

Research Article

Investigating the Accuracy of Panoramic Radiography for Assessing the Condition of the Roots of Small Canines

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Abstract

Background and Purpose: Correct radiographic interpretation, especially for root morphology, helps to distinguish open or closed surgical methods and avoid root fracture during tooth extraction. Therefore, canines are very important among teeth.

Materials and Methods: This study was performed on 35 patients who were referred to the clinic. patients, under standard conditions of panoramic radiograph preparation and dentistry, on November 1402, based on a radiologist's questionnaire about the interpretation of radiographs of canines before surgery. The questions included the number of tooth roots, the relation of roots to each other and the angle of the root to the crown.

Findings: In the present study, based on differences in angle reported interpretations of practical and real radiographs, considering 10 degrees of difference, the diagnostic accuracy of panoramic radiography is approximately 97%, and if we consider 15 degrees, panoramic radiography is more than 97%. It has diagnostic accuracy.

Conclusion: The results of this study showed that panoramic radiography is a valuable guide for evaluating the condition of canines.

Keywords: Dental Radiography, Panoramic and Canine Teeth

1. Introduction

The use of X-ray tools in dentistry is an obvious necessity [1]. Tooth extraction not only has therapeutic value but also involves the use of mechanical components. It is very important to check the curvature of the root during tooth extraction. Canine teeth are very important among teeth [2]. It is also very important to evaluate the inferior alveolar nerve before the extraction procedure. During a study, Wnzel and his colleagues investigated the accuracy of a digital system with panoramic film and intraoral radiography in the third molar of the jaw, and the results showed greater accuracy of the digital system in determining the number of third molar roots of the lower jaw [3]. Notably, bite wing imaging is useful and has advantages, such as the ability to detect caries under fillings, and disadvantages, such as high radiation and noncooperation [4-9]. Panoramic radiography is faster and less expensive. Our goal was to evaluate the accuracy of canine imaging via panoramic imaging. Canine teeth play an important role in determining dental structure. These teeth improve beauty by supporting the muscles of the lips and face. Additionally, these teeth are protected from destructive pressure from the back teeth during dental movements. Embedding is one of the major problems related to these teeth. A total of 2.8% of people have impacted canine teeth, possibly because of inheritance or late fall of milk teeth. If a ca-

nine tooth is lost, it is very difficult to replace it. because the upper canine teeth are located outside the axis between the base teeth [10].

The eruption of a dormant tooth is delayed, and there is no hope for eruption. Among the teeth, none is as important as canine teeth. Impaction in canines after the third molar is common [11]. Brenchley observed canine impaction more often in people with malocclusion [12]. In September 2015, Dr. Haqanifar, an assistant professor of oral and maxillofacial radiology at Babol University of Medical Sciences, investigated the accuracy of panoramic radiography for identifying the roots of third molar teeth. He conducted research on 38 patients. Photographs taken and completed questionnaires were checked by an expert radiologist to determine the number of roots. An evaluation revealed that 64% of the panoramic radiographs confirmed the accuracy of the images. Dr. Maffakheri, a radiologist, presented the diagnostic accuracy of panoramic radiographs for investigating tooth decay in Rafsanjan, Iran.

2. Materials and Methods

A recent study was performed on 35 patients (8 women and 27 men) aged 18 to 67 years. who visited Saheb AlZaman Clinic in Isfahan for OPG imaging on December 1402, and

their crowns and roots were healthy. The sampling method was completely nonrandom, and small canines were examined. For patients, panoramic radiography was performed using the GENORAY DB-160 device. The questionnaire included the characteristics and name of the patient, position of the tooth, number of roots and condition of the roots in relation to each other (adhesion or nonadhesion), and the angle of the tooth root to the crown. Digimizer software was used to determine the angle between the root and crown of the tooth. Therefore, from the middle point of the root end, two lines are extended, one toward the root and the other toward the crown. At this stage, a protractor could be used to measure the angle, but this angle was obtained from the difference from 90 (Figure 1). The data were subsequently analysed via SPSS tests via linear software and Pearson's correlation coefficient.



