

Accelerating Orthodontic Treatment with AcceleDent

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General Overview

One of the most common patient concerns with orthodontic therapy is the length of time required for treatment. Recent studies have shown that micropulse technology significantly reduces the amount of time required for orthodontic movement. AcceleDent harnesses micropulse technology into an easy-to-use device for patients at home or on the go. FDA-clearance as a Class II medical device means that AcceleDent is a safe way to accelerate orthodontic treatment.

Faster care without sacrificing quality offers distinct advantages. Some of these advantages are:

- (1) Less time spent in orthodontic appliances means fewer hygiene problems.
- (2) Patients are more likely to accept orthodontic treatment plans if the length of anticipated care is drastically reduced.
- (3) Patients rate their overall satisfaction with therapy higher when it can be accomplished more efficiently.

How does micropulse technology work? How do patients use AcceleDent and how much does it speed up care? The story starts in Outer Space.

The Science of Micropulses

The use of vibration forces in medicine can be traced back to the space program. Scientists discovered that an astronaut's bone density decreased upon return to Earth. It was theorized that the cause was extended periods of time in a weightless environment. Bone is continually subjected to a cycle of deposition and resorption addition and subtraction held in balance. Weightlessness tips the scales of that balance in favor of resorption, a process known as disuse atrophy. Unbalanced bone cycles are also a contributing factor for osteoporosis.

Medical literature has shown that the application of low level vibration forces to bone can restore balance to the bone cycle^{1,2}. The decrease in bone density is not only stopped, but also reversed. Although the exact mechanisms of action are not fully understood, medical devices that transmit micropulses have shown to prevent bone breakdown and increase bone density in animal and human studies. Micropulse therapy continues to be re-

searched as a viable treatment option for patients with osteoporosis and bone fractures.

Micropulse Applications for Dentistry

Orthodontic tooth movement is made possible by controlled manipulation of the bone deposition and resorption cycle. Arch wires, springs, aligners, and other appliances apply forces to teeth, which then alter the environment of their alveolar bone. Dental studies based on the medical research of vibration therapy have investigated the effects of micropulse devices on orthodontic movement^{3,4}.

A 2010 study showed that use of a micropulse device for 20 minutes a day accelerated the rate of tooth movement by as much as 106% during the alignment phase compared with a control group⁵. The rate of space closure with micropulse therapy was shown to be on average 38% faster than with traditional orthodontics. The study also reported no increased incidences of complications such as root resorption or loosening of temporary anchorage devices (TADs).

AcceleDent

Supported by this positive research, AcceleDent (Fig. 1) was developed for patient use. The device is comprised of an Activator, which generates the micropulses, and a Mouthpiece, which comes in various arch sizes. The patient turns on the Activator and bites into the Mouthpiece for 20 minutes a day during the course of orthodontic treatment. The device is lightweight and is intended to be held in place, retained solely by gentle bite pressure.

In any orthodontic treatment, compliance tends to diminish over time. The patient's cooperation decreases resulting in poorer oral hygiene and the possibility of associated problems. Minimizing the



Figure 1: AcceleDent Activator and Mouthpiece

time spent in orthodontic appliances provides a substantial benefit to both the patient and orthodontist by reducing the likelihood of complications arising from poor oral hygiene.

Patient compliance with AcceleDent is typically excellent as it is used by the patient in the comfort of his/her own home. While it requires a full 20 minute treatment period each day, AcceleDent is easily incorporated into other daily activities such as watching television, reading, and working on a computer. A small Charging Port and Travel Shell complement the portability of the system (Figs. 2 and 3). Additionally, the Charging Port records use of the system for the caregiver or the prescribing orthodontist



Figure 2: AcceleDent Charging Port



Figure 3: AcceleDent Travel Shell

who may be concerned about non-compliance by younger patients.

AcceleDent and all its component parts (Activator, Mouthpiece, Charging Port, and Travel Shell) are a prescription device intended for home-use only by a single patient and should be properly disposed of once treatment is finished. The patient simply disposes of the AcceleDent as he would any other device with a rechargeable battery — there is no need to return it to the orthodontist.

Conclusions

AcceleDent has been proven by research to accelerate tooth movement. As an FDA cleared Class II medical device, it has been held to the highest of standards for patient safety. Patients enjoy the ease of introducing it into their daily routines thanks to the small, ergonomic, and lightweight design. Drastic reductions in treatment time are highly attractive to patients entering orthodontic care.

References

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