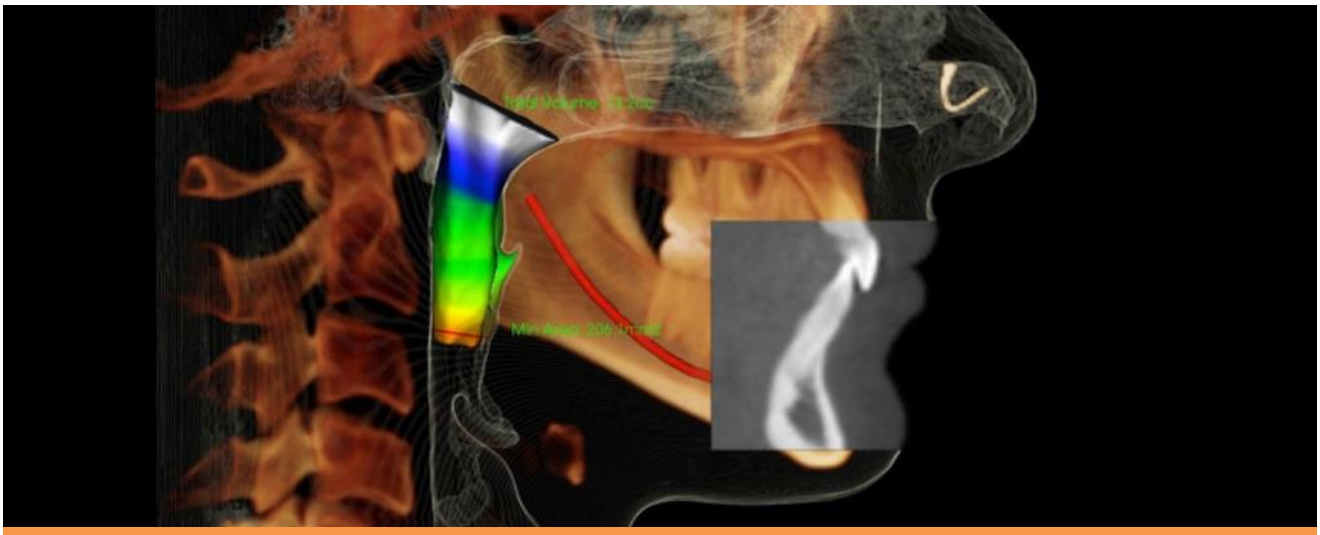

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CBCT & ENDODONTICS

Presented By: Dr. Jack DeGruchy, DDS, FAGD

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INDICATIONS

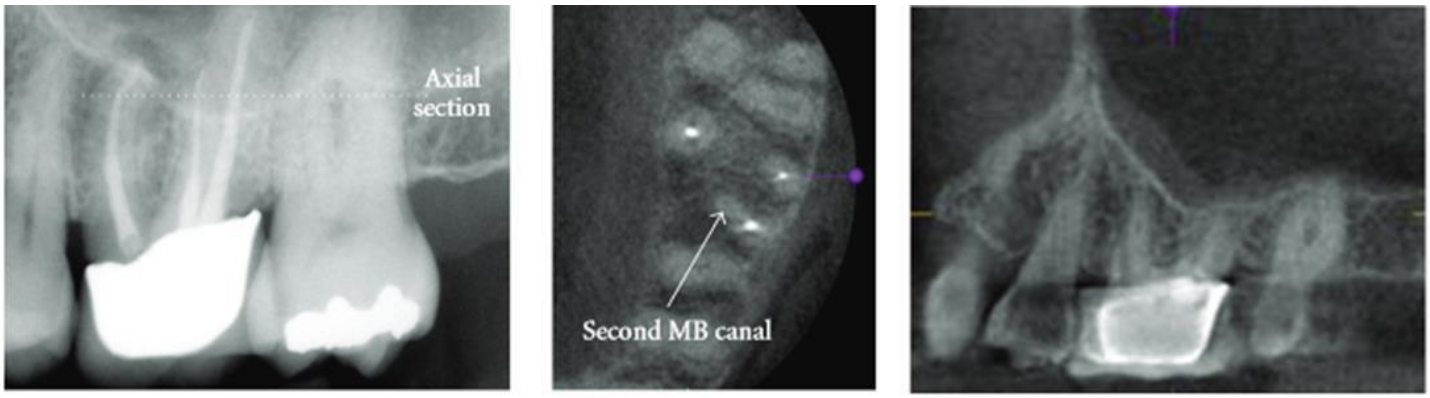
1. Preoperative Assessment
2. Dental Periapical Pathosis
3. Root Fracture
4. Root Resorption
5. Postoperative Assessment

1. Preoperative Assessment

Tooth Morphology:

Successful endodontic treatment is dependant on the identification of all root canals so that they may be accessed, cleaned, shaped and obturated. Depending on the study method employed the prevalence of the MB2 canal in the maxillary first molars has been reported to vary from 69% to 93%.

