The Cone Beam Conversation

A Townie endodontist shares 5 reasons she's sold on CBCT

by Dr. Sonia Chopra

Dr. Sonia Chopra is a practicing endodontist with 10 years of experience who currently practices at Ballantyne Endodontics in Charlotte, North Carolina. She is creator of E-School, an online endodontics course for general dentists. Subscribe to her blog at soniachopradds.com for endodontic tips, tricks and case studies.

I will never forget the day I was introduced to cone beam technology. It was 2009, I was at an endodontic conference, and I was completely blown away.

Having been a practicing endodontist for a year, I had already witnessed the struggles and the limitations of my profession. There was often much that was unknown about my cases—issues I couldn't detect on a daily basis. With questionable diagnoses and variable tooth anatomy, there was so much potential for uncertainty throughout my procedures.

The data presented by the cone beam made my jaw drop. The machine allowed me to see details I never thought possible. After investing in a cone beam unit for my own practice in 2012, I now wonder how I ever performed a root canal without it.

Despite the technology's transformative power, finding my groove with it took some time; it's definitely not a plug-and-play machine. While dental professionals should still be guided by their foundational education, adding in cone beam technology—and investing the time it takes to learn to use it—is well worth their time.

Here are the top five reasons I love my cone beam.

1 It aids in early diagnosis and early detection of disease.

How many times have patients arrived at your office with pain, yet your radiograph tells you nothing—and they can't determine which tooth is hurting them? Periapical radiographs can be limiting because they don't always tell the whole story; we need a certain amount of cortical bone to break down before a periapical radiolucency will ever show up on an X-ray. Add some referred pain to the mix, and you really have a diagnostic dilemma.

This is something I see all day, every day. It's not just frustrating to the patient; it's frustrating for me as well. The horrible feeling of not being able to help my patients right away plagued me for years, until I invested in my cone beam.

Using the cone beam means I don't have to wait for bony breakdown of the cortical plate to occur; now I can see right through that buccal bone and view the bone immediately adjacent to the root. The guessing game is officially over. Instead of making my patient wait for the symptoms to get worse before I treat, I can treat right away.

An example: Fig. 1 is a PA of a 56-year-old woman who had pain when she saw her general dentist. Her dentist recommended antibiotics, ibuprofen and hydrocodone because of her level of pain. By the time she got to me, she had absolutely no pain


