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Original research article

Comparison of panoramic radiography and cone-beam computed tomography for qualitative and quantitative measurements regarding localization of permanent impacted maxillary canines

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Abstract

Objective: The purpose of this retrospective study was to compare the correlation between digital panoramic radiography (DPR) and cone-beam computed tomography (CBCT) evaluations for localization of impacted permanent maxillary canines (IPMCs) and for other qualitative and quantitative parameters.

Materials and Method: DPR and CBCT images of 60 patients (17 men and 43 women) were examined independently by two observers. Correlations between DPR and CBCT images were evaluated regarding qualitative (bucco-palatal positioning of IPMCs, morphology and presence of root resorption of adjacent permanent lateral incisors, and contact relationship between IPMCs and adjacent permanent lateral incisors) and quantitative (angle measurements) variables. All evaluations were repeated 1 month later by each observer. Chi-square and t-tests were used for statistical analysis. Kappa statistics were used to assess intra- and interobserver agreement (Cohen's κ).

Results: No correlation was observed for determination of bucco-palatal positioning of IPMCs between DPR and CBCT images ($p>0.05$). Correlations were observed for other qualitative variables ($p<0.05$). Differences between DPR and CBCT images were seen for all examined quantitative variables ($p<0.01$). Intra- and interobserver agreements were substantial to almost-perfect.

Conclusion: No significant correlation was found between DPR and CBCT images for determination of bucco-palatal positioning of IPMCs. All quantitative measurements performed on DPR and CBCT images significantly differed from each other.

Keywords: Canine tooth; cone-beam computed tomography; panoramic radiography

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Introduction

Permanent maxillary canines are the second most frequently impacted teeth after the third molars, with an impaction prevalence of 1–3%.[1,2] Impacted permanent maxillary canines (IPMCs) are found twice as often in women than in men.[3] These impacted teeth can cause aesthetic concerns because they appear in the smile line. They can cause functional problems as a result of various pathologies, such as cyst formation and root resorption of adjacent teeth.[3] Surgical interventions for the rehabilitation of aesthetic and functional problems are very difficult, and orthodontic treatment is difficult and time consuming.[4] The proper localization and early detection of IPMCs are very important to prevent possible complications in adjacent teeth, ankyloses, and cysts.[5]

In clinical practice, panoramic radiography is the preferred primary radiographic imaging technique for impacted teeth.[4] When determining the actual position of the impacted tooth, two-dimensional images obtained by occlusal and periapical radiographs can be used in combination. However, these images have many disadvantages, such as blurring, superposition, and distortion due to projection errors. Therefore, three-dimensional (3D) imaging is necessary to determine the actual position of the IPMC.[4] In recent years, cone-beam computed tomography (CBCT) systems for acquiring 3D images of oral structures have been preferred due to their relatively low cost and low radiation dose.[6] Several studies have examined the localization of IPMCs for various populations, such as

Italian,[7] Swedish,[5] Chinese,[8,9] German,[10] Belgian,[6] North American,[11] Korean,[12] Swiss,[13] and Polish.[14] To the best of our knowledge, however, no such studies have been conducted for the Turkish population.

The purpose of this retrospective study was to compare whether there was a correlation between digital panoramic radiographic (DPR) and CBCT evaluations in terms of the localization of IPMCs, morphology of the adjacent permanent lateral incisors (PLIs), contact relationship between IPMCs and PLIs, presence of root resorption in the adjacent PLIs, and various angle measurements.

Table 1. *Evaluated variables and categories of variables in the study*

	Variable	Category
Qualitative variables	Bucco-palatal location of IPMC	Buccal Palatal
	Morphology of adjacent PLI	Peg-shaped Normal
	Contact relationship between IPMC and adjacent PLI	Cervical third of the root Apical third of the root
	Root resorption in adjacent PLI	No resorption Resorption
Quantitative variables	Angle measurements	IPMC angle to lateral incisor IPMC angle to midline IPMC angle to occlusal plane

Materials and Method

The present study was approved by Ankara University Faculty of Dentistry Clinical Research Ethics Committee (no. 36290600/54, 3 March 2014). At baseline, 150 patients with unilateral or bilateral IPMCs were identified among 2,218 CBCT images, obtained for various reasons between December 2011 and February 2013 at Gazi University Faculty of Dentistry Department of Dentomaxillofacial Radiology. Of the 150 patients, 60 patients who had DPR images stored in the Radiology Archive in addition to CBCT images were selected.