2. Dental Periapical Pathosis



Maxillary first and second molars often present treatment challenges because of the frequent presence of mesioaccessory (mb2)canals. On initial periapical radiographic examination of this previously treated maxillary left first molar, no mb2 canal was detected; however a periapical lesion is seen (a). Note the overlap of the interproximal contacts between the molars indicating a geometric distortion in the horizontal plane. CBCT imaging ((b) 0.076 mm axial and (c) 0.076 parasagittal) clearly demonstrates an additional canal that was not previously treated

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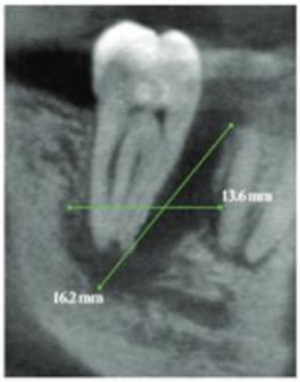
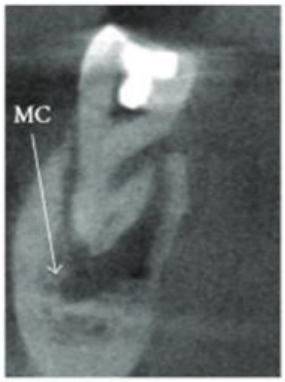
(a)

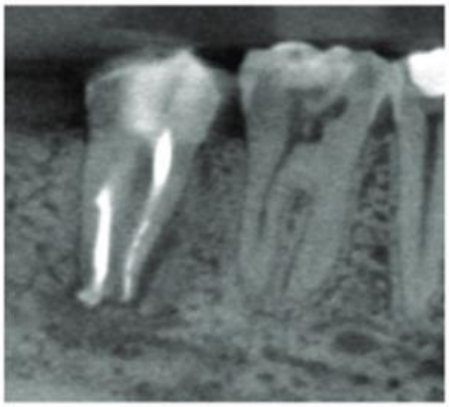


(b)



(c)

(d)



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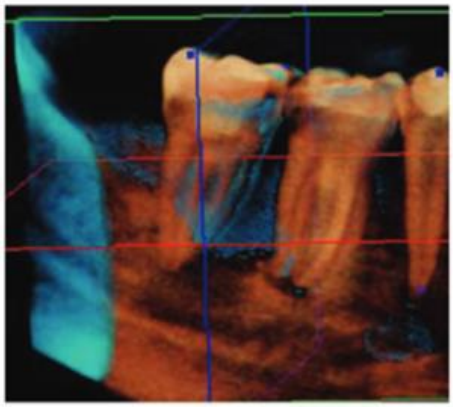

(f)

