

## Prevalence of Impacted Maxillary Canines and its Associated Anomalies among a Dental College Patients

Huda Abutayyem<sup>1\*</sup>, Farida Fouly<sup>2</sup>, Nancy Awny<sup>2</sup>, Tamer El-Marsafawy<sup>3</sup> and Rania Hamed Ghanem<sup>4</sup>

<sup>1</sup>Assistant Professor and Specialist in Orthodontics, Ras Al Khaimah College of Dental Sciences, Ras Al Khaimah Medical and Health Sciences University, United Arab Emirates

<sup>2</sup>BDS Student, Orthodontics Department, Ras Al Khaimah Medical and Health Sciences University, United Arab Emirates

<sup>3</sup>Dean, Institutional Research, Ras Al Khaimah Medical and Health Sciences University, United Arab Emirates

<sup>4</sup>Assistant Professor of Natural Science, Ras Al Khaimah Medical and Health Sciences University, United Arab Emirates

**\*Corresponding Author:** Huda Abutayyem, Assistant Professor and Specialist in Orthodontics, Ras Al Khaimah College of Dental Sciences, Ras Al Khaimah Medical and Health Sciences University, United Arab Emirates.

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### Abstract

**Background:** Upper canines are the second most teeth to be impacted and not erupt into the oral cavity. Therefore, by calculating the prevalence of their impaction and their association with other dental abnormalities, steps could be done in educating the population about preventive procedures and treatment options.

**Aim:** The aim of this study was to quantify the prevalence of impacted maxillary canines and identify any associations with other dental anomalies.

**Materials and Methods:** panoramic radiographs of patients aged above 15 years who attended RAKCODS clinic in the period of 5 years were examined and then classified according to gender, site of impaction, and the presence of any associated dental anomalies then descriptive statistics was done and the prevalence of maxillary canine impaction was calculated.

**Results:** according to this study, the prevalence of Maxillary Impacted Canines among RAKCODS patients was found out to be 1.7%. The number of patients who had bilateral impactions was 28, representing 19%, while 118 were unilateral impactions which was further divided into 62 cases to be on the left side and 56 on the right side. As for the impaction cases that had associated dental anomalies, those were found to be 36 cases, representing 25% of the Impaction cases.

**Conclusion:** The prevalence of Maxillary canine impaction in this population is 1.7%. Moreover, patients with IMC have also shown to have a high occurrence of other associated dental anomalies, these included Impacted lower right canines, Multiple impacted upper and lower teeth, peg shaped laterals, Supernumerary teeth, Impacted Premolars Odontomas and retained primary teeth.

**Keywords:** Impacted; Tooth; Unerupted Teeth; Canine; Dental Anomalies; Prevalence Study

### Introduction

A tooth is considered impacted when its eruption is hampered by other teeth, bone, or soft tissues, impacted teeth can be clinically observed and later confirmed by radiographic methods [1]. The incidence of impacted teeth, excluding third molars, has been reported to vary between 5.6 to 18.8% [2]. Permanent maxillary canines are the second most frequently impacted teeth; the prevalence of their impaction is 1 - 2% in the general population. The incidence of canine impaction in the maxilla is more than twice that in the mandible. Of all patients who have impacted maxillary canines, 8% have bilateral impactions [3], 85 percent of impacted maxillary permanent cuspids are palatal impactions, while 15% are labial impactions [4].

Canines are considered to be the cornerstones of the mouth, they have very essential functions; as they aid the premolars and incisors during mastication as well as their primary action in tearing food. They are able to withstand excessive lateral pressure caused by chewing [5]. The development of the maxillary canine is initiated around 4 to 5 months of age and crown calcification is complete around 6 to 7 years of age. The permanent canine then migrates forwards and downwards to lie buccal and mesial to the apex of the deciduous canine before erupting down the distal aspect of the root of the upper lateral incisor. In normal development the maxillary canines should be palpable in the labial sulcus by age 11 years and usually erupt around 11 - 12 years [6]. Maxillary Canines are known for their long, tortuous path of eruption as they travel almost 22 mm and move down the distal aspect of the lateral incisor [7]. Therefore, any displacement from the normal path may cause impaction.

### Literature Review

There are various factors and multiple theories governing the etiology of the maxillary canine impaction. The guidance theory suggests that the canine erupts along the root of the lateral incisor, which serves as a guide, and if the root of the lateral incisor is absent or malformed, the canine will not erupt [8]. While the genetic theory points to genetic factors as a primary origin of palatally displaced maxillary canines and includes other possibly associated dental anomalies, such as missing or small lateral incisors [9].