DPR and CBCT images of patients with following criteria were included in this study: patients were over 15 years old, had clear maxillary radiographic images with unilateral or bilateral IPMCs, had no pathology in the maxillary region, and had no artifacts in the maxillary region that would affect image quality. A total of 69 IPMCs of 60 patients (17 men and 43 women) met the study criteria and were examined. Sample size was determined to be adequate by statistical power analysis (power value = 0.94).

DPR images were obtained using a Morita Veraviewepocs 2D (Morita, Kyoto, Japan) with parameters of 60–80 kVp, 1–10 mA, 0.5 mm focal spot, and exposure time of 7.4 seconds. CBCT images were obtained with a Promax 3D® (Planmeca, Helsinki, Finland) with 8 × 8 cm, 5 × 8 cm, and 5 × 4 cm fields of view and parameters of 90 kVp, 12 mA, scanning time of 13.85 seconds, and voxel size of 0.4 × 0.4 × 0.4 mm. DPR and CBCT scans were performed with the patient resting in the supine position. The head of the patient was positioned using two light-beam markers, with a vertical positioning light being aligned with the mid-sagittal line of the patient.

Criteria used in various previous studies were modified to assess DPR and CBCT images of IPMCs.[1-15] The amount of magnification, which was determined by the manufacturer (×1.3), was taken into account in the measurements of DPR images. Morphology of the adjacent PLI, contact relationship between the IPMC and the adjacent PLI, presence of root resorption in the adjacent PLI, and angle measurements were evaluated in DPR images and in the coronal and sagittal sections of CBCT images (Table 1).

The Canine-Incisor Index (CII) was used to localize the bucco-palatal position of the IPMC in DPR images. The CII was calculated by dividing the widest mesiodistal size of the IPMC by the widest mesiodistal size of the permanent central incisor on the same side. If the resulting number was smaller than 1.15, then the position was classified as “buccally located”; if the number was greater than 1.15, then the position was classified as “palatally located”.[9,15,16] To determine the bucco-palatal position of the IPMC in the CBCT image, distances from the IPMC crown to the buccal and palatal cortical bones were measured. When the distance from the IPMC crown to the buccal bone was shorter than the distance to the palatal bone, the tooth was categorized as “buccally located”; otherwise, the tooth was categorized as “palatally located”.[17]

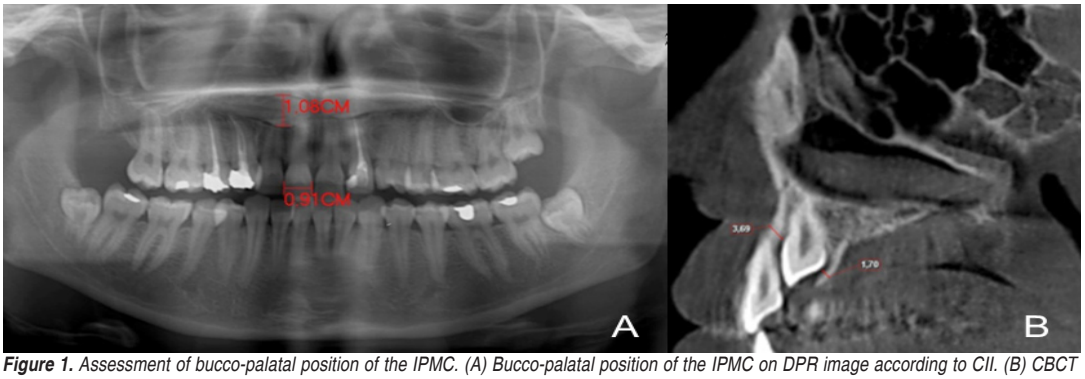

Figure 1. *Assessment of bucco-palatal position of the IPMC. (A) Bucco-palatal position of the IPMC on DPR image according to CII. (B) CBCT image for measurements of distances from IPMC crown to buccal and palatinal cortical plates in the sagittal plane.*