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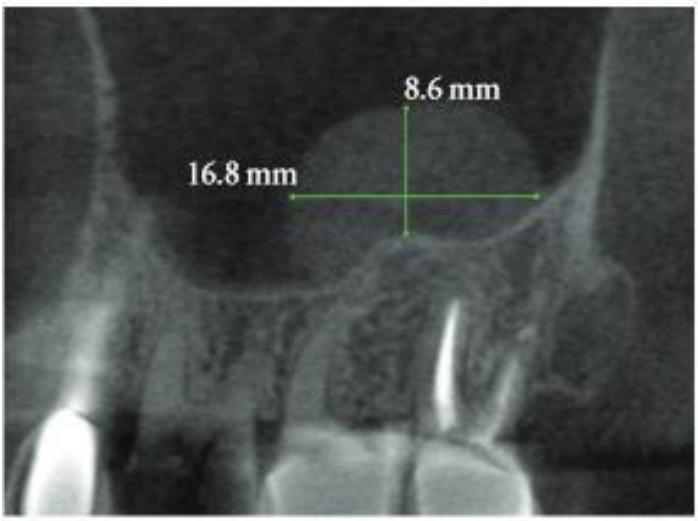
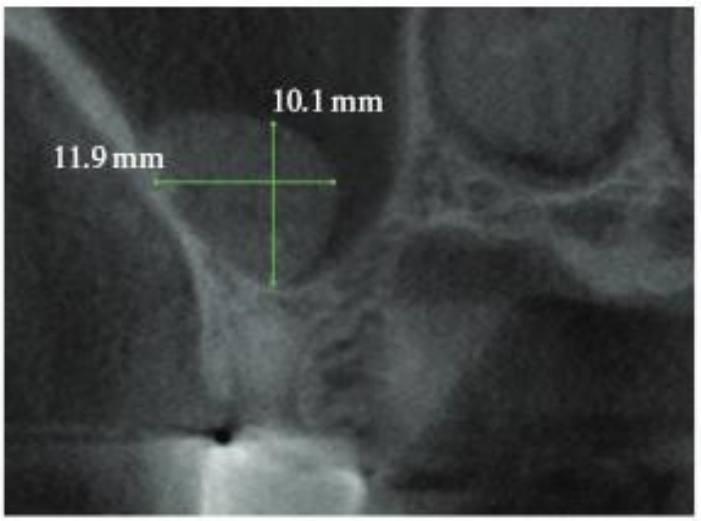


(a)



(b)

Antral mucosal pseudocysts, also called ***mucus retention cysts***, are a relatively common localized dome-shaped antral mucosal swelling, often of allergic origin and while they can occur anywhere in the sinus present diagnostic challenges when associated with the floor of the maxillary sinus. CBCT imaging ((a) sagittal, (b) cross-sectional) can be useful in differentiating these lesions from periapical mucositis in that the former is usually not associated with disruption of the floor of the sinus and expansion superiorly from the apex of roots of adjacent teeth.

