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Cochrane Database of Systematic Reviews 2013, Issue 11. Art. No.: CD003452.

DOI: 10.1002/14651858.CD003452.pub3.

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[Intervention Review]

Orthodontic treatment for prominent upper front teeth (Class II malocclusion) in children

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Editorial group: Cochrane Oral Health Group.

Publication status and date: Edited (no change to conclusions), published in Issue 11, 2013.

Citation: Thiruvengkatachari B, Harrison JE, Worthington HV, O'Brien KD. Orthodontic treatment for prominent upper front teeth (Class II malocclusion) in children. *Cochrane Database of Systematic Reviews* 2013, Issue 11. Art. No.: CD003452. DOI: 10.1002/14651858.CD003452.pub3.

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ABSTRACT

Background

Prominent upper front teeth are a common problem affecting about a quarter of 12-year old children in the UK. The correction of this condition is one of the most common treatments performed by orthodontists. This condition develops when the child's permanent teeth erupt and children are often referred to an orthodontist for treatment with dental braces to reduce the prominence of the teeth. These teeth are more likely to be injured and their appearance can cause significant distress.

If a child is referred at a young age, the orthodontist is faced with the dilemma of whether to treat the patient early or to wait until the child is older and provide treatment in early adolescence.

Objectives

To assess the effects of orthodontic treatment for prominent upper front teeth when this treatment is initiated when the child is seven to 11 years old compared to when they are in early adolescence, or when treatment uses different types of orthodontic braces.

Search methods

We searched the following databases: Cochrane Oral Health Group's Trials Register (to 17 April 2013), CENTRAL (*The Cochrane Library* 2013, Issue 3), MEDLINE (OVID) (1946 to 17 April 2013) and EMBASE (OVID) (1980 to 17 April 2013). There were no restrictions regarding language or publication date.

Selection criteria

Randomised controlled trials of children and/or adolescents (age \leq 16 years) on early treatment (either one or two-phase) with any type of orthodontic braces (removable, fixed, functional) or head-braces compared with late treatment with any type of orthodontic braces or head-braces; or, on any type of orthodontic braces or head-braces compared with no treatment or another type of orthodontic brace or appliance (with treatment starting in children of similar ages in both groups) to correct prominent upper front teeth.

Data collection and analysis

Review authors screened the search results, extracted data and assessed risk of bias independently, used odds ratios (ORs) and 95% confidence intervals (CIs) for dichotomous outcomes, mean differences (MDs) and 95% CIs for continuous outcomes and a fixed-effect model for meta-analyses as there were fewer than four studies.

Main results

We included 17 studies based on data from 721 participants.

Three trials ($n = 343$) compared early (two-phase) treatment (7-11 years of age) with a functional appliance, with adolescent (one-phase) treatment. Statistically significant differences in overjet, ANB and PAR scores were found in favour of functional appliance when the first phase of early treatment was compared with observation in the children due to receive treatment in adolescence. However, at the end of treatment in both groups, there was no evidence of a difference in the overjet (MD 0.21, 95% CI -0.10 to 0.51, $P = 0.18$) (low quality evidence), final ANB (MD -0.02, 95% CI -0.47 to 0.43, $P = 0.92$), PAR score (MD 0.62, 95% CI -0.66 to 1.91, $P = 0.34$) or self concept score (MD 0.83, CI -2.31 to 3.97, $P = 0.60$). However, two-phase treatment with functional appliance showed a statistically significant reduction in the incidence of incisal trauma (OR 0.59, 95% CI 0.35 to 0.99, $P = 0.04$) (moderate quality evidence). The incidence of incisal trauma was clinically significant with 29% (54/185) of patients reporting new trauma incidence in the adolescent (one-phase) treatment group compared to only 20% (34/172) of patients receiving early (two-phase) treatment.

Two trials ($n = 285$), compared early (two-phase) treatment using headgear, with adolescent (one-phase) treatment. Statistically significant differences in overjet and ANB were found in favour of headgear when the first phase of early treatment was compared with observation in the children due to receive treatment in adolescence. However, at the end of treatment in both groups, there was no evidence of a difference in the overjet (MD 0.22, 95% CI -0.56 to 0.12, $P = 0.20$) (low quality evidence), final ANB (MD -0.27, 95% CI -0.80 to 0.26, $P = 0.32$) or PAR score (MD -1.55, 95% CI -3.70 to 0.60, $P = 0.16$). The incidence of incisal trauma was, however, statistically significantly reduced in the two-phase treatment group (OR 0.47, 95% CI 0.27 to 0.83, $P = 0.009$) (low quality evidence). The adolescent treatment group showed twice the incidence of incisal trauma (47/120) compared to the young children group (27/117).