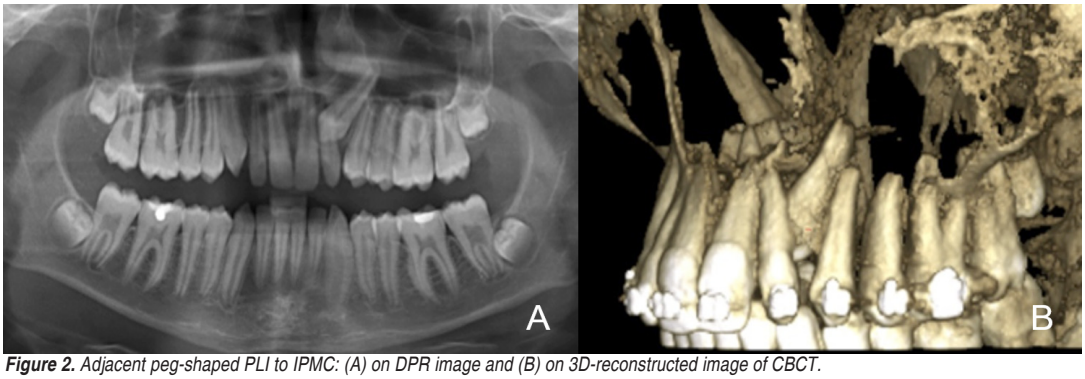

Figure 2. *Adjacent peg-shaped PLI to IPMC: (A) on DPR image and (B) on 3D-reconstructed image of CBCT.*

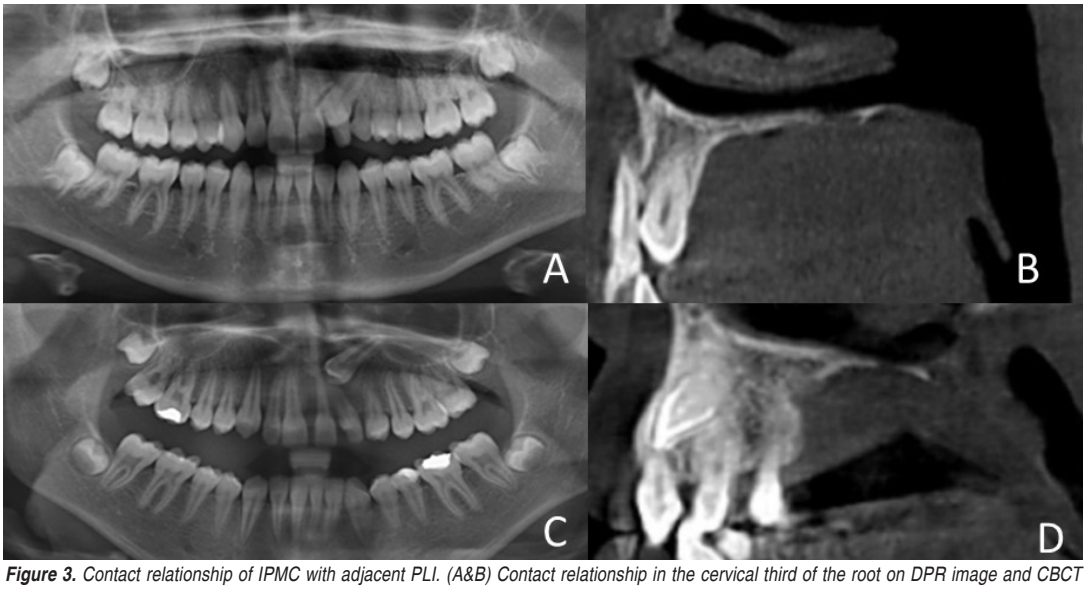

Figure 3. *Contact relationship of IPMC with adjacent PLI. (A&B) Contact relationship in the cervical third of the root on DPR image and CBCT image in the sagittal plane. (C&D) Contact relationship in the apical third of the root on DPR image and CBCT image in the sagittal plane.*