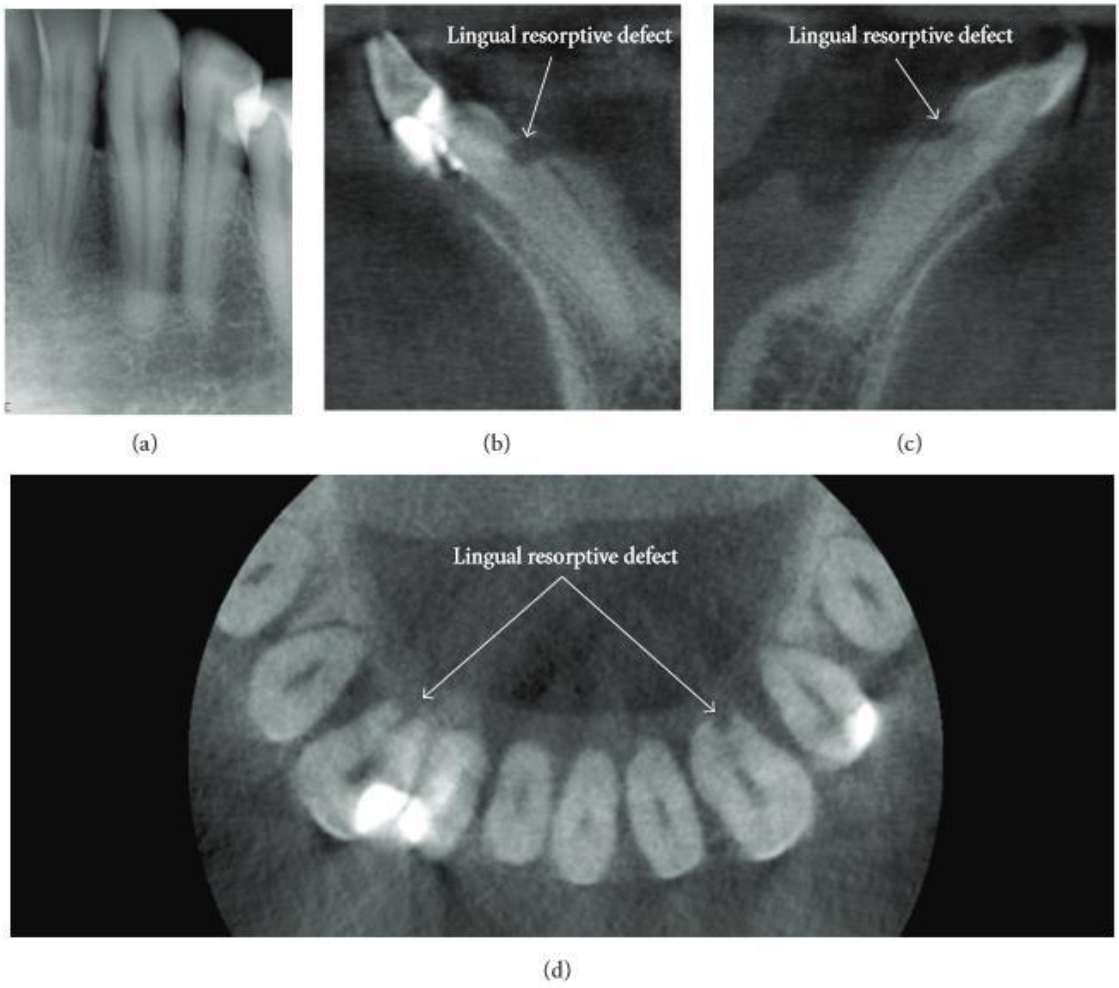
3. Root Fracture

(a)

(b)

Traumatic injuries to the anterior dentition may result in a horizontal root fracture. Visualizing these fractures with periapical radiographs can be difficult as the beam must be in parallel alignment to the axis of the fracture. Conventional periapical image (a) shows horizontal radiolucent line separating the apical 1/3rd of the root. Note the loss of lamina dura and lateral radiolucency on the distal root surface adjacent to the horizontal radiolucency. Cross-sectional high-resolution (0.076 mm) image showing “V” shaped fracture and minimal displacement of the root segments. Note the loss of buccal cortical plate, widening of the buccal periodontal ligament space and periapical rarefaction.

4. Root Resorption



This patient was referred for endodontic revision of the mandibular right lateral incisor. Initial periapical radiographic examination of the mandibular anterior teeth including the left anterior (a) was unremarkable. Note the appearance of a large radiolucency at the on the distal surface of the left canine due to nonperpendicular X-ray beam projection of the distal curvature of the cervical margin.

CBCT images ((b) right cross-sectional, (c) left cross-sectional, (d) axial) demonstrated an occult finding of early ERR on the mandibular left and right mandibular cuspids. Early detection and classification of the lesion improve the prognosis and assist in early direct treatment

consisting of surgical exposure and removal of granulation tissue from the resorbing lacunae and sealing.

5. Postoperative Assessment

Monitoring the healing of apical lesions is an important aspect of postoperative assessment in endodontics.

As adequacy of root canal obturation is an important determinant of endodontic success, it might be considered that CBCT is used in the initial and subsequent monitoring of the integrity of root canal fillings.

Endodontic surgery is often complicated in the posterior teeth by their proximity to anatomical structures. The mandibular teeth can be close to the mandibular canal while maxillary molars are often close to the maxillary sinus.

They also reported that numerous additional clinically relevant findings were seen significantly more frequently in CBCT images including expansion of lesions into the maxillary sinus, sinus membrane thickening, and missed canals.

