

THE READERS' CORNER

JOHN J. SHERIDAN, DDS, MSD

(Editor's Note: The Readers' Corner is a quarterly feature of JCO in which orthodontists share their experiences and opinions about treatment and practice management. Pairs of questions are mailed periodically to JCO subscribers selected at random, and the responses are summarized in this column.)

Do you have a cone-beam computed tomography (CBCT) unit available to you? If you do not have access to a CBCT unit, would you make use of one if you did? What factors would influence your decision to use one in the future?

About a third of the respondents did not have CBCT units available. The remainder, in descending order of frequency, had access to units at a local commercial facility, at a colleague's office, in their own office, at a local university, or in their building.

Forty-two percent of the respondents without current access to a CBCT indicated they would make use of one if available; the same percentage were undecided, but 15% said they would not use a CBCT. Influential factors were mainly cost and radiation exposure, which were mentioned about equally by the majority of respondents.

Some comments were:

- "I have a CBCT unit, but do not use it very much because the information will not change the manner and method of treatment. After doing three years of scans on all patients, my future scans will be limited to the two or three percent

that will actually benefit."

- "It seems like the diagnostic gains are only helpful in a small number of cases. Otherwise, it is too much information to process."
- "I would not use one routinely, due to high exposures and recent bad press. The CBCT images are critical for certain aspects of certain cases (supernumeraries, impacted teeth, and implant placement); it is difficult to blanket-prescribe this imaging for the general treatment population."
- "I'd use it for SureSmile scans and impacted teeth, primarily."
- "I would use the unit for severe impactions and other pathology."
- "I would use one, but only for complex skeletal malocclusions."
- "The radiation risk does not seem to outweigh the benefits."
- "Way too much radiation for a child, with a very significant chance that there is no change in the outcome of treatment."
- "To change my mind and obtain one, the radiation risk has to be decreased and the cost of the unit has to come down."
- "Liability issues with interpretation of image, magnitude of radiation exposure, cost, quality of image."
- "An important factor is proper education on its use, so that liability does not become an issue. Also being convinced that the technology would make a difference in the results of my treatment."
- "Many factors: cost, space in office, development of good three-dimensional analysis, interface with practice-management software, ability for work stations to handle 3D images, infrastructure of office computer network to manage and store 3D data."



Dr. Sheridan is an Associate Editor of the *Journal of Clinical Orthodontics* and a Professor of Orthodontics, Jacksonville University, 2800 University Blvd. N., Jacksonville, FL 32211.

If you have a CBCT in your own office, did you retire your conventional pan/ceph units? How much additional training was required for doctor and staff? Have you found your CBCT unit to be cost-effective?

About 60% of the respondents had retired their old pan/ceph units after installing CBCT. Of the clinicians with CBCT units, 60% reported that a moderate amount of training was required, 30% a minimal amount, and 10% an extensive amount. Forty-four percent of the respondents thought their units were cost-effective; 6% believed they were not, and 50% were undecided.

A few specific remarks:

- “Additional training was moderate to date, but will only get more extensive as we learn to interpret on our own for most cases. I am a user of SureSmile technology, so my cost-effectiveness may be different from non-SureSmile users. I have partnered with local ENTs who can also use my CBCT, which allows me to spread out the costs involved.”
- “The increased effectiveness of my treatment planning, improved ability to explain treatment, and access to information I didn’t have previously have not translated into income. However, the improved results from using CBCT in concert with lasers, TADs, and particularly SureSmile (so I see roots in 3D) have made a dramatic difference in the bottom line, and it has more than paid for itself.”
- “I have found that providing new patients and their families with all the information needed to diagnose and present a plan of treatment is appreciated and aids in their making a decision. Today’s family is very busy, and they certainly do not appreciate having to reschedule a visit to review your recommendations. CBCT is efficient for our practice.”

How often do you use CBCT for diagnosis?

Eighteen percent of the respondents never used CBCT scans, while 20% used them for virtually all of their patients. The remainder reported using CBCT for diagnosis only in certain types of cases, either routinely or frequently (6%), occasionally (27%), or rarely (28%). The

most common use was to evaluate the status of impactions.

