A Cochrane Systematic Review Finds No Evidence to Support the Use of Antibiotics for Pain Relief in Irreversible Pulpitis

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Abstract

The Cochrane Systematic Review promotes evidence-based outcomes studies. The review summarized here was conducted in an attempt to achieve reliable evidence concerning the effectiveness, or otherwise, of prescribing antibiotics for patients having irreversible pulpitis. A competent search strategy was developed and used across several databases including MEDLINE to identify randomized controlled trials for inclusion. Assessment of methodological quality was based on criteria defined by The Cochrane Collaboration. Clinical outcome, expressed in terms of pain relief, was examined. There was a relative dearth of research providing a high level of evidence. Only one methodologically sound trial was found that compared pain relief with systemic antibiotic/analgesic treatment against a placebo/analgesic combination during the acute preoperative phase of irreversible pulpitis. Although the selected study used a relatively small, low-powered sample, it did provide some evidence that there is no significant difference in pain relief for patients with untreated irreversible pulpitis who received antibiotics versus those who did not. These findings increase the rationale to investigate the teaching of safe and effective antibiotic prescribing in endodontics and to advance the development of appropriate evidence-based clinical guidelines. *(J Endod 2006;32:87–92)*

Key Words

Anti-bacterial agent, antibiotic, irreversible, pulpitis

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This paper provides the essence of a Cochrane Review published in The Cochrane Library Issue 2, April 2005 (see http://www3.interscience.wiley.com/aboutus/sharedfiles/cochrane_transition/ for further information). Cochrane Reviews are regularly updated in response to comments and criticism, and as new evidence emerges. Hence, The Cochrane Library should be consulted for the most recent version of this Systematic Review.

Dental emergencies are extremely common. In a survey conducted in the United States 12% of the population had experienced toothache in the preceding 6 months (1). Although there is very little data available, irreversible pulpitis, characterized by acute and intense pain, is considered to be one of the most frequent reasons for patients to seek emergency dental care. Irreversible pulpitis is defined as an inflammatory process in which the dental pulp has been damaged beyond repair and will eventually become necrotic (2). Most commonly the inflammation of irreversible pulpitis in vital teeth occurs beneath a deep carious lesion before bacteria reaching the pulp (3). Therefore, the involved tooth often has an extensive restoration and/or caries, which may give way to necrosis of the pulp (4). The process of irreversible pulpitis may progress even in the absence of the initiating irritant (e.g. dental caries). Irreversible pulpitis is considered to be an immune system–mediated event. It is most often not a result of a bacterial infection of the pulp, but rather of inflammatory mediators (2). A number of studies indicate that antibiotics do not reduce pain, percussion sensitivity, or the amount of analgesics required in untreated teeth diagnosed with irreversible pulpitis (5).

The symptoms of irreversible pulpitis constitute a continuum. A history of spontaneous pain is usual and can include an exaggerated response to hot or cold that lingers after the stimulus is removed (6). Any tooth may be affected by irreversible pulpitis. The condition can affect individuals in any age group. It may occur as a direct result of dental caries, a cracked tooth, or as a sequel to trauma. The affected tooth is usually not sensitive to percussion, and palpation tests do not produce an untoward reaction. The characteristics of irreversible pulpitis are a vital pulp that responds to cold and electric pulp testing, with responses to cold stimuli resulting in prolonged reaction. Not infrequently, cold may actually alleviate the pain of irreversible pulpitis and thus can be used as a diagnostic test (7). Apart from removal of the tooth, the customary way of relieving the pain of irreversible pulpitis is by accessing the pulp chamber, removing the inflamed pulp tissue, and cleaning the root canal as a prelude to endodontic treatment (8). Nevertheless, some dentists continue to prescribe antibiotics to stop the pain of irreversible pulpitis (9).

The prescription of systemic antibiotics as a perceived means for relieving pain in endodontic emergencies has received considerable attention (10). There appears to be limited empirical evidence to support the effectiveness of this approach and there have been questions raised about the safety of indiscriminate antibiotic prescription. A study conducted in the United States on antibiotic use by members of the American Association of Endodontists evaluated the practice of prescribing antibiotics for irreversible pulpitis among endodontists (9). It was found that 16.76% of endodontists responding prescribed antibiotics for irreversible pulpitis. Although very little information exists concerning the prescription of antibiotics by general dental practitioners for this purpose, it is likely that the percentage could well exceed that of endodontists. In a study of the prescribing habits of general dental practitioners in the United Kingdom, it was

found that a significantly higher number of practitioners prescribe antibiotics before root canal treatment (5.4%) than after (2.8%). Unnecessary prescription of antibiotics, aside from the impact on healthcare costs, also bears the risk of promoting the development of antibiotic-resistant strains of bacteria. Other potential side effects to antibiotics include sensitization, skin rashes and on rare occasions anaphylactic shock.

