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[Intervention Review]

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

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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 condition develops when permanent teeth erupt. These teeth are more likely to be injured and their appearance can cause significant distress. Children are often referred to an orthodontist for treatment with dental braces to reduce the prominence of their teeth. 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 and provide treatment in adolescence.

Objectives

To assess the effects of orthodontic treatment for prominent upper front teeth initiated when children are seven to 11 years old ('early treatment' in two phases) compared to in adolescence at around 12 to 16 years old ('late treatment' in one phase); to assess the effects of late treatment compared to no treatment; and to assess the effects of different types of orthodontic braces.

Search methods

Cochrane Oral Health's Information Specialist searched the following databases: Cochrane Oral Health's Trials Register (to 27 September 2017), the Cochrane Central Register of Controlled Trials (CENTRAL) (the Cochrane Library, 2017, Issue 8), MEDLINE Ovid (1946 to 27 September 2017), and Embase Ovid (1980 to 27 September 2017). The US National Institutes of Health Ongoing Trials Registry (ClinicalTrials.gov) and the World Health Organization International Clinical Trials Registry Platform were searched for ongoing trials. No restrictions were placed on the language or date of publication when searching the electronic databases.

Selection criteria

Randomised controlled trials of orthodontic treatments to correct prominent upper front teeth (Class II malocclusion) in children and adolescents. We included trials that compared early treatment in children (two-phase) with any type of orthodontic braces (removable, fixed, functional) or head-braces versus late treatment in adolescents (one-phase) with any type of orthodontic braces or head-braces, and trials that compared any type of orthodontic braces or head-braces versus no treatment or another type of orthodontic brace or appliance (where treatment started at a similar age in the intervention groups).

We excluded trials involving participants with a cleft lip or palate, or other craniofacial deformity/syndrome, and trials that recruited patients who had previously received surgical treatment for their Class II malocclusion.

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Data collection and analysis

Review authors screened the search results, extracted data and assessed risk of bias independently. We used odds ratios (ORs) and 95% confidence intervals (CIs) for dichotomous outcomes, and mean differences (MDs) and 95% CIs for continuous outcomes. We used the fixed-effect model for meta-analyses including two or three studies and the random-effects model for more than three studies.

Main results

We included 27 RCTs based on data from 1251 participants.

Three trials compared early treatment with a functional appliance versus late treatment for overjet, ANB and incisal trauma. After phase one of early treatment (i.e. before the other group had received any intervention), there was a reduction in overjet and ANB reduction favouring treatment with a functional appliance; however, when both groups had completed treatment, there was no difference between groups in final overjet (MD 0.21, 95% CI –0.10 to 0.51, P = 0.18; 343 participants) (low-quality evidence) or ANB (MD –0.02, 95% CI –0.47 to 0.43; 347 participants) (moderate-quality evidence). Early treatment with functional appliances reduced the incidence of incisal trauma compared to late treatment (OR 0.56, 95% CI 0.33 to 0.95; 332 participants) (moderate-quality evidence). The difference in the incidence of incisal trauma was clinically important with 30% (51/171) of participants reporting new trauma in the late treatment group compared to only 19% (31/161) of participants who had received early treatment.

Two trials compared early treatment using headgear versus late treatment. After phase one of early treatment, headgear had reduced overjet and ANB; however, when both groups had completed treatment, there was no evidence of a difference between groups in overjet (MD - 0.22, 95% CI -0.56 to 0.12; 238 participants) (low-quality evidence) or ANB (MD - 0.27, 95% CI -0.80 to 0.26; 231 participants) (low-quality evidence). Early (two-phase) treatment with headgear reduced the incidence of incisal trauma (OR 0.45, 95% CI 0.25 to 0.80; 237 participants) (low-quality evidence), with almost half the incidence of new incisal trauma (24/117) compared to the late treatment group (44/120).

Seven trials compared late treatment with functional appliances versus no treatment. There was a reduction in final overjet with both fixed functional appliances (MD -5.46 mm, 95% CI -6.63 to -4.28; 2 trials, 61 participants) and removable functional appliances (MD -4.62, 95% CI -5.33 to -3.92; 3 trials, 122 participants) (low-quality evidence). There was no evidence of a difference in final ANB between fixed functional appliances and no treatment (MD -0.53° , 95% CI -1.27 to -0.22; 3 trials, 89 participants) (low-quality evidence), but removable functional appliances seemed to reduce ANB compared to no treatment (MD -2.37° , 95% CI -3.01 to -1.74; 2 trials, 99 participants) (low-quality evidence).

Six trials compared orthodontic treatment for adolescents with Twin Block versus other appliances and found no difference in overjet (0.08 mm, 95% CI –0.60 to 0.76; 4 trials, 259 participants) (low-quality evidence). The reduction in ANB favoured treatment with a Twin Block (–0.56°, 95% CI –0.96 to –0.16; 6 trials, 320 participants) (low-quality evidence).

Three trials compared orthodontic treatment for adolescents with removable functional appliances versus fixed functional appliances and found a reduction in overjet in favour of fixed appliances (0.74, 95% CI 0.15 to 1.33; two trials, 154 participants) (low-quality evidence), and a reduction in ANB in favour of removable appliances (-1.04° , 95% CI -1.60 to -0.49; 3 trials, 185 participants) (low-quality evidence).

Authors' conclusions

Evidence of low to moderate quality suggests that providing early orthodontic treatment for children with prominent upper front teeth is more effective for reducing the incidence of incisal trauma than providing one course of orthodontic treatment in adolescence. There appear to be no other advantages of providing early treatment when compared to late treatment. Low-quality evidence suggests that, compared to no treatment, late treatment in adolescence with functional appliances, is effective for reducing the prominence of upper front teeth.

PLAIN LANGUAGE SUMMARY

Orthodontic treatment for prominent upper front teeth in children

Review question

This review, carried out by authors working with Cochrane Oral Health, 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 looks at whether this treatment is best initiated at seven to 11 years old (early treatment in two phases), or in adolescence, at around age 12 to 16 years (late treatment in one phase). The use of different types of braces was also assessed.

Background

Prominent (or sticking out) upper front teeth are a common problem in children around the world. For example, this condition affects 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

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permanent teeth erupt. 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 adolescence.

In 'early treatment', treatment is given in two phases: first at an early age (seven to 11 years old) and again in adolescence (around 12 to 16 years old). In 'late treatment' (one phase), there is only one course of treatment in adolescence.

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

Study characteristics

This review is based on 27 studies including 1251 participants. Participants were children and adolescents aged under 16 years who had prominent upper front teeth (Class II Division 1 malocclusion). The evidence in this review is up to date as of 27 September 2017.

Key results

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

The evidence also suggests that providing treatment with functional appliances for adolescents with prominent upper front teeth, significantly reduces their prominence when compared to adolescents who did not receive any treatment. The studies did not suggest that any particular appliance was better than any other for reducing teeth prominence.

Quality of the evidence

The overall quality of the evidence is low for most comparisons and outcomes, therefore further research is needed and may change the findings.