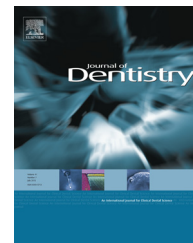


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Review

Is orthodontics prior to 11 years of age evidence-based? A systematic review and meta-analysis



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ABSTRACT

Objectives: To determine whether interceptive orthodontics prior to the age of 11 years is more effective than later treatment in the short- and long-term.

Data and Sources: Multiple electronic databases were searched, authors were contacted as required and reference lists of included studies were screened.

Study selection: Randomised and quasi-randomised controlled trials were included, comparing children under the age of 11 years requiring interceptive orthodontic correction for a range of occlusal problems, to an untreated or positive control group. Data extraction and quality assessment were performed independently and in duplicate.

Results: Twenty-two studies were potentially eligible for meta-analysis, the majority related to growth modification. Other outcomes considered included correction of unilateral posterior crossbite, anterior openbite, extractions and ectopic maxillary canines. Meta-analysis was possible for 11 comparisons. For Class II correction in the short-term, meta-analyses demonstrated a statistically significant reduction in ANB (-1.4 degrees, 95 CI: -2.17 , -0.64) and overjet (-5.81 mm, 95 CI: -6.37 , -5.25) with both functional appliances and headgear versus control. In the long-term, however, statistical significance was not found for the same outcomes. Treatment duration was prolonged with both functional appliances (6.85 months, 95 CI: 3.24, 10.45) and headgear (12.47 months, 95 CI: 8.67, 16.26) compared to adolescent treatments. Meta-analyses were not possible for comparisons of other interceptive treatments due to heterogeneity and methodological limitations.

Conclusions: The results suggest a lack of evidence to prove that early treatment carries additional benefit over and above that achieved with treatment commencing later; however, this does not necessarily imply that early treatment is ineffective. Further high quality trials are required to assess the effectiveness of early treatment compared to later intervention. **Clinical Significance:** Interceptive orthodontics is variously recommended for a range of malocclusions both of skeletal and dental aetiology. The merits of interceptive treatment, however, are often disputed. Further high quality trials are required to assess the effectiveness of early treatment compared to later intervention.

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1. Introduction

Equipose underpins much of what is done in orthodontics. There appears to be little to differentiate a range of treatment approaches and mechanics with randomised controlled trials repeatedly failing to highlight significant differences in the merits of, for example, various means of anchorage support, bracket type or bonding system.^{1,2} In view of this variation allied to operator preferences, clinicians differ in respect of preferred approaches to treatment; there is also a dichotomy relating to the preferred timing of treatment.^{3,4}

Preventive and interceptive orthodontic procedures may be undertaken to alleviate developing problems. Interceptive treatment involves the elimination of existing interferences, removing the need for further orthodontic treatment in the permanent dentition or aiming to reduce the severity of the developing malocclusion.^{5,6} Interceptive treatment may also be an element of ‘two-phase’ treatment representing the first phase prior to a definitive second phase in adolescence. Two-phase treatment has been promoted, particularly in the management of malocclusion with a skeletal component e.g. Class II and Class III malocclusion, both in an effort to address early manifestations, to prevent risks associated with the malocclusion, and potentially produce a more significant improvement in the skeletal pattern than that which might accrue if treatment were postponed until adolescence. Much debate has surrounded the latter, in particular, with Proffit (2006)⁷ concluding that early treatment is ‘no more effective and less efficient than one-phase treatment, in isolation.

The claimed advantages of early treatment include the possibility of optimal compliance, particularly among those performing well at school.⁸ Given that modalities to address skeletal discrepancies are invariably compliance-based, this is of potential importance. Moreover, commencing treatment early has the potential to capture a longer period of near-peak growth. However, harnessing maximal growth potential would require a more prolonged period of intervention, which may tax the co-operation of even the most compliant patients; there is, therefore, a trade-off between the theoretical value and practical reality of early treatment.

While definitive orthodontics with fixed appliances is deferred until the establishment of the permanent dentition, more limited treatment can be initiated at an earlier stage to address localised malocclusions, for example, anterior or posterior crossbites, ectopic teeth and crowding. These may be undertaken in the mixed dentition and appear to be effective in addressing specific problems although the level of evidence to support some of even the more accepted interventions has been criticised.^{9–11}

Clearly, a considerable amount of orthodontic treatment is instituted prior to the age of 11 years.^{3,4} There has, however, been no systematic appraisal of the relative merits of interventions prior to this age. The aims of this review were therefore to assess the effectiveness of a range of orthodontic interventions undertaken prior to the age of 11 years both in the short-term and long-term.

2. Materials and methods

The protocol for a systematic review relating to the relative merits of early orthodontic treatment was registered (www.crd.york.ac.uk/prospéro, Protocol: CRD42014006287). The following inclusion criteria were used.

Study design: Randomised and controlled clinical trials.

Type of participants: Patients aged under 11 years at the start of treatment with a malocclusion or dental condition requiring interceptive orthodontic correction or other procedure. The following exclusion criteria were applied:

- Patients with oro-facial anomalies (e.g. cleft lip and palate).
- Medical conditions influencing treatment.

Type of interventions included but were not restricted to the following:

- Interceptive extractions of primary teeth or first permanent molars of poor prognosis.
- Use of fixed or removable space maintainers.
- Correction of anterior/posterior crossbites with associated displacement.
- Growth modification to address sagittal, vertical or transverse skeletal discrepancy.
- Orthodontic treatment to address crowding with fixed or removable appliances.
- Habit dissuasion.

Comparators included: Untreated controls (negative controls) or participants undergoing alternative active intervention (positive controls).

Outcome measures:

- Improvement in the intra-arch or inter-arch occlusal features including overjet and overbite.
- Frequency of favourable positional changes or autonomous eruption of ectopic or impacted teeth.
- Occlusal changes using validated scales including Peer Assessment Rating (PAR) and Little’s irregularity index.
- Change in skeletal discrepancy using accepted cephalometric measures e.g. ANB differential, Wits analysis.

Secondary outcomes included:

- The requirement for a second phase of orthodontic treatment.
- Patient satisfaction measured using validated questionnaires or scales.
- Duration of orthodontic treatment, and number of visits during active treatment, scheduled and unscheduled.
- Harms arising during orthodontic treatment.
- Need for orthodontic extractions.

2.1. Search strategy for identification of studies

The following electronic databases were searched: MEDLINE through PubMed (until January 2014), Ovid via MEDLINE (until January 2014, Appendix 1), the Cochrane Oral Health Group’s

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