

Abstract

Introduction:

Vertical root fractures (VRFs) represent a challenging clinical situation for dental professionals because of difficulties in terms of diagnosis and treatment and may provide a feasible path for bacterial penetration with a consequent inflammatory process followed by resorption of the alveolar bone. For this reason, the early detection of VRFs is important to prevent extensive and additional damages to the periodontal tissues and also unnecessary treatment and costs. The aim of this study is determining the accuracy of Planmeca 3D Promax CBCT imaging Systems with different intracanal materials in detecting Vertical Root Fractures.

Materials and Methods:

40 extracted human premolars were selected and inspected under a stereomicroscope to confirm the absence of vertical root fractures. Root canals were instrumented using Rotary files. 20 teeth were included in the study as the control group and 20 teeth were randomly selected for inducing VRF (n=40). Electromechanical Universal Testing Machine was used for creating Fractures. Four different intracanal material conditions were established: no material, Gutta Percha, Metal post and Fiber post. Then the teeth were placed in one dry mandibular alveoli containing dental sockets. For soft tissue reconstruction, the bony surfaces were covered by two layers of boxing wax before taking CBCT images. CBCT images were taken by Planmeca Promax 3D. Two oral radiologists who were blinded to the root fractures evaluated the images independently in three planes (axial, coronal and sagittal). Statistical analysis was performed using SPSS Statistics 22.

Results:

The Kappa Values For Agreement Between the Observers was 0.749 indicating high agreement. For 1st Observer, when used "Metal Post" as IntraCanal Material, minimum values were obtained with accuracy of 70% followed by "Gutta Percha" with accuracy of 80%. The highest values were for "Fiberglass Post" and when "no intracanal material" was used with accuracy of 90%.

For 2nd Observer, highest values were for "No intracanal material" and "Fiberglass Post" as intracanal materials. For this 2 groups, accuracy was 100% followed by Gutta Percha and Metal post with accuracy of 80%.

Conclusion:

Planmeca Promax 3D CBCT System showed a high accuracy in the diagnosis of vertical root fractures. Moreover, the presence of Fiber posts had no effect on the accuracy of this system how ever gutta percha and metal posts had little effect on accuracy.

Keywords: VRF, RC ,Cone Beam Computed Tomography