

Australian Society
of Orthodontists



University of Sydney



Contemporary Orthodontic Treatment for Young Patients: Challenging some recently promoted concepts

PART 2

*Creating **B**righter Futures*

Contemporary Orthodontic Treatment for Young Patients: Challenging some recently promoted concepts

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This second part continues the summary of the material presented by Prof Michael Woods which was awarded by international assessors a prestigious research award. A recording of a lecture by Prof Woods presenting this material can be viewed at www.asofre.org.au/continuing-education/#michael-woods

Concept 2.

Don't extract upper premolars because it will lead to unsightly dark buccal corridors.

Meyer AH, Woods MG, Manton DJ. Maxillary arch width and buccal corridor changes with orthodontic treatment. Part I: Differences between premolar extraction and non-extraction treatment outcomes. Am J Orthod Dentofac Orthop 2014; 145: 207-16

Meyer AH, Woods MG, Manton DJ. Maxillary arch width and buccal corridor changes with orthodontic treatment. Part II: Attractiveness of the frontal facial smile in extraction and non-extraction outcomes. Am J Orthod Dentofac Orthop 2014; 145: 296-30

These studies assessed changes in maxillary arch-width and buccal corridor spaces accompanying premolar extraction or non-extraction treatment. Contrary to what is often promoted as a negative effect of extractions in orthodontics, there was a significant mean increase in the maxillary inter-canine width within the extraction group – but not in the non-extraction group (Figure 3). No significant differences were found for treatment changes in any of the buccal corridor widths or areas in extraction and non-extraction groups.

When frontal facial attractiveness was assessed, there was no real difference in the attractiveness ratings for extraction and non-extraction groups. When rated by clinicians and lay people attractiveness was not affected by buccal corridor widths. It would seem that, if there are differences in average post-treatment upper anterior and posterior arch widths following treatment with or without premolar extractions, those differences simply reflect the presenting pretreatment morphology and dimensions. The directly-quoted peer-reviewed conclusions are:

- Premolar extraction treatment is unlikely to lead to a greater narrowing of upper arch width than treatment without premolar extractions.
- Premolar extraction treatment is unlikely to lead to larger post-treatment buccal corridor spaces.

Figure 3. 11 year-old female with significant crowding, a large overjet and considerable overbite.



(a) Pretreatment face and occlusion

(b) Pretreatment lateral cephalogram

(c) Post-treatment face and occlusion, age 14, after extractions of upper and lower first premolars

(d) Post-treatment lateral cephalogram

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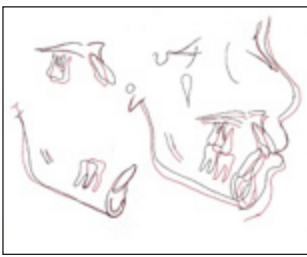
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(e) Cephalometric superimpositions showing favourable mandibular growth, some upper incisor retraction and some reduction in lip strain.



(f) Face and teeth, age 21



(g) Frontal photographs, ages 11 and 21. The extractions of the upper premolars, especially, have facilitated the apparent widening of the upper arch.

Concept 3. One either expands or extracts in orthodontics. Extractions really aren't necessary in contemporary orthodontics.

Woods MG. Mandibular arch dimensional and positional changes in late mixed-dentition Class I and II treatment. *Am J Orthod Dentofacial Orthop* 2002; 122: 180 – 8

Sable DL, Woods MG. Growth and treatment changes distal to the mandibular first molar: a lateral cephalometric study. *Angle Orthod* 2004; 74: 367 – 74

Kandasamy S, Woods M. Is orthodontic treatment without premolar extractions always non-extraction treatment? *Aust Dent J* 2005; 50: 146 – 51

These studies undertook to assess the arch-dimensional effects of comprehensive treatment commenced in the late mixed dentition – focusing on both the transverse and antero-posterior dimensions. In all, the amount of space required for mandibular alignment and levelling was the most important factor related to arch-dimensional changes with this sort of treatment, especially in the anteroposterior dimension.

