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Interventions for acute internal hordeolum

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Abstract

Background—Hordeolum is a common, painful, inflammation of the eyelid margin that is usually caused by bacterial infection. The infection affects oil glands of the eyelid and can be internal or external. In many cases, the lesion drains spontaneously and resolves untreated; however, the inflammation can spread to other ocular glands or tissues and recurrences are common. If unresolved, acute internal hordeolum can become chronic or develop into a chalazion. External hordeola, also known as styes, were not included in the scope of this review.

Objectives—The objective of this review was to investigate the effectiveness and safety of non-surgical treatments for acute internal hordeolum compared to observation or placebo.

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Declarations of interest
None

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Search methods—We searched the Cochrane Central Register of Controlled Trials (CENTRAL) (which contains the Cochrane Eyes and Vision Group Trials Register) (*The Cochrane Library* 2010, Issue 6), MEDLINE (January 1950 to June 2010), EMBASE (January 1980 to June 2010), Latin American and Caribbean Literature on Health Sciences (LILACS) (January 1982 to June 2010), the *meta*Register of Controlled Trials (*m*RCT) (www.controlled-trials.com), ClinicalTrials.gov (http://clinicaltrials.gov) and the WHO International Clinical Trials Registry Platform (ICTRP). There were no language or date restrictions in the search for trials. The electronic databases were last searched on 21 June 2010.

Selection criteria—The selection criteria for this review included randomized or quasi-randomized clinical trials of patients diagnosed with acute internal hordeolum. Studies of patients with external hordeolum (stye), chronic hordeolum or chalazion were excluded. Non-surgical interventions of interest included the use of hot or warm compresses, lid scrubs, antibiotics, or steroids compared to observation, placebo, or other active interventions.

Data collection and analysis—Two review authors independently assessed the references identified by the electronic searches for inclusion in this review. No relevant studies were found. The reasons for exclusion were documented.

Main results—There were no trials identified for inclusion in this review. The majority of the references identified from our search reported on external hordeola or chronic internal hordeola. The few references specific to acute internal hordeolum reported mostly recommendations for treatment or were reports of interventional case series, case studies, or other types of observational study designs and were published over 20 years ago.

Authors' conclusions—We did not find any evidence for or against the effectiveness of non-surgical interventions for the treatment of hordeolum. Controlled clinical trials would be useful in determining which interventions are effective for the treatment of acute internal hordeolum.

Plain language summary

Interventions for acute internal hordeolum

Hordeolum is a common, painful, inflammation of the eyelid margin that is usually caused by a bacterial infection. The infection affects the oil glands within the eyelid and can be internal or external. In many cases, the inflamed lesion drains spontaneously and resolves untreated; however, the infection can spread to other ocular glands or tissues and recurrences are common. If unresolved, acute internal hordeolum can become chronic or develop into a chalazion (cyst). External hordeola are known more commonly as styes and were not included in the scope of this review. It is common practice to use one or several interventions for the treatment of hordeolum, including warm compresses applied at home, topical medications and lid scrubs available over-the-counter, antibiotics or steroids, lid massages, and others. There were no trials identified for inclusion in this review, thus no evidence for or against the effectiveness of non-surgical interventions for the treatment of hordeolum was found. Controlled clinical trials would be useful in determining which interventions are effective for the treatment of acute internal hordeolum.

Background

Description of the condition

Hordeolum is a common inflammation of the eyelid margin. It presents as a red, painful, swollen furuncle with an acute onset and is usually caused by a staphylococcal infection (Mueller 2008; Peralejo 2008; Skorin 2002). The infection can be internal, affecting the meibomian glands, or external, affecting the glands of Zeis or Moll (Wald 2004). External hordeola are known more commonly as styes. In many cases, the lesion drains

spontaneously and resolves untreated; however, the infection can spread to other ocular glands or tissues and recurrences are common. If unresolved, acute internal hordeolum can become chronic or develop into a chalazion. (De Jesus 2004; Hudson 1981; Mueller 2008; Rubin 1995).