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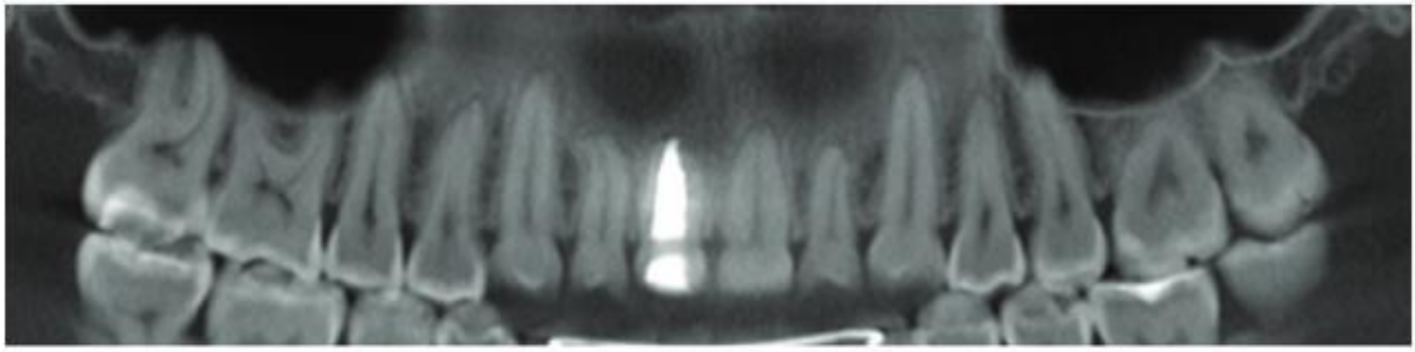
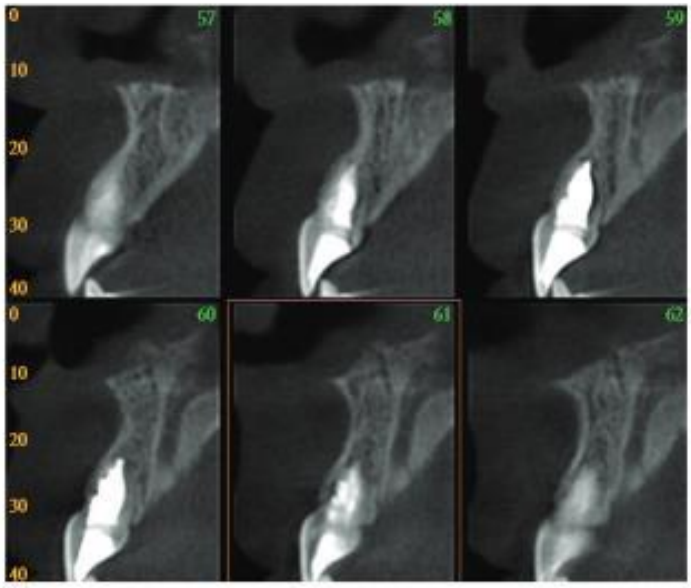
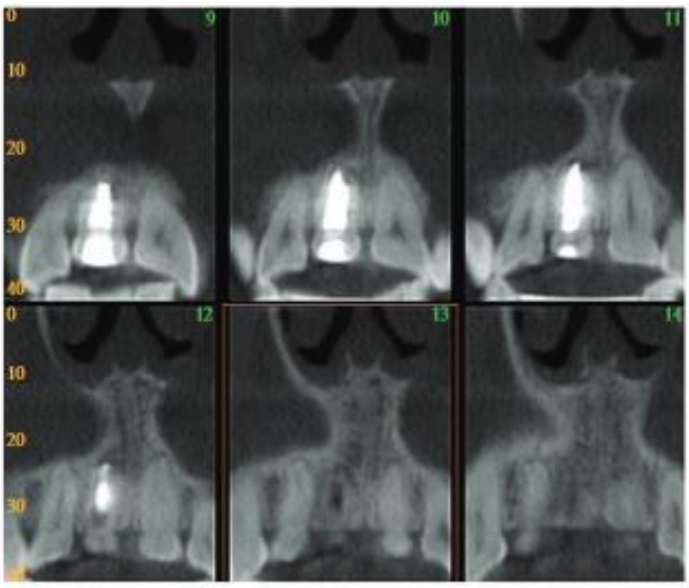


(a)