This review sought to provide reliable evidence concerning the effectiveness of prescribing systemic antibiotics for irreversible pulpitis. Clinical outcomes compared were expressed in terms of pain relief. The following null hypothesis was tested: "for irreversible pulpitis, there is no difference in pain relief between patients who took antibiotics/analgesics compared to those who received placebo/analgesics."

Methods

Types of Studies

Only randomized controlled clinical trials (RCTs) were considered for the purpose of this review.

Types of Participants

Only studies that had recruited patients who were over the age of 18 years and who presented with a single tooth with a clinical diagnosis of irreversible pulpitis were included.

Types of Interventions

Active Interventions

Administration of any systemic antibiotic at any dosage and any analgesic at any dosage prescribed in the acute preoperative phase of irreversible pulpitis.

Control

Administration of placebo and any analgesic, at any dosage, prescribed in the acute preoperative phase of irreversible pulpitis.

Types of Outcome Measures

Primary

The primary outcome for this review was patient reported pain (intensity/duration) and pain relief measured on a categorical scale in the preoperative phase of irreversible pulpitis.

Secondary

The secondary outcomes for this review were type, dose, and frequency of medication required for pain relief. No additional secondary outcomes or adverse effects related to any clinically diagnosed hypersensitivity reactions to either antibiotics or analgesics, nor any data on the costs of prescribing antibiotics for irreversible pulpitis were included.

Search Strategy for Identification of Studies

Electronic Search

For the identification of studies to be considered for this review, detailed search strategies were developed for each database to be searched. These were based on the search strategy developed for MEDLINE but revised appropriately for each database. The search strategy combined the subject search with phases 1, 2, and 3 of the Cochrane Optimal Search Strategy for Randomized Controlled Trials revised by the Cochrane Oral Health Group (OHG) taking into account research methods applicable to oral health.

Databases Searched

Cochrane Oral Health Group Trials Register to September 6, 2004.

- Cochrane Pain, Palliative Care and Supportive (PaPaS) Care Group Trials Register to September 6, 2004.
- Cochrane Central Register of Controlled Trials (CENTRAL), *The Cochrane Library,* Issue 3, 2004.
- MEDLINE (1966 to September 6, 2004).
- EMBASE (1980 to week 36 2004).

The detailed search strategy developed for each database is available in Issue 2, April 2005 of The Cochrane Library (www.thecochranelibrary.com).

Handsearching

A list of the journals already hand searched by the Cochrane Oral Health Group was compiled; no additional hand-searching was conducted. Reference lists of relevant articles, clinical trials, and the reviewers' personal databases of trial reports were searched in an attempt to identify applicable studies for inclusion in the review.

Language

Although no language restriction was made on included studies, no relevant trials were identified in languages other than English.

Review Methods

Assessment of Search Results

The abstracts of studies identified by the searches were independently assessed by two reviewers, Zbys Fedorowicz (ZF) and James Keenan (JVK). Papers that did not meet the criteria for inclusion were excluded. Full copies of designated potentially relevant studies in accordance with the inclusion criteria were obtained. The full paper was also obtained where insufficient data was available in the title and abstract to make a clear decision.

Assessment of Methodological Quality

Each reviewer graded the selected studies. Studies reporting a randomized controlled trial were assessed using a simple contingency form following the Cochrane Reviewers' Handbook 4.2.0 criterion grading system (11). Grading scores were compared and any inter-reviewer inconsistencies in the interpretation of the inclusion criteria and their significance to the selected studies were discussed and resolved. Studies deemed not to match the inclusion criteria were eliminated from further review. Reasons for their exclusion were noted in a 'Characteristics of Excluded Studies' Table (Table 1).

The following parameters of methodological quality were assessed:

TABLE 1. Characteristics of excluded studies

Study	Reason for Exclusion
Fouad 1996	This study combined antibiotic or placebo or neither as an adjunct to operative endodontic treatment in resolving the acute apical abscess.
Henry 2001	This study combined antibiotic as an adjunct to endodontic treatment.
Nusstein 2003	This study was a retrospective non-experimental study.