Comments included:

- “It replaces our pano, lateral ceph, and AP ceph with just about a wash in terms of exposure, so we take one scan (along with photos) for initial examinations when I have determined they are ready to begin treatment. If it is likely they may be going into pre-orthodontic guidance, we’ll take a digital pano instead. The CBCT also gives me access to corrected tomos and airway films, which further aids in diagnosis.”
- “I stopped taking screening panos on children with apparently normal development about 10 years ago. I use the lowest-resolution setting, 5-second/300-micron scan, for records on all patients (unless pregnant, of course), and read the images myself. If I see something unusual, I send it to an oral and maxillofacial radiologist for a second read, the same as I would do with any other image that had a finding I was unsure of.”
- “The majority of cases in which I prescribe a cone-beam x-ray involve pathology that requires more definition. I am not using the equipment for routine diagnostic records. I leave it up to my oral surgeon to decide if it is necessary for canine exposure, third-molar extraction, TADs, and implant-site manipulation.”
- “I use them for transposed teeth, treatment planning, and future implant preparation—i.e., root position and sufficient implant space. Also for certain impactions, especially the permanent maxillary cuspids, to determine the resorption of permanent roots and suspected pathology or TMJ issues.”

What images do you typically generate with CBCT? Do you use any kind of 3D analysis with your CBCT data?

The most commonly used image was the panoramic radiograph, closely followed by the lateral cephalogram and sagittal, coronal, or axial slices. TMJ, sinuses/airway, and frontal cephalometric images were also generated by a majority of respondents. The most infrequent application was for bite-wing images.

About three-quarters of the respondents did

not use 3D analysis. Among those who did, Dolphin and Anatomage software were mentioned by far the most often.

How much time do you spend analyzing CBCT data for an average patient, compared to your time spent analyzing traditional radiographic records?

About one-third of the clinicians reported spending five minutes or less analyzing CBCT data, but nearly half took 15 minutes or longer. On the other hand, 70% said they spent five minutes or less analyzing traditional radiographic records.

How has the use of CBCT for diagnosis altered your treatment decisions in routine cases?

A sizable majority of respondents reported no change or minimal change in their treatment decisions based on CBCT information. Many commented, however, that even if there was no change in treatment, they had more specific data with which to confirm their treatment-planning decisions.

Some interesting comments were:

- “Not a lot of change, except direction of pull and TAD placement. Also, we use SureSmile, and the root angulation with SureSmile in conjunction with CBCT is unbeatable.”
- “I feel I have complete understanding of not only the traditional diagnostic information, but also the coordination with TMJ, airway, and tongue posture all in one scan, without potential differences from different jaw positions and problems created by head-positioning errors.”
- “I can now see joint position in low- and high-angle cases, and that can influence my treatment decisions. I can now see roots and plan my root movements and torques for more efficient and effective tooth movement, in addition to avoiding the buccal plate where the bone is thin. I can see impacted tooth positions in three dimensions, which can alter my vectors of force. I see some pathology at least once a month that is hard or impossible to pick up on the pano.”
- “It allows me to specifically design mechanical vectors from the beginning of treatment instead

of just ‘guessing’ the required vectors.”

- “I am starting to develop a better awareness of volume studies, airways, etc. There will be much to learn in the future as orthodontic programs help develop research programs. As they say, the future is wide open.”
- “I am much more aware of airway issues, I am much more tuned in to impacted teeth and precise positioning of them (so I can plan mechanics better). I can see small condyles and diagnose, for example, unilateral Class IIs easier. I don’t get fooled by supernumerary teeth or severe dilacerations (buccolingual) that aren’t apparent clinically. I can see lingual tips to molars that may require uprighting, where it wasn’t always as apparent clinically. Bottom line: I am more aware that some ‘routine cases’ are not routine and can provide a more complete diagnosis.”
- “I have found impacted and supernumerary teeth that did not show up on either the initial pano or ceph. It also has helped in avoiding the distortion in the root positions of premolars when evaluating root parallelism.”
- “I have an instant visualization of the occlusal plane when selecting bracket torques, and also any unforeseen pneumatization of sinuses around maxillary molar roots.”
- “I don’t use CBCT in routine cases. Rather, it is used to help in diagnosis and treatment planning of some difficult issues. My feeling is that CBCT does not take the place of traditional orthodontic radiographic records, but it certainly can help to uncover and answer questions previously left unanswered. CBCT has altered treatment decisions in a number of situations, primarily with unerupted or impacted teeth, and with providing sufficient interradicular width for the placement of future implants. Furthermore, CBCT allows me the luxury of precisely measuring mesiodistal width of unerupted permanent teeth.”

Do you ever consult with a radiologist or other dental/medical specialist regarding CBCT patient data?

Sixty-six percent of the respondents “never” or “rarely” consulted with other specialists, while 33% frequently did so.

Specific remarks included:

- “Initially, pretty much every case. As I got appropriate training, when I noticed something I wasn’t 100% sure of.”
- “I have used a radiologist when, especially for medicolegal reasons, I would want another opinion to be more certain I haven’t missed anything that the CBCT revealed. This is because of my inexperience with this modality. I would want not to overlook any other issue, even if it doesn’t pertain to the orthodontic issue that I initially used the CBCT for.”
- “When I find an anomaly that seems unusual, it is referred for specialist evaluation. I always offer every patient the option for a complete review by an oral radiologist.”

