Orthodontics – science or fashion?

by Dr. Chris Farrell, BDS

The orthodontic specialty is now 100 years old, and the times since Angle have witnessed the rise and fall in popularity of numerous orthodontic techniques. One of the more memorable of these was the 1950s challenge to the Angle purists by the Tweed extractionists. This represented a fundamental shift in orthodontic diagnosis and treatment planning. The move to fixed, multi-banded appliances (braces) has now become well accepted as the face of orthodontics in the general public. Over the protests of Angle, extractions have become a commonplace adjunct to orthodontics never before claiming that their use is declining.

Despite refinement in the technique, moving a tooth from its stable and naturally induced position to an unstable but theoretically correct position has changed little since Angle first introduced the system. Alongside fixed, multi-handed appliances, removable or “functional” appliances have a relatively long history in Europe – and more recently in the USA – as a means of enhancing “arch modification” and skeletal development. But the braces and wire technicians (orthodontists), generally denounce the acrylic and wire techniques as ineffective. Debates on this subject have ebbed and flowed for decades, indicating that this fundamental issue is far from resolved. At the heart of the debate lies the question of whether the popularity of fixed techniques is built upon responsible science or simply upon convenience and fashion. The article by Dr. Robert Robert Cerny, “Orthodontics: Trapped in a time warp” (American Journal of Orthodontics and Orthognathic Surgery 105: 727-730, 1994) has rightly led many in the orthodontic community to question how far we have come.

Science or fashion?

If the last 100 years have given us a sound scientific understanding of the causes of malocclusion, then we are wrong in assuming that whether our treatment techniques are scientifically based on published research, or whether the science of orthodontics has been hijacked by a big-business fashion industry.

A study of the literature reveals a wide range of reports indicating orthodontic treatment to be unsuccess-

ful in most cases. This claim can easily be challenged by anyone who can demonstrate a sequence of correct and stable cases. One of the more memorable of these was the 1950s challenge to the Angle purists by the Tweed extractionists.

Is this the best orthodontics can achieve after a century of research? If it is, should the braces-wearing public be informed that the orthodontist – not orthodontic correction – are for life? And are extractions all in vain anyway, given that we know the teeth will still crowd again? Sadly, the research seems to indicate this, raising significant issues of accountability for our profession.

What is our response to these challenges? Do we accept that the orthodontic techniques are prone to failure unless permanent retention is used? There is increasing concern in the literature that this approach has no scientific or long-term research to show it is not detrimental to the dental structures. Is there a legal requirement for the referring dentist to inform every patient and parent of this probability?

Forces in orthodontics

The force required to move a tooth is quite small. We know this from the light and ultra-elastic wires available. The ability to move teeth effectively, quickly and with fewer wire-bending skills have been the major advance in orthodontics in the late 20th century. Modern techniques require far less of the traditional skills of the orthodontist. Increasingly, general dentists are attempting fixed orthodontics with the same assumption of a stable outcome as their orthodontic colleagues. Even Invisalign, the no-bracket system, is based on this same incorrect assumption. There has also been a resurgence in maxillary expansion techniques, which have been conclusively demonstrated in the past to be highly unstable. This has rightly led many in the orthodontic profession to condemn the resurrection of this treatment strategy.

The principle of force is crucial to the debate. The force of the lower lip is considerably higher – 100-500 grams – than that of the wires typically used in fixed appliances. (See graph.) This reality is reflected in practice. For example, techniques generally do not seek to change lower incisor position because the force of the lower lip will move the tooth back to the stable position. The lower lip is also responsible for the arch form. Changing any lower anterior tooth position is therefore potentially undesirable. The little research seems to prove this point.

This critical perspective from both practice and research is not new. Graber’s observations in the American Journal of Orthodontics about “the 3-Ms”: Muscles, Malformation and Malocclusion, raised similar concerns about the failure of some Orthodontists to neglect the forces of the soft tissue.

“IT IS IMPERATIVE THAT THE ORTHODONTIST APPRAISE MUSCLE ACTIVITY AND THAT HE CONDUCT HIS ORTHODONTIC THERAPY IN SUCH A MANNER THAT THE RESULT REFLECTS A BALANCE BETWEEN THE STRUCTURAL CHANGES OBTAINED AND THE FUNCTIONAL FORCES ACTING ON THE TEETH AND INVESTING ISSUES AT THAT TIME.”

Unfortunately, too many orthodontists and dentists evaluate the muscle dysfunction associated with the majority of malocclusions. A change in tooth position must be accompanied by a simultaneous change in the soft tissue (dysfunction).

In addition to the forces exerted by the lower lip, the force of the tongue is certainly more than capable of moving teeth[12]. We know that the treatment of open bites is difficult because of the constant battle with the tongue[13]. This is why surgically treated open bites show similar poor stability.

Research and practice clearly show us that instability is the norm, rather than the exception, when we undertake the relatively easy task of moving teeth. It is impossible to ignore the reality of the forces at work.

Soft tissue dysfunction – ignored for 100 years


Using modern digital video and capture techniques, we are now able to analyze the soft tissue component Angle observed in a much more objective way. It is still difficult to measure, but seeing the movement of the soft tissue and knowing their influence on the arch form and the dentition, we have a better understanding of why the teeth occupy the position they do. There are also much fewer crowding cases than previously perceived. Soft tissue dysfunction syndrome (STDS) is the cause, not big teeth. Logic and science tells us orthodontic treatment will be futile unless the tissue dysfunction and the tooth position are simultaneously corrected. The research confirms the reality of this understanding.