As hordeolum is one of the most common diseases of the eye, many people can be affected and there are many causative factors related to the disease. Incidence rates for hordeolum are not available because most cases are not reported. Hordeola tend to occur in younger people, but are not limited to any age, gender, or racial group (Fuchs 1911; Lederman 1999; Roodyn 1954). Onset is spontaneous and may be related to lid hygiene, an underlying condition, or a systemic infection (Mathew 1966; Wald 2004). Studies have shown that patients with internal hordeolum tend to be nasal carriers for staphylococci as well (Copeman 1958; Roodyn 1954). Typically, the size of the swelling is a direct indicator of the severity of the infection (Lebensohn 1950). Internal hordeolum tends to be more painful and longer lasting than external hordeolum (Barza 1983; Fuchs 1911; Olson 1991; Wilkie 1956). Cases of recurrent hordeolum are usually the result of a failure to eliminate bacteria completely rather than from new infections (Roodyn 1954). Blepharitis (Fuchs 1911; Skorin 2002), acne rosacea (De Jesus 2004), trichiasis and cicatricial ectropion (Moriarty 1982) are conditions frequently associated with internal hordeolum.

Since most cases of internal hordeolum resolve on their own, people with hordeolum often do not seek professional medical treatment (Olson 1991). Home therapies, including heated compresses, lid scrubs, and over-the-counter medications are often employed without consultation with a medical professional. For times when medical care is sought, a general practitioner or family physician may be consulted before seeing an ophthalmologist or optometrist (Fraunfelder 1971; Lebensohn 1950).

Practice standards for the initial treatment of hordeola are conservative, typically limited to the application of warm compresses several times a day if any treatment is recommended at all (Barza 1983; Fuchs 1911; Librach 1979; Olson 1991 ; Wilkie 1956). A topical antibiotic may also be prescribed in conjunction with warm compresses (Black 1990; Diegel 1986; Lebensohn 1950; Lederman 1999; Wald 2004). If the condition is severe and resistant to topical antibiotics, systemic antibiotics or surgical incision and drainage may be implemented (Briner 1987; Moriarty 1982; Mueller 2008; Rubin 1995; Skorin 2002).

Description of the intervention

Non-surgical treatments for hordeolum include the application of warm or hot compresses, the use of lid scrubs and digital massage, the administration of antibiotics or steroids, or alternative medicine such as acupuncture and autohemotherapy. Typically, the intent of these interventions is to reduce healing time and to relieve the symptoms associated with the lesion. Thus, the timing for the interventions of interest would be during the first week after onset. Beyond one week, it is believed that internal hordeolum may resolve on its own or may require surgical incision and curettage. Secondary to the resolution of the presenting hordeolum, other aims of the interventions are to minimize the risk of the infection worsening, spreading to other areas, or becoming recurrent.

How the intervention might work

The natural history of acute internal hordeolum generally spans one to two weeks, beginning with the appearance of an abscess and concluding with the draining of the abscess. Initial treatments for hordeolum have therefore been aimed at promoting the evacuation of pus from the abscess. The application of a warm or hot compress may facilitate drainage by softening the granuloma (Diegel 1986; Fuchs 1911; Moriarty 1982; Skorin 2002). Heated

compresses are typically employed for five to 10 minutes several times a day until the hordeolum is resolved.

Lid scrubs consist of mild shampoos or saline solutions and are applied while gently massaging the affected area. The theory underlying the use of lid scrubs is that they promote lid hygiene and prepare the physical environment for drainage by clearing debris from the lid margin (Driver 1996; Skorin 2002). Creating a clear channel is believed to initiate drainage, similar to the epilation of an eyelash in cases of external hordeolum (Hudson 1981). Also, ingredients used in shampoos break down bacterial membranes, which would further decrease the presence of bacteria at the infection site (McCulley 1984). Lid scrubs are commonly recommended in the treatment of other ocular bacterial infections, such as blepharitis, and may prevent the spread of the infection (Avisar 1991). In conjunction with lid scrubs, lid massage has been proposed to physically express secretions from the infected glands (Driver 1996; Scobee 1942).