Are you concerned about radiation dosage with CBCT compared to traditional radiography, and if so, how do you limit patient exposure?

Sixty-eight percent of the respondents said they were concerned about the elevated radiation levels of CBCT scans. Many of the clinicians reported limiting exposure by using a small field of view and/or short scan times.

Comments were:

- “Yes, I am very concerned. There is a growing body of evidence that there are too many x-rays taken on patients in general, leading to higher cancer rates. See the recent *New York Times* article.”
- “We only take CBCTs when we judge it to be absolutely necessary, and then only expose the area of interest.”
- “Everyone should be using digital radiography at this time, due to the marked decrease in exposure. It really is all relative to the technology currently being used in the practitioner’s office. If you are using traditional technology, the CBCT would be an improvement in limiting patient exposure. If you are using digital technology, the CBCT moves you backwards with regard to patient exposure.”
- “Given the settings I use, I feel confident that I am in the same range of radiation dosage as the traditional pan/ceph I used previously.”
- “This has been hyped beyond reality. Our exam exposure to construct a pan/ceph/TMJ/airway,

etc., with CBCT is lower than my digital pan/ceph on a traditional, excellent Planmeca machine. We use a limited field of view whenever possible and always provide lead aprons. Cervical drapes are provided, depending on the need to assess the airway; cervical assessment is voided by the cervical drape, and I am convinced that we orthodontists underutilize this tool for assessing our patients’ overall health. We have so much information that the question should be: how much of the patient’s health are we now responsible for?”

Have patients or parents expressed any concern about CBCT radiation dosage? If so, how do you alleviate these concerns?

A little more than three-quarters of the clinicians reported that they had not heard complaints from patients and parents about radiation exposure.

A few representative remarks:

- “I assure my patients that we are using the latest technology, limiting the scan times where possible, and point out that relative to the exposure in the environment on a daily basis and especially exposure while flying, the exposure levels are reasonable and safe.”
- “I assure them that we only use it in cases where we need more information than regular x-rays can provide.”
- “I educate patients about the digital-imaging pan/ceph unit that we use and show them how it is one of the lowest exposures on the market.”

Do you have any other comments about the use of CBCT in orthodontics?

From the number of replies to this question, it was obvious that orthodontists are highly interested in the advantages and disadvantages of CBCT scans. Many expressed strong opinions about the risks vs. benefits of the technology. Their comments included:

- “I believe it is a valuable tool. There is a distinct advantage for me in being able to view in 3D, both from a diagnostic perspective and from a patient understanding perspective. Patients are able to quickly grasp orthodontic concepts from the volumetric rendering that they otherwise

were having some difficulty comprehending. I have found numerous 'other findings' that otherwise would have gone undiagnosed."

- "In the near future, orthodontists will wonder how we managed without CBCT."
- "It's here to stay, and I would hate to have to go back to two-dimensional radiographs."
- "Unless we can document risks of exposure, there is no turning back to 2D in orthodontics. When we first got our CBCT, we would often opt for a traditional 2D digital pano. Once we saw the 2D, we often realized we needed the benefit of the 3D and ended up exposing the patient twice. I think we continually find more uses for 3D imaging. It is likely, however, that we will develop hybrid devices, limiting radiation exposure while increasing surface resolution with sonic and laser imaging."
- "My opinion is that with certain orthodontic issues, CBCT should be the 'standard of care' in helping to uncover facts that are not possible with traditional radiography. This will lead to improved diagnosis and treatment planning and, therefore, better results. I also feel that CBCT scans can be overused, exposing the patient to unnecessary radiation."
- "I think it is going to be more routine. More information can't be bad; it just needs to come down in price and have standards established."
- "I am afraid that if CBCT is overused for routine cases, it will make it harder to convince people to have it done when it is actually needed."
- "I am a very early adopter of technology, and like to think my practice is progressive and on the cutting edge. Three years ago, when I remodeled both of my offices, the plan was to place a CBCT in both offices, and the remodel was done to accommodate this. As I spent more time really looking at the need for the system, I really found that it was 'cool' and I could brag about it, but

there was no information that the scans would provide that I could do anything about, meaning the treatment efficiency and effectiveness of the orthodontics would remain the same regardless of the scan. The tremendous increase in exposure to our patients and the added liability exposure to us as practitioners made me decide to wait this one out."

