

Acceleration By Vibration

An early user of OrthoAccel's AcceleDent System, Asif Chatoo, BDS, FDS, RCS(Eng), MSc, MOrth RCS(Eng), has seen firsthand how the device can shorten treatment time

By Alison Werner

For decades, one of the major objections patients had to orthodontic treatment was aesthetics. With clear aligners and custom lingual systems now providing adults and teens a choice of "invisible" orthodontic options, innovators are taking on the next biggest patient issue: treatment time.

For London-based orthodontist Asif Chatoo, BDS, FDS, RCS(Eng), MSc, MOrth RCS(Eng), the AcceleDent System has proven quite helpful. "The main objections to orthodontic treatment in adults are the appearance of braces, the treatment time, the discomfort, and the cost," says Chatoo, who is accredited by the European and World Society of Lingual Orthodontics. "With lingual braces, I am able to eliminate the objection to appearance. And with AcceleDent, I am able to offer an effective and safe solution to help address the treatment time."

AcceleDent, manufactured by OrthoAccel Technologies Inc, a Houston-based medical device company, is an appliance used by patients at home to accelerate orthodontic tooth movement and thereby reduce treatment time with braces or clear aligners.

According to the company, AcceleDent works by applying low-frequency oscillations that work in combination with standard orthodontics to move teeth faster through accelerated bone remodeling. The patient uses the handheld appliance—consisting of a mouthpiece and activator—for 20 minutes daily during treatment. The activator delivers the low-frequency forces via the mouthpiece to the patient's teeth.

According to Chatoo, the low-frequency oscillations induce increased cellular signaling and activity within the alveolar bone to promote movement. While they are using the appliance, patients can go about their other daily activities—doing homework, watching TV, using the computer, reading, or doing housework.

For OrthoAccel, which recently submitted a regulatory application to the FDA to gain clearance for the sale of AcceleDent System in the United States, the appliance does not change the premise of how braces or clear aligners work; it just makes the process faster. Currently, the AcceleDent System is only available for "investigational use" in the United States. It is available commercially in the European Union and Australia, and is pending in other countries.

The Alpha Orthodontists

Chatoo opened his first practice, dedicated to lingual orthodontics, in London in 2005. He introduced AcceleDent to his practice in December 2009 after being asked to join the initial alpha team of orthodontists using the device. From the beginning, the science behind AcceleDent made perfect sense to him, given the demonstrated benefits of vibratory forces on bone density and fracture healing among orthopedic patients.

He worried that his practice was too small to be considered, but his practice's lingual focus seemed to sway the decision-makers. Since then, the process of integrating AcceleDent into his practice has been "simple," he says. OrthoAccel representa-

tives trained Chatoo's staff on how to discuss the benefits of AcceleDent with patients, as well as how to check a patient's compliance data.

Chatoo adds, "The AcceleDent team has been very helpful in answering questions to make sure we had no problems at the start."

Since then, 20 of Chatoo's patients have used AcceleDent, and the results have pleased both parties. Chatoo notes a 20% to 30% reduction in treatment time compared to the original proposed treatment time frame for those patients using AcceleDent. In a recent survey of his patients using AcceleDent, Chatoo found a 95% satisfaction rate. In addition to liking the reduction in treatment time, users reported being pleased with the fact that use of AcceleDent made "little or no disturbance in [their] daily schedule," Chatoo says.

So far, Chatoo has seen the most dramatic results with a patient using lingual braces and requiring surgery to correct a skeletal discrepancy.

"I predicted a treatment time of 24 months. This was an average treatment-time prediction based on my experience in treating similar cases with lingual braces and orthognathic surgery," he explains. "Treatment [with this patient] was successfully completed in 17.5 months, representing just over a 25% reduction in treatment time."



Chatoo

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Testing, Testing

Chatoo's clinical experiences corroborate the results of the recent prospective, randomized, controlled clinical trial done at the University of Texas Health Science Center in San Antonio. The research team sought to evaluate the effect of AcceleDent on the rate of tooth movement.

The trial enrolled 45 patients with crowding in the maxillary arch requiring extraction of first bicuspid who were randomly assigned to use an active AcceleDent prototype—the technical characteristics of which were the same as the currently available commercial appliance—or a sham control appliance daily for 20 minutes. The research team set the study's end point at the point when less than 1 mm of extraction space remained to be closed.

According to the authors of the study, led by Dubravko Pavlin, DMD, MSD, PhD, "After the initial alignment, maxillary cuspids were retracted by sliding mechanics along a 0.018-inch stainless steel archwire. A uniform and reproducible force of

180 g was applied to the cuspid by a nickel-titanium coil spring attached distally to an osseous mini-transplant (Tomas Pin, Dentaaurum). At each 4-week visit, distal movement of the canine was measured with a digital caliper between the mini-implant (TAD) and the distal aspect of the cuspid bracket, parallel to the occlusal plane."

At the end of the study, with data available for 39 patients (21 in the AcceleDent group and 18 in the control group), the researchers found that during the alignment stage, tooth movement in the AcceleDent group was more than twice as fast as in the sham group: 2.71 mm per week versus 1.32 mm per week, respectively. Additionally, the rate of tooth movement during space closure was 38% faster in the AcceleDent group compared to the sham control group ($P=0.02$): 0.29 mm per week and 0.21 mm per week, respectively. The increased rate of tooth movement, according to the researchers, was greater in adults than in teens.

In terms of safety, patients

reported no adverse events from use of AcceleDent. Moreover, they exhibited neither increased root resorption nor an increased risk of TAD loosening compared to the control group, according to the researchers. As Chatoo noted with his patients, patients participating in the study were similarly satisfied with both the results of their AcceleDent use as well as the ease of use and lack of schedule disruption.

The results of the University of Texas trial only echo the positive experience and results Chatoo has seen since introducing AcceleDent to his patients. Chatoo believes AcceleDent can benefit all of his patients, but it can be particularly beneficial to those patients who may have a longer proposed treatment time—greater than 12 to 16 months. The possibility of shortening that time is good news for his patients, and holds promise for future patients around the world. **OP**

Alison Werner is the associate editor of Orthodontic Products. She can be reached at awerner@allied360.com.



The AcceleDent System includes a charging port, a travel shell, an activator, and a mouthpiece.