Speeding Up Orthodontic Treatment with OrthoAccel's AcceleDent System

Three orthodontic practices share their experiences with this new technology.

by Pamela Waterman

"How long do I have to be in braces?" This question ranks right up there with "how much is this going to cost?" when new patients are discussing orthodontic treatment. Your answer to the first question might soon be, "about 38 percent shorter time than in the past," thanks to the results shown when treatment is enhanced with OrthoAccel's AcceleDent System. The AcceleDent system has been in use in Europe and Australia since 2009, and received U.S. FDA clearance in November 2011. This article looks at the physics and technology behind the system, and discusses several patient-success stories of three U.S. orthodontic providers.

Static vs. Dynamic Forces

Day-to-day living subjects our bone structures to continuous cycles of deposition and resorption. These cycles go out of balance when bone is damaged due to breakage and might also contribute to osteoporosis. Studies have shown that treatment consisting of non-invasive mechanical intervention, in the form of low-level vibratory forces, not only decreases bone-density loss but also reverses the process. This field is now called micro-pulse therapy and has been investigated and applied to orthodontic treatment.

Traditionally, orthodontic appliances rely on the application of static forces to induce micro-movement of a tooth and the subsequent alveolar bone remodeling. Both osteoblastic (tension) and osteoclastic (compression) activity takes place as the desired movement is accomplished, and the treatment time depends directly on the bone remodeling rate. Many different approaches have been evaluated to increase the speed of movement and thus decrease treatment time, from chemical and biological mediators (whose development takes decades and may have side effects) to surgical intervention and the well-documented use of temporary anchor devices (TADs) for certain cases.

However, in recent years clinical studies involving dynamic forces, such as applied through micro-pulse therapy, have

demonstrated accelerated rates of movement and thus bone formation, leading to shorter treatment times. The cyclic nature of the force (a true oscillation, not just an intermittent application) changes magnitude rapidly and repeatedly, creating stresses on the tissues and cellular structures multiple times over short periods, increasing blood flow. This approach has been shown to have a greater stimulating effect than that of constant forces. Frequencies found relevant to orthodontic applications range from several Hertz (Hz or cycles per second) up to 100Hz or greater.

An Orthodontic Stimulation System

Pursuing a practical design for an oscillatory orthodontic stimulation system came next. A prospective, randomized, blinded, controlled trial was conducted at the University of Texas Health Science Center, San Antonio, Texas, from February 2009 to December 2010, enrolling 45 patients age 12 to 40. The device used during this evaluation (patients used it for 20 minutes daily) has the same functional properties as the currently marketed AcceleDent System. Results from the trial showed that during the alignment phase of treatment, tooth movement in the AcceleDent group, as determined by the rate of change in the mandibular arch perimeter, produced a rate 106 percent faster, recorded as 2.71mm/week for the AcceleDent group, as compared to the control group rate of 1.32mm/week. Also, the rate of tooth movement during the space closure phase was 38 percent faster for the AcceleDent group as compared to the control group.[1]

These results were so successful (with no root resorption issues) that the device has now been fully productized and FDA-cleared as a Class II medical device. Developed and marketed by OrthoAccel as an adjunct to routine orthodontic treatment, the device has been in use in Europe and Australia for almost three years, and was approved for use in the United States in November 2011. Overall treatment time savings (over both phases) is said to range from 38 to 50 percent.

The AcceleDent System consists of four parts: 1) a mouthpiece, not unlike a sports mouthguard, which the patient gently bites onto during use, 2) an activator that houses the micropulse generator (attached external to the removable mouthpiece and about the size of a couple of flash drives), 3) a small desktop docking station that recharges the unit and also tracks usage (via a microprocessor in the activator) and 4) a carrying case that keeps the mouthpiece-plus-activator clean and secure for travel.

AcceleDent plastic mouthpieces come in two sizes and three shapes and can be trimmed with dental scissors for minor fitting. The various configurations accommodate patients dealing with a flat bite, open bite or deep bite. A fully charged unit will last for five to seven uses, so patients can take it on a weekend trip without needing to pack the charger. Mouthpieces are meant to be hand-washed after each use, as with a sports guard or retainer.

