Radiographic detection of artificial bone lesions in an *in vitro* mandible

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Objectives

To assess diagnostic accuracy for diagnosis of bone lesions *in vitro* with different Cone Beam CT (CBCT) devices and conventional 2D radiographs.

Materials and methods

A dry human mandible was cut in five serial blocks, artificial bone lesions were created with different depths: 150 μm, 175 μm, 200 μm, 250 μm and 300 μm. Lesions were created in the trabecular bone and in the cortico-trabecular area. Periapical radiographs were made using VistaSCAN perio® (Dürr Dental AG, Bietigheim-Bissingen, Germany). CBCT images were made using Scanora 3D® (Soredex, Finland), 3D Accuitomo® (J.Morita, Japan), Galileos® (Sirona, Germany), Kodak 9000 3D® (IMTEC/Kodak dental System, USA), ProMax 3D® (Planmeca, Finland) and Picasso® (Vatech, Korea). Six calibrated observers, evaluated all digital images with at least one week between subsequent sessions. Observers rated the presence or absence of lesions in the trabecular layer and in the cortico-trabecular area on a 5-point probability scale. The observers indicated the locations of the lesions on schematic figures of the bone blocks for both imaging modalities.

Results

CBCT images were significantly better to detect bone lesions in the mandible than periapical images. For the different CBCT systems, minimal detection threshold ranged from 175 μm to 250 μm. More specific, for the Scanora 3D® the threshold was 175 μm. For ProMax 3D® and 3D Accuitomo® it was 250 μm. The detection of bone lesions in the

cortico-trabecular area was significantly better than the detection in trabecular bone. Detecting the cortico-trabecular lesions with the Galileos® was more difficult compared to the other CBCT devices.

Conclusions

CBCT images show a significantly better diagnostic accuracy than periapical images. For the different CBCT systems, the threshold for detecting bone lesions ranged from 175 to 250 μm.