When well documented large samples from these two groups were compared some years after the completion of active treatment, mandibular third molars were considerably more likely to have become impacted, with or without partial eruption, in those patients treated by holding the E-spaces, without premolar extractions, than in those treated with the extractions. Many factors such as the orthodontic mechanics used, molar anchorage considerations, management of the residual space, the goals for final lower incisor positioning, and the amount of resorption of the anterior border of the ramus will play important roles in determining the eventual space available for third molar eruption.

Contemporary treatment protocols involving molar-distalizing mechanics, the holding of the E-spaces and even arch-expansion may, for various dental and facial reasons, be sound approaches to the correction of individual malocclusions. All clinicians need to acknowledge, however, that these techniques do not necessarily create space to accommodate all the teeth.

Rather, they would seem to involve the “borrowing” of space for alignment and, in most people, this borrowed space has to be paid back in the form of other extractions after active treatment. Put more simply, even after considerable expansion, these so-called non-extraction approaches may only be relocating the crowding more posteriorly (Figure 4).

Figure 4. Growth and eruption changes from mixed to permanent dentition



(a) Lower arch after full eruption of the permanent first molar.



(b) Lower arch after full eruption of the permanent second molar. Note the position of the unerupted third molar.



(c) Upper arch after the eruption of the permanent first molar.



(d) Upper arch after the eruption of the permanent second molar. Note the position of the unerupted third molar.

Despite many advances in orthodontic diagnosis and treatment over the last century, it seems that, for the majority of patients, clinicians are yet to meet the challenge of retaining 32 teeth in good alignment and functional occlusion in the long term. In the end, neither non-extraction nor non-premolar extraction should be goals of treatment in themselves, but merely different paths taken to best meet the diagnosed needs of individual patients at the time of presentation. The directly-quoted peer-reviewed conclusions are:

- Depending on the actual amount of available bilateral E-space, arch space of 4 to 8mm may be found for some patients without the need for antero-posterior or transverse expansion.
- For a claim of overall non-extraction treatment to be made, 32 teeth need to be kept in good alignment, in useful functional and healthy positions. If not, it really isn't non-extraction treatment.

Concept 4. The mandible will jump forward after being unlocked with deep overbite correction.

Woods MG. Overbite correction and sagittal changes: late mixed-dentition treatment effects. *Aust Orthod J* 2001; 17: 69 – 80

Woods MG. Lower incisor changes on basal bone and in relation to the lower face: combined growth and treatment effects in the late mixed-dentition. *Aust Orthod J* 2002; 18: 7 – 18

Woods MG. Sagittal mandibular changes with overbite correction in subjects with different mandibular growth directions: late mixed-dentition treatment effects. *Am J Orthod Dentofac Orthop* 2008; 133: 388 – 94

Deen E, Woods MG. Effects of the Herbst appliance in growing subjects with different underlying vertical patterns. *Aust Orthod J* 2015; 31: 59-68

These studies reported the treatment effects of overbite correction in growing patients.

The first result was that significantly greater amounts of forward dentoalveolar (but not skeletal) movement were found to have occurred in patients with more horizontal growth (brachyfacial) patterns but not in patients with more vertical growth (dolichofacial) patterns. In view of this potential releasing effect of bite-opening on the mandibular dentoalveolar structures, Class I and II brachyfacial patients with very deep overbites should be treated early enough (during the pubertal growth spurt) to ensure that considerable facial growth potential exists. If attempted at a later stage, it is less likely that favourable effects will be seen either at the chin or in the lateral facial profile.