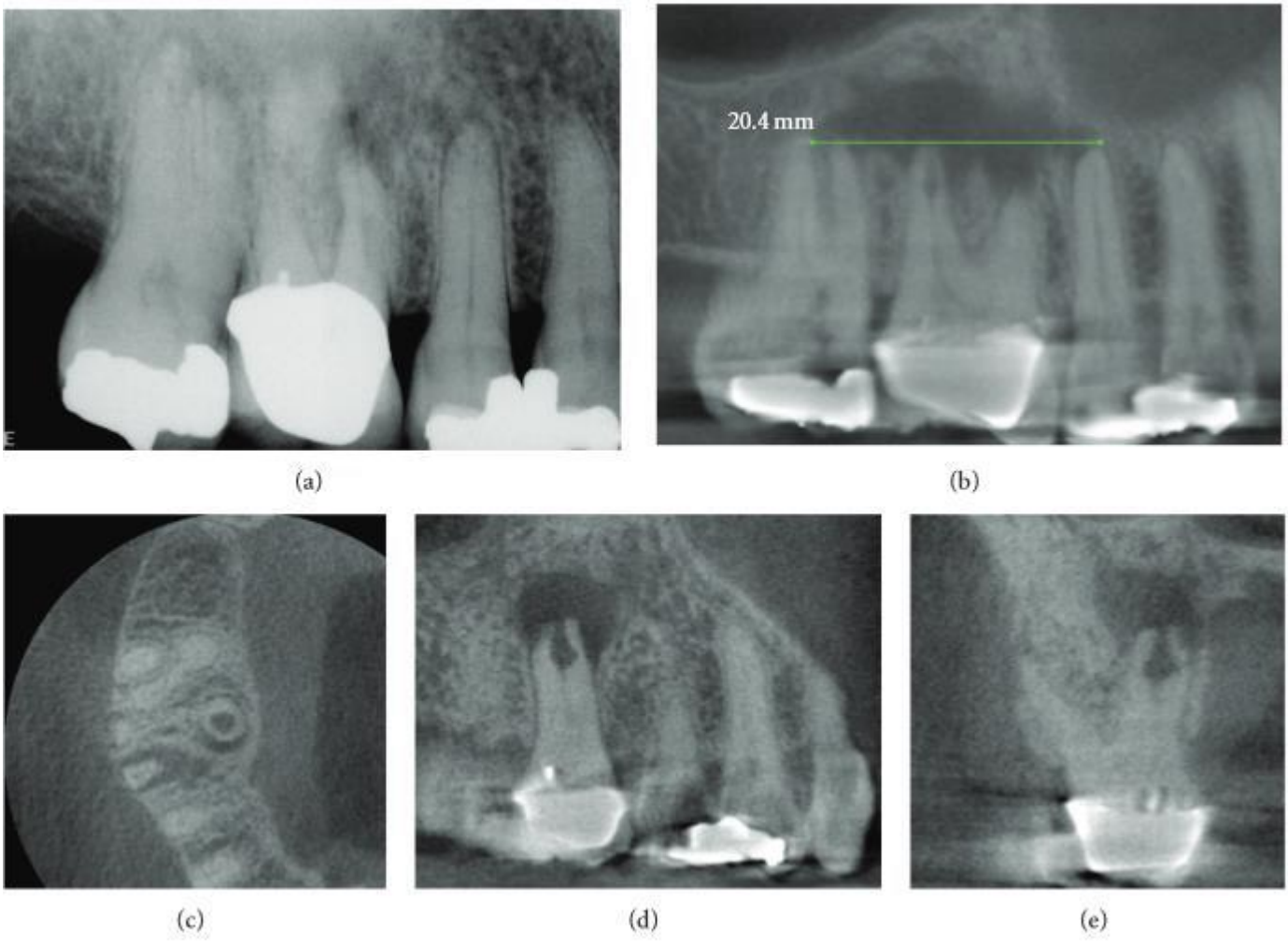


(b)