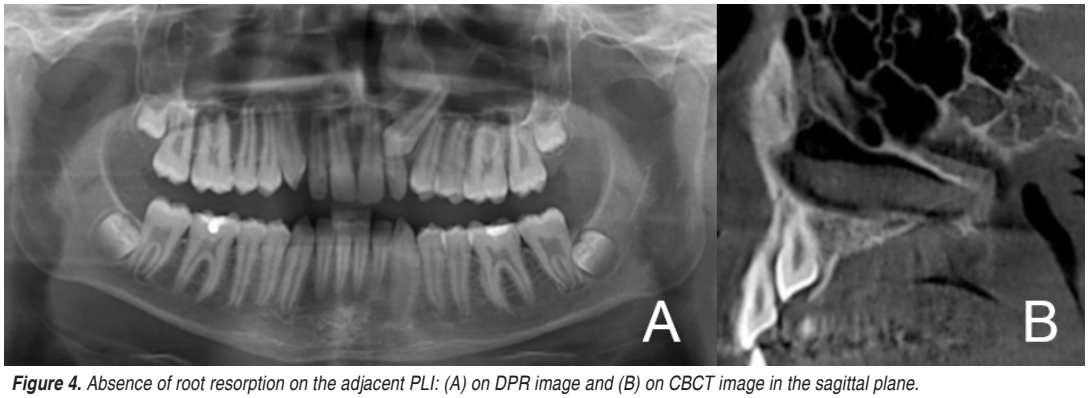

Figure 4. *Absence of root resorption on the adjacent PLI: (A) on DPR image and (B) on CBCT image in the sagittal plane.*

All evaluations were conducted independently by two researchers (C.S., S.D.) with at least 2 years of experience in DPR and CBCT images, in a quiet room with subdued ambient lighting, approximately 50 cm away from the screen. One month after the initial assessment, all evaluations were repeated by both researchers. Examples of evaluations are shown in Figs. 1–5.

DPR images were assessed on 20-inch Asus medical monitor (Asustek Computer Inc., Taipei, Taiwan) with 1280 × 768-pixel resolution and ATI Radeon™ HD 5470 (AMD Inc., Sunnyvale, CA, USA) graphics card. CBCT images were analyzed on 24-inch Philips medical monitor with NVDIA QUADRO FX 380 (NVDIA Corp., Santa Clara, CA, USA) graphics card and 1920 × 1080-pixel resolution by using Romeksis 2.7.0. (Planmeca, Helsinki, Finland).

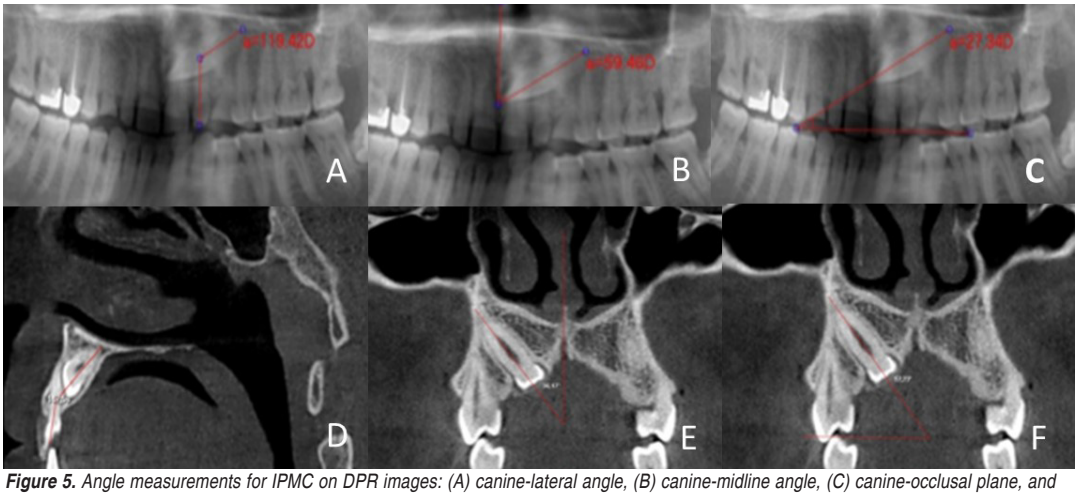

Figure 5. *Angle measurements for IPMC on DPR images: (A) canine-lateral angle, (B) canine-midline angle, (C) canine-occlusal plane, and angle measurements for IPMC on CBCT images in sagittal and coronal planes, (D) canine-lateral angle, (E) canine-midline angle, and (F) canine-occlusal plane angle.*

Data analysis

Data were analyzed statistically using SPSS program version 21.0 (SPSS Inc., Chicago, IL, USA). Fisher's exact test was performed. Cramer's V correlation coefficients were calculated for statistical analysis of the correlation between DPR and CBCT images for the following qualitative variables: bucco-palatal positioning of the IPMC, contact relationship between the IPMC and the adjacent PLI, and morphology of the PLI. Differences between DPR and CBCT images were statistically analyzed by using the t-test for quantitative variables, including angle measurements. Kappa statistics were used to assess intra- and interobserver agreements. Interpretation of the correlation coefficient obtained from the Kappa statistics was evaluated as suggested by Landis and Koch.[18] Statistical analyses were performed at significance levels of 95% and 99% for qualitative and quantitative variables, respectively.

