

Australian Society  
of Orthodontists



University of Sydney



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

PART 1

*Creating **B**righter Futures*

# Contemporary Orthodontic Treatment for Young Patients:

## Challenging some recently promoted concepts

### PART 1

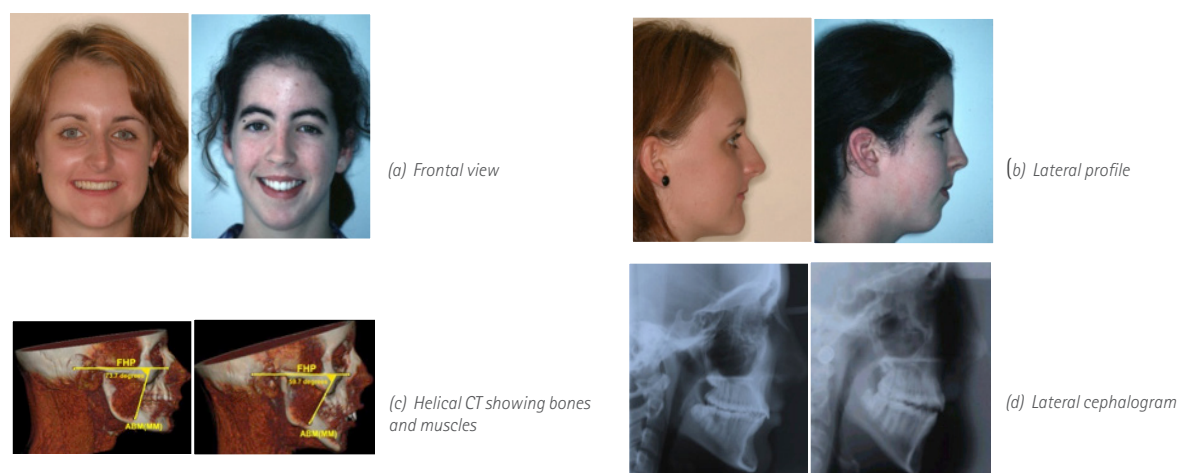
The next two issues of Brighter Futures are a summary of the research material presented by Professor Michael Woods, the former Chair of the Department of Orthodontics at Melbourne University. It resulted in him being granted, in 2014, the prestigious P Raymond Begg Research Award. This award, offered biennially, is judged by an international panel of eminent researchers. Professor Woods presented a summary of this winning research at the 2015 ASO Foundation Meeting and his lecture was subsequently recorded and is available for viewing at [www.asofre.org.au/continuing-education/#michael-woods](http://www.asofre.org.au/continuing-education/#michael-woods)

This research, which is directly applicable to clinicians making orthodontic treatment planning decisions, provides the crucial evidence base for these decisions.

#### A clinical introduction

Before undertaking active orthodontic treatment, the clinician must really understand the active functional environment in which teeth exist. Chewing, swallowing and breathing are all important, but of greater significance to the height of the face and profile is the underlying genetically-determined vertical muscular pattern (Figure 1.).

Figure 1. Teenage females (left: brachyfacial, right: dolichofacial)



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#### Dental Anxiety

Patients who suffer from anxiety in dental settings continue to be a challenging group to manage in practice. Assoc Prof Jason Armfield from the Australian Research Centre for Population Oral Health at Adelaide University has researched this topic over many years and has recently produced a patient brochure and practitioner fact sheet that can be downloaded from the Dental Practice Education Research Unit webpage <https://www.adelaide.edu.au/arcpoh/dperu/> under "Special Topics". The materials include a questionnaire that patients can answer to provide you with information that will help to guide you in the provision of care.

Assoc Prof Armfield will be presenting on the topic of Dental Anxiety in a webinar on the Colgate Oral Health Network at 6 pm AEST on the 10 th August. Go to [www.colgateoralhealthnetwork.com/](http://www.colgateoralhealthnetwork.com/) to sign up for the webinar. You will be able to ask questions on the night and access the webinar later if you wish. It is always rewarding to be able to help someone who has previously been too anxious to receive effective dental care. This webinar will provide you with insights into the condition and provide some approaches that may assist you.

