

Consider the 'extras' of cone beam

By Edward Y. Lin, DDS, MS;
Richard L. Bridgham, DDS;
& William (Bill) Harrell, Jr., DMD

Cone beam technology has changed the face of dental treatment, literally adding depth to the art of diagnosis. Benefits to both the doctor and the patient include detailed 3-D images of patients' entire jaw and skull structures, shorter scan and appointment times and less radiation exposure than traditional CT scans. For orthodontists, the 3-D scans improve diagnostic accuracy, treatment precision and patient satisfaction — right in the office.

While most of cone beam's diagnostic and treatment-planning capabilities are apparent, three orthodontists share their insights into some additional benefits.

Adding to the toolbox

— Edward Y. Lin, DDS, MS

Using cone beam imaging, orthodontists can add more high-tech tools that streamline efficiency and increase productivity. For example, SureSmile® technology, an original method of orthodontic movement, has become an integral part of our practice. Because the i-CAT® is the only cone beam unit that is certified by SureSmile, we were able to integrate its technology with our existing cone beam 3-D system.

To be able to combine these two technologies means that we can utilize the second active therapeutic application developed in dentistry thus far (the first being surgical guides).

Orthodontists use SureSmile software to determine the teeth's final position and treatment plan, combining tools such as 3-D imaging and CAD/CAM. This process can cut treatment time from 24 months to about 14 months.

One method of using SureSmile involves a handheld digital intraoral camera, which takes hundreds of images of a patient's teeth and renders them into a 3-D model on a computer screen. We use our i-CAT scans instead of the camera (Fig. 1) to compile the image in the SureSmile software (Fig. 2). Digital lab technicians then use this software to virtually move teeth according to the doctor's prescription (Fig. 3). This information is then used to direct a small robotic arm to bend shape-memory alloy archwires (Fig. 4). When placed (Fig. 5), these unique wires produce precise and controlled tooth movement to achieve faster, more effective results.

Currently, the i-CAT creates the required 3-D CAD model, shortening scan time from 30 minutes (with the camera) to around 20 seconds. Because the scan offers full anatomical details, we can see the roots in addition to the crowns

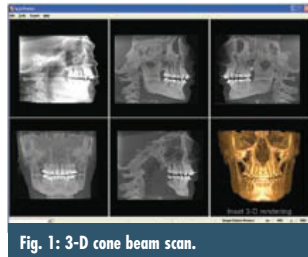


Fig. 1: 3-D cone beam scan.



Fig. 2: 3-D X-ray in SureSmile.

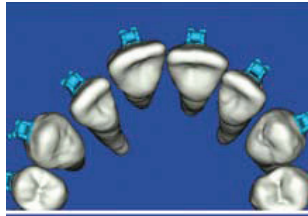


Fig. 3: SureSmile movement.



Fig. 4: Robot making wires.



Fig. 5: Wires in place. (Image acquisition of figs. 1–5 facilitated by Angela Berna.)



Fig. 6: i-CAT in office.®

of the teeth and gain more accurate SureSmile setups. Plus, the radiographic scan also can be used for diagnostic applications.

The advantage is more than just clinical. Time savings is a big part of our return on investment. We've calculated the value of each clinical minute at our practice at approximately \$5. With i-CAT scans instead of camera images, we typically shorten an appointment time by at least 30 minutes, saving about \$150 in the process. Multiplied by 1,000 possible new appointments for braces yearly, that means up to \$150,000 in savings.

Shorter appointments have resulted in higher productivity. Using Cone Beam 3-D scans, we see the same number of patients, about 75 to 125 per day, depending on my clinical schedule, in a three-day clinical week rather than in four days, which reduces our staff requirements. It's definitely a tool that benefits our patients and our practice.

Clinical and captivating

— Richard L. Bridgham, DDS

Our investment in a cone beam machine keeps us ahead of the curve in treatment applications and

6). Lowering the patients' stress also means reduced stress for practitioners and their teams.

