COMPARISON OF THE ACCURACY OF PERIAPICAL RADIOGRAPHY AND CONE-BEAM COMPUTED TOMOGRAPHY IN THE DIAGNOSIS OF INFLAMMATORY ROOT RESORPTION

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ABSTRACT

The objective of this study was to compare the accuracy of periapical radiography (Rx-P) and cone beam computed tomography (CBCT) in detecting inflammatory root resorption. Fourteen patients referred to the Emergency Service were evaluated (8 female; 57.14% and 6 male; 42.86) aged between 18 to 64 years. The sample consisting of 52 teeth was divided according to their dental group, with 6 being anterior, 23 premolars, and 23 molars. The number of roots analyzed was 88. Regarding the diagnosis, the classifications were as follows: periapical abscess without fistula phase I (n = 1; 1.92%), pulpal necrosis (n = 1; 1.92%), asymptomatic apical periodontitis (n = 36; 69.23%), symptomatic apical periodontitis (n = 14; 26.92%). Regarding the type of infection, 42 (80.77%) teeth presented with primary infection and 10 teeth (19.23%) with secondary infection. High prevalence was observed after the use of tomography. However, there was no statistically significant difference between Rx-P and TCFC. Advances in clinical evaluation have greatly improved diagnostic accuracy. CBCT allows for a greater likelihood of correct management of resorption lesions compared to intraoral radiographs.

Keywords: Inflammatory root resorption, CBCT, Periapical Radiography.

INTRODUCTION

The infection of the root canal after pulp necrosis follows a natural route towards the apex, being capable of inducing an inflammatory process of the periapical structures. This process of aggression can stimulate the destruction of periapical tissues and induce the loss of dental structure, characterizing a process of external root resorption (ERR) (Andreasen & Andreasen, 2001; Tronstad, 1988; Nance et al.,

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2000; Pierce, 1989; Ne et al., 1999; Gunraj, 1999; Andreasen et al., 1987). Most cases involve the apical and middle thirds of the root; however, cases where the cervical third is initially involved are more common. Dental literature presents possible causative agents of RRE as complications from orthodontic treatment, dental trauma, dental transplantation, pulp infection, dental bleaching, periodontal procedures, impacted teeth, cysts and tumors, and compression due to the eruption of an adjacent tooth (Leach et al., 2001).

The gold standard for the diagnosis of root resorption (RR) is microscopic analysis (Gunraj, 1999), and it can be classified as active, inactive, or repaired according to the microscopic findings. The prevalence of each stage affects the prognosis and treatment (Andreasen & Andreasen, 2001). Periapical radiographs are regularly used in the diagnosis of root changes and offer advantages such as low radiation exposure, a quick development process, and satisfactory images in the mesiodistal direction. However, in the vestibulolingual direction, the images are unsatisfactory, in addition to potential image distortions that may be present (Estrela et al., 2008a, Takeshita et al., 2013, Hedrick et al., 1994).

The great difficulty in diagnosing RR through two-dimensional exams remains, even with the use of various angles of the X-ray beam. The imaging diagnostic method for RRE with the highest accuracy is cone beam computed tomography (CBCT). CBCT has become the method of choice in dentistry when a three-dimensional evaluation is needed, causing a revolution in information in clinical procedures, contributing to the planning, diagnosis, treatment, and prognosis of RR (Cotton et al., 2007; Patel et al., 2007; Estrela et al., 2008ab; Durack & Patel, 2012). CBCT has been used for various clinical and research purposes in endodontics (Arai et al., 1999; Cotton et al., 2007; Nielsen et al., 1995; Patel et al., 2007; Yajima et al., 2006).

The objective of this study was to compare the accuracy of periapical radiography (Rx-P) and cone beam computed tomography (CBCT) in the detection of inflammatory root resorption.

METHODOLOGY

The sample was composed of patients referred to the Emergency Service of the Faculty of Dentistry at the Federal University of Goiás. The exclusion criteria for the study will involve patients presenting teeth with periodontal pockets deeper than 3 mm, endo-periodontal lesions, and communication of the root surface or periapical tissues with the oral cavity. Once the clinical diagnosis was made, the teeth were referred for surgical treatment. The samples were collected and stored in properly identified plastic containers containing 10% formalin. The radiographic examinations were evaluated by 3 previously calibrated examiners. Teeth with periapical radiolucencies were qualitatively assessed for the presence or absence of apical root resorptions according to the criteria proposed by Laux et al. (2000): (1) absence of root resorption; (2) evidence of root resorption (presence of irregularities in the root contour or shortening of the root apex). The criterion for diagnosing root resorption described by Estrela et al., (2009) was employed in the diagnosis of root resorptions in the CBCT examinations. The area of resorption was not measured. The final diagnosis of the presence of apical resorption was that determined by at least 2 of the 3 examiners.

RESULTS

Fourteen patients were involved in the study, 8 female (57.14%) and 6 male (42.86%), aged between 18-64 years. The sample consisted of 52 teeth (6 anterior, 23 premolars, and 23 molars). In total, 88 roots were analyzed. Regarding the diagnosis, the classifications were as follows: periapical abscess without fistula phase I 1 tooth (1.92%), pulp necrosis 1 tooth (1.92%), asymptomatic apical periodontitis 36 teeth (69.23%), symptomatic apical periodontitis 14 teeth (26.92%). Regarding the type of infection, 42 (80.77%) teeth presented with primary infection and 10 (19.23%) with secondary infection. A high prevalence of RR was observed after the use of tomography. However, there was no significant difference between Rx-P and TCFC.

CONCLUSION

Advances in clinical evaluation have greatly improved diagnostic accuracy. CBCT allows for a greater likelihood of correct management of resorption lesions compared to intraoral radiographs.

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