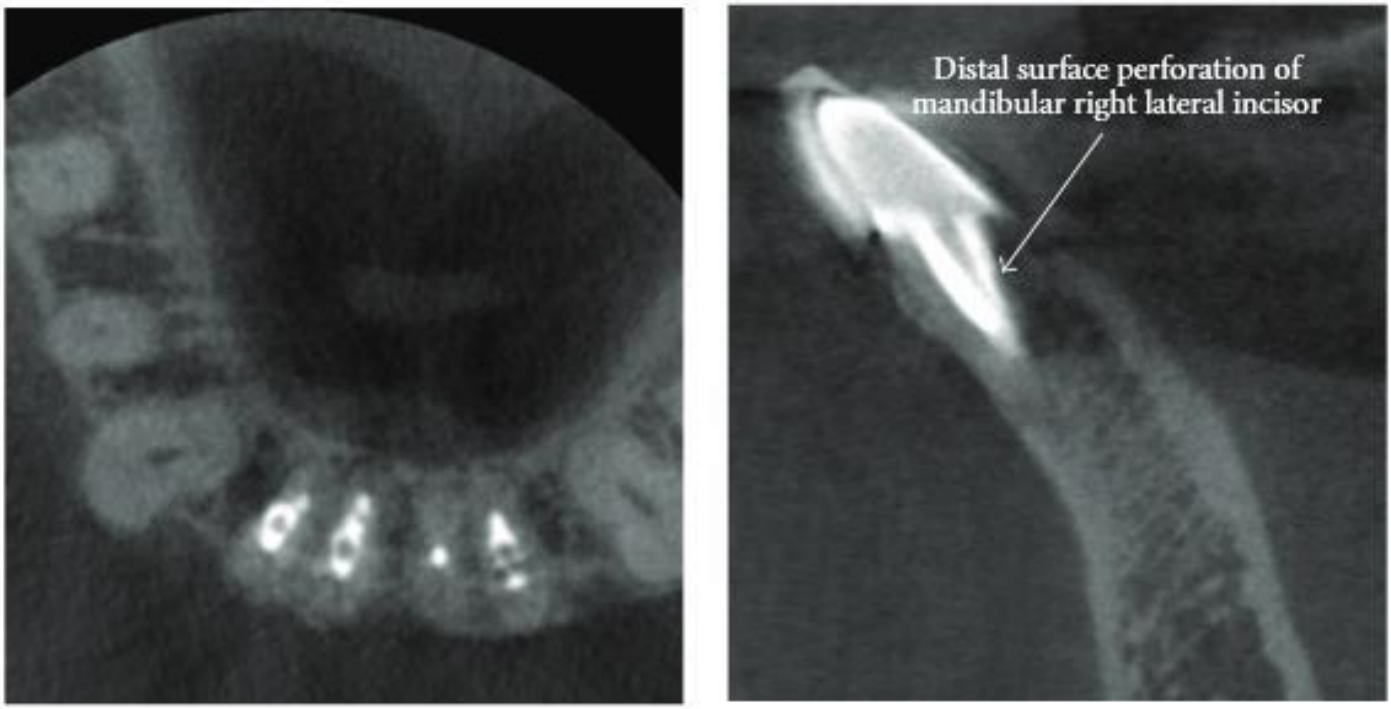


(c)

Replacement external resorption associated with root canal filled right maxillary central incisor. An oblique multiplanar reformatted “panoramic” image (a) shows the dentition with minimal restorations and a single root canal filled maxillary right central incisor; note that the obturation is large in relation to the width of the adjacent left maxillary central suggesting endodontic treatment at an early age. Sequential 1 mm cross-sectional (b) and parasagittal (c) images show bone trabecular-like replacement of the superior and palatal aspects of the root indicative of replacement resorption. Initial management consisted of conventional endodontic treatment. Because of the questionable long-term prognosis of the apical resorptive lesions, periodic CBCT imaging is recommended with a view towards surgical revision therapy consisting of apicoectomy and retrograde root canal treatment (data acquired on an iCAT, Imaging Sciences International, Hatfield, PA USA at 0.4 mm resolution and reformatted using InVivo Dental, Anatomage, San Jose, CA)



Because two-dimensional imaging suffers from superimposition of anatomic structures, determination of the extent and pathogenesis of periradicular lesions can present diagnostic challenges. This is particularly true of the maxillary posterior region, where the roots of teeth overlap and anatomic structures form complex patterns. A patient presented with discomfort in the maxillary right that extended from the nose to the ear. On clinical examination buccal swelling and induration were present—all teeth tested vital except the maxillary right first molar. A periapical radiograph (a) demonstrated areas of low density at the apices of the maxillary right first and second molars. CBCT images ((b) 10 mm curved planar, (c) axial, (d) sagittal, (e) cross-sectional) however demonstrated a much more extensive (21.4 mm maximum length) unilocular lesion, centered on the palatal root of the maxillary first molar, and extending anteriorly to the second bicuspid and posteriorly to the second molar. Also note the large internal resorptive lesion at the mid-palatal root of the maxillary first molar, not visible on the periapical radiograph. Biopsy confirmed the lesion to be a periapical granuloma with abscess formation.



(a) (b)

Iatrogenic perforative defects can be difficult to confirm by periapical radiography alone. This patient was referred for evaluation and possible endodontic revision of the mandibular right lateral incisor because of chronic sensitivity to occlusal forces. CBCT images ((a)axial, (b) sagittal) demonstrate a mid-root post perforation.

Conclusion

Conventional intraoral radiography provides clinicians with an accessible, cost effective, high-resolution imaging modality that continues to be of value in endodontic therapy.

There are, however, specific situations, both pre- and post- operatively, where the understanding of spatial relationships afforded by CBCT facilitates diagnosis and influences treatment.

The usefulness of CBCT imaging can no longer be disputed—CBCT is a useful task specific imaging modality and an important technology in comprehensive endodontic
evaluation.

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excerpts taken from the

International Journal of Dentistry