Fig. 1

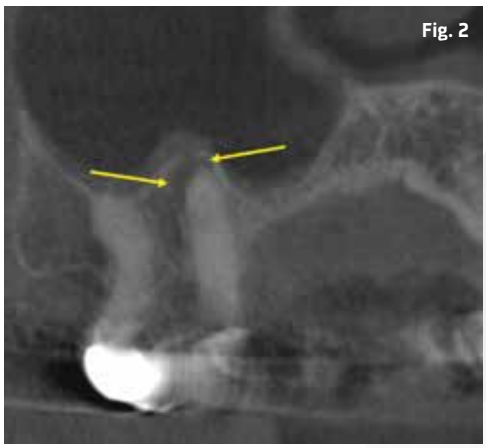
Fig. 2

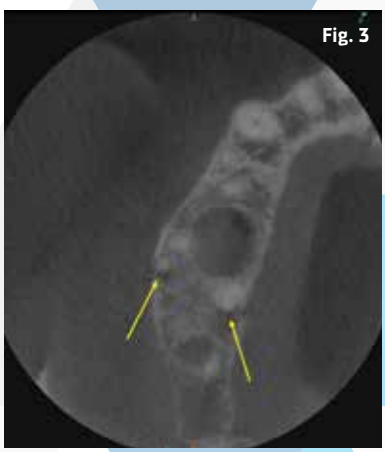
Fig. 3

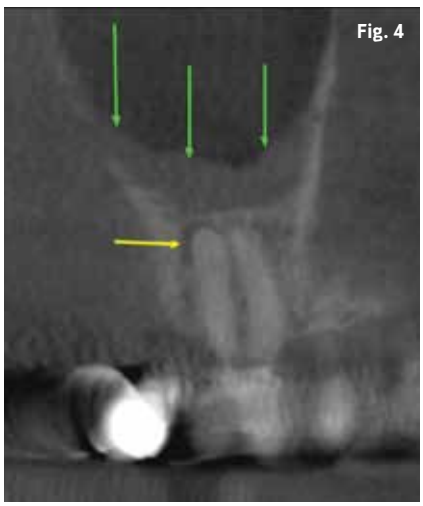
Fig. 4


Fig. 5

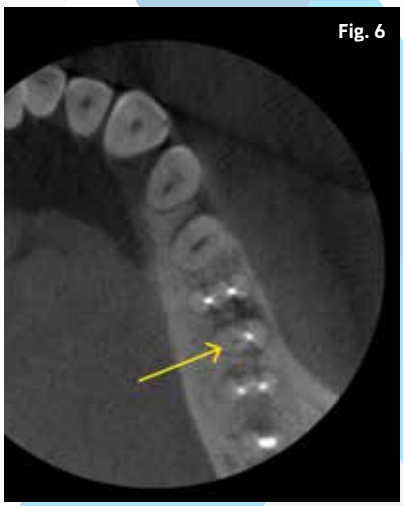
Fig. 6


Fig. 7


Fig. 8


Fig. 9

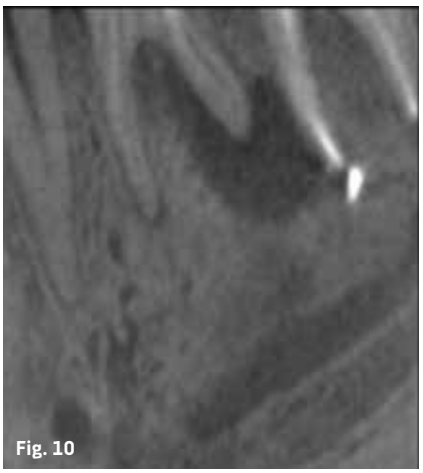
Fig. 10


Fig. 11


Fig. 12

but only tooth #2 (out of #2–5) had a response to cold. I could not assume that all of her teeth were necrotic.

I took a cone beam to see if I could find any evidence of pathology and scrolled through the entire volume of the cone beam in every plane. Slice by slice, I looked for any irregularities in the teeth and any resorption of bone. The entire scan looked fine until I got to the distobuccal and palatal roots of tooth #3, where I could see a very small radiolucency around these roots (shown as yellow arrows in Figs. 2–4). The sinus membrane was thickened around the area (Fig. 4, green arrows) as well. This was a sure sign that tooth #3 was necrotic and I could be confident in my diagnosis, so my patient didn't have to wait for the pain to return before treatment.

Your patients will not always be the most reliable testers, through no fault of their own. This is an example of a patient case where my cone beam helped me diagnose disease when my traditional testing and imaging are inconclusive. The patient's story of having a painful episode is usually a sign that a nerve somewhere has died, and it was through my cone beam that I was able to diagnose appropriately.

2 It reveals the true etiology of root canal failure.

When I see a root canal that is failing, I always want to know why—and my cone beam always tells me the whole story. Fig. 5, p. 95, is an example of a patient with a failed root canal on tooth #19.

The tooth has that typical J-shaped radiolucency around the distal root, and many would consider this tooth fractured. But the axial slice of the CBCT (Fig. 6, p. 95) shows the road map of the tooth and you can clearly see a missed distolingual canal. The missed canal is the true etiology of failure. In reality, there's still bacteria in the tooth, and the tooth is not fractured. In Fig. 8, you see how the tooth should really look when it's obturated.

The two cardinal rules of root canal therapy were applied—finding all the canals and getting to the end of every canal—and two years later (Fig. 9 is a two-year recall PA radiograph) the bone was filling back in. This bone regeneration can also be seen in the cone beam images (Fig. 10 and 11, preoperative and two-year recall images side by side to observe the bone regeneration).