Antibiotics can be administered locally at the site of the infection or given systemically. As most cases of hordeolum are caused by a staphylococcal species, antibiotics should be effective against the bacteria. The application of topical antibiotics may reduce healing time by fighting against the causative bacterial infection and reducing inflammation. Many topical medications include ingredients to relieve the symptomatic pain of internal hordeolum. Local administration of antibiotics can also be by injection. Systemic antibiotics are sometimes used when local antibiotics are not effective or when the infection is not localized.

Steroids can be applied topically as ointments or eyedrops. Since internal hordeolum has a short course, as little as one steroid treatment could be effective in reducing healing time and relieving symptoms associated with the inflammation (King 1986; Palva 1983).

Why it is important to do this review

Acute internal hordeolum is a common disease experienced by a wide population. Although the course of the disease is relatively short, instances of internal hordeolum are painful and bothersome. Furthermore, improper management of the underlying cause of the infection may lead to recurrent infections or to the development of other disease. Despite the common recommendation to employ heated compresses, their efficacy in treating hordeolum has not been systematically reviewed. If heated compresses are indeed sufficient in treating hordeolum, then more rigorous interventions, such as antibiotics or steroids, may not be warranted for initial treatment. Conversely, comparing the efficacy and safety of all available interventions, to determine which may be most beneficial to the individual, is also important. A summary of the evidence should assist patients and professionals in determining preferred methods of treatment.

Objectives

The objective of this review was to investigate the effectiveness and, when possible, the safety of non-surgical treatments for acute internal hordeolum compared to observation or placebo.

Methods

Criteria for considering studies for this review

Types of studies—This review was limited to randomized and quasi-randomized clinical trials. Examples of quasi-randomized allocation include using participants' birth dates, medical record numbers, or order of enrollment to determine treatment groups.

Types of participants—We were interested in studies of patients with a diagnosis of acute internal hordeolum. Studies of patients with only external hordeolum (stye), chronic hordeolum or chalazia were excluded.

Types of interventions—Non-surgical interventions were the primary focus of this review. We included trials which compared the use of hot or warm compresses, lid scrubs, antibiotics, or steroids to observation, placebo, or another active intervention for the treatment of acute internal hordeolum.

Types of outcome measures

Primary outcomes: The primary outcome for this review was the proportion of patients with complete resolution of hordeolum seven days after diagnosis. The seven day period for resolution was selected since most cases of hordeolum resolve on their own at between one to two weeks. We also analyzed the proportion of patients with complete resolution of hordeolum after 14 days as a secondary outcome, when these data were available.

Secondary outcomes

1. The proportion of patients requiring surgical incision and drainage after the treatment period or seven days after diagnosis.
2. The incidence of chalazion after the treatment period or seven days after diagnosis.
3. The incidence of recurrence of hordeolum after six months and after one year. A recurrent case was considered as any hordeolum that occurred after one month of the resolution of the initial hordeolum and at any location on the same eyelid, or as defined by the included study.
4. The incidence of a secondary hordeolum during or after the treatment period or seven days after diagnosis. A secondary hordeolum was defined as a hordeolum that occurred within one month of the initial hordeolum and at a different location than the initial hordeolum, or as defined by the included study.

Adverse outcomes: We planned to report all adverse effects related to the treatment of hordeolum that were reported in the primary studies. Specific adverse outcomes of interest included conjunctivitis; eye irritation; discoloration of the eyelid, conjunctiva, and lens; and corneal damage.

Economic data: We planned to report economic data.

Quality of life data: We planned to report quality of life data.

Search methods for identification of studies

Electronic searches—We searched the Cochrane Central Register of Controlled Trials (CENTRAL) (which contains the Cochrane Eyes and Vision Group Trials Register) (*The Cochrane Library* 2010, Issue 6), MEDLINE (January 1950 to June 2010), EMBASE (January 1980 to June 2010), Latin American and Caribbean Literature on Health Sciences (LILACS) (January 1982 to June 2010), the *meta*Register of Controlled Trials (*m*RCT) (www.controlled-trials.com), ClinicalTrials.gov (http://clinicaltrials.gov) and the WHO International Clinical Trials Registry Platform (ICTRP). There were no language or date restrictions in the search for trials. The electronic databases were last searched on 21 June 2010.