Patients use the hands-free AcceleDent system 20 minutes a day and can easily read, text or work on a computer while doing so. Since it can only go in one way, there's no chance of improper seating. AcceleDent uses SoftPulse technology to deliver the micro-pulsations at a frequency of 30Hz, with an output force of approximately 25 grams. The whole unit weighs just 2.3 ounces and patients report only a very slight vibratory sensation.

The AcceleDent System can be used on patients undergoing all forms of orthodontic treatment, from fixed traditional bracket systems to lingual braces to removable aligners (the aligner stays in while the device is in use). It is primarily marketed to adults, though children could also use it, and is handled as a single-user, prescription device.

More than 300 U.S. orthodontists already offer the AcceleDent system. Based on their prior knowledge of the system's effectiveness in Australia, three of the earliest users were Dr. Robert Rudman (Colorado), Dr. Anil Idiculla (Colorado) and Drs. Marc Lemchen and Jennifer Salzer (New York).

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1. *AcceleDent Safely Accelerates Conventional Orthodontic Treatment – Results of a RCT, OrthoAccel, http://acceledent.com/orthodontists/scientific-evidence/*

Accelerating a Mile-High Smile

Fred Churbuck is well known around Denver for his savvviness and style as General Manager of LivingSocial Denver, the consumer-buying phenomenon that connects online and offline commerce. In recent months, his smile has also become the local "face" of the AcceleDent system as he became the first person in Colorado to use it and started blogging about the experience on Facebook for Dr. Robert Rudman of Advanced Orthodontic Care. Fred has traditional braces with ceramic brackets on the upper front six teeth; he's been a bit self-conscious about them in both business and social scenes, and was definitely interested in speeding up the process. With the AcceleDent in he says, "It's basically innocuous to use. I put it in for 20 minutes after dinner when I watch TV, and that's it."

He started in braces on January 16, with treatment expected to take 22 months. After just 12 weeks of use, in a May 29 blog-post, he wrote, "I was blown away by my progress pictures side by side today. I am totally in awe of you guys." Now the plan is to be done by November 1. "We've literally moved them in half the time," says Fred. "I love this thing to the point where I tell everyone."

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Offering More Options in Denver


Rudman

Dr. Robert Rudman of Advanced Orthodontic Care (www.cherrycreeksmiles.com) in Denver, Colorado, is a frequent international lecturer who encountered the AcceleDent System while speaking in Australia in 2009. He followed the progress of the system through the company's international Web site and began offering the option to his patients in March 2012.

Dr. Rudman's first case, a 37-year-old male with a Class III occlusion and a 4mm anterior open bite, offered a unique opportunity to put the technology into use. The patient had already had traditional bracket braces on for two months prior to starting with the AcceleDent, so he could readily report on any perceived differences before and after. (In fact, Dr. Rudman persuaded him to share his experiences on the practice's Facebook page – see "Accelerating a Mile-High Smile.") The original probable treatment time was 18 to 24 months. Progress has been so rapid that completion is now expected at the 16-month mark.

Advanced Orthodontic Care offers the AcceleDent option to all its full-treatment patients (fixed or aligner). The practice has had 15 more patients choose to shorten their treatment time through use of the AcceleDent, with more soon coming on board. As Dr. Rudman says, "It is easy to implement and does not change your treatment mechanics." He adds, "Pay particular attention to the fitting of the mouthpieces. Also, have your patients bring the device to their appointment and have them wear it prior to adjustments. This reduces discomfort and you can check on the fit." In some cases, enough movement of both jaw and teeth has occurred (as in closing an open bite) that a different mouthpiece is required as treatment progresses.

Accelerating Invisalign Cases


Idiculla

Dr. Anil Idiculla is another Denver-area orthodontist (www.live-life-smiling.com) who travels the world. He first heard about the AcceleDent System from Dr. Craig Scott, one of the first orthodontists to use the system in Australia. The two have stayed in touch, so Dr. Idiculla was prepped to work with the system immediately upon its FDA clearance in the U.S.

Now, every one of Dr. Idiculla's Invisalign patients (currently more than 50) uses the AcceleDent System – perhaps the highest number of system users at one U.S. practice. You can tell how much he likes this approach when he says, "What a difference. It's all we offer – we don't offer non-accelerated Invisalign treatment." Also, having transitioned many patients mid-treatment from non-accelerated to accelerated, he says those patients really see the contrast in progress between a regular two-week tray change and a one-week change with AcceleDent.