Dental anomalies are relatively common changes, often influenced by genetic, epigenetic and environmental factors, in dental development [1]. They exhibit several degrees of severity, from chronological delay in odontogenesis to complete absence of a tooth germ, also comprising deviations in morphology and position of the teeth in the arch. Various dental anomalies have been associated with Impacted maxillary canines. This study aims to quantify the prevalence of impacted maxillary canines and identify any associations with other dental anomalies, through the screening of panoramic radiographs of patients aged 15 or older presenting to Ras Alkhaimah College of Dental Sciences (RAKCODS) Clinic.

### Materials and Methods

This study is a retrospective, cross-sectional study and the study population is patients presenting at RAKCODS Clinics. This retrospective study was planned to include panoramic radiographs attained in RAKCODS dental clinic. Panoramic radiographs of patients who attended RAKCODS clinic between the September 2013 and December 2018 were screened and conveniently selected according to the inclusion criteria.

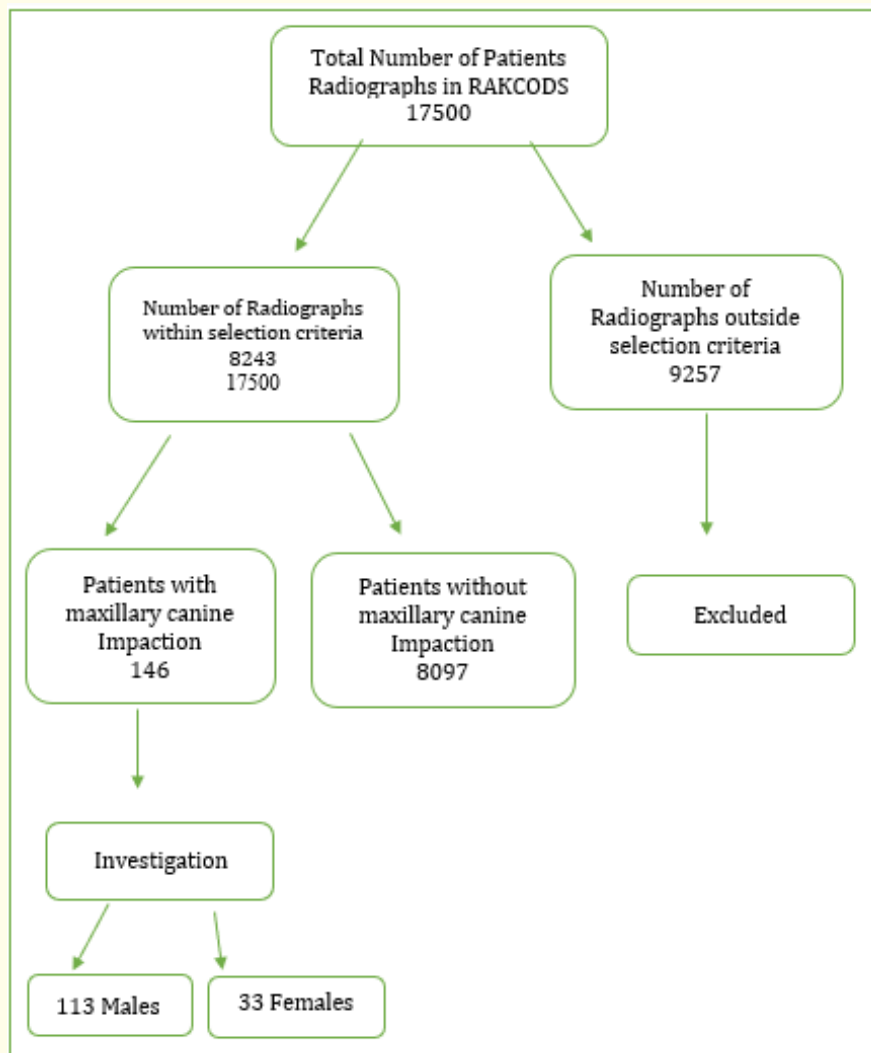
The Inclusion criteria was including patients older than 15 years old visiting dental clinics at RAKCODS and exclusion criteria were patients under the age of 15 years visiting dental clinics at RAKCODS, patients with any known syndromes that may be associated with dental variations and OPGs with artifacts.

Regarding data Collection and Analysis; the radiographs were examined and then classified according to gender, site of impaction, and the presence of any associated dental anomalies. A customized examination form was used to collect the data and a special table for data recording was prepared. Statistical analysis was done using SPSS version 22 (SPSS UK Ltd, Guildford Surrey, UK). Data was entered and analyzed using descriptive statistics and paired t test.