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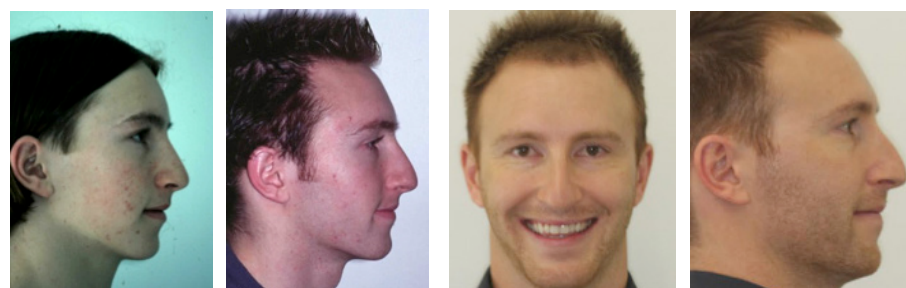
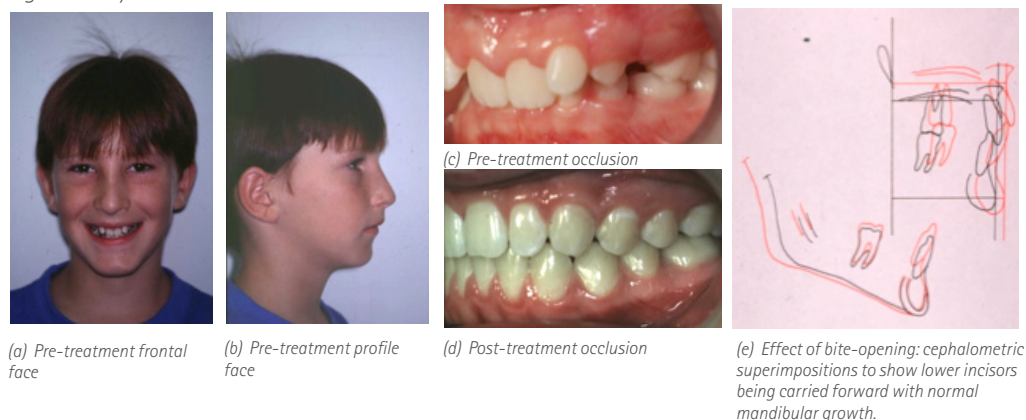
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Having said that, a whole range of other factors, such as patient burnout, duration of treatment and treatment cost also have to be taken into account when considering earlier treatment.

All clinicians need to understand the complex interaction occurring between the maxilla and the chin in both the horizontal and vertical dimensions. This is important because, following reduction of deep overbites in growing brachyfacial patients, the lower incisors may be carried forward in the face with normal mandibular growth, without actually having to move forward on the underlying basal bone at all (Figure 5). That is important for long-term stability and lower lip aesthetic reasons.

Figure 5. 12 year-old Class II division 2 male



Finally, it is often claimed that the use of so-called fixed functional appliances might lead to increased mandibular growth and the ability to really control vertical changes in the face. However, when one looks carefully at large samples of treated patients, neither of these claims can be supported.

So, if the aim of treatment for any individual patient is to provide a good-looking, well-functioning occlusion, with pleasing facial appearance, routine orthognathic surgery may still need to be considered for those with excessively short or long faces. The directly-quoted peer-reviewed conclusions are:

- There is unlikely to be a greater than expected forward movement (unlocking) of the mandible, as seen at the chin, as a result of deep overbite correction in any growing orthodontic patient.
- There is likely to be enhanced forward movement of the lower dentoalveolus as a result of deep overbite correction in horizontally growing brachyfacial patients. This dentoalveolar response will not be seen in vertically growing, dolichofacial patients.

Relevance

From the results of these studies it can be seen that the listed concepts cannot be supported and cannot be applied universally to treatment planning for individual patients. So, in turn, devices, philosophies and techniques promoted on the basis of these statements cannot be supported for use in all patients.

What does this mean for the public, the dental profession, the orthodontic specialty and graduate students in all dental disciplines? All should keep these findings in mind because, if history teaches anything, it is that such statements, or variations of them, will continue to reappear in the future.

While fashions in dentofacial aims have changed back and forth over time, the overall key would seem to be that individualised treatment planning, based on a thorough systematic diagnosis, followed by careful, controlled and competent clinical management are still the most likely ways in which a favourable dentofacial aesthetic and functional result can be provided for any individual orthodontic patient.

(References for introduction, history and context are available on request)



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