See: Appendices for details of search strategies for CENTRAL (Appendix 1), MEDLINE (Appendix 2), EMBASE (Appendix 3), LILACS (Appendix 4), *m*RCT (Appendix 5), ClinicalTrials.gov (Appendix 6) and the WHO International Clinical Trials Registry Platform (ICTRP) (Appendix 7).

Searching other resources—We reviewed the reference lists from potentially eligible studies to identify further studies. In addition we proposed to use the Science Citation Index to search for references that cited any included trials.

Data collection and analysis

Selection of studies—Two review authors independently assessed the titles and abstracts from the electronic literature searches and the manual search to identify possible trials of interest according to the 'Criteria for considering studies for this review'. We designated each reference identified from the searches as (a) relevant, (b) possibly relevant, or (c) not relevant for this review. We retrieved full text copies of the articles if an abstract was classified as (a) or (b). Each article was then independently assessed by two review authors and was classified as (1) include in review, (2) awaiting classification, or (3) exclude from review. We resolved discrepancies between authors by consensus. We contacted investigators of studies classified as (2) to obtain sufficient information to include or exclude the study from the review.

Data extraction and management—As no studies were identified for inclusion in this review, no data extraction or assessment of risk of bias was performed. If, in the future, relevant studies become available, we will undertake the following methods for updating this review. Two review authors will independently extract data using the data extraction forms created by the Cochrane Eyes and Vision Group. For each included study, we will extract data on study characteristics, interventions, outcomes, cost, quality of life, and other relevant information. One review author will enter the data into Review Manager Version 5.0 and a second review author will verify the data entry. Discrepancies between review authors will be resolved by the third review author.

Assessment of risk of bias in included studies—Two review authors will independently assess the risk of bias of included studies based on the methods provided in Chapter 8 of the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2008). Sources of potential bias affecting the quality of a study are divided into six domains that include (1) adequate sequence generation; (2) allocation concealment; (3) masking (blinding) of participants, personnel and outcome assessors; (4) adequate handling of incomplete outcome data; (5) free of selective outcome reporting; and (6) free of other sources of bias. Each domain grouping for every study included in the review will be assessed for bias and judged as (A) yes, low risk of bias; (B) unclear or not reported; or (C) no, high risk of bias. Discrepancies between review authors will be resolved by a third review author. For studies classified as unclear or not reported, we will contact the authors of the study for further information in an attempt to reclassify the quality of the study.

Measures of treatment effect—The measures of treatment effect will depend on the types of data presented in the included studies and be identified by the definitions given in Chapter 9 of the *Cochrane Handbook for Systematic Reviews of Interventions* (Deeks 2009).

Dichotomous data: The primary outcome of interest, the proportion of patients with complete resolution of hordeolum at seven days after diagnosis, will be analyzed as a dichotomous variable: resolved versus not resolved. Data on the proportion of patients

requiring surgical incision and drainage after treatment, the proportion of patients developing a chalazion after treatment, the proportion of recurrent hordeola, and the number of secondary hordeola will also be analyzed as dichotomous data. We will report dichotomous data as a summarized risk ratio with 95% confidence interval.

Continuous data: We will report continuous data as a weighted mean difference with its standard deviation. We anticipate that available economic and quality of life data will be analyzed as continuous data.

Ordinal data: We will summarize ordinal data qualitatively.

Counts and rate data: We will summarize counts and rate data in rate ratios when the event is rare and as continuous outcome data when the event is more common. We will analyze adverse events data as counts and rates.

Unit of analysis issues—The unit of analysis for this review will be an eyelid of an individual participant.

Dealing with missing data—We will contact authors of included studies in an attempt to obtain missing data. If data cannot be retrieved, we will impute data from the reported data in the study. We will report loss to follow-up when available.

Assessment of heterogeneity—We will test for statistical heterogeneity using the I^2 statistic and examine clinical heterogeneity using forest plots.

Assessment of reporting biases—We will use funnel plots to assess the possibility of reporting biases if a sufficient number of studies are available.