Results

The study sample comprised 60 patients (17 males, 28.3% and 43 females, 71.7%) between 15 and 62 years old (mean age ± standard deviation: 28.4 ± 14.4 years). Sixty-nine IPMCs were evaluated. There were 51 patients with unilateral and 9 patients with bilateral IPMCs.

Intra- and interobserver agreements

When we examined intraobserver agreement for the DPR method for quantitative variables, we obtained Cohen's κ values of 0.78–0.98 and 0.74–0.95 for the first and second rater, respectively (substantial to almost-perfect agreement). For the CBCT method, intraobserver Cohen's κ values varied 0.95–0.99 for both raters (almost-perfect agreement). When interobserver agreements in both methods for the quantitative variables were examined, Cohen's κ values were 0.84–0.98 (almost-perfect agreement).

Table 2. *Correlation between DPR and CBCT images for bucco-palatal positioning of IPMCs*

Positioning on DPR	Positioning on CBCT			Statistical analysis		
	Buccal, n (%)	Palatal, n (%)	Total, n (%)	χ^2	Cramer's V	P[a]
Buccal, n (%)	23 (33.8)	45 (66.2)	68 (98.6)	0.51	0.11	0.67
Palatal, n (%)	0 (0.0)	1 (100.0)	1 (1.4)			
Total, n (%)	23 (33.3)	46 (66.7)	69 (100.0)			

[a]*Fisher's exact test*

Table 3. *Correlation between DPR and CBCT images for morphology of adjacent PLI*

Morphology on DPR	Morphology on CBCT			Statistical analysis		
	Peg-shaped, n (%)	Normal shaped, n (%)	Total, n (%)	χ^2	Cramer's V	P[a]
Peg-shaped, n (%)	6 (40.0)	9 (60.0)	15 (21.7)	18.74	0.52	0.00*
Normal-shaped, n (%)	1 (1.9)	53 (98.1)	54 (78.3)			
Total, n (%)	7 (10.1)	62 (89.9)	69 (100.0)			

[a]*Fisher's exact test; * statistically significant (p<0.05)*

Table 4. *Correlation between DPR and CBCT images for contact relationship of the IPMC and the adjacent PLI*

Contact relationship on DPR	Contact relationship on CBCT			Statistical analysis		
	Cervical third, n (%)	Apical third, n (%)	Total, n (%)	χ^2	Cramer's V	P[a]
Cervical third, n (%)	28 (80.0)	7 (20.0)	35 (50.7)	32.29	0.68	0.00*
Apical third, n (%)	4 (11.8)	30 (88.2)	34 (49.3)			
Total, n (%)	32 (46.4)	37 (53.6)	69 (100.0)			

[a]*Fisher's exact test; * statistically significant (p < 0.05)*

Table 5. *Correlation between DPR and CBCT images for root resorption caused by IPMC in adjacent PLI*

Root resorption on DPR	Root resorption on CBCT			Statistical analysis		
	Resorption, n (%)	No resorption, n (%)	Total, n (%)	χ^2	Cramer's V	P[a]
Resorption, n (%)	14 (87.5)	2 (12.5)	16 (23.2)	5.63	0.27	0.02*
No resorption, n (%)	29 (54.7)	24 (45.3)	53 (76.8)			
Total, n (%)	43 (62.3)	26 (37.7)	69 (100.0)			

[a]*Fisher's exact test; * statistically significant (p<0.05)*

Table 6. *Comparison of DPR and CBCT images for quantitative variables*

Measurement	Method	Mean	Standard deviation	T	P[a]
IPMC angle to lateral incisor	DPR	57.26	25.00	-3.37	0.00*
	CBCT	83.41	56.23		
IPMC angle to midline	DPR	47.08	18.52	7.26	0.00*
	CBCT	34.68	17.50		
IPMC angle to occlusal plane	DPR	45.99	28.20	-0.95	0.00*
	CBCT	49.79	19.35		

[a]*t-test; * statistically significant (p<0.05)*

Qualitative variables

No correlation was found between DPR and CBCT images for bucco-palatal positioning of IPMCs (Table 2; p>0.05). The percentage of teeth observed in the buccal region on both DPR and CBCT images was 33.8%. Correlations between DPR and CBCT images were found for the morphology of the adjacent PLI, the contact relationship, and the root resorption (Tables 3–5; p<0.05). These parameters were determined identically on DPR and CBCT images in 85.5%, 84.1%, and 55% of cases, respectively.

