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Clinical Review

SAFETY AND EFFECTIVENESS OF TOPICAL ANESTHETICS IN CORNEAL ABRASIONS: SYSTEMATIC REVIEW AND META-ANALYSIS

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☐ **Abstract—Background: Topical anesthetics are used in the emergency department (ED) to relieve eye pain and allow eye examinations in patients with corneal abrasions. There is concern for delayed corneal healing, which is associated with the long-term use of topical anesthetics, so outpatient use is not recommended. Objectives: We sought to systematically study the effectiveness and complications associated with the short-term use of topical anesthetics (≤72 hours) in the management of patients presenting to EDs with corneal abrasions. Methods: Four electronic databases were searched from inception of the database until April 2014. We included studies of patients >16 years of age who were using topical anesthetics for <72 hours. Postoperative cases were not included. Results: A total of 140 patients (68 in the intervention group and 72 in the control group) from 2 randomized trials were included in the analysis. Comparing control patients who did not use topical anesthetics to study patients who did use topical anesthetics, this meta-analysis found no significant difference in pain scores (standardized mean difference −1.01 [95% confidence interval {CI} −2.39 to 0.38), corneal healing (OR 1.31 [95% CI 0.53–3.27), or persistent symptoms (OR 0.98 [95% CI 0.06–16.69). The 2 trials reported no adverse effects. Conclusion: There were no differences regarding pain, persistent symptoms, or corneal healing when comparing short-term use of topical anesthetics to placebo in the treatment of corneal abrasion. Data on safety are sparse, and the use of this treatment is currently not supported by evidence.** © **2015 Elsevier Inc.**

☐ **Keywords—adverse effects; complications; corneal abrasions; corneal healing; effectiveness; emergency department; eye pain; meta-analysis; pain scores; persistent symptoms; satisfaction; systematic review; topical anesthetics**

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INTRODUCTION

Corneal abrasions are one of the most common complaints presenting to primary care and emergency departments (EDs) in the United States and worldwide, and represent the leading cause of red eye in EDs (1–4). Corneal abrasion is defined as a disruption of the epithelium covering the cornea, and it is commonly caused by minor trauma, foreign bodies, contact lens use, and flash burns (5).

Although corneal abrasion is in general a self-limited benign entity, it can be the cause of discomfort, pain, and distress among patients and can lead to work absenteeism (4,6). Although common in EDs, there is considerable variation in the clinical management approaches to corneal abrasions, including the use of oral analgesic, cycloplegic, and topical nonsteroidal antiinflammatory drugs (7).

Topical anesthetics traditionally have been used for pain management of corneal abrasions while the patient is in the ED; its use for outpatient analgesia has been

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discouraged because of the concern of delayed corneal healing that has been shown with its long-term use (8). However, the evidence supporting these concerns is mostly out of date and based on case reports. At the same time, the short-term use of topical anesthetics (<72 hours) in the acute setting is debated (9). Available research about short-term use is derived from studies reporting no complications after use of local anesthetics after photorefractive keratectomy and after corneal abrasions managed in EDs (10–14).

Withholding what appears to be a potentially appropriate therapy for pain associated with corneal abrasion leads to the use of other analgesics that may be not as effective and may even have more complications (9). The objectives of this systematic review are to study the effectiveness and potential complications of the use of topical anesthetics in the management of patients presenting to EDs with corneal abrasions.

METHODS

This systematic review and meta-analysis is reported in accordance with recommendations from the Preferred Reporting Items for Systematic Reviews and Meta-Analysis statement (15). The review protocol was developed in April 2014 and was followed during the entire review.

Eligibility Criteria

Study inclusion and exclusion criteria are shown in Table 1.

Information Sources

A comprehensive search was undertaken by an expert senior librarian (P.J.E.) to identify all relevant articles. The electronic search covered 4 databases from their inception to April 28, 2014. No language restrictions were applied.

Search

The combination of search terms used is shown in Appendix A. The initial strategy was designed for the Ovid Medline database, and a modified version was used to identify studies in the other databases. The PubMed, Ovid MEDLINE, Ovid Cochrane Central, Ovid Embase, and Web of Science databases were searched. In addition, a manual search of the reference lists in the articles identified was performed.

Study Selection

Phase I of the review process consisted of 2 authors (D.C. and H.A.P.) independently screening all titles and abstracts found during the initial search. After excluding irrelevant studies, the remaining articles were retrieved for full-text examination. One author (D.C.) reviewed the related citations and reference lists to identify additional eligible studies for phase II of the review. Two investigators (D.C. and H.A.P.) carried out phase II: full-text examination. Any discrepancies were to be resolved by a third investigator (M.F.B.); however, there were no disagreements during study selection. Based on predefined criteria, studies were chosen for data extraction, qualitative synthesis, and meta-analysis. The review authors were not blinded to journal, institution, or study authors.

Data Collection Process and Data Items

Standardized data extraction forms were used for data collection. Descriptive data and outcome data were abstracted from each study by 1 review author (H.A.P.) and reviewed by 2 other investigators.

Descriptive data collected included the following: study design; sample size; number of individuals allocated to each group, intervention, and control; number of pediatric patients; gender; age of study participants;

Table 1. Study Eligibility Criteria

Category	Inclusion	Exclusion
Language	All languages	None
Population	Subjects ≥16 years of age and a diagnosis of traumatic or nontraumatic corneal abrasion	Subjects <16 years of age and corneal abrasion caused by eye surgery
Interventions	Topical sodium channel blocker anesthetics; full or diluted strength; short-term use (<72 h)	Other classes of drugs; >72 h of drug use
Control	Regular treatment	Regimens containing ≥1 sodium channel blocker and topical anesthetic
Study outcomes	≥1 of the following: pain relief, patient satisfaction, delayed corneal healing, measurement of abrasion extent, keratitis, recurrence, surface keratopathy, corneal stromal infiltration, infection, uveitis, or hypopion	
Study design	Randomized controlled trials, experimental studies without randomization, cohort studies, or case control studies	Case series or case reports