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In general those with shorter faces (brachyfacial) tend toward broader faces with more concave lower facial profiles while those with longer faces (dolichofacial) tend to have narrower faces with more convex lower facial profiles; these patterns becoming more obvious during the pubertal growth spurt. Clinicians planning orthodontic treatment must therefore try to visualise the likely three-dimensional effects of facial growth, right through to maturity.

Thus, in a still developing brachyfacial patient, one would attempt to maintain maximum smile width and lip fullness. Active treatment might be commenced earlier, in the late mixed dentition (to use the E-spaces) and certainly while considerable facial growth is still likely to come (to help with any necessary Class II correction and bite-opening). On the other hand, in a developing dolichofacial patient, one would want to reduce, or prevent the occurrence of, unnecessary tooth and lip protrusion and lip strain. Space would be needed for alignment and/or reduction in protrusion so permanent tooth extractions might be necessary. In the middle (mesofacial), one can go either way. At times, especially if there are cross-bites, there will be the need to expand the upper arch, but in most mesofacial cases, the aim will be to align the teeth and to detail the occlusion, without really altering the natural muscle-related arch-forms. Necessary space would then be found by utilising E-spaces, distalising buccal teeth or reducing the amount of tooth tissue (extractions or interproximal reduction). In any event, the aim will always be to provide a pleasing smile and relaxed lip curves.

Finally, when diagnosing and planning treatment all teeth present – up to and including the third molars – must be considered. Eventual third molar decisions will be very much based on three factors: the amount of growth at the posterior ends of the arches; the directions of their eruption; and, the effects of any active orthodontic treatment (including extractions, distalisation and expansion).

### A little history

Over the last decade or so, there has been a movement towards “simpler” orthodontic practice. Some newer devices and techniques promote quicker, faster, less invasive and less complex treatments – relying less on the dexterity of, and individual planning by, the responsible clinician. While a considerable amount of this change can be attributed to invention or re-development of mechanical devices, much contemporary commercially-based treatment philosophy seems to be based on several largely unsupported claims.

Of particular note are statements warning of the likely negative facial effects of certain standard procedures associated with orthodontic treatment. Paralleling this is an increased discussion of dental and facial aesthetics, including such factors as smile width and arc, tooth size and shape, gingival exposure and symmetry, and lip fullness. While all of this is now freely discussed amongst the wider dental and cosmetic community there is little in the peer-reviewed literature to support many of these concepts.

In this environment, and in many places, it has thus become unsound practice to consider extractions or even orthognathic surgery. The results of these procedures, it is claimed, will be universally negative – especially on the above facial characteristics.

With all of this in mind, and in an attempt to make statements of fact, a long-term research initiative of focussed clinical-effects was commenced over a decade ago. All were rigorously-undertaken formal university-based studies. Four general concepts were addressed in these studies.

### The Studies

**Concept 1. Don't extract premolars because there will be an inevitable collapse of the anterior teeth and overlying soft tissues. Extract 5s instead of 4s in order to protect the profile.**

Shearn BN, Woods MG. An occlusal and cephalometric analysis of lower first and second premolar extraction effects. *Am J Orthod Dentofacial Orthop* 2000; 117: 351 – 61

Ong HB, Woods MG. An occlusal and cephalometric analysis of maxillary first and second premolar extraction effects. *Angle Orthod* 2001; 71: 90 – 102

Wholley CJ, Woods MG. The effects of commonly-prescribed premolar extraction sequences on the curvature of the upper and lower lips. *Angle Orthod J* 2003; 73: 386 – 95

Wholley CJ, Woods MG. Tooth and lip responses to three commonly-prescribed premolar extraction sequences: a review of recent research findings *Aust Orthod J* 2004; 20: 115 – 121

Moseling KP, Woods MG. Lip curve changes in females with premolar extraction or nonextraction treatment. *Angle Orthod* 2004; 74: 51 – 62

Lin PT, Woods MG. Lip curve changes in males with premolar extraction or non-extraction treatment. *Aust Orthod J* 2004; 21: 71 – 86

Tadic N, Woods MG. Incisal and soft tissue effects of maxillary premolar extraction in Class II treatment. *Angle Orthod* 2007; 77: 808 – 16

Tadic N, Woods MG. Contemporary Class II orthodontic and orthopaedic treatment: a review. *Aust Dent J* 2007; 52: 168 – 74

### Incisor Retraction /Molar Protraction

The above were all studies using randomly-chosen records of young orthodontic patients, treated with or without premolar extractions. In the extraction samples, sub-groups of different sequences (such as 4/4, 4/5, 5/5) were gathered.

