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 and cone-beam computed tomography (CBCT) in detecting inflammatory root resorption. Fourteen patients referred to the Emergency Service of the School of Dentistry of the Federal University of Goiás were evaluated. The sample consisted of 52 teeth and was divided according to tooth group: 6 anterior, 23 premolars, and 23 molars, with 88 roots analyzed. Periapical abscess without fistula stage I was diagnosed in 1 tooth (1.92%), pulp necrosis in 1 tooth (1.92%), asymptomatic apical periodontitis in 36 teeth (69.23%), and symptomatic apical periodontitis in 14 teeth (26.92%). Regarding the type of infection, 42 teeth (80.77%) presented primary infection and 10 teeth (19.23%) secondary infection. A high prevalence was observed after the use of CBCT. However, no statistically significant difference was found between periapical radiography and CBCT. Advances in clinical evaluation have greatly improved diagnostic accuracy. CBCT provides a greater probability of correct management of resorption lesions compared to intraoral radiographs.

Keywords: Inflammatory root resorption; CBCT; Periapical radiography.

INTRODUCTION

Root canal infection following pulp necrosis follows a natural route toward the apex and can induce an inflammatory process in the periapical structures. This aggressive process may stimulate the destruction of periapical tissues and induce loss of dental structure, characterizing an external root resorption (ERR) process (Andreasen & Andreasen, 2001; Tronstad, 1988; Nance et al., 2000; Pierce, 1989; Ne et al., 1999; Gunraj, 1999; Andreasen et al., 1987). Orthodontic treatment complications, dental trauma, tooth transplantation, pulp infection, dental bleaching, periodontal procedures, impacted teeth, cysts and tumors, as well as compression due

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to the eruption of an adjacent tooth are possible etiological agents of ERR (Leach et al., 2001).

Periapical radiographs are routinely used in the diagnosis of root changes and have advantages such as low radiation exposure, rapid processing, and satisfactory images in the mesiodistal direction. However, in the buccolingual direction, images are unsatisfactory and image distortions may be present (Estrela et al., 2008a; Takeshita et al., 2013; Hedrick et al., 1994).

CBCT has become the method of choice in dentistry when three-dimensional evaluation is required, revolutionizing clinical procedures by providing detailed information that aids in planning, diagnosis, treatment, and prognosis of root resorptions (Cotton et al., 2007; Patel et al., 2007; Estrela et al., 2008ab; Durack & Patel, 2012).

The aim of this study was to compare the accuracy of periapical radiography and cone-beam computed tomography in detecting inflammatory root resorption.

METHODOLOGY

The sample consisted of 14 patients referred to the Emergency Service of the School of Dentistry of the Federal University of Goiás, presenting teeth with extensive crown destruction due to caries and diagnosed with asymptomatic apical periodontitis with indication for surgical removal.

Inclusion criteria were individuals without systemic diseases, absence of odontogenic pain, and diagnosis of asymptomatic apical periodontitis. Exclusion criteria included patients with periodontal pockets deeper than 3 mm, endo-periodontal lesions, and communication between the root surface or periapical tissues and the oral cavity.

After clinical diagnosis, teeth were referred for surgical treatment, performed according to the individual characteristics of each patient, considering the relationship with adjacent anatomical structures. Before extraction, periapical radiographs were obtained and evaluated by three previously calibrated examiners. Teeth with periapical radiolucencies were qualitatively assessed for the presence or absence of apical root resorption according to the criteria proposed by Laux et al. (2000): (1) absence of root resorption; (2) evidence of root resorption (presence of irregularities in root contour or root apex shortening).

In addition, CBCT images were obtained. The diagnostic criterion for root resorption described by Estrela et al. (2009) was used. The resorption area was not measured.

The final diagnosis of apical resorption was established when at least 2 of the 3 examiners agreed.

RESULTS

A total of 14 patients comprised the sample. The demographic distribution of the sample was analyzed by sex, age, and tooth group. Among the patients, 8 were female (57.14%) and 6 were male (42.86%), with ages ranging from 18 to 64 years

and a mean age of 31.7 years.

The sample consisted of 52 teeth divided by group: 6 anterior, 23 premolars, and 23 molars. A total of 88 roots were analyzed. Regarding diagnosis, the classifications were: periapical abscess without fistula stage I in 1 tooth (1.92%), pulp necrosis in 1 tooth (1.92%), asymptomatic apical periodontitis in 36 teeth (69.23%), and symptomatic apical periodontitis in 14 teeth (26.92%). Concerning the type of infection, 42 teeth (80.77%) presented primary infection and 10 teeth (19.23%) secondary infection.

	Rx-P	TCFC
Raízes (n = 88)		
Sem reabsorção	78 (88,6%)	67 (76,1%)
Com reabsorção	10 (11,4%)	21 (23,9%)

Table 1 – Diagnosis of root resorption according to the type of imaging examination

Table 1 presents the data regarding the diagnosis of root resorption. A higher prevalence was observed with the use of tomography. However, no significant difference was found between periapical radiography (Rx-P) and cone-beam computed tomography (CBCT).

	Rx-P			TCFC			
	0	**1**	**Total**	**0**	**1**	**Total**	**Total**
Anterior	6	0	6	4	2	6	6
Pré-molar	24	5	29	21	8	29	29
Molar	48	5	53	42	11	53	53

Table 2 – Diagnosis of root resorption according to the tooth group.

Table 2 presents the data regarding the diagnosis of root resorption in relation to the tooth groups. A higher prevalence was observed after the use of tomography. However, no significant difference was found between PR and CBCT.

	Rx-P			TCFC		
	0	**1**	**Total**	**0**	**1**	**Total**
Mesio-vestibular	7	1	8	7	1	8
Palatina	17	0	17	14	3	17
Disto-vestibular	9	0	9	8	1	9
Mesial	9	2	11	8	3	11
Distal	11	2	13	11	2	13
Vestibular	7	1	8	6	2	8
Única	17	4	21	12	9	21
Fusionada	1	0	1	1	0	1

Table 3 – Diagnosis of root resorption as a function of the roots..7

Table 3 presents the data regarding the diagnosis of root resorption in relation to the dental roots. A higher prevalence was observed after the use of tomography.

However, no significant difference was found between PR and CBCT in the root analyses.

CONCLUSION

Advances in clinical evaluation have greatly improved diagnostic accuracy.

CBCT allows for a greater probability of correct management of resorption lesions when compared with intraoral radiographs.

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