Observation is a vital first step in understanding. A sound understanding must precede any treatment. Consider the case in the adjacent photographs. At eight years of age, this patient shows evidence of tongue thrust and reverse swallow causing open bite and anterior crowding.
The world's most effective, most convenient functional appliance

Most functional appliances had their basic beginnings more than 100 years ago. The Balters Bionator, the Activator and the Frankel are all old designs, developed from Eastern European versions. They are the most powerful functional appliance of all – one that is still working today in developed and primitive races alike, with no professional assistance required.

While it is popular – or perhaps just fashionable – to respond that “functional” appliances do not work as well as fixed appliances, it is informative to contemplate the thumb. Such appliances are readily available, requires no lab fees, it is convenient, does not break, and enjoys excellent compliance. In terms of effectiveness, the skeletal changes brought about by the thumb functional appliance are well documented.1,3,12 If a child sucks their thumb for any reasonable amount of time, dental and skeletal changes routine occur. And as we have all observed, these changes are usually permanent. Correction of the damage done by thumb-sucking can be a difficult orthodontic exercise even long after a child has quit the habit. So the skeletal and dental change is usually permanent. But why? The thumb creates a narrow maxilla and an open bite. But it also trains the tongue to thrust while swallowing and produces a mouth-open posture. This perpetuates the malocclusion long after the habit has gone. Some will self-correct, but rarely after the early mixed dentition stage.

So we can conclude that for better or worse, any appliance placed in the mouth at an early age that can influence the tongue position and function can have an effect on the child's development.1,3 Dentists also inform parents of the dangers of long-term use of a dummy. It is hard to argue the potential effectiveness of functional appliances in light of the effectiveness of the thumb.

However, the majority of these acrylic and wire appliances encourage tongue pressure, lowering tongue position, (with the exception of the Frankel) which can make soft tissue dysfunction worse. Most are as bad as the thumb when it comes to correction of skeletal, functional habits, and once removed, the badly trained tongue forms the teeth into another position of malocclusion. Like the thumb, these appliances fail to correct soft tissue dysfunction, and often make myofunctional habits worse. This concurs with the unpredictable results that occur with these functional appliances.

Tongue position is vital for correct growth and a good occlusion. Compare a retainer to that of a nose breathing.

"The mouth breathers' maxillae and mandible were more retrusive. Palatal height was higher, overjet was greater in mouth breathers. Overall, mouth breathers had longer faces, with narrower maxillae and retrognathic jaws."

An appliance that retrained the tongue to the correct position in the palate and that stops mouth breathing and tongue thrusting should be of great assistance in correcting the soft tissue component of a malocclusion (STDS) before or during regular orthodontic treatment. Such an appliance should complement the orthodontic appliance, myofunctional appliance, to achieve long-term stability.

This broader perspective

Of course, extractions do sometimes prove effective in the long term for some patients. Likewise, some fixed appliances are able to provide stable longer-term outcomes, as do some functional appliances. We know that moving teeth is easy but that long-term stability is uncertain. We know that many functional appliances have limitations, and also know that occlusion cannot come about without the tongue behind them (think of the thumb) demands our consideration. The orthodontic practitioner is perhaps best to advise and treat patients – particularly when those patients may expect a certain type of treatment based on popular awareness. Do we adhere to fashion or consider the science?

What is not uncertain is that our first responsibility is to acknowledge and address the underlying myofunctional problems (STDS) causing the orthodontic disorder. The majority of our growing children have this problem rather than the simple webbing underpinning our profession compels us to consider the soft-tissue and myofunctional aspects in treatment planning, and not simply relying on temporary relocation of teeth, which remain subject to those underlying forces. In that light, it is prudent for us to consider all possible treatment options. We are well-advised to re-examine the potential of properly designed myofunctional appliances as an effective adjunct to better and more stable orthodontic treatment. Because of their capacity for addressing the underlying causes of malocclusion earlier than fixed appliances, myofunctional appliances can potentially be an essential part of every orthodontist’s range of treatments.

A broader concept in diagnosis

Crowding is not related to tooth or jaw size. Compare these normal and crowded upper arches. Tooth size is the same. Only arch form is different, which is directly related to tongue position and function. Orthodontic diagnosis must shift toward a better treatment of the cause of malocclusion rather than treating the result. This requires a change in classification beyond the definitions of Angle. Part 2 explores a broader approach to diagnosis based on the soft tissue dysfunction rather than measuring millimeters of tooth and jaw size discrepancies.

About the Author

Dr. Chris Farrell, BBS is a practicing dental surgeon who has specialized in myofunctional research and treatment of malocclusion for two decades. He is the founder and president of the Myofunctional Research Company, which designs, manufactures and distributes innovative dental appliances now used in more than 60 countries. Facing the problems of malocclusion in daily clinical practice and seeing the results of many different orthodontic approaches led him to explore the literature on both sides of the debate. As a result, in presentations to a number of university orthodontic schools, he has argued that popular orthodontics is based on fashion and not on research.

Contact

Chris Farrell, BBS
P.O. Box 14, Helensvale
QLD 4212 Australia
+61 7 5573 5999
Fax: +61 7 5573 6535
E-mail: chris@myoresearch.com
www.myoresearch.com
References

1. Angle EH. The Treatment of Malocclusion of the Teeth. Saunders; Phil: Ed 7: ch2.1907


