

## **Evaluation of root fractures using a CBCT artifact reduction algorithm and PSP plates**

Background/introduction: Cone Beam Computed Tomography (CBCT) is used widely to depict dental root fracture in endodontically treated teeth. Beam hardening and artifacts due to the gutta percha may increase the time of the diagnosis and result in an incorrect diagnosis. These same artifacts do not exist on photostimulated phosphor (PSP) plates images.

The Objectives were to compare two CBCT machine scans, Master 3D (Vatech-Republic of Korea) and Promax (Planmeka-Finland), and enhanced PSP plate images with the equalization tool in detecting root fractures on endodontically treated teeth.

Methods: Sixty-six roots were collected and decoronated. All roots were treated endodontically using the same technique with gutta percha and zinc oxide cement. Half of the roots were randomly selected and fractured using a nail that was taped gently with a hammer until complete fracture resulted in two root fragments; the two root fragments were glued together with methyl methacrylate. The roots were placed randomly in eight prepared beef ribs fragments. CBCT scans were acquired. Periapical radiographs were acquired using PSP plates. The equalization tool was used when evaluating the PSP plates images.

Results/discussion: The Promax CBCT images resulted in the highest accuracy in detecting root fractures (Field of View: 8x8 cm). The Master 3D gave the lowest accuracy (Field of View: 16x7 cm). The smaller Field of View gave a higher accuracy compared to the larger one. Enhanced PSP plates had the lowest sensitivity. The highest sensitivity was obtained using the Promax. The highest specificity was obtained from the enhanced PSP plates, and the lowest one from the Master 3D.

In Conclusion, the Promax CBCT images resulted in the highest accuracy and sensitivity in

depicting root fractures of endodontically treated root. The AR algorithm decreased the root fracture detection accuracy. PSP plates were more accurate than the large FOV in detecting root fractures.