

THE CUTTING EDGE

(Editor's Note: This quarterly column is compiled by JCO Technology Editor Ronald Redmond. To help keep our readers on The Cutting Edge, Dr. Redmond will spotlight a particular area of orthodontic technology every three months. Your suggestions for future subjects or authors are welcome.)

In this month's Cutting Edge column, Dr. William Mehan exposes a diagnostic chasm that we have all fallen into on occasion. We use lateral headfilms, frontal headfilms, and panorex—*all two-dimensional records*—and we supplement these images with our knowledge and understanding of the "normal" three-dimensional anatomy of the head and neck to produce a mental image—in this case, of the positions of impacted canines.

Two things prevented a disaster here: Dr. Mehan's observation of the lateral incisor crowns beginning to move labially, which is contrary to normal movement in these situations, and his recommendation to the parents to have a cone-beam scan. Obviously, Dr. Mehan's observation saved the roots of the lateral incisors.

Another case I have seen recently involved a young girl with impacted canines, which cone-beam computed tomography (CBCT) confirmed were in a more normal configuration than in Dr. Mehan's patient. Both maxillary canines were impacted lingual to the upper incisors. What made this case unusual was not the position of the canines, but the small mass located in the patient's right maxillary sinus. Although the mass was obvious, attention was focused on the canines, and the mass was overlooked. Orthodontic treatment was begun. About 18 months later, the mass had grown large enough to produce symptoms, and the girl's family took her to their physician, who referred her to an ENT specialist. After some diagnostic tests, it was determined that the mass was a malignant tumor. The ENT specialist explained that this type of tumor was usually not detected until it became symptomatic, but during a follow-up discussion with the parents, the physician discovered that a CBCT scan had been taken 18 months earlier. The scan was requested, and the rest of the story continues through our legal system.

These two examples are different, but the principles are the same. One involves what our mind lets us "see" through mental interpretation, and the other involves what we don't see because of our field of focus or the limitations in our education. Dr. Mehan's observations were acute, he took the proper action, and his treatment was eventually successful. In the second case, the results were less satisfactory, and the lesson should be clear to all orthodontists requesting cone-beam scans: Every CBCT scan must be reviewed by a radiologist for pathologies outside the scope of our training. To paraphrase from Dr. Mehan's fine article, in this case it's not what we think we know, but what we really don't know.

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The Use of Cone-Beam Computed Tomography in the Diagnosis and Treatment of Severely Ectopic Teeth

The 19th-century American humorist Artemus Ward once said, "It ain't so much the things we don't know that get us into trouble. It's the things we do know that just ain't so."¹ Orthodontists may find themselves in that situation when their treatment mechanics produce unexpected results.

Although orthodontic forces operate in all three planes of space, our diagnosis and treatment planning are based largely on two-dimensional imaging. We extrapolate the third spatial dimension from our knowledge of anatomy and our past experience. Occasionally our limited perspective is inadequate, however, as the following case illustrates.

