The utility of cone-beam computed tomography in endo

By Dov M. Almog, DMD; Samuel Melcer, DMD and Sergio Bueno, DMD

Following what seemed to be a root canal failure in tooth No. 14 based on clinical and radiographic diagnosis with a conventional two-dimensional periapical radiograph (Fig. 1), the patient was referred for referral for an endodontic consult.

At this stage, several treatment options were contemplated: apicectomy and retrograde filling; palatal root amputation; and possible extraction. This diagnostic and treatment planning protocol is fairly common in dentistry. However, although no clinical evidence was reached at this stage and periodontal disease is frequently the reason for apical root resorption over time, at times it is derived from endodontic disease. A peri-apical lesion can have a variety of pathogenesis, thus, a periapical lesion, root fractures and/or root canal perforation. Although peri-probing surrounding tooth No. 14 was done in this case, there was no evidence for furcation or apical progression of periodontal disease.

As a matter of fact, already in 1997 it was found that only one out of 14 furcation defects in the maxillary molars was seen on periapical radiographs because of overlapping roots, whereas medical CT scans were able to identify all furcation defects.4 Moreover, in 2008 it was found that CBCT showed significantly more lesions than periapical radiographs.5 Given the recent CBCT extended diagnostic capacity as it pertains to endodontics, the treating dentist made a decision to take advantage of this three-dimensional diagnostic modality and the patient was referred for a CBCT.

As is described in this case report, some root canal treatment failures sometimes go unnoticed, and therefore it behooves us to familiarize ourselves with the diagnostic capacity of CBCT as it pertains to endodontic complications vs. conventional periapical radiographs.

Dentists’ ability to assess the anatomical area of any tooth utilizing conventional periapical radiographs that are known for superimposition of anatomical structures is very limited; with their ability to assess the anatomical area of interest utilizing a three-dimensional CBCT is almost unlimited.6,7 After performing a CBCT utilizing an i-CAT™ 5-D CBCT (Imaging Sciences International, Hatfield, Pa.) to evaluate tooth No. 14 and its surrounding anatomy, it was determined that the peri-apical lesion was of the mesio-lingual aspect of tooth No. 14. A pre-curved gutta-percha point size 40 was then inserted and directed to a palatal direction reaching a depth of 11 mm.

This indicates that on routine periapical probing, an endo-perio lesion may not be diagnosed because the osseous defect does not always occur in a perfect matching path to the long axis of the tooth. A pre-curved gutta-percha point size 40 was then inserted and directed to a palatal direction reaching a depth of 11 mm.

When the pulp becomes infected, the periapical lesion can progress beyond the apical foramen and cause periodontal disease. Therefore, it is essential for us to familiarize ourselves with the diagnostic capacity of CBCT as it pertains to endodontic lesions diagnosis and associated complications vs. the use of conventional diagnostic periapical radiographs.

This would certainly lead to better diagnosis and treatment planning. This is besides the fact that CBCT offers considerable scan-time and radiation dose reduction compared to a medical CT.8

References

About the authors
• Dov M. Almog, DMD, Chief of the Dental Service, VA New Jersey Health Care System (VANJHCS)
• Sergio Bueno, DMD, General Dentist, VANJHCS
• Samuel Melcer, DMD, Assistant Chief of the Dental Service, VANJHCS

Dov M. Almog, DMD VA New Jersey Health Care System
585 Trenton Avenue
East Orange, NJ, 07018
Tel: (973)-676-1000, ext. 1254
Fax: (973) 595-7019
E-mail: dov.almog@va.gov

For more information, visit Patterson Dental at pattersondental.com