.4%)
Levofloxacin drops (1 × 3–5)	6 (11.5%)
Tobramycin drops (1 × 2–3)	4 (7.7%)
Ciprofloxacin drops (1 × 3)	1 (1.9%)
No topical treatment	8 (15.4%)

greater risk of recurrence during the first year after their first-onset dacryocystitis.

## DISCUSSION

Patients presenting with first-onset dacryocystitis constituted a heterogeneous group. Although first-onset dacryocystitis affected

**Table 3** Surgical procedures performed

Procedure	Number of patients ( <i>n</i> ) and (%) <i>N</i> = 18
Probing and stent intubation	7 (38.9%)
Endoscopic DCR	7 (38.9%)
External DCR	2 (11.1%)
Dacryocystectomy	2 (11.1%)

**Table 4** Comparison of patients treated solely with antibiotics versus patients who also underwent lacrimal surgery

Group	Age	Treatment duration (days)	Average number of recurrences of dacryocystitis during first year of follow-up
Patients treated with antibiotics solely	50.2	11.7	0.18
Patients who also underwent lacrimal surgery	54.1	17.7	0.5
<i>P</i> value	0.82	0.17	0.19

**Table 5** Comparison of patients who underwent lacrimal surgery

Type of lacrimal surgery	Age (years)	Average number of recurrences of dacryocystitis in the first year of follow-up
Probing and intubation	38.6	0
DCR	58.8	0.7
Dacryocystectomy	87.5	1.5
<i>P</i> value (comparing the probing and intubation to the DCR group)	0.03	0.09

patients of all ages, it was more common in middle-aged and elderly people. A female predominance was observed, which is consistent with previous studies of dacryocystitis (not only first-onset dacryocystitis) [16]. In most of the patients with first-onset dacryocystitis the course was uncomplicated, with few healthcare contacts and no surgery being required. However, some patients had recurrent infections and lacrimal surgery was required. As healthcare professionals, we have a tendency to remember the complicated cases; however, it is important to remember that the majority of patients with

first-onset dacryocystitis suffer only from a single episode of dacryocystitis.

Relevant patient records were identified by searching the hospital's medical record system for cases of dacryocystitis. A large number of records were initially found and reviewed, but only 52 patients were included in the study. Patients were excluded for different reasons. In some cases, the dacryocystitis was a recurrence, and the first-onset dacryocystitis had occurred before 2010. Other reasons included incorrectly registered diagnosis code, i.e., a completely different disease, other nasolacrimal infections such as canaliculitis or dacryoadenitis, initial

diagnosis and therapy initiated in the primary healthcare sector or at other eye clinics. These patients were excluded as the aim of the study was to study patient characteristics and treatment at the tertiary eye care center in Skåne, using as reliable data as possible.

There was a large variation in age among the patients in this study. Also, the risk for a relapse varied as well as problems with remaining epiphora. This large variation makes it important to customize the treatment and possible surgery to suit the individual patient.

Our review of patient records showed that the treatment of first-onset dacryocystitis differed. The choice of antibiotics can be affected by patient allergies, the spectrum of bacterial pathogens in the geographical region, and differences in guidelines between clinics. The length of antibiotic treatment seemed to be correlated to the severity of lacrimal obstruction, as patients who later underwent lacrimal surgery were treated, on average, substantially longer.

Incision of the lacrimal abscess was performed in only a few of all cases of dacryocystitis (15.4%). There may be several reasons for this, such as the ophthalmologist's experience of incisions, the patient's reluctance to have an abscess incised, and the possibility that first-onset dacryocystitis causes less bulging of the skin than recurrences. In a future study it would be interesting to investigate whether there is a difference between the rate of incision of the abscess in first-onset and recurrent dacryocystitis.

A limitation of the study is that the system only extends about 15 years back in time, and earlier episodes of dacryocystitis could have taken place before this. A challenge during the analysis was inadequate information regarding, for example, treatment duration, dosage of antibiotics, or whether incision was performed. In cases where there was uncertainty as to whether the patient was actually affected by first-onset dacryocystitis, and not by canaliculitis or a dacryocystocele, these patients were excluded from the study.

Only one of the 18 patients undergoing surgery had recurrent dacryocystitis during the follow-up period and had to be operated on again. This is in line with the findings of

previous studies proving that both external and endoscopic DCR are very effective treatments for lacrimal stenosis [4, 11]. None of the patients treated with probing and stent intubation had recurrent dacryocystitis during the first year of follow-up, but three patients had further episodes of dacryocystitis during the second and third years of follow-up. This is in line with previous studies, showing stenting to be less effective than DCR in treating lacrimal stenosis [17]. However, over half of the patients treated with stenting had no recurrence for at least the next 3 years, which shows that this form of treatment is of value in some settings.

## CONCLUSION

To summarize, of the 52 patients with first-onset dacryocystitis, only 29% had another episode of dacryocystitis within 3 years. Patients presenting with first-onset dacryocystitis constituted a very heterogeneous group. DCR had an excellent success rate in reducing the risk of recurrent dacryocystitis.

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**Disclosures.** Karl Engelsberg and Mikael Sadlon confirm that they have no conflicts of interest to disclose.



**Compliance with Ethics Guidelines.** The study was approved by the Regional Ethics Committee in Lund, Sweden, and complied with the principles of the Declaration of Helsinki.

**Data Availability.** The datasets used during the current study are available from the corresponding author on reasonable request.

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