Data synthesis—If limited heterogeneity is suggested (defined here as $I^2 < 50\%$), we will perform meta-analyses using the random-effects model unless there are three or fewer trials, in which case we will use the fixed-effect model. If heterogeneity is detected, we will combine trial results by relevant, less heterogeneous subgroups if sufficient data are available, otherwise we will describe the results individually.

Subgroup analysis and investigation of heterogeneity—We will investigate heterogeneity by conducting subgroup analyses provided sufficient information is available. Subgroups of interest include sex, age, use of contact lenses, including soft lenses versus hard lenses, and the frequency of hordeolum occurrences, co-infections and other co-morbidities at baseline.

Sensitivity analysis—We will investigate the impact of studies with a high likelihood of bias, or missing data, as well as the impact of unpublished studies using sensitivity analyses.

Results

Description of studies

Results of the search—There were 517 total references identified by the electronic searches as of 21 June 2010. After screening the titles and abstracts, 19 references were classified as being potentially relevant. Of the 19 references, which reported 18 unique studies, all were excluded.

Excluded studies—There were 18 excluded studies in this review. The reasons for exclusion are described in the table Characteristics of excluded studies.

Of the 18 excluded studies two were randomized controlled trials that included patients with acute internal hordeolum. The first included pediatric patients with lid inflammation and was conducted to evaluate the safety of loteprednol etabonate 0.5% and tobramycin 0.3% ophthalmic suspension (Zylet®) in the pediatric population (NCT00420628 2007). As safety was the primary focus of the trial, the study population comprised patients with varying ocular inflammatory conditions and data were not collected by study investigators for specific conditions. The results of the trial were not available during the course of this review. The second study compared the effectiveness of a combined antibiotic ophthalmic solution with placebo in patients with internal and external hordeolum following surgical incision and curettage (Hirunwiwatkul 2005). All patients were newly diagnosed and untreated prior to undergoing incision and curettage. There were 14 patients randomized to each group and results for patients with internal and external hordeolum were not reported separately. The study authors concluded that there was no evidence of differences in pain score, mass size, or duration of cure between groups.

Risk of bias in included studies

There were no included studies in this review, thus no risk of bias assessment was done.

Effects of interventions

There were no included studies in this review, thus no effects of interventions were reported.

Discussion

Summary of main results

There were no trials identified for inclusion in this review.

Overall completeness and applicability of evidence

The majority of the references identified from the search for this review were related to external hordeola (styes) or chalazion. By and large the few references specific to acute internal hordeolum either reported recommendations for treatment without cited evidence or were reports of interventional case series, case studies, or other types of observational study designs. The only clinical trials found that included patients with acute internal hordeolum were not applicable for the review since they included multiple conditions and did not stratify by specific diagnoses or included patients who underwent surgical treatment as a criterion for study enrollment. Furthermore, the bulk of the literature was published over 20 years ago.

Potential biases in the review process

The primary source of bias for this review pertained to selection bias, specifically the identification and inclusion of relevant studies. Prior to beginning the review process, we expected that few trials had been published on hordeolum, that various authors used different terminologies when referring to different classifications of hordeola (that is hordeolum, stye, chalazia, etc.), and that relevant studies may be from older publications. We therefore designed a broad search strategy for the electronic databases in order to increase identification of potentially relevant studies. We also manually searched the reference lists of potentially relevant studies to identify older studies that may not be included in electronic databases.

To minimize bias during the process of selecting studies for this review, two review authors screened the references from the electronic search and independently classified them for inclusion or exclusion. We included potentially relevant references that mentioned any type of hordeolum or external eye inflammation for assessment at the full text level. Inclusion and exclusion were determined by using the definition of the disease given in the full text article. Furthermore, one review author screening the studies had a clinical background (JN) and one had a methodological background (KL).

Agreements and disagreements with other studies or reviews

While it is the most recommended therapy for hordeola, the application of warm compresses has not been shown to be effective in accelerating the healing time or reducing the symptoms associated with hordeolum in a controlled trial. Moreover, there is no evidence that warm compresses alone would eliminate the infection. It is also unclear whether medical treatments or lid hygiene are effective in treating acute internal hordeolum.