Two trials ($n = 282$) compared different types of appliances (headgear and functional appliance) for early (two-phase) treatment. At the end of the first phase of treatment statistically significant differences, in favour of functional appliances, were shown with respect to final overjet only. At the end of phase two, there was no evidence of a difference between appliances with regard to overjet (MD -0.21, 95% CI -0.57 to 0.15, $P = 0.26$), final ANB (MD -0.17, 95% CI -0.67 to 0.34, $P = 0.52$), PAR score (MD -0.81, 95% CI -2.21 to 0.58, $P = 0.25$) or the incidence of incisal trauma (OR 0.79, 95% CI 0.43 to 1.44, $P = 0.44$).

Late orthodontic treatment for adolescents with functional appliances showed a statistically significant reduction in overjet of -5.22 mm (95% CI -6.51 to -3.93, $P < 0.00001$) and ANB of -2.37° (95% CI -3.01 to -1.74, $P < 0.00001$) when compared to no treatment (very low quality evidence).

There was no evidence of a difference in overjet when Twin Block was compared to other appliances (MD 0.01, 95% CI -0.45 to 0.48, $P = 0.95$). However, a statistically significant reduction in ANB (-0.63°, 95% CI -1.17 to -0.08, $P = 0.02$) was shown in favour of Twin Block. There was no evidence of a difference in any reported outcome when Twin Block was compared with modifications of Twin Block.

There was insufficient evidence to determine the effects of Activator, FORSUS FRD EZ appliances, R-appliance or AIBP.

Authors' conclusions

The evidence suggests that providing early orthodontic treatment for children with prominent upper front teeth is more effective in reducing the incidence of incisal trauma than providing one course of orthodontic treatment when the child is in early adolescence. There appears to be no other advantages for providing treatment early when compared to treatment in adolescence.

PLAIN LANGUAGE SUMMARY

Orthodontic treatment for prominent upper front teeth in children

Review question

This review, carried out by authors of the Cochrane Oral Health Group, has been produced to assess the effects of orthodontic treatment (treatment by dentists who specialise in the growth, function and position of teeth and jaws) for prominent upper front teeth in children. The review question looks at when this treatment is best provided, either initiated at seven to 11 years old (in one or two phases), and compares this to when the child's treatment is initiated in adolescence, aged 11 to 16 years (one-phase). The use of different types of braces was also assessed.

Background

Prominent (or sticking out) upper front teeth are a common problem affecting about a quarter of 12-year old children in the UK. The correction of this condition is one of the most common treatments performed by orthodontists (dentists who specialise in the growth, function and position of teeth and jaws). This condition develops when the child's permanent teeth erupt and children are often referred to an orthodontist for treatment with dental braces to reduce the prominence of the teeth. Prominent upper front teeth are more likely to be injured and their appearance can cause significant distress.

If a child is referred at a young age, the orthodontist is faced with the dilemma of whether to treat the patient early or to wait until the child is older and provide treatment in early adolescence.

In 'two-phase treatment' - treatment is given first at an early age (seven to 11 years old) and again in adolescence (11 to 16 years old).

In 'one-phase treatment' - there is only one course of treatment in adolescence (11 to 16 years old).

As well as the timing of treatment this review also looked at the different types of braces used, either removable, fixed, functional, or head-braces.

Study characteristics

The evidence on which this review is based was up to date as of April 2013. Seventeen trials including 721 participants formed the basis for the review. Participants were children and adolescents aged under 16 years who had prominent upper front teeth (Class II Division 1 malocclusion).

One study included had been stopped early because of harms. In the initial analysis of the comparison between two appliances, the Twin Block and Dynamax, the Twin Block was shown to be more effective in reducing the overjet of the protruding upper front teeth and also caused less harms.

Key results

The evidence suggests that providing orthodontic treatment, for children with prominent upper front teeth, in two phases appears to significantly reduce the incidence of damage to incisor teeth (middle four teeth at the top) as compared to treatment that is provided in one phase when the child is in early adolescence. There are no other advantages for providing a two-phase treatment i.e. early from age seven to 11 years and again in adolescence compared to one phase in adolescence.

When functional appliance treatment is provided in early adolescence it appears that there are minor beneficial changes in skeletal pattern, however, these are probably not clinically significant. Similarly, the choice of functional appliance when compared to the Twin Block does not result in any advantageous effects.

Quality of the evidence

The overall quality of the evidence was low.