Size constitutes another consideration for 3-D cone beam systems and other large-scale units. Because each square foot of our offices is valuable real estate, choosing a system with a small footprint makes for better use of this space. My i-CAT fits into a 4-foot by 4-foot area. It's a true 3-D system with a traditional 2-D pan option that additionally allows dentists to trade out their 2-D pan units while still preserving this lower-radiation option along with 3-D scans.

For practitioners who are considering adding 3-D technology, I recommend the following: The new unit should be a good fit in many ways — with the clinical needs of your particular practice, with your financial considerations and with the size and physical blueprint of your office. For those with tight budgets, check with your local dealer on pan trade-in options as this may let you make this practice-changing investment sooner, so you can begin to gain the benefits of this technology.

Building patient trust and case cooperation

— William (Bill) Harrell, Jr., DMD

The benefits of obtaining 3-D images from the i-CAT are clear — the virtual, rotating model replicates the human jaw and face for greater accuracy, precision and efficiency. These scans expose pathologies that were previously undetectable with traditional methods; we all appreciate discovering the unexpected well in advance of a procedure. Thanks to the insights we gain from cone beam imaging, we also achieve better patient understanding of our diagnosis and build trust in our treatment plans.

The more precise we are during diagnosis and treatment planning, the more direct and efficient the process can become — which has the potential to eliminate costly or dangerous errors and reduce adjustments. 3-D imaging has revealed anatomically true conditions that are indiscernible with traditional 2-D X-rays.

For example, in one case, a traditional panoramic projection showed mal-alignment and malformation of the patient's maxillary left first bicuspid (Figs. 7, 8); the most obvious treatment seemed to entail uprighting the crown mesially.

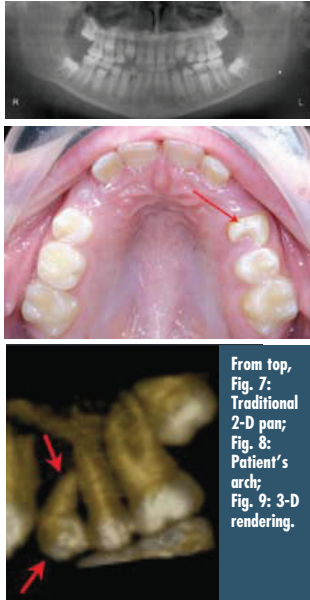
However, an i-CAT scan revealed that the tooth's root was dilacerated and actually positioned 90 degrees to the crown. After viewing the i-CATVision software's cross-sections and 3-D rendered views (Fig. 9), it became apparent that uprighting this tooth's crown to the mesial would move the root into the

builds our reputation as technology leaders. While the clinical implications of having 3-D technology in our office were obvious, before we chose a system we reflected on how it would blend into our total design and aesthetic considerations, how it would be perceived by our patients and how it fit in to our space requirements.

While the trend in dental design leans toward opulent reception rooms, many of us still prefer to evoke a calming ambiance in our treatment areas. In design and equipment choice, we wanted to consider the patient's view with a broader perspective than just color and style.

While the main determinant for this investment was improving my practice's diagnostic and treatment capabilities, appearance did enter into my rationale for choosing my particular machine, the i-CAT by Imaging Sciences International. Its design is not imposing, and it performs scan functions quickly.

By contemplating both the functionality and the looks of this unit, we can retain our high-tech advantage yet offer equipment with a pleasant non-threatening appearance and streamlined non-intimidating function for our patients (Fig.



From top, Fig. 7: Traditional 2-D pan; Fig. 8: Patient's arch; Fig. 9: 3-D rendering.

ods. While the dentist's decision is important, patient cooperation is a huge factor. You can devise the greatest treatment plan, but unless the patient understands and is ready to cooperate with what you are trying to accomplish, you may not have the success you're trying to attain. If the patients can better visualize their problems and truly understand the reasons for the treatment because of the 3-D scan, they will be ready and willing and, best of all, cooperative.