The cone beam tells you exactly what you need to find, with no more guessing. Once you have a clear diagnosis, you know exactly what to fix and you can

heal the tooth. Don't assume it's cracked and send it for extraction; it might not be cracked at all. So don't give up! As dentists, saving teeth is our game.

3 It serves as a communication and patient education tool, leading to increased case acceptance.

Sometimes I see patients who have undergone an attempted root canal, but because I have incomplete records or information I use my cone beam to tell me the whole tooth story. This takes the guesswork out of the whole process and shapes my conversation with the patient.

Fig.12 is a radiograph of a patient who continued to have a sinus tract after she had an attempt on her root canal. From the radiograph, it looks like there was a previous access of a tooth with a very calcified canal. There is also the presence of a periapical radiolucency, which is the origin of the sinus tract.

Like an endo Sherlock Holmes, the cone beam helped me reveal evidence of what the previous clinician did. In this case, the cone beam (Fig. 13) showed that there is actually a canal, and I could be confident when I access the tooth as long as I used the composite as my buccal border. If I came into contact with the composite, I'd have known I was too far buccal and I ran the risk of perforating the tooth. This image completely changed the conversation I had with my patient, allowed me to de-emphasize the possibility of surgery, and gave me the confidence to try to save the tooth. (Fig. 14 shows the completed root canal.

4 It helps determine true lesion size and assists in follow-up.

The periapical radiolucency will always be bigger in the CBCT than in the traditional PA, but don't let size scare you! Otherwise you'll never save teeth once you start working with the cone beam.

Fig. 15 is a radiograph of a 16-year-old girl who had trauma to the mandibular anterior region about nine years previously. She presented with a very large swelling

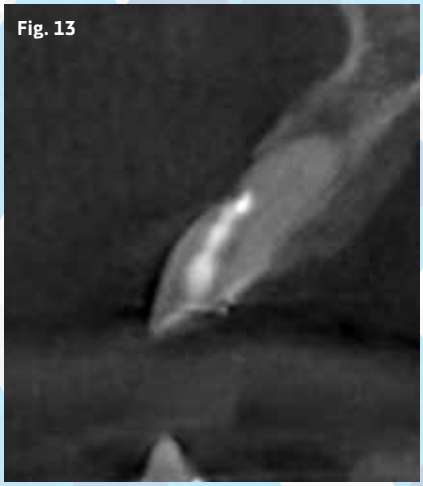
Fig. 13


Fig. 14


Fig. 15


Fig. 16


Fig. 17


Fig. 18


Fig. 19


Fig. 20

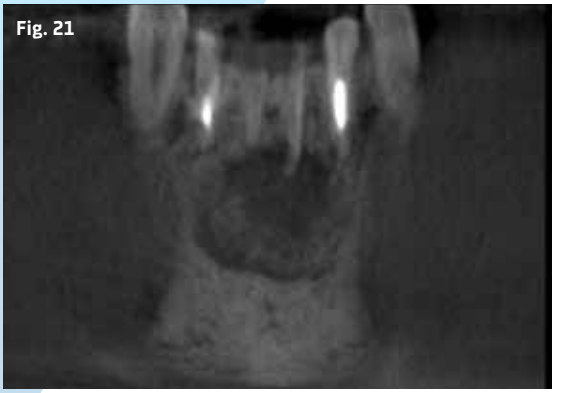
Fig. 21


Fig. 22


Fig. 23


Fig. 24


Fig. 25

and, upon radiographic examination, I discovered she had a very large periapical radiolucency that encompassed teeth #23–26.

I found no response to cold in teeth #23–26, percussion tenderness only to #25, and no mobility of the teeth. She was diagnosed with necrotic pulps in teeth #23–26 and acute apical abscess. My initial treatment was to open tooth #25 for an emergency pulpal debridement, but to also perform root canal therapy on #23, 24 and 26. I obtained a cone beam—not to see the lesion, but rather to get an appreciation for the true extent of the bone loss (Figs. 16–18, p. 97: sagittal, axial and coronal views, respectively).

