Early orthodontic treatment of skeletal open-bite malocclusion: a systematic review

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CRD summary
This review, which aimed to evaluate the outcome of early treatment of open-bite malocclusions, concluded that the quality of the studies was insufficient to draw any evidence-based conclusions. The authors' recommendation for future research is supported by this conclusion. However, the review itself was poorly reported and it is possible that studies might have been overlooked.

Authors' objectives
To assess evidence on the outcome of early treatment of open-bite malocclusions.

Searching
MEDLINE (1966 to 2004) and the Cochrane Controlled Trials Register were searched; the search terms were reported.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs), prospective and retrospective studies with concurrent untreated and normal controls, and clinical trials that compared at least two treatment strategies without any untreated or normal controls were eligible for inclusion.

Specific interventions included in the review
Studies of early treatment of open-bite malocclusions were eligible for inclusion. The treatment modality varied across studies and included functional appliances (in association with high pull head gear, or with high pull head gear and vertical cup chin) and bite-block therapy (posterior bite block alone or in combination with vertical cup chin, spring-loaded bite block and magnetic bite block).

Participants included in the review
Participants who had open-bite malocclusion in the mixed dentition developmental stage were eligible for inclusion. No further details of the participants were reported.

Outcomes assessed in the review
The studies had to report on treatment effect to be eligible for inclusion. The outcomes reported were success rate, reduction of open bite and divergency, side-effects and stability. They were measured using cephalometric analysis, study casts with and without photos, electromyography, and pre- and post-treatment.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
Each study was assessed, based on the following characteristics: study design, sample size and a priori estimation of sample size, selection description, withdrawals, valid method, method error analysis, adequate statistics, and blinding in measurements. The studies were categorised as low, medium or high quality. Two independent reviewers assessed the quality of each study.

Data extraction
Two reviewers independently extracted the data and any disagreements were resolved by discussion. One reviewer assessed the statistical methods used. Data on the success rate, decrease of open-bite and divergency, side-effects and...
Methods of synthesis
How were the studies combined?
The studies were combined narratively.

How were differences between studies investigated?
Differences between the studies were not formally evaluated but were evident from the results tabulated.

Results of the review
Seven studies met the inclusion criteria: one prospective clinical trial, two retrospective controlled clinical trials and four retrospective clinical trials.

Most of the included studies had several methodological limitations, such as small sample size, bias and confounding variables, absence of method error analysis, no blinding of measurement, and inadequate or a lack of appropriate statistics.

The success rate was reported in four studies: three reported a 100% success rate and one reported a 67% success rate. All studies reported a reduction in open bite and/or divergency.

In terms of side-effects, one study reported that magnetic bite block was associated with lateral crossbite and that the effect of posterior bite block declined over time. One study reported increased divergency with Begg therapy and edgewise therapy. Another study reported a tendency to relapse with magnetic bite blocks.

Cost information
The authors stated that no included study performed a cost analysis.

Authors’ conclusions
The quality of the included studies was not sufficient to draw any evidence-based conclusions.

CRD commentary
The review question was broadly defined in terms of the study design, population and intervention. No explicit outcome was defined, although this is in line with the objective of the review (to determine the actual outcome of early treatment). The literature search was not comprehensive: unpublished literature was not sought and it was unclear whether attempts were made to account for language bias. The methods used to protect against bias when selecting studies for inclusion were not clearly documented. However, methods were used to minimise reviewer error and bias in the data extraction and validity assessment processes. The criteria used to assess validity appeared appropriate, although the method used to categorise study quality was not reported and some of the criteria chosen were not adequately defined.

Details of the participants evaluated in the included studies were limited, thus making it difficult to generalise the results. Furthermore, the incomplete reporting of study populations, interventions and outcomes means that it is difficult to interpret the results presented. Overall, limitations in the reporting and review methodology mean that it is not possible to comment on the overall reliability of this review.

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

Research: The authors stated that RCTs with adequate sample size are needed to determine the most effective treatment for the early correction of skeletal open bite. These studies should also consider an assessment of long-term
stability alongside the cost and side-effects of the interventions.

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