Ethical approval was obtained from RAK Research Ethics Committee and favorable ethical opinion was obtained from The Ministry of Health and Prevention Research Ethics Committee; under reference number (MOHAP/REC/2019/31-2019-UG-D). Participants were only identified through their unique file number and data was only available to be accessed by the investigators and coordinators. All Patients signed a consent form allowing RAKCODS to use their records for education and research purposes. During the course of this study, no patients were exposed to unnecessary radiation, as all the data collected was from already existing patient's files which included previously taken radiographs.

**Results**

As shown in figure 1, there were originally 17500 Panoramic Radiographs available at RAKCODS radiology department from 2013 till 2018, out of those 9257 OPGs were excluded by the selection criteria. From the remaining 8243 Radiographs 146 OPGs were selected, which represent Maxillary Canines Impaction cases. These were further divided into 113 male and 33 female participants.

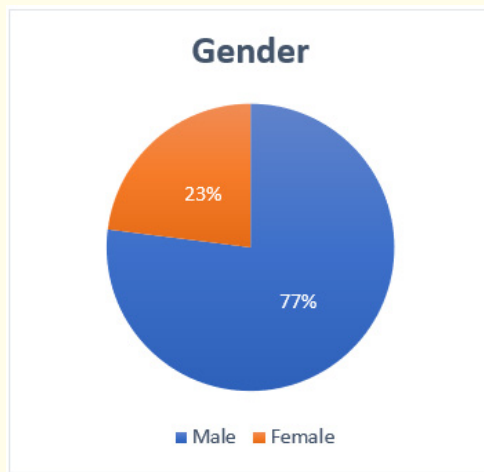


**Figure 1:** Workflow diagram of the participant's selection and study progress (Sample Size).

As shown in table 1, it was observed that out of the 8243 radiographs that were examined 146 cases had maxillary canine impactions. Of those cases 77% were male patients versus 23% female patients. As shown in figure 2, It has been observed that the number of males who had Impacted Maxillary Canines was almost three folds the number of females, this could be due to the number of male patients presenting to RAKCODS clinic being higher than the number of female patients.

Gender	Number	Percentage
Male	113	77%
Female	33	23%
Total	146	100%

**Table 1:** Gender distribution in the selected participants.



**Figure 2:** Gender distribution in the selected participants

As described in table 2 and figure 3, The number of patients who had bilateral impactions was 28, representing 19%, while 118 were unilateral impactions which was further divided into 62 cases to be on the left side and 56 on the right side. Therefore, according to this study, the prevalence of Maxillary Impacted Canines among RAKCODS patients was found out to be 1.7%.

Impaction Location	Female	Male	Total	Percentage
Left	15	47	62	42%
Right	13	43	56	38%
Bilateral	5	23	28	19%
Total	33	113	146	100%