The coronal (Fig. 18) is the view that really puts this case into perspective: This young woman had only a sliver of lingual bone left.

Getting her bone back was critical, so she was treatment-planned for root canals in teeth #23–26. This was based on her pulpal diagnosis of all the teeth, and done just in case surgical intervention was in her future.

The root canals were completed over multiple visits until the teeth became asymptomatic.

We were able to recall the patient at six months (Figs. 19–22) and two years (Figs. 23–26) after the procedure. The images show the PA, axial view, sagittal view and coronal view, respectively in each time frame.

Remember: If we can detect disease a lot quicker with the cone beam, the opposite will be true when we are evaluating the same tooth with respect to healing. It will take a lot longer for you to see the bone healing, but it doesn't mean it's not happening.

5 It helps locate hard-to-find canals, especially the MB2 in maxillary molars.

To this day, even though I have 10 years of extensive endodontic experience, some canals can be hard to find. The MB2 canal in particular can still be a challenge to locate, but it's present in the maxillary first molar about 95 percent of the time. When I don't find one with the microscope, my cone beam always saves the day.

Fig. 27 is a case where a cone beam served multiple purposes. I initially took the cone beam to assist in my diagnosis, then returned to it later to confirm whether there was an MB2. My patient was experiencing very vague pain, and we could not reproduce the sensation with traditional testing. Since the periapical radiograph (Fig. 27) showed the teeth to be within normal limits, we took a cone beam.

The cone beam (Fig. 28) showed that there was some thickening of the sinus membrane (green arrows) and also the smallest

incipient periapical radiolucency of the DB root (yellow arrows) and a small break in the sinus membrane. This was enough for me to diagnose tooth #14 with a necrotic pulp and to see that the odontogenic infection was having an effect on the sinus membrane. I confirmed my diagnosis of a necrotic pulp with asymptomatic apical periodontitis when I started to do the root canal.

Once I began the procedure, I did everything by the book—but even with my microscope, I could only see three canals (Fig. 29: working length radiograph showing only three canals located). I didn't want to trough too much and take away too much tooth structure if there was no MB2, but since I know there nearly always is, I re-referenced the cone beam to see the anatomy of the MB root.

I used the axial view (Fig. 30), which can sometimes be the most helpful view for looking at MB2 anatomy. In this case, the MB root is very wide in a buccal and lingual direction, with room for two canals. This image gave me the information I needed, and I continued to trough apically and look for the MB2 canal.

A few millimeters below the orifice of the MB, I was able to access the MB2 canal orifice and finish the case. (Fig. 31 shows the fourth canal located.) Without the cone beam's assistance in finding this canal, this would have been a failed case.

This is a great example of how one cone beam can be beneficial in many different ways for the same case.

The most important benefit of cone beam technology is saving teeth.

Whether you're looking for canals, evaluating resorption or trauma, or simply educating your patients and communicating with your specialists, cone beam technology can significantly improve your practice.

While it's not all-powerful—it doesn't typically show cracks or vertical root fractures, for instance—it's an important tool for any dental professional, and it's well worth the time to learn how to use it. ■


Fig. 26


Fig. 27


Fig. 28


Fig. 29


Fig. 30

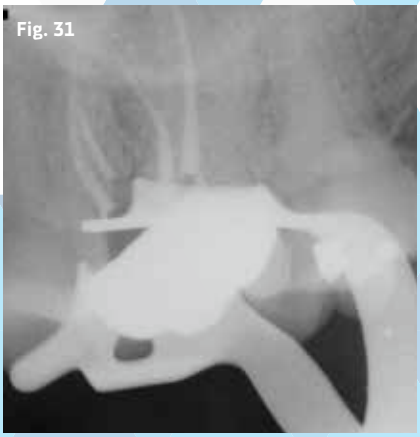
Fig. 31