

## Opinion

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# Accelerating Orthodontic Treatment: A Continuous Challenge

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Every clinician will always aim for providing effective treatment, this can be accomplished by delivering the planned treatment goals over the shortest time possible, with minimal biological side effects and high levels of patient satisfaction. Unlike most of the dental specialities, orthodontic treatment tends to take relatively longer duration; this can range from as short as a several months to as long as several years (representative average 24 months).<sup>1</sup> This can be explained by the conservative nature of orthodontic treatment that mainly depends on the dento-alveolar response to gentle orthodontic forces.

It is not surprising that patient satisfaction with fixed orthodontic treatment outcome is generally high.<sup>2</sup> However, according to an interesting survey, the majority of orthodontic patients expressed that their duration of treatment was considered too long and that they wish if the duration of orthodontic treatment could be less than 12 months i.e. reduced to half.<sup>3</sup> Nowadays, there seem to be voices in the dental field claiming this is achievable. One must be wondering if this is true?

Let us first agree that this unresolved challenge is not new. Since Edward Angle introduced the edgewise fixed orthodontic in the early 1900's and hundreds of studies were conducted to identify factors influencing the duration of orthodontic treatment. Interestingly, most studies agreed that these factors can be categorised into: patient-related and treatment-related factors.<sup>4</sup>

As it was assumed that the patient-related factors are difficult to change, it was not a surprise to know that the main focus during the last few decades was to develop the mechanics around the fixed orthodontic appliance system. This included advanced technologies in the archwires (e.g. Nickel titanium), bracket design (e.g. self-ligation) and force application (e.g. elastomers and NiTi coils). Although, these advances might have been useful in different aspects, none were found to significantly shorten the duration of orthodontic treatment.<sup>3</sup> This had confirmed to the clinician that there is no such thing called "fast brace systems".

It then became obvious that new approaches had to be considered. Approaches that are mainly focused on influencing patient response to orthodontic forces leading to accelerated tooth movement. This includes surgical and non-surgical interventions.

Adjunctive surgical interventions geared towards reducing orthodontic treatment times have been collectively described as 'surgically assisted orthodontics'. These methods are based on the principle of initiating inflammation after the bone is irritated surgically. This usually leads to increased rate of bone remodelling and in turn accelerates tooth movement. Although there is some evidence from several studies that these interventions can accelerate tooth movement, the results should be considered with caution.<sup>5</sup> This is mainly because the effect of the intervention was evaluated for few months (e.g. space closure stage) and not the whole duration of treatment; which may question the clinical significance of the intervention.<sup>6</sup> It is also worth mentioning that the effect of the surgical intervention was found to decay after few months.<sup>7</sup> This may suggest that repeated surgical intervention may be required through the

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treatment; which in turn may affect the popularity of the intervention among patients who already prefer non-invasive orthodontics.<sup>3</sup> Recently, less invasive surgical methods were proposed e.g. piezosurgery and microosteoperforation.

Non-surgical mechanical or physical stimulation of the dento-alveolar process has also been used in conjunction with conventional braces to increase the speed of alveolar bone remodelling. These non-surgical adjunctive interventions include Photobiostimulation (e.g. lasers), cyclic vibration and direct electric current. The popularity of these interventions has grown in the orthodontic field due to their non-invasive nature and the influence from marketing companies. Interestingly, some of these companies promote devices by claiming that they can reduce the orthodontic treatment time to half. However, currently there is no sound evidence to support these claims.<sup>1</sup> There are currently several ongoing research projects in this field and hopefully the future will tell us more about these interventions.

Unfortunately, accelerating orthodontic treatment is still an ongoing challenge. The evidence available regarding the adjunctive interventions is not supportive, but can be promising. Obviously, there is a rapid increase in the research around the non-invasive adjunctive interventions. It is important to remember that effective orthodontic treatment is not solely about the duration. I trust that patients expectations will continue to drive proper research for the continuous development of our speciality.

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