Journal of Cancer Science & Therapy - Open Access

Research Article
OPEN ACCESS Freely available online
doi:10.4172/1948-5956.1000044

JCST/Vol.2 Issue 6

Use of Panoramic Radiograph as a Single Radiographic Technique to Localize Impacted Maxillary Canine

Bhuvaneshwari[1]*, Junaid Ahmed[2] and Mohit Pal Singh[3]

[1]*Senior Lecturer, MDS, Department Of Oral Medicine & Radiology, Pacific Dental College & Hospital, Udaipur, Rajasthan*
[2]*Professor & Head Of The Department, MDS, Department of Oral Medicine & Radiology, Pacific Dental College & Hospital, Udaipur, Rajasthan*
[3]*Associate Professor, MDS, Department of Oral Medicine & Radiology, Pacific Dental College & Hospital, Udaipur, Rajasthan*

Abstract

Objective: To develop a reliable method of diagnosing the position of a displaced maxillary canine on the basis of a single radiograph.

Study design: Based on the criteria of selection, 50 subjects [19 males and 31 females] with a total of 67 impacted canines were evaluated. The ratio of the width of the displaced canine to the width of the homo-lateral central incisor [the canine-incisor index] and the ratio of the width of the displaced canine to the width of the contra lateral canine [canine-canine index] were calculated. The height of the crown of each displaced canine was classified in the vertical plane, relative to the adjacent incisor, as apical, middle or coronal.

Results: The canine incisor index [CII] ranges for the labially and palatally impacted canines were 0.66-1.75 and 0.7-2.00 respectively. There was presence of an overlap in these ranges .The canine-canine index [CCI] for labially and palatally impacted canines were 0.875 -1.750 and 0.800-1.857 which again showed an overlap. A cut off point of 1.16 was determined.

Conclusion: Provided that vertical restriction and the canine-incisor index were used, the panoramic radiograph can serve as a useful indicator as a single radiograph for determining the position of unerupted maxillary canines.

Introduction

Impaction is defined as the failure of a tooth to erupt in its appropriate site in the dental arch within its normal period of growth (Preda et al., 1997). The frequency of individual based permanent tooth eruption disturbances is 20% the overwhelming majority of impacted teeth involve third molars, followed by maxillary canines and the mandibular second premolars (Grover and Lorton, 1985). Maxillary canines are the most frequently impacted teeth after the third molars with the prevalence ranging from 0.92% [DACHI AND HOWELL 1961 (Dachi and Howell, 1961)] to 2.56% depending on the population examined (Bass, 1967). They are twice as common in females [1.17%] when compared to males [0.51% (Bishara, 1992)], the impacted canine is mostly found palatal to the lateral incisor and labial only in about 15%of cases (Richardson and Russell, 2000). The panoramic radiograph is widely used in the general practice and is the first choice radiograph for the orthodontic patients as stated by south all and gravely 1987 (Southall and Gravely, 1987). Localization with panoramic radiograph is a relatively new technique.

From the panoramic view, impaction of maxillary canine is an occasional but significant finding. It could be advantageous if this single film could be reliably used for localization of the unerupted teeth. As these are the films, which are often taken for patients undergoing orthodontic appraisal, no additional films need to be taken for such patients.

Materials and Methods

A total of 90 subjects [117 impacted canines] were taken up for the study. Based on the criteria of selection, 50 subjects [19 males and 31 females] with a total 67 impacted canines were included in the study. The age ranged from 13-25 years with the mean age of 14.7 years.

After the film exposure ,to ensure that the horizontal magnification equivalent the widest mesio-distal dimension of the first molar on the both sides were measured and compared .a difference greater than 5% resulted in the exclusion of the panoramic radiograph from the study (Figure 1).

The following measurements were assessed

- The widest mesio distal dimension of the impacted canine was measured on a line perpendicular to the long axis
- The widest mesio distal dimension of the erupted, properly positioned canine was measured on a line perpendicular to the long axis.

Figure 1: Orthopantomograph.

***Corresponding author:** Dr. S. Bhuvaneshwari, Senior Lecturer, Department of Oral Medicine & Radiology, Pacific Dental College & Hospital, Airport road, Debari, Udaipur, Rajasthan, Tel: 9828105776; Fax: 0294-2491508; E-mail: saibhu@yahoo.co.in

Received September 01, 2010; **Accepted** September 21, 2010; **Published** September 21, 2010

Citation: Bhuvaneshwari, Ahmed J, Singh MP (2010) Use of Panoramic Radiograph as a Single Radiographic Technique to Localize Impacted Maxillary Canine. J Cancer Sci Ther 2: 163-165. doi:10.4172/1948-5956.1000044

- The widest mesio distal dimensions of both the central incisors were measured on a line perpendicular to their long axis.