**Table 2:** Location of Impaction distribution.

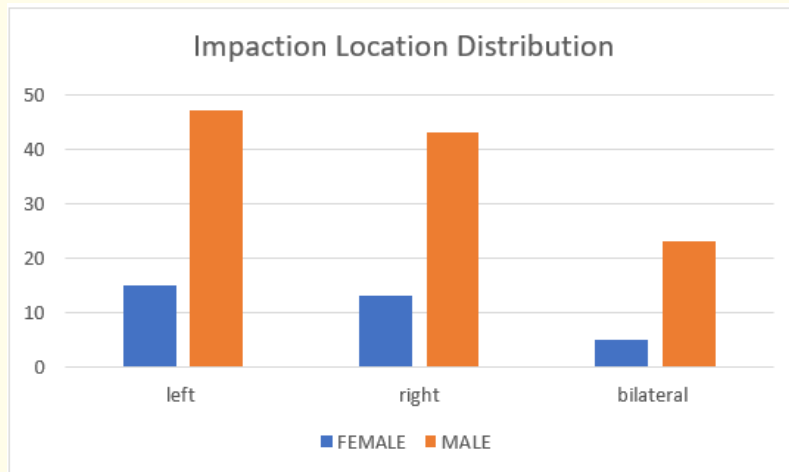
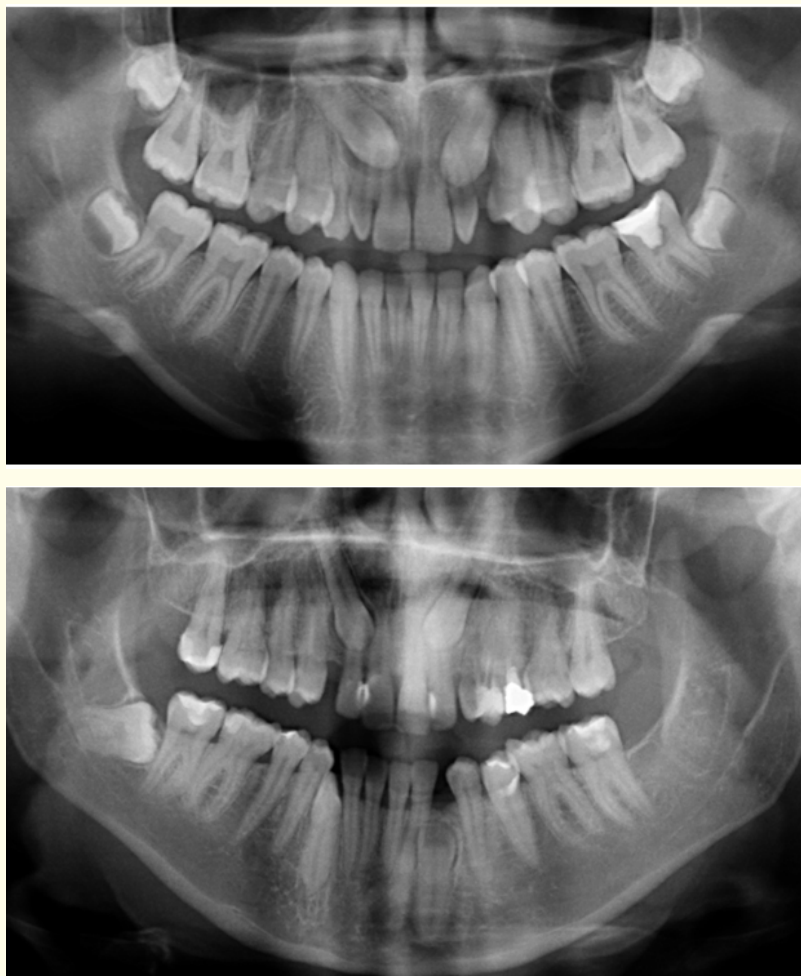


Figure 3: Impaction location distribution.

As for the impaction cases that had associated dental anomalies, those were found to be 36 cases, representing 25% of the Impaction cases. Various Dental anomalies were observed in the participants’ radiographs, the most common being Impacted lower right canines representing 27.78% followed by Multiple impacted upper and lower teeth and peg shaped laterals, representing 25% and 16.67% respectively. While the least common was found to be Odontomas and retained primary teeth, representing 5.56% each (Figure 4). The individual prevalence of the rest of the anomalies lies in between and is further described in detail in table 3.