The first thing to note is that, as in all studies involving live human subjects, there was considerable individual variation in the observed combined treatment and growth effects. In the upper and lower arches, for instance, it was shown that the anterior teeth may have been retracted, held in their pre-treatment positions or proclined.

That's the key – orthodontic treatment with the extractions of premolars did not consistently cause a retrusive effect on the incisors.

In the lower arch, there was generally more forward movement of the molars than incisor retraction following extractions of second premolars than first premolars. A specific extraction pattern did not, however, necessarily guarantee certain amounts of incisor retraction or lower molar protraction. In the upper arch, while there was some evidence that greater incisor retraction might follow maxillary first premolar extractions, there was also considerable individual variation. Once again, a specific extraction sequence did not guarantee predictable amounts of incisor retraction or molar protraction. Even Class II orthodontic treatment involving the extractions of only two upper premolars resulted in widely-varying upper incisor positions and angulations.

Overall, as far as tooth movements go, the individual variation seen in response to growth and treatment is likely



is published by the Australian Society of Orthodontists (NSW Branch) Inc. in conjunction with the Orthodontic Discipline at the University of Sydney.

The newsletter is intended to help keep the dental profession updated about contemporary orthodontics, and also to help foster co-operation within the dental team.

Without the generous support of Henry Schein Halas and Colgate, who are an integral part of the dental team, this publication would not be possible.

*The statements made and opinions expressed in this publication are those of the authors and are not official policy of, and do not imply endorsement by, the ASO (NSW Branch) Inc or the Sponsors.*

Correspondence is welcome and should be sent to:

Department of Orthodontics  
University of Sydney  
Sydney Dental Hospital  
2 Chalmers Street,  
Surry Hills NSW 2010

## AUTHOR & EDITORS

Professor Michael Woods  
PRINCIPAL AUTHOR

Dr Chrys Antoniou  
Dr Dan Vickers  
Prof M Ali Darendeliler  
Dr Ted Peel  
Dr Ross Adams  
Dr Susan Cartwright  
Dr Vas Srinivasan

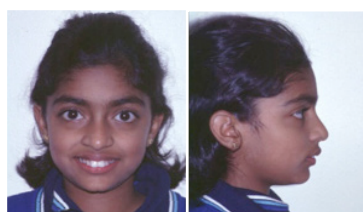
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to be the result of different treatment mechanics and facial and occlusal objectives. It is therefore likely to depend as much on the pre-treatment dentofacial characteristics as on the chosen extraction sequence.

## Lip Morphology

When looking at the effects on lip morphology and positions within the face, a similar range of changes in depths of upper and lower lip curves should be expected, regardless of whether premolars have been extracted or not. While extreme changes in dental or skeletal factors, such as excessive retraction of the anterior teeth, may lead to adverse facial profile changes, the results of these studies suggest that it is not the routine outcome. Instead, it would seem possible for the competent clinician to carefully manage either first or second premolar extraction spaces while still protecting the lateral profile (Figure 2.).

Figure 2. 12 year-old Class II female



(a) Pretreatment face



(b) Pretreatment occlusion before unsuccessful attempt with functional appliance



(c) Pre and post-treatment lateral cephalograms



(d) Post-treatment occlusion after extractions of upper 4s



(e) Post-treatment face, age 15



(f) Two sisters. Can you really tell which one had upper extractions?

As these studies were concluded, it became obvious that many skeletal, dental and soft tissue factors are associated with changes in the depth of lip curves in individual patients. No single factor is likely to determine those changes on its own.

The pre-treatment thickness of the upper and lower lips, at the level of the vermillion tissue, is likely to be the pre-treatment characteristic with the greatest potential to influence changes in depths of lip curvature. Overall, the measurements show that, if dental and skeletal factors have been well managed during treatment, the post-treatment depths of lip curvature are likely to be satisfactory.

The directly-quoted peer-reviewed conclusions are:

- Premolar extraction treatment does not lead to inevitable incisor retraction.
- Premolar extraction treatment does not lead to a direct inevitable flattening of the lips.
- The choice of first premolar extractions, on its own, does not immediately lead to a greater retraction of the teeth and flattening of the lips than the choice of second premolar extractions.

(To be continued in Part 2)