- "I think it is an expensive marketing tool that will, in actuality, have no effect on the treatment plan or treatment outcome. It comes with a heavy price of excess radiation exposure to the patient."
- "I have been one of the first to use the most cutting-edge technology presented to orthodontists since 1990. I have been paperless since 1998, used digital technology since 1999, and 3D modeling since its inception. My vision was to be able to replace all other diagnostic tools with the CBCT once software became available to enhance these applications, in addition to other peripheral companies jumping onboard with this technology. Now that this has happened, I am still not sure, outside of the 'wow factor' that my colleagues note, how CBCT technology in the orthodontist's hands will benefit the patient outside of surgical orthodontics. The use of 3D imaging to replace individual x-rays and impressions is very appealing, but will this actually help to improve the final result for my patients? Cost aside, at the end of the day, does this technology really make me a better orthodontist?"
- "I think it is a technology that will one day have realistic uses, for fabrication of appliances in particular. However, that day has not come. Once the realistic uses of CBCT are attained with technology, there will be inherent alternative advantages, but the current practicing orthodontist cannot afford the machine for daily use and make it economical for a business model."

(continued on next page)

JCO would like to thank the following contributors to this month's column. Some responses were provided by members of the Schulman Study Group.

Dr. Tim Alford, Anderson, IN
Dr. William Bird, Madison, WI
Dr. Frederick Booth, Fayetteville, NC
Dr. Paul Brown, Birmingham, MI
Dr. Scott Brustein, Staten Island, NY
Dr. Jeffrey Burzin, Clinton, CT
Dr. Ronald Champion, Modesto, CA
Dr. Louis Chmura, Marshall, MI
Dr. William J. Cline, Cartersville, GA
Dr. Joseph Comizio, Eastchester, NY
Dr. Brent Corbridge, Reno, NV
Dr. Bill Dabney, Midlothian, VA
Dr. Mark Dake, West Plains, MO
Dr. Nelson R. Diers, Cincinnati, OH
Dr. Jeff Donnelly, Hanover, MA
Dr. Carla Evans, Chicago, IL
Dr. Mark Farina, Tampa, FL
Dr. Richard Fogel, Elyria, OH
Dr. Jeff Genecov, Dallas, TX
Dr. Raymond George, Jr., South Attleboro, MA
Dr. Jimmy Glenos, St. Augustine, FL
Dr. Jerome Goldberg, Monroe, NY
Dr. Jasmine Gorton, San Rafael, CA
Dr. Robert Haeger, Kent, WA
Dr. William Hatcher, Chesapeake, VA
Dr. C. Robert Henry, Jr., Midland, TX
Dr. Kurt Hoffman, Leawood, KS
Dr. Thomas Iverson, Yuba City, CA
Dr. Jene Jordan, Archdale, NC
Dr. John Kanyusik, Mankato, MN
Dr. Barry M. Katzen, Medford, OR

Dr. Steven Kazley, Rochester, NY
Dr. W.A. Kimbrough, Kingwood, TX
Dr. Samuel B. King, Dayton, OH
Dr. Leon Klempner, Port Jefferson, NY
Dr. Sam Koonce, Whiteville, NC
Dr. Marc Lemchen, New York, NY
Dr. Brent Lenz, Harrisonburg, VA
Dr. Mark Lively, Stuart, FL
Dr. Jim Lovell, West Hartford, CT
Dr. Philip Mansour, Goffstown, NH
Dr. Frank Marshall, Columbus, OH
Dr. William J. McLendon, Powder Springs, GA
Dr. William Mehan, Manchester, NH
Dr. Randall Moles, Racine, WI
Dr. Donald Montano, Bakersfield, CA
Dr. Greg Nalchajian, Fresno, CA
Dr. Eric Nease, Spartanburg, SC
Dr. Donald J. Neely, Hanover, NH
Dr. J. Greg Osborne, Birmingham, AL
Dr. David E. Paquette, Mooresville, NC
Dr. Ted Pope, Dayton, OH
Dr. Gary Thomas Puccio, Castleton, NY
Dr. Mehdy Rad, Potomac, MD
Dr. Marvin Rosenberg, Studio City, CA
Dr. John P. Roth, Shawnee, KS
Dr. Gail Schupak, New York, NY
Dr. Bobby Shemirani, Fremont, CA
Dr. Kenneth Shimizu, Sunnyvale, CA
Dr. Michael Stebbins, Kalispell, MT
Dr. Timothy J. Tremont, White Oak, PA
Dr. Tim Trulove, Montgomery, AL
Dr. Paul R. White, Glen Allen, VA
Dr. James R. Wise, Calimesa, CA
Dr. Ernest Wooden, Durham, NC
Dr. Chip Youngblade, Dunn, NC