Authors' conclusions

Implications for practice

Common interventions for the treatment of acute internal hordeolum include warm compresses applied at home, topical medications and lid scrubs available over-the-counter, antibiotics or steroids, lid massages, and others. At this time there is insufficient evidence regarding the effectiveness of these non-surgical interventions for treating acute internal hordeolum. Clinical practice decisions should be based on physician judgment and available treatment options should be discussed with patients.

Implications for research

Generally, RCTs are considered the gold standard for comparing the efficacy of interventions. However, because of the relative mildness and short duration of the disease, study participants may be limited to more severe cases that are not representative of the general population; recruitment of patients at onset may be challenging. Even with these considerations, controlled clinical trials would be useful in determining which interventions are effective for the treatment of acute internal hordeolum.

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Internal sources

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External sources

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Appendices

1 CENTRAL search strategy

#1 MeSH descriptor Hordeolum

#2 hordeol* or sty or stye or styes

#3 MeSH descriptor Meibomian Glands

#4 (meibomian) near/3 (gland* or cyst*)

#5 (conjunctiv*) near/3 (gland* or cyst*)

#6 (gland*) near/5 (Zeis or Moll)

#7 #1 or #2 or #3 or #4 or #5 or #6

2 MEDLINE search strategy

1. randomized controlled trial.pt.
2. (randomized or randomised).ab,ti.
3. placebo.ab,ti.
4. dt.fs.
5. randomly.ab,ti.
6. trial.ab,ti.
7. groups.ab,ti.
8. or/1–7
9. exp animals/
10. exp humans/
11. 9 not (9 and 10)
12. 8 not 11
13. exp hordeolum/
14. (hordeol$ or stye or styes).tw.
15. sty.tw.
16. exp eyes/

17. 15 and 16
18. exp meibomian glands/
19. (meibomian adj3 (gland$ or cyst$)).tw.
20. (conjunctiv$ adj3 (gland$ or cyst$)).tw.
21. (gland$ adj5 (Zeis or Moll)).tw.
22. 13 or 14 or 17 or 18 or 19 or 20 or 21
23. 12 and 22

The search filter for trials at the beginning of the MEDLINE strategy is from the published paper by Glanville et al (Glanville 2006).

3 EMBASE search strategy

1. exp randomized controlled trial/
2. exp randomization/
3. exp double blind procedure/
4. exp single blind procedure/
5. random$.tw.
6. or/1–5
7. (animal or animal experiment).sh.
8. human.sh.
9. 7 and 8
10. 7 not 9
11. 6 not 10
12. exp clinical trial/
13. (clin$ adj3 trial$).tw.
14. ((singl$ or doubl$ or trebl$ or tripl$) adj3 (blind$ or mask$)).tw.
15. exp placebo/
16. placebo$.tw.
17. random$.tw.
18. exp experimental design/
19. exp crossover procedure/
20. exp control group/
21. exp latin square design/
22. or/12–21
23. 22 not 10
24. 23 not 11
25. exp comparative study/

26. exp evaluation/

27. exp prospective study/

28. (control$ or prospectiv$ or volunteer$).tw.

29. or/25–28

30. 29 not 10

31. 30 not (11 or 23)

32. 11 or 24 or 31

33. exp hordeolum/

34. (hordeol$ or stye or styes).tw.

35. sty.tw.

36. exp eye/

37. 35 and 36

38. exp meibomian glands/

39. (meibomian adj3 (gland$ or cyst$)).tw.

40. (conjunctiv$ adj3 (gland$ or cyst$)).tw.

41. (gland$ adj5 (Zeis or Moll)).tw.

42. 33 or 34 or 37 or 38 or 39 or 40 or 41

43. 32 and 42

4 LILACS search strategy

hordeol$ or stye$ or meibomian

5 metaRegister of Controlled Trials search strategy

hordeolum or hordeola or stye or styes or meibomian

6 ClinicalTrials. gov search strategy

hordeolum or hordeola or stye or styes or meibomian

7 WHO International Clinical Trials Registry Platform search strategy

hordeolum or hordeola or stye or styes or meibomian