

Management of root canal perforation by using cone-beam computed tomography

Q In case of perforation during root canal treatment, how can I use cone-beam computed tomography (CBCT) for diagnose and treatment?

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A Radiographic examination is an essential component in the management of endodontic problems such as root canal perforation. However, the conventional intraoral periapical views produce only a 2-dimensional image of a 3-dimensional object, resulting in the superimposition of structures. Conventional multidetector computed tomography (CT) imaging has been widely used in medicine since the 1970s and was introduced in the endodontic field in 1990.¹ Recently, a new diagnostic tool, cone-beam computed tomography (CBCT), is being used in endodontics. CBCT has also been considered as a useful tool for diagnosis of root canal perforation. Shemesh *et al.* demonstrated that CBCT scans showed a significantly higher sensitivity than periapical radiographs for detection of strip root perforations.² Lim *et al.* also suggested that CBCT is more useful for detection of perforations in the faciolingual plane than conventional radiography (Figure 1).³

The risk and benefit of radiation should be considered whenever a clinician decides to acquire CBCT images. Generally, the radiation doses from CBCT are much higher than those in conventional periapical radiography. For this purpose, the mode with the smallest field of view (FOV) should be chosen. Patel *et al.* reviewed that the effective dose of a small FOV is 2 - 3 times higher than that of a periapical film.⁴

CBCT scans can be considered if a clinician notices early signs of perforation including sudden



Figure 1. Sagittal cone-beam computed tomography (CBCT) section of the tooth. White arrow indicates the perforation site. (Lim *et al.* *Restor Dent Endod* 2012;37:50-53)

pain during the working length determination, sudden appearance of hemorrhage, or burning pain during irrigation. The clinician can perform multisliced scans of the focused tooth with informed consent from the patient. Then, the morphology is obtained in axial, coronal and sagittal sections. The sagittal and axial sections are usually useful for detecting the perforation occurred in the faciolingual plane. The position and direction of the perforation should be carefully observed. Sometimes, a 3-dimensional reconstruction of the tooth may be helpful for detecting the perforation. Song *et*

al. reported the usefulness of the reconstruction for recognizing the perforation between maxillary first molar and supernumerary tooth.⁵ The perforation is then repaired by using mineral trioxide aggregate under surgical operating microscope as early as possible to minimize the complication.

Conventional radiography provides clinicians with cost-effective, high-resolution imaging that continues to be the front-line method for dental imaging. However, it is obvious that there are many specific situations where the images produced by CBCT facilitates diagnosis and influences treatment such as root canal perforation. The usefulness of the CBCT cannot be disputed. It is a valuable task-specific imaging modality, providing maximal information to the clinician.

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