The ratio of the widest mesio distal dimension of the impacted canine to the widest mesio distal dimension of the ipsilateral central incisor was defined as the canine-incisor index [CII] (Figure 2). The ratio of the widest mesiodistal dimension of the erupted canine to the widest mesio-distal dimension of the ipsilateral central incisor was defined as control canine incisor index [c-CII]. The ratio of the widest mesio distal dimension of the impacted canine to that of the contralateral erupted canine was defined as canine-canine index [CCI] (Figure 3). On the panoramic radiograph ,the height of the tip of the crown of each displaced canine was assessed in the vertical plane relative to the ipsilateral central incisor .the root of the central incisor was divided in to three zones, apical, middle, coronal (Figure 4). For the purpose of surgical exposure as required by the oral surgeons, two periapical radiographs were taken using slob technique and the labio palatal position of the impacted canine was determined (Figure 5).

Results

Out of 50 panoramic radiographs with impacted maxillary canines, 16 had bilateral and 35 had unilateral impactions (Chart 1). This resulted in a total of 67 canine impactions .among 35 unilateral impactions ,17 were right sided and 18 were left sided impactions .the result of the study revealed 30 buccally impacted and 37 palatally impacted teeth (Chart 2). The canine incisor index [CII] range for labially impacted canine was 0.66-1.750 and for palatally impacted canines the ranges are 0.700-2.00 respectively (Chart 3). The canine canine index [CCI] range for labially impacted canine was 0.97-1.71 and for palatally impacted canine was 0.86-1.857 which again showed an overlain these ranges. The level of statistical significance was done by independent sample test [t-test].the independent t-test indicated that there was significant difference between buccal and palatal groups in CII in all the three zones.

The c-CII ranged from 0.571-2.00.when these results were examined in relation to the vertical height of the canine, clear difference could be seen between labially and palatally impacted canine, enabling bucco-lingual diagnosis. Based on the results, from

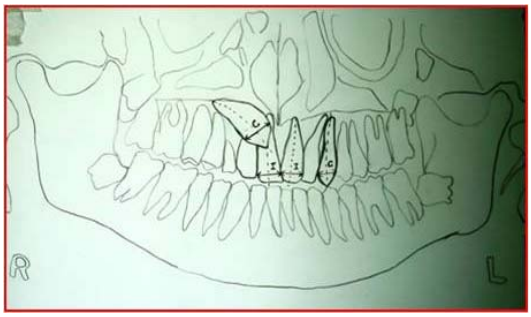

Figure 2: Canine-incisor index.

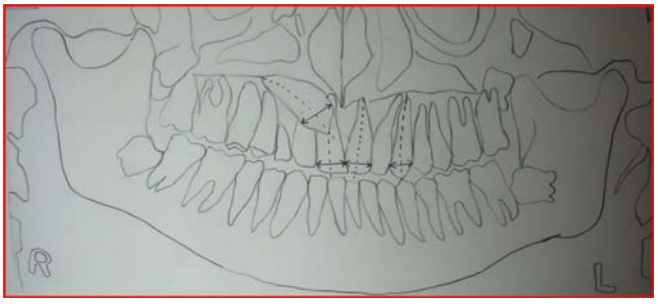

Figure 3: Canine- canine index.

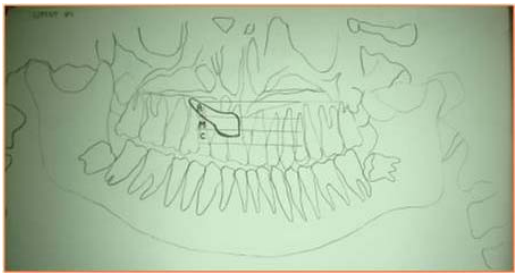

Figure 4: Vertical restriction criteria.

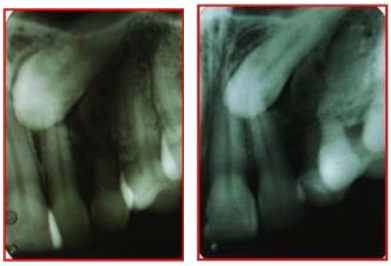

Figure 5: Slob technique.

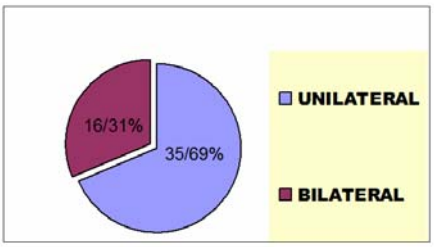

Chart 1: Distribution of unilateral and bilateral impactions.

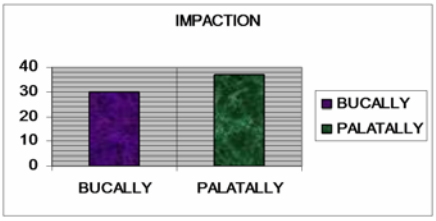

Chart 2: Distribution of sample into various localization groups.

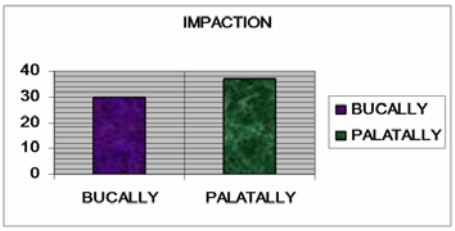

Chart 3: Distribution of the sample into various localization groups.