Figure 1: How to measure the angle between the root and crown via Digimizer software

Results

condition of 35 canine teeth in the study showed that 35 teeth were not impacted. An evaluation of the number of canine roots revealed that in 35 patients, the radiographic interpretation of the number of roots was correct, so the accuracy of the radiographic interpretation was approximately 100%. Additionally, when evaluating root conditions in relation to each other via radiographic interpretation and clinical examination, 35 patients' radiographic interpretations were found to be correct; thus, the accuracy of the radiographic interpretation in relation to the condition of the roots was 100%. For the 35 teeth evaluated, the angle detected via radiography was more than 7 degrees in 7 patients, more than 7 degrees in 28 patients, and exactly 0 degrees in 5 patients. Additionally, there is a relationship between the reported angle in radiographic interpretation and the actual angle in this study as follows:

The real angle of the tooth root relative to the crown is given by [13]:

$$0.912 \times \text{reported angle on radiography} + 7.922$$

Therefore, by converting practical angles to real values according to the above formula and sorting the data columns in the questionnaire table and then using Excel software, we constructed Graph 2, which shows the angular distribution of real values at four intervals for 35 patients (Figure 2). According to this diagram, the most reported angle range is 7.9 to 12.9, with 23 cases.

Therefore, detecting the angle of the tooth root relative to the crown via radiography is a significant way to estimate the real angle. Considering the difference in angles reported in practical and real radiographs and considering 10 degrees of difference, the diagnostic accuracy of panoramic radiography is approximately 97%, and if we consider 15 degrees, panoramic radiography has more than 97% diagnostic accuracy (Figure 3).

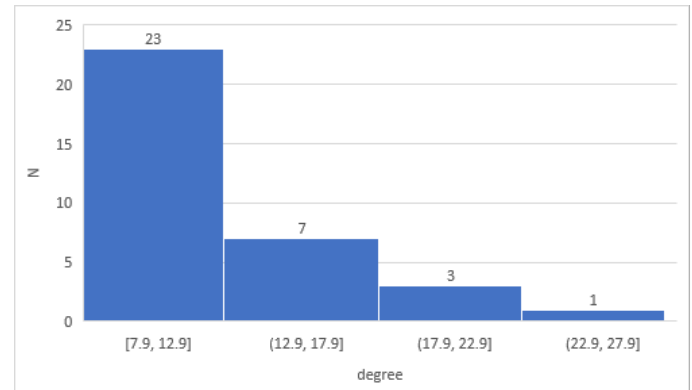


Figure 2: Angular distribution of real values at four intervals for 35 patients

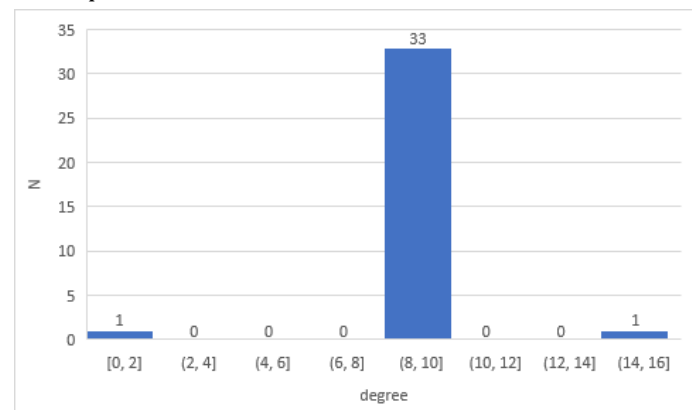


Figure 3: Differences between the reported angles for the interpretation of practical and actual radiographs

4. Discussion

In the present study, there was a difference in the reported angle used for the interpretation of practical and real radiographs. Considering the difference of 10 degrees, the diagnostic accuracy of panoramic radiography was approximately 97%, and if we considered the criterion of 15 degrees, panoramic radiography had more than 97% diagnostic accuracy. accuracy of radiographic interpretation regarding the condition of tooth roots is 100%. For the 35 teeth evaluated, the angle detected via practical radiography was more than 7 degrees in 7 patients, more than 7 degrees in 28 patients, and exactly 0 degrees in 5 patients. In 2015, in a similar study at Babol University of Medical Sciences, Dr. Haqqanifar and his colleagues worked on third molar teeth. In that study, the accuracy of the interpretation of panoramic radiographs of the third molar was evaluated in 64% of the roots, and the ratio of roots to each other (adherent or nonadherent) was 63%. This issue is probably related to the type of radiography used in the present study, which was extraoral and panoramic and does not have high resolution in revealing anatomical and

morphological details. On the other hand, the type of radiography device may also be effective, and the number of studied teeth and the number of radiograph interpreters are probably related to the study findings.

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