Quantitative variables

Differences were found between DPR and CBCT images for all examined quantitative variables (Table 6; p<0.01).

Discussion

To the best of our knowledge, only five studies in the literature have compared panoramic radiography and CBCT in terms of the localization of IPMCs.[6,10,17,19,20] In these studies, orthodontists, oral surgeons, and/or dental practitioners worked as observers. Although radiology was an important part of these studies, none of them involved dentomaxillofacial radiologists. In contrast, all of the evaluations in this study were performed by specialists in dentomaxillofacial radiology with at least 2 years of experience.

Previous studies used magnification methods[6,20,21] and CII[9,15,16] calculations to determine the bucco-palatal positions of IPMCs in panoramic radiographs. Chaushu *et al.*[16] confirmed that localization of the bucco-palatal

positioning of IPMCs can be determined reliably using the CII in panoramic radiography. Similar results were reported in other studies.[6,20] Haney *et al.*[19] reported significant correlations between CBCT and DPR images for the bucco-palatal localization of IPMCs. However, no other study to date has analyzed IPMC localization by comparing DPR (using CII) and CBCT. In this study, only 33.8% of IPMCs were in an identical bucco-palatal position in both DPR and CBCT images.

Previous reports found that peg-shaped PLIs with small mesiodistal width and delayed root development and the absence of lateral incisors caused the eruption of permanent maxillary canines toward the palatal side.[22-24] Lai *et al.*[13] investigated the morphology of PLIs on CBCT images of IPMCs. Permanent lateral incisors were absent in 2.9%, had a normal morphology in 70.9%, and had a peg-shaped morphology in 26.1% of images. In the present study, on DPR images, peg-shaped PLIs were identified in 21.7% of cases, whereas CBCT revealed this rate as 10.1%. However, the two methods were statistically consistent with each other for the "morphology of the adjacent PLI" variable, with identical readings in 85.5% of cases.

Consistent with previous studies of CBCT images, IPMCs were mostly impacted in the palatal side in patients with peg-shaped PLIs.[23,24] Ericson and Kurol[5] emphasized that resorption in maxillary PLIs in patients with IPMCs was due to the pressure from the permanent canine during eruption or from contact between these teeth. They also found that the IPMC crown was in contact with the adjacent PLI in 67% of cases, and was in contact with the permanent central incisor in 57% of cases.[5] Lai *et al.*[13] classified the contact relationship between the IPMC and the PLI as follows: cervical (10.4%), middle (43.2%), or apical third (21.6%) of the root. Alqerban *et al.*[6] stated that there was a contact relationship between respective teeth in 73.9% of DPR images and 89% of CBCT images. In the present study, 50.7% of PLIs were in contact with the IPMC in the cervical third and 49.3% were in contact in the apical third, as evaluated on DPR images. No tooth without contact was found. This study showed that DPR and CBCT readings were substantially consistent, with a rate of identical readings of 84.1%.

Root resorption caused by IPMC occurs most often in PLIs.[2,5,8] Ericson and Kurol[5] reported that root resorption in permanent incisors due to ectopically positioned IPMCs was approximately 50% and four times more prevalent in women than in men. Preda *et al.*[7] observed root resorption in PLIs at a rate of 27.6% on spiral CT images. In studies conducted by CBCT, root resorption in adjacent PLIs was reported at rates of 13.4%,[17] 25.4%,[13] 30.1%,[12] 43%,[20] and 59.6%.[11] Liu *et al.*[8] reported that root resorption was present in PLIs on CBCT at a rate of 27.2%, whereas the rate for the permanent central incisors was 23.4%. Alqerban *et al.*[6] compared panoramic radiography with CBCT and found root resorption in PLIs at rates of 29.4–30.7% on panoramic radiography and 50.9–53.9% on CBCT. In the same study, root resorption was observed in 13% of permanent central incisors on panoramic radiography and 15.1% on CBCT.[6] In the present study, the presence of root resorption in adjacent PLIs was detected in 23.2% of DPR images and 62.3% of CBCT images. Identical readings in DPR and CBCT were found in 55% of cases. These findings are similar to the findings of previous studies.[6,11]