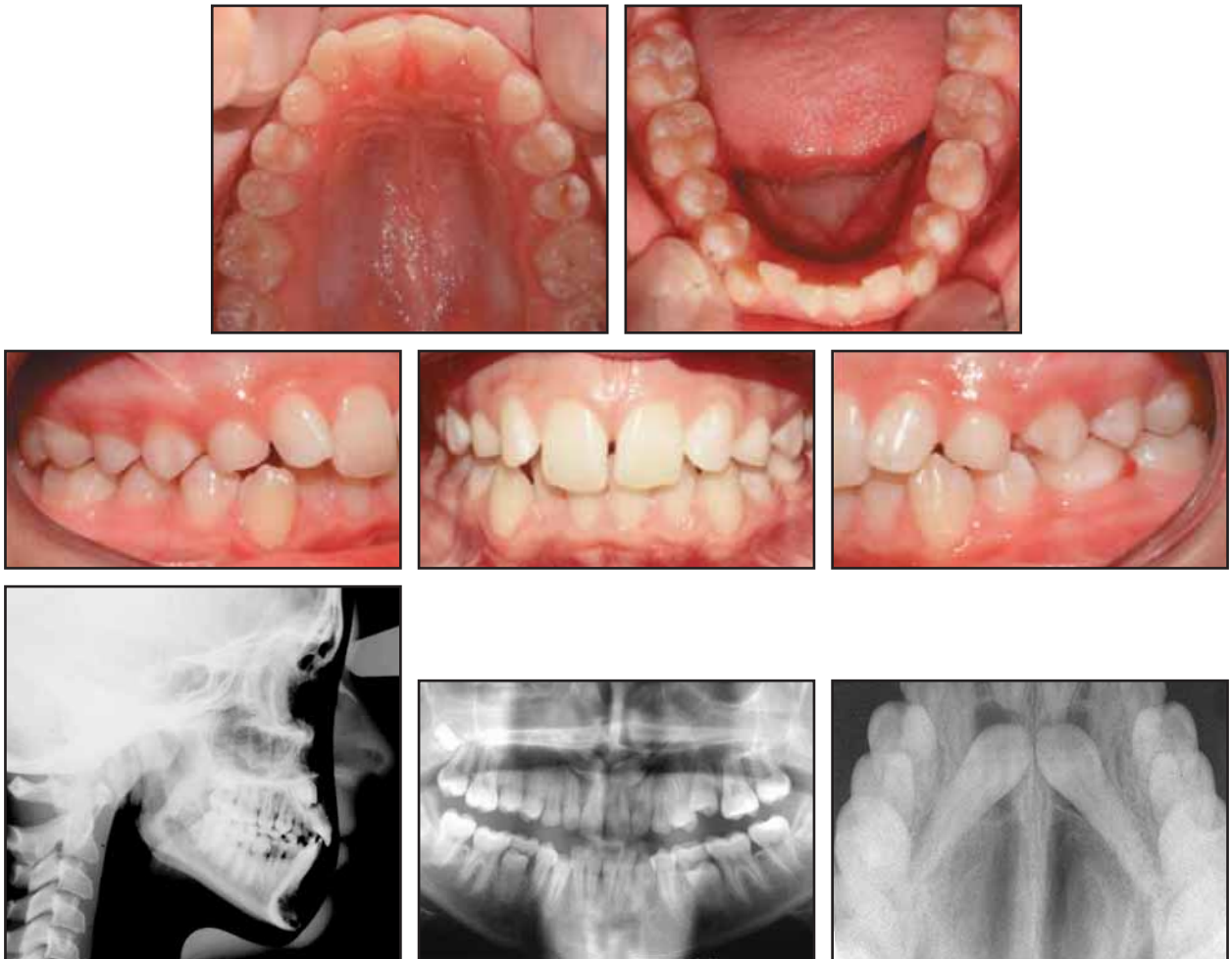


Fig. 1 13-year-old female patient with palatally impacted canines before treatment.



Fig. 2 After three months of traction.



Dr. Redmond



Dr. Mehan



Fig. 3 Computed tomographic scans showing crown tips of canines labial to root apices of lateral incisors.

Case Report

A 13-year-old female was referred by her general dentist because of delayed eruption of both maxillary canines. Conventional pretreatment records showed the canines to be palatally impacted (Fig. 1).

Orthodontic appliances were placed, the arch-

es leveled, and the maxillary permanent canines surgically uncovered using a palatal approach. Because each canine crown was in close proximity to the apex of the adjacent lateral incisor, the traction was attached to pull in a posterior and occlusal direction.

After three months of traction, the maxillary lateral incisors appeared to be flaring labial-

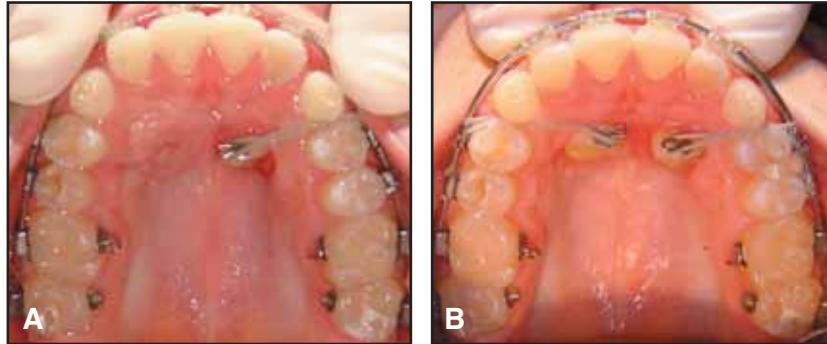


Fig. 4 A. Eruption of canines six months after removal of orthodontic forces from lateral incisors. **B.** Three months later, with both canine crowns accessible for bonding.

ly. The mechanics of reciprocal forces could not explain this unusual movement. Treatment was interrupted, and progress records were taken (Fig. 2). These radiographs did not appear unusual for severely displaced, palatally impacted canines, although the cephalogram did show a counter-clockwise rotation of the incisors. Because we needed further information, the patient's parents consented to the use of cone-beam computed tomography.

The 3D images obtained from the volumetric study showed that the crown tips of the canines were labial to the apices of the lateral incisors (Fig. 3). Apparently, as the canines had moved posteriorly and occlusally, they had driven the apices of the lateral incisors lingually and the crowns labially. We decided to remove all orthodontic forces from the lateral incisors and allow their roots to rotate with the canine crown movement. When the canine crowns moved away from the lateral apices, the lateral roots could then be uprighted labially without obstruction from the canines.

Six months later, the canines could be seen erupting; another three months later, they were accessible in the midpalatal area (Fig. 4).

Conclusion

This case shows the benefits of using 3D imaging for diagnosis and treatment planning in patients with severely ectopic teeth. This patient's original treatment plan was developed and forces applied on the basis of information that the orthodontist "knew" to be true. But in the words of Artemus Ward, it sometimes "just ain't so".

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REFERENCES

1. Ward, A.: *Pearls of Wisdom*, ed. J. Agel and W. Glanze, Perennial Library, New York, 1987.

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