Dr. Idiculla notes, "I'm looking very closely to see if there are certain movements that are faster than others with AcceleDent, which will help me better plan the future."

Due to the simple issue of practice management, he does not yet offer the system to his fixed-appliance patients. He says, "If we did it with fixed patients, they would have to come in (for appointments) probably twice as fast, so they would come in every four weeks, instead of eight weeks. The beautiful thing with Invisalign is we can bring them back every eight weeks, but they have twice the amount of trays – they get eight trays now instead of four – so it doesn't burden an orthodontic schedule." He will continue to look to his study-club mentors for advice that might change that approach down the road.


Initial photo before orthodontic treatment.
Images courtesy of Dr. Robert Rudman.


Six months into orthodontic treatment including four months' use of OrthoAccel's AcceleDent system.

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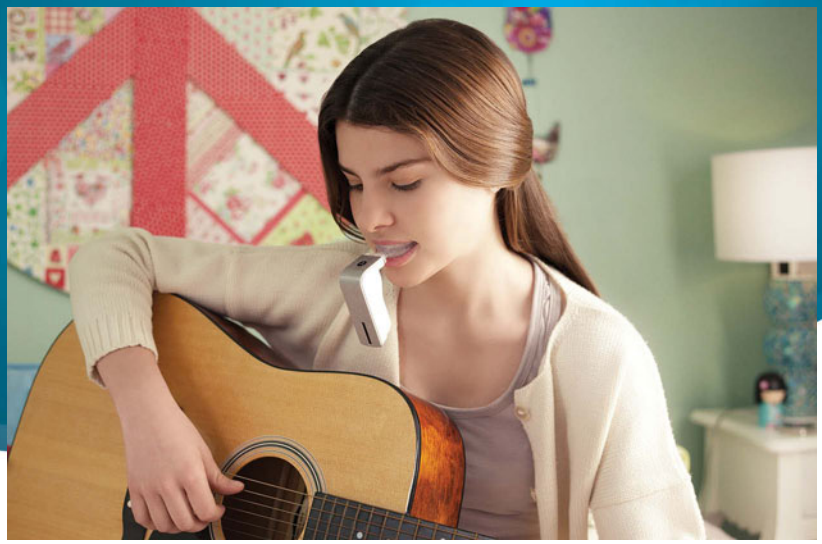

OrthoAccel's AcceleDent system in use, showing how the patient can easily be doing other activities during the 20 minute session.

Personal Approval by NYC Orthodontists

Lemchen

Salzer

In New York City, Dr. Marc Lemchen and Dr. Jennifer Salzer (www.drmarclemchen.com) really took the system to heart: Dr. Salzer became the practice's first AcceleDent patient. Dr. Lemchen had been following the work done by OrthoAccel years before the system's U.S. debut, so the two orthodontists were well informed about its capabilities and process.

As an Invisalign patient, Dr. Salzer knew how the trays worked and felt in her mouth at start-up and said, "Use of the AcceleDent system made the aligners seat better. And, the normal discomfort you have when you change a wire or aligner is mitigated by the use of the device – it makes them more comfortable."

Both doctors say the unit produces a very subtle vibration. "You barely feel it's working," says Dr. Lemchen.

When asked about any downsides, Dr. Lemchen proposed, "We might be concerned about using it in cases where we are looking for anchorage that is dental in nature as opposed to any kind of skeletal anchorage. We assume it would make everything move more easily, and since we can't apply it to specific areas, we have to be aware of that. A TAD would be the best option."

He adds, "It's a question of how you present the cost, but we would probably use it for every case. We have not discovered any contraindications – we have used them with Invisalign cases, with labial braces as well as lingual appliances. It absolutely works."

For more information about OrthoAccel's device, visit www.orthoaccel.com. ■

Author's Bio

Pamela Waterman is the president of Metal Mouth Media, a publishing company dedicated to "taking the bite out of braces" through specialty cookbooks, articles, Web resources and workshops. Based in Mesa, Arizona, Waterman has more than 25 years of experience in engineering and writing; she is a member of the American Academy for Oral Systemic Health, a contributing editor for Desktop Engineering magazine and the author of four books including the award-winning Braces Cookbook series. A veteran of both teen and adult braces, she can be contacted at pwaterman@metalmouthmedia.net.