Research Article
OPEN ACCESS Freely available online
doi:10.4172/1948-5956.1000044
JCST/Vol.2 Issue 6

the present study, it could be inferred that 85.07% accuracy can be made from horizontal and vertical magnification criteria 0.59.70% accuracy can be made by localization using slob technique.

Discussion

The proper localization of the impacted tooth plays a fundamental role in determining the proper access for the surgical approach and the proper direction of application of orthodontic forces. The basic radiographic principle applied was that an object placed close to the panoramic film [i.e. further from the x-ray source] throws a smaller shadow than on object placed at a greater distance from the film and closer to the x-ray source. It is known that mesio-distal dimension of the canine is, on an average 90% of mesio-distal dimension of the central incisor or 1mm less. In an ideal dental arch, the canine is slightly more distant from a panoramic film than its ipsilateral incisor. The result is a 10% magnification of the canine on panoramic radiographs, which yields nearly identical mesio distal dimension, this represents the key to using the central incisor as the reference in the canine-incisor index [CII]. Hence the contralateral canine could be used in all the instances because of bilateral displacement, resulting in lower numbers for evaluation of CCI. Out of 67 impacted canines, 15 were projected in the coronal zone, ie 6 [22.22%] were labially placed and 9 [22.5%] were found to be palatally placed, 33 were projected in the middle zone i.e. 12 [44.44%] were labially placed 21 [52.5%] were palatally placed and 19 were projected in ten apical zone i.e. 9 [33.33%] were placed labially and 10 [25%] were placed palatally. In a previous study by Chaushu et al., (1999), 66.15% of the labially impacted canine overlaid the coronal zone and 74.74% of the palatally impacted canines were set in the middle zones. Similarly in our study the incidence of the palatally impacted canines in the middle zone [52.05%] was higher than the incidence of the palatally impacted canines in the coronal zones.

According to Chaushu et al., (1999), amount of magnification in impacted canine is the factor of distance from the dental arch, in which the canine was supposed to be located, if it was erupted. Hence this factor should have more influence on the mesiodistal dimensions of impacted canines rather than vertical zones.

According to Wolf and Mattila (1979), the labiopalatal position of approximately 90% of all the cases can be determined accurately. The greatest accuracy was achieved with palatally located teeth where the magnification is the largest. The accuracy of this method decreased significantly when these are positioned at the level of the dental arch or buccal to it. The author concluded that the magnification method is quite accurate for the clinical usage. Our findings were in accordance with the study. A prior study by Fox et al., (1995) demonstrated that correct prediction of palatal unerupted maxillary canine crowns using differential magnification on dental panoramic radiographs is possible in four out of five cases. It is accomplished from the present study that the correct prediction of palatal or labial canine impactions using differential magnification on dental panoramic radiograph is possible in about 85.07%

Conclusion

When CII and CCI valves of labially and palatally impacted canine were compared a statistically significant difference was found between the two. A cut off valve for CII with respect to the zones was determined the labial and palatally impacted canines could be reliably localized if canine with CII valves of 1.16 or above were measured.

It is concluded from the present study that correct prediction of palatal and labial canine impaction using differential magnification criteria on a dental; panoramic radiograph was possible in 85.07%. Although narrow image layer in the anterior region is a disadvantage of panoramic radiograph, the resulting distortion can prove to be a blessing in disguise, if a method is established to reliably localize impacted maxillary canine using a single panoramic radiograph.

References

1. Bass TB (1967) Observations On The Misplaced Upper Canine Teeth. Dent Pract Dent Rec 18: 25-33.
2. Bishara SE (1992) Impacted Maxillary Canines-A Review. Am J Orthod Dentofacial Orthop 101: 159-171.
3. Chaushu S, Chaushu G, Becker A (1999) The Use Of Panoramic Radiograph To Localize Displaced Maxillary Canines. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 88: 511-516.
4. Dachi SF, Howell FV (1961) A Survey of 3874 Routine Full Mouth Radiographs. A Study of Retained Roots and Teeth. Oral Surg Oral Med Oral Pathol 14: 1165-1169.
5. Fox NA, Fletcher GA, Horner K (1995) Localizing Maxillary Canines Using Dental Panoramic Tomography. Br Dent J 179: 416-442.
6. Grover PS, Lorton I (1985) The Incidence Of Unerupted Permanent Teeth And Related Clinical Cases. Oral Surg Oral Med Oral Pathol 59: 420-425.
7. Preda L, La Fianza A, Di Maggio EM, Dore R, Schifino MR, et al. (1997) The Use Of Spiral Computed Tomography In The Localization Of Impacted Maxillary Canine. Dentomaxillofac Radiol 26: 236-41.
8. Richardson G, Russell KA (2000) A Review of Impacted Permanent Maxillary Cuspids - Diagnosis and Prevention. J Can Dent Assoc 66: 497-501.
9. Southall PJ, Gravely JF (1987) Radiographic Localization of Unerupted Teeth in the Anterior Part of the Maxilla; a Survey of Methods Currently Employed. Br J Orthod 14: 235-242.
10. Wolf JE, Mattila K (1979) Localization of Impacted Maxillary Canines by Panoramic Tomography. Dentomaxillofac Radiol 8: 85-91.