Original article:

CBCT Evaluation of the Prevalence of Impacted Maxillary Canines in a Saudi Arabian Population: A Preliminary Study

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Abstract

Objective: To determine the prevalence of impacted canines in a Saudi Arabian population using CBCT. **Material and methods:** A total of 439 CBCT scans of 241 male and 198 female subjects were analyzed in this study by two qualified observers to know the presence or absence of impacted canines and their distribution in terms of gender, jaw and side. All the obtained data were tabulated statistically analyzed using SPSS 21.0 (Chicago, USA). **Results:** Impacted canines were noted in 13 of 439 subjects with a prevalence of 3.03%, among which 7 (2.96%) were seen in males and 6 (3.12%) were seen in females. Out of these 13 impacted canines, 9 were observed in maxillary jaw, 3 in the right quadrant and 6 in the left quadrant. Four impacted canines were noted in mandibular jaw, 2 in right side and 2 in the left side. **Conclusion:** The results from the present study indicate that the prevalence of impacted canines is comparable with other studies. Most of the impacted canines were located in the maxillary jaw and in females.

Keywords: CBCT, Impacted canines, maxilla; prevalence

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Introduction

Impaction of maxillary and mandibular canines is as often as possible experienced clinical issue, the treatment of which for the most part requires an interdisciplinary approach.¹ Maxillary canines are reported to be the most frequently impacted teeth after third molars. Generally the reason behind delayed eruption of teeth may be related to general or local factors.² Missing of the maxillary lateral incisor and its variation in terms of the size of the root as well as variation in the timing of its root formation, have been implicated

as important etiologic factors associated with canine impaction.³ Impacted canine can lead to various pathological changes such as migration and displacement of the adjacent teeth, loss of arch length, periapical pathologies, cysts, internal and external resorption.⁴ Timely diagnosis and intervention may help in preventing these pathologies related to impacted canines.⁵ The evaluation of the impacted canine is routinely carried out using conventional radiographic techniques like periapical radiography and panoramic radiography. These imaging modalities

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have some of the limitations like, magnification, unsharpness, distortion and superimposition, which make the diagnosis and treatment planning difficult. Superimposition of various structures leads to difficulty in distinguishing the details which also make the diagnosis and treatment planning more complex by using conventional radiographic methods.^{5,6} CBCT can provide the accurate anatomy and position of the crown and root apex of the impacted canine and its orientation with the long axis. The proximity of the impacted canine to the roots of the adjacent teeth can also be clearly observed on CBCT images. The existence of any related pathological condition, like supernumerary teeth, periapical abscess, cyst, resorption can be very well depicted by CBCT imaging.⁷ To the best of our knowledge most of the previous studies evaluated the prevalence of impacted canine with the aid of conventional imaging modalities.³⁻⁶ In this study, we used CBCT to determine the prevalence of impacted canines in a Saudi Arabian population.

Materials and methods

The present retrospective study was carried out in College of Dentistry, Aljouf University, Kingdom of Saudi Arabia. Clearance was obtained from the institutional ethical committee. All the CBCT scans observed in this study were taken for various needs of the participants. A total of 428 CBCT scans of 236 male and 192 female subjects were analyzed in this study by two qualified observers following in the criteria described previously.⁵ The CBCT scans were taken using, Scanora 3D; Soredex, Tuusula, Finland with 6 mA and 89 kVp and the evaluation of the scans done with accompanying software (NewTom 3G: NNT, QR SRL; Scanora 3D: OnDemand®, Cypermed Inc., Irvine, CA). Participants with any pathological conditions like trauma or fracture of the maxilla or mandible that might have influenced the normal growth of permanent dentition or any hereditary diseases or syndromes such as Down's syndrome or cleidocranial dysostosis were not incorporated in this study. All the obtained data were tabulated statistically analyzed using SPSS 21.0 (Chicago, USA).

Results

The ages of the patients ranged from 15 to 62 years, with a mean age 31 ± 4.18 years. Out of 439 patients scans examined, 241 were of males and 198 were belonging to females. Impacted canines were noted in 13 of 439 subjects with a prevalence of 3.03%, among which 7 (2.90%) were seen in

males and 6 (3.03%) were seen in females (Table 1). Out of these 13 impacted canines, 9 were observed in maxillary jaw, 3 in the right quadrant and 6 in the left quadrant. Four were noted in mandibular jaw, 2 in right side and 2 in the left side. None of the patients were observed with bilateral impacted canines (Table 2).

Discussion

The dental surgeon can evaluate the presence and position of the impacted canine using 3 simple methods, by visual inspection, by palpation and with the aid of different radiographs.⁵ CBCT is latest imaging technique that has been found to be a valuable modality in recent dental practice as it trounced a large number of the confinements of conventional radiographic method by giving precise anatomical and pathological details in all the three dimensions without superimposition.⁸ The results of the present study indicated that the prevalence of maxillary canine impaction (2.96%) in the sample studied was comparable with other similar studies reported in the literature. The Japanese population is reported to have the lowest frequency of impacted canines (0.27%), which was very less when compared with the observations of our study.⁹ Similarly a lower prevalence of 0.92% was reported in American population.¹⁰ A prevalence of 1.5% was reported in an Israeli population by Brin et al. which was also less when compared with the present study, accordingly, a lower prevalence rate of 1.8% was noted in Icelandic population.¹¹ In contrast to this a higher prevalence is observed in Australian (9.9%)¹² and Greek Population (8.8%).¹³ Our observations were almost similar to that of similar studies carried out in a population of Riyadh, Saudi Arabia (3.65%)¹⁴ and Western Part of Saudi Arabia (3.3%).¹⁵ A much lesser prevalence of impacted canine was reported by Mustafa (1.44%) in a study from Abha region of Saudi Arabia.¹⁶

In the present study, the prevalence rate in females (3.03%) was marginally higher when compared to males (2.90%) which was almost similar to that reported by Melha et al.¹⁴ An increased prevalence of impacted canines is observed in females in different population reported in the literature.^{10,13} Whereas study in Israeli population showed approximately an equal male-female prevalence rate.¹¹ Previous studies reported the occurrence of bilaterally impacted canines but in our study we did not notice any patient with bilateral impaction, this may be due to limited sample size of our study compared to that of other studies.^{10,14} Maxillary

impacted canines are believed to occur 10-20 times more frequently than that of mandibular.^{17,18} In accordance to this, we have observed in our study sample that maxillary canines were more frequently impacted when compared with that of mandibular. One of the limitations of our study is the small sample size obtained from single centre, studies with larger sample size from multiple centers to evaluate the impacted canine in terms of

position and related pathologies are recommended.

Conclusion

The results from the present study indicate that the prevalence of impacted canines is comparable with other studies. Most of the impacted canines were located in the maxillary jaw and in females. The early recognition of an impacted canine tooth is very significant to prevent the related pathological complications associated with it.

Table 1: Distribution of patients with impacted canines according to gender

Gender	No. of patients examined	No. of patients without impacted canines	No. of patients with impacted canines	% of prevalence
Male	241	234	7	2.90
Female	198	192	6	3.03
Total	439	15	13	2.96

Table 2: Distribution of patients with impacted canines according to side and jaw

Gender	Maxilla			Mandible			Total
	Right	Left	Bilateral	Right	Left	Bilateral	
Male	2	3	0	1	1	0	7
Female	1	3	0	1	1	0	6
Total	3	6	0	2	2	0	13

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