Angles of IPMCs to the midline, occlusal plane, and PLIs are useful for estimation of the possibility of root resorption in adjacent PLIs, and also for the localization of the bucco-palatal position of the IPMC.[14,25] Our findings regarding these quantitative variables are in accordance with a previous study, in which the angle measurements in panoramic radiographs and CBCT images were inconsistent.[9]

Conclusion

DPR and CBCT images yielded similar results for some of the qualitative parameters, including morphology of the adjacent PLI, contact relationship with adjacent PLIs, and root resorption. However, discrete findings were obtained for the bucco-palatal position of IPMCs and for all quantitative variables in DPR and CBCT techniques.

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Conflict of interest disclosure: The authors declare no conflict of interest related to this study.

References

1. Mason C, Papadakou P, Roberts GJ. The radiographic localization of impacted maxillary canines: a comparison of methods. Eur J Orthod 2001;23:25–34.

2. Walker L, Enciso R, Mah J. Three-dimensional localization of maxillary canines with cone-beam computed tomography. Am J Orthod Dentofac Orthop 2005;128:418-23.

3. Peck S, Peck L, Kataja M. The palatally displaced canine as a dental anomaly of genetic origin. Angle Orthod 1994;64:249–56.

4. Rossini G, Cavallini C, Cassetta M, Galluccio G, Barbato E. Localization of impacted maxillary canines using cone beam computed tomography. Review of the literature. Ann Stomatol (Roma) 2012;3:14–8.

5. Ericson S, Kurol PJ. Resorption of incisors after ectopic eruption of maxillary canines: a CT study. Angle Orthod 2000;70:415–23.

6. Alqerban A, Jacobs R, Fieuws S, Willems G. Comparison of two cone beam computed tomographic systems versus panoramic imaging for localization of impacted maxillary canines and detection of root resorption. Eur J Orthod 2011;33:93–102.

7. Preda, L, La Fianza, A, Di Maggio EM, Dore R, Schifino MR, Campani R. The use of spiral computed tomography in the localization of impacted maxillary canines. Dentomaxillofac Radiol 1997;26: 236–41.

8. Liu DG, Zhang WL, Zhang ZY, Wu YT, Ma XC. Localization of impacted maxillary canines and observation of adjacent incisor resorp-

tion with cone-beam computed tomography. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008;105:91–8.

9. An S, Wang J, Li J, Cheng Q, Jiang C-M, Wang Y-T, *et al.* Comparison of methods for localization of impacted maxillary canines by panoramic radiographs. Dentomaxillofac Radiol 2013;42:20130129.

10. Wriedt S, Jaklin J, Al-Nawas B, Wehrbein H. Impacted upper canines: examination and treatment proposal based on 3D versus 2D diagnosis. J Orofac Orthop 2011;73:28–40.

11. Oberoi S, Knueppel S. Three-dimensional assessment of impacted canines and root resorption using cone beam computed tomography. Oral Surg Oral Med Oral Pathol Oral Radiol 2012;113:260–7.

12. Jung YH, Liang H, Benson BW, Flint DJ, Cho BH. The assessment of impacted maxillary canine position with panoramic radiography and cone beam CT. Dentomaxillofacial Radiol 2012;41:356–60.

13. Lai CS, Bornstein MM, Mock L, Heuberger BM, Dietrich T, Katsaros C. Impacted maxillary canines and root resorptions of neighbouring teeth: a radiographic analysis using cone-beam computed tomography. Eur J Orthod 2013;35:529–38.

14. Chaushu S, Kaczor-Urbanowicz K, Zadurska M, Becker A. Predisposing factors for severe incisor root resorption associated with impacted maxillary canines. Am J Orthod Dentofacial Orthop 2015;147:52–60.

15. Sudhakar S, Patil K, Mahima VG. Localization of impacted permanent maxillary canine using single panoramic radiograph. Indian J Dent Res 2009;20:340–5

16. Chaushu S, Chaushu G, Becker A. Reliability of a method for the localization of displaced maxillary canines using a single panoramic radiograph. Clinical Orthod Res 1999;2:194–9.

17. Lai CS, Suter VG, Katsaros C, Bornstein MM. Localization of impacted maxillary canines and root resorption of neighbouring teeth: a study assessing the diagnostic value of panoramic radiographs in two groups of observers. Eur J Orthod 2014;36:450–6.

18. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics 1977;33:159–74.

19. Haney E, Gansky SA, Lee JS, Johnson E, Maki K, Miller AJ, *et al.* Comparative analysis of traditional radiographs and cone-beam computed tomography volumetric images in the diagnosis and treatment planning of maxillary impacted canines. Am J Orthod Dentofacial Orthop 2010;137:590–7.

20. Botticelli S, Verna C, Cattaneo PM, Heidmann J, Melsen B. Two versus three-dimensional imaging in subjects with unerupted maxillary canines. Eur J Orthod 2011;33:344–9.

21. Mallya SM, Lurie AG. Panoramic imaging. White SC, Pharoah MJ, ed. Oral Radiology: Principles and Interpretation Ed.7, St. Louis, Missouri: Mosby; 2014. p. 167–184.

22. Alqerban A, Jacobs R, Fieuws S, Willems G. Radiographic predictors for maxillary canine impaction. Am J Orthod Dentofacial Orthop 2015;147:345–54.

23. Becker A, Smith P, Behar R. The incidence of anomalous maxillary lateral incisors in relation to palatally-displaced cuspids. Angle Orthod 1981;51:24–9.

24. Baccetti T. A controlled study of associated dental anomalies. Angle Orthod 1998;68:267–74.

25. Katsnelson A, Flick WG, Susarla S, Tartakovsky JV, Miloro M. Use of panoramic x-ray to determine position of impacted maxillary canines. J Oral Maxillofac Surg 2010;68:996–1000.

Gömülü daimi maksiller kanin dişlerin lokalizasyonunun belirlenmesi için panoramik radyografi ve konik-ışınlı bilgisayarli tomografi görüntülerinde yapılan nitel ve nicel ölçümlerin karşılaştırılması

Özet

Amaç: Bu retrospektif çalışmanın amacı; gömülü daimi maksiller kanin dişlerin lokalizasyonunun belirlenmesinde, ve diğer nitel ve nicel değişkenler için, dijital panoramik radyografi (DPR) ve konik-ışınlı bilgisayarlı tomografi (KIBT) görüntülerinde yapılan değerlendirmeler arasındaki uyumluluğun karşılaştırılmasıdır.

Gereç ve Yöntem: Çalışmada 60 hastanın (43 kadın ve 17 erkek) DPR ve KIBT görüntüleri iki gözlemci tarafından, birbirinden bağımsız olarak incelendi. DPR ve KIBT görüntüleri arasındaki ilişki, nitel (gömülü daimi maksiller kanin dişlerin bukko-palatal yöndeki lokalizasyonu, komşu daimi lateral kesici diş kökünde rezorpsiyon varlığı, gömülü daimi maksiller kanin dişler ve komşu daimi lateral kesici arasındaki kontakt ilişkisi) ve nicel değişkenler (açı ölçümleri) yönünden değerlendirildi. Veri istatisksel olarak ki-kare ve t-testleri ile analiz edildi. Gözlemci içi ve gözlemciler arası uyum Kappa istatistiği ile incelendi (Cohen's κ).

Bulgular: Gömülü daimi maksiller kanin dişlerin bukko-palatal yöndeki lokalizasyonunun belirlenmesinde DPR ve KIBT görüntüleri arasında istatistiksel olarak anlamlı bir korelasyon bulunamadı ($p>0.05$). Diğer nitel değişkenler için DPR ve KIBT görüntüleri arasında istatistiksel olarak anlamlı korelasyon vardı ($p<0.05$). Tüm nicel değişkenler için DPR ve KIBT görüntüleri arasında istatistiksel olarak anlamlı fark bulundu ($p<0.01$). Yapılan tüm incelemelerde gözlemci içi ve gözlemciler arası değerlendirmeler tutarlı bulundu.

Sonuç: Gömülü daimi maksiller kanin dişlerin bukko-palatal yöndeki lokalizasyonunun belirlenmesinde DPR ve KIBT görüntüleri arasında anlamlı bir korelasyon bulunamadı. DPR ve KIBT görüntüleri üzerinde yapılan tüm nicel ölçümler birbirinden belirgin bir şekilde farklılık gösterdi.

Anahtar Kelimeler: Kanin diş; konik-ışınlı bilgisayarlı tomografi; panoramik radyografi