The more complete diagnostic information and knowledge you gain from your imaging, the better you can relay that information to the patient. A patient's trust and confidence in your decisions can make or break case acceptance. 3-D radiography gives the orthodontist another avenue on which to build a more successful practice.

adjacent second bicuspid root.

The 3-D view changed my treatment plan and allowed me to create a more sound treatment option to upright the crown more distally to place the root correctly into the alveolar bone. In the future, if the tooth is eventually lost, the alveolar bone will be preserved for a possible dental implant.

In yet another case, an i-CAT scan showed some suspicious calcifications around a patient's neck. While this doesn't affect our treatment, we were able to refer the patient to a radiologist and cardiologist for evaluation.

These areas turned out to be carotid artery calcifications and required treatment, even though the patient was not experiencing any symptoms.

Other areas such as airway problems or TMJ degenerative changes may affect our overall treatment plan. Some of these issues are not discernable on traditional panoramic or cephalometric imaging. In such cases, it is more advantageous for us to recognize such issues as clearly as possible and be a part of the solution.

This technology builds patient trust, improving the doctor-patient relationship. With 3-D scans, patients and parents can reach a new level of understanding their treatment because I can point out the details of the situation.

When I show them the rendered volume, and I am able to rotate and cross-section the model, it helps them to understand the impact of their condition — that we can predict problems in repositioning the teeth, impactions, thin alveolar bone and other conditions. Besides the clear case presented by the 3-D image, they are aware that we are ahead of the curve in taking care of their oral health.

Cone beam technology increases patient trust because we are able to predict treatment outcomes better than with other imaging meth-

OT About the authors



Dr. Edward Lin graduated with a bachelor of arts degree from the University of Chicago and continued his dental education and orthodontic residency at Northwestern University Dental School. He maintains a full-time private group practice in Green Bay, Wis. He has lectured extensively nationally and has taught at both Marquette University and the University of Minnesota Orthodontic Residency Programs.

he completed an orthodontic residency and became certified in orthodontics at the Albert Einstein Medical Center in Philadelphia. He is board certified as a diplomate of the American Board of Orthodontics and is a member of the World Federation of Orthodontists.



Dr. William (Bill) Harrell, Jr. graduated from the University of Alabama dental school in Birmingham in 1975 and completed his orthodontic residency at the University of Pennsylvania in 1977. He was board certified by the ABO in 1989. His private orthodontic practice is in Alexander City, Ala., and he conducts research in 3-D imaging and TMJ disorders as well as speaks internationally on 3-D imaging.



Dr. Richard Bridgham received his bachelor's from the State University of New York at Stony Brook and his DDS from Loyola University at Chicago. After a general practice residency,

AD

HOW

[Discover your potential]

WHO

ORTHO II

Efficiency comes standard — and with Ortho II, that's just the beginning. Our cutting edge software includes the comprehensive features you need to help grow your practice and quickly maximize profitability. With over 25 years of experience, focus, and stability, you can't go wrong. To learn more, visit www.orthoii.com or give us a call. We'll show you the Ortho II difference.

Practice Management Evolved

ORTHO II
1107 Buckeye Avenue • Ames, IA 50010
800 678-4644 • www.orthoii.com • © 2008

- LIMITLESS MANAGEMENT • SCHEDULING • IMAGING • TREATMENT CHART • PATIENT FLOW CONTROL •
- APPOINTMENT REMINDERS • PAPERLESS DOCUMENT MANAGEMENT • IN-OFFICE MESSAGING • WEB ACCESS • CEPH TRACING AND
- ANALYSIS • CREDIT CARD PROCESSING • CORRESPONDENCE • COMPREHENSIVE FINANCIALS • ELECTRONIC INSURANCE •
- AUTOMATIC BANK DRAFT (ACH) ACCEPTANCE • TIME CLOCK • EMPLOYEE TO-DO LISTS • FINGERPRINT RECOGNITION • ELECTRONIC
- SIGNATURES • OFFSITE HOSTED BACKUPS • CUSTOM REPORTS • AUTOMATED UPDATES • MULTIPLE INTEGRATIONS