Effectiveness of single- versus multiple-visit endodontic treatment of teeth with apical periodontitis: a systematic review and meta-analysis

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CRD summary
This review compared healing rates for single- versus multiple-visit root canal treatment for apical periodontitis. The authors concluded that there was a lack of evidence of a difference between single and multiple visits. This was generally a well-conducted review and the authors' conclusion is likely to be reliable.

Authors' objectives
To compare healing rates for single-visit versus multiple-visit root canal treatment for apical periodontitis.

Searching
The Cochrane CENTRAL Register, MEDLINE (1966 to August 2004), EMBASE (1988 to 2004) and HealthSTAR were searched without any language restrictions using the reported search terms. Further studies were sought by checking the reference lists of identified studies, searching the Science Citation Index, and conducting forward searches for the authors of identified studies.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion. The sample sizes in the included studies ranged from 17 to 36 teeth per treatment group. The duration of follow-up ranged from 1 to 5 years.

Specific interventions included in the review
Studies that compared single-visit with multiple-visit nonsurgical root canal treatment were eligible for inclusion. All of the included studies appeared to use standard endodontic treatment with 1 to 2.5% sodium hypochlorite irrigant. Multiple-visit treatments included calcium hydroxide dressings for 1 to 4 weeks.

Participants included in the review
Studies of patients with no underlying medical condition, with previously untreated apical periodontitis in mature teeth with infected necrotic root canal and radiographic evidence of periapical bone loss, were eligible for inclusion. One of the included studies only included patients with a periapical index (PAI) of 3 or more (out of a possible 5 points).

Outcomes assessed in the review
Studies that assessed the number of teeth with radiographic evidence of healing were eligible for inclusion. The included studies measured healing using different time periods: one study classified healing as a decrease in PAI at 1 year, while another followed up most patients until complete healing occurred up to 5 years; methods used in the third study were not reported.

How were decisions on the relevance of primary studies made?
Two reviewers independently selected studies, but the methods used to resolve disagreements were not reported.

Assessment of study quality
Aspects of validity (adequacy of randomisation, methods used to ensure baseline comparability of the treatment groups, blinding and follow-up rates) were assessed during the data extraction. The authors did not state who performed the validity assessment.
Data extraction
Two reviewers independently extracted the data, but the methods used to resolve disagreements were not reported. The authors of 2 studies were contacted for additional data. For each study, the numbers of teeth healed and not healed and the percentage healed were extracted for each treatment group, and the risk difference (RD) with 95% confidence interval (CI) was calculated.

Methods of synthesis
How were the studies combined?
The pooled RD with 95% CI was calculated using a fixed-effect model weighted by the inverse of the variance.

How were differences between studies investigated?
Statistical heterogeneity was tested using the chi-squared or Q statistic. Differences between the studies were also discussed in the text.

Results of the review
Three RCTs (146 teeth) were included.

Randomisation was considered to be adequate in all 3 studies but no detailed information was provided. Two studies tried to minimise baseline group differences when allocating treatments. All studies had small sample sizes and none reported a power calculation. Two studies reported calibration of the outcome assessors. All 3 studies reported blinding but gave no details. Recall rates were high (92 to 100%).

Single-visit root canal treatment did not significantly increase healing in comparison with multiple visits; the pooled RD was -6.3% (95% CI: -20.3, 7.8, P=0.4). There was no evidence for heterogeneity (P=0.4).

Authors' conclusions
There was a lack of evidence of a difference between single and multiple visits for root canal treatment.

CRD commentary
The review addressed a clear question that was defined in terms of the participants, intervention, outcomes and study design. Several relevant databases were searched without language restrictions and attempts were made to locate unpublished studies, thus minimising publication and language bias. Methods were used to minimise reviewer errors and bias in the study selection and data extraction processes, but it was unclear whether similar steps were taken in the validity assessment. Some aspects of validity were discussed, but adequacy of randomisation was not rigorously assessed. The inclusion criteria restricted the potential clinical heterogeneity among studies and statistical heterogeneity was assessed; this made the pooling of studies in a meta-analysis appropriate. This was generally a well-conducted review. The authors' conclusion about the lack of evidence of a difference between treatments is likely to be reliable.

Implications of the review for practice and research
The authors did not state any implications for practice or further research.

Bibliographic details

PubMedID
15910469

DOI
Indexing Status
Subject indexing assigned by NLM

MeSH
Calcium Hydroxide; Episode of Care; Humans; Periapical Periodontitis /therapy; Root Canal Irrigants; Root Canal Therapy /methods; Treatment Outcome

AccessionNumber
12005003903

Date bibliographic record published
31/10/2006

Date abstract record published
31/10/2006

Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.