

Accelerated Orthodontics: How far we have come

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Received: January 21, 2019; **Published:** March 28, 2019

Abstract

Fixed orthodontic treatment is a long duration procedure, making the patients unwilling to undergo this. With the advent of newer methods, this problem has been solved up to some extents. These methods, by using drugs, surgeries, vibrations etc. make the tooth movement faster, resulting in the reduction in the treatment duration.

Keywords: Orthodontic tooth movement, Accelerated movement, surgeries, biologic response

Introduction

The major concern for the patients undergoing orthodontic treatment is the long duration of treatment. With the recent advancements in the technology, a new method known as accelerated orthodontics has addressed the issue of long duration. The goal of this treatment is to reduce the time of the treatment. It involves Orthodontics along with the other measures.

As we all know that the tooth movement gets affected by so many factors like type of malocclusion, genetics, health of gingival tissue and the environment. All these factors play a role up to some extent in the duration of orthodontic treatment. As a tooth is embedded in the bone, so there are limitations of bone which allow the force application and tooth movement within certain limits. As we all know, a biologic response is initiated in the periodontium, when a low and continuous force is applied on the teeth which results in slow and continuous movement of the teeth. Accelerated orthodontics is used in combination with routine braces. It leads to stimulation and softening of the surrounding bone which helps in easy removal of teeth and in the accelerated tooth movement while simultaneously adding the new bone.

How it is done

It is an advanced orthodontic procedure involving the periodontal surgery resulting in the activation of bone surrounding the tooth.

The following methods have been used till date:

1. Drugs
2. Surgical Methods
3. Mechanical/Physical stimulation methods

Drugs

The various drugs [1-3] which have given successful results are interleukins, vitamin D, parathyroid hormone, prostaglandin, misoprostol etc. But, the adverse effects of these drugs cannot be ignored.

Surgical methods

It was introduced by Bichlmayr in 1931 to treat the maxillary protrusion. It involved the removal of wedges of bone through which teeth have to be moved. Kole in 1959, emphasized for the additional movements like correction of cross bites and closure of spaces. It was suggested that corticotomy created bony blocks (teeth-bone unit), resulting in the faster movement of teeth.

A new concept was proposed by Wilcko, *et al.* [4] by a different name as PAOO (Periodontally Accelerated Osteogenic Orthodontics) which described the occurrence of a transient demineralization – remineralization phase after corticotomy. Here, tissue formation is at a faster rate than normal regeneration and healing is at a faster rate because of enhancement of various healing stages.

The same concept was given by Frost by the name of RAP (Regional Acceleratory Phenomenon) [5].

The various surgical methods are:

1. Corticotomy- It involves the conventional procedure along with the placement of corticotomy cuts, if required, graft materials can be placed. But it has certain disadvantages [6] like high morbidity, post-operative pain, damage to vital structures. To overcome the disadvantages, Cortication technique was introduced by Park and Kim, where bone was surgically injured without elevating the flap. With the advantage of being non-invasive, it had some disadvantage as graft placement was difficult along with signs of dizziness in patients after surgery [7].
2. Piezocision- A flapless method was introduced by Dibart., *et al.* in 2009 [8] to overcome the conventional corticotomy associated morbidity. It was done with the help of piezosurgery. After placing the orthodontic brackets, the surgery had to be performed. The risk of root damage associated with this technique, was overcome by a method introduced by Jorge., *et al* [9]. They named it Minimally Invasive Rapid Orthodontic procedure or MIRO, where metal wires used as a guide for the placement of corticotomy cuts.
3. Micro-Osteoperforations (MOP)- A New device named as Propel system has been used to overcome the irritation of bone because of invasive nature of surgery. This process is known as Alveocentesis [10].

In this system, Bone growth stimulation is done by a small trauma which enhances the movement of teeth. It is done before putting braces to cause easy sliding of teeth in the bone.

Physical/Mechanical Stimulation

The surgical methods are always associated with some complications along with being invasive in nature. To overcome all these problems, non-invasive modalities were introduced like direct electric current, vibration, lasers etc. Studies [11,12] were done to evaluate the effects of lasers on the tooth movement which showed different results. This variation might be because of variations in intensity of laser, frequency of application of laser and method of force application used on the tooth.

Numerous investigations [13,14] done to visualize the effects of Vibrations on tooth movement in animals, demonstrated increased rate of tooth movement. For this purpose, recently, a new product has been launched by the name of AcceleDent.

Instead of using any invasive procedures, it makes use of a device which emits micro-pulses that results in bone growth and

faster movement of teeth. A mouth piece is worn and turned on for 20 minutes in a day to accelerate the movement of teeth.

Benefits of Accelerated Dentistry

The much-appreciated benefit of Accelerated Orthodontics over the traditional method is the reduction in the treatment time. It is mainly the adult patients who are more concerned about the timing of the treatment, especially the female patients at a marriageable age demand for the short cuts. Some patients are very concerned about their appearance, even after putting ceramic brackets, they just demand to cut down the time period of the treatment. Other benefit is that this type of treatment modality can be used with any of the bracket type; metal, ceramic or the lingual brackets.

Discussion

As every coin has two sides, there are some limitations associated with accelerated orthodontics as well. Although, there are no adverse effects seen but still long-time research is required to support the evidence to know the way it is going to affect the treatment. Secondly, it requires frequent visits to the orthodontist because you need to get the wires adjusted accordingly.

As they say, old is gold, so whatever method is chosen for the treatment; one needs to follow the precautions and guidelines to get the treatment finished faster. Though it will not speed up the treatment time but at the same time, treatment would not be slowed down.

1. Avoid biting on the hard foods that can break the brackets or bend the wires: This is the time period when no pressure or force is being exerted by the broken segment on to the desired area till the next appointment, so resulting in the delay of the treatment.
2. Brush after every meal as gingival health plays an important role for the easy and on time movement of the teeth. Follow all the instructions given by the doctor.
3. Always take small portions of food and in small size to avoid the unnecessary pressure and forces on the teeth and on the brackets.
4. Try to be regular for the appointments to keep your ongoing treatment on the regular basis.
5. As advised by the doctor, elastics should be worn for the full time. For the comfort sake, the child might not put the elastics back after brushing. The time period for which elastics are kept outside the mouth is equivalent to the treatment time delayed.
6. Avoid grinding and clenching of teeth while undergoing the treatment. If it is during the sleep, the doctor should be informed about it.

Conclusion

Traditional methods of treatment should be followed for the patients who have more complicated and severe malocclusions.

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Volume 3 Issue 4 April 2019

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