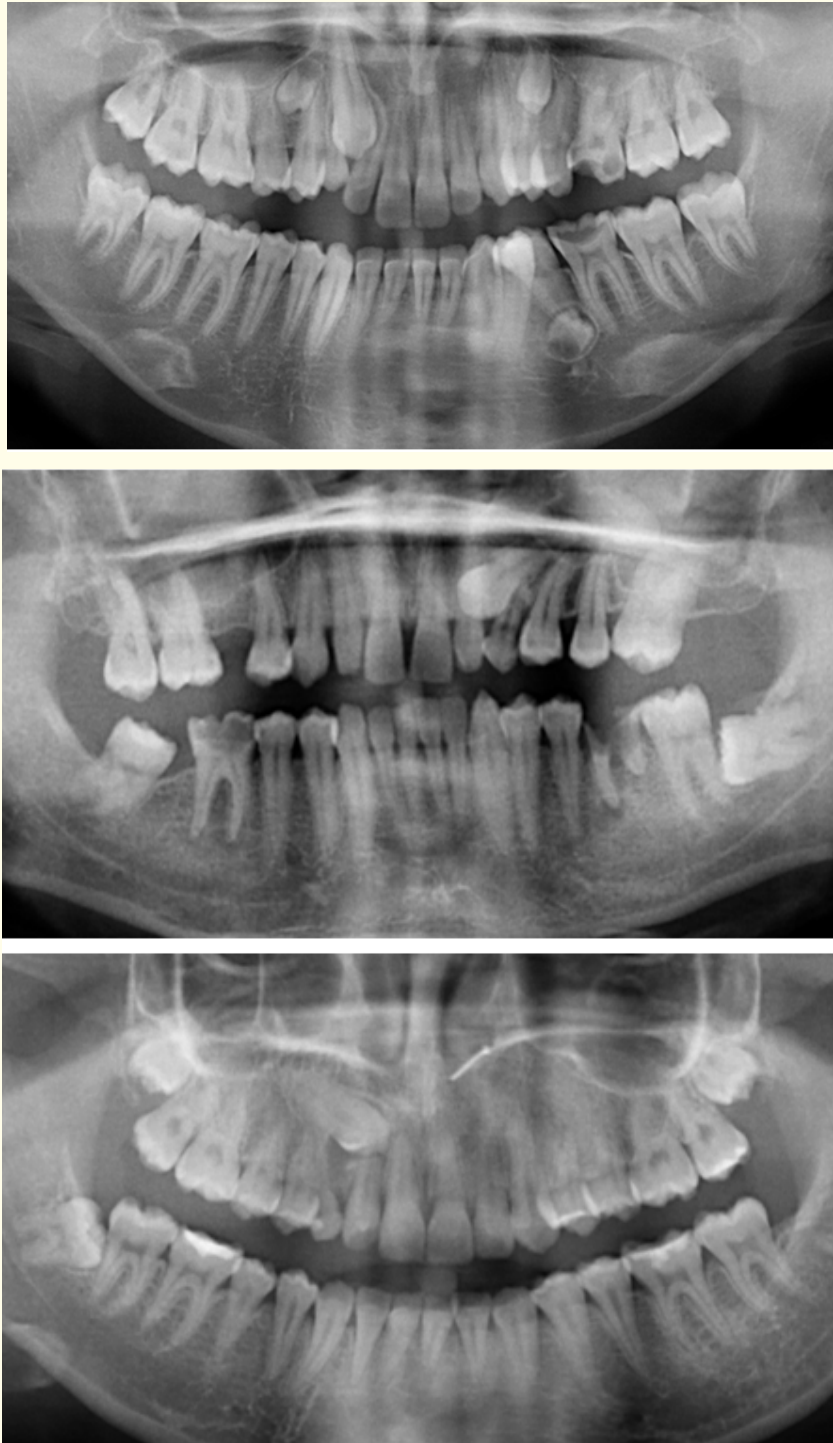








Figure 4: Panoramic radiographs of different Maxillary Canine Impaction and dental anomalies cases.

Dental anomalies	Number	Percentage
1. Peg Shaped laterals	6	16.67
2. Impacted lower Right canines	10	27.78
3. Supernumerary teeth	4	11.11
4. Odontoma	2	5.56
5. Multiple Impacted upper and lower teeth	9	25.00
6. Impacted premolars	3	8.33
7. Retained primary teeth	2	5.56
Total	36	100

Table 3: Associated dental anomalies that were observed and their prevalence.

**Statistical test results**

Paired t test was conducted to compare between gender and location of impaction and gender and the presence of the associated dental anomalies. The results of statistical analysis shows a highly significant difference with 7.431 and 11.266 t-values at 0.01 level of significance respectively.

**Discussion**

This study was conducted to determine the prevalence of impacted maxillary canines in RAKCODS population using panoramic radiographs. 8243 participants were selected according to the inclusion and exclusion criteria and there panoramic radiographs were examined thoroughly and classified according to gender, site of impaction, and the presence of any associated dental anomalies. After data analysis, 1.7% prevalence of Maxillary Impacted Canines was found in this study, which was very similar to the 1.74% rate that was found in the Turkish population [10]. However, it was relatively low compared to the prevalence of IMC reported in other populations; such as

the 8.8% rate reported in the Greek population [11] and the 6.04% rate in the Mexican population [12]. However, it was close to the 3.2% rate that was present in the Puerto Rican population [13]. Other studies were done in central Saudi Arabia and found the prevalence to be 7.5% [15] and two others were done in Riyadh which showed a prevalence of 3.41% [16] and 3.37% [17].

Our study results regarding the bilateral location of Impaction which was 19% was similar to that of the Greek population which was found to be 19.2% [11]. In a Chinese population [14], the prevalence of IMC was also associated with the presence of other impacted teeth; as 25% of the associated dental anomalies were Multiple Impacted upper and lower teeth as well as 27.78% were impacted lower right canines. The statistical tests done showed a high level of significance between the relationship between Gender and the location of Impaction as well as the relationship between Gender and the presence of Associated dental anomalies, however, this could be due to the unequal number of females and males in the population of choice. Further research is needed to determine whether this relation is due to genetic differences in the genders or it is due to the misrepresented sample.

### Conclusion

Within the limitations of this study, the following was drawn: the prevalence of Maxillary canine impaction in RAKCODS is 1.7%. Moreover, patients with Impacted Maxillary Canines have also shown to have a high occurrence of other associated dental anomalies, these included Impacted lower right canines, Multiple impacted upper and lower teeth, peg shaped laterals, Supernumerary teeth, Impacted Premolars Odontomas and retained primary teeth. The increase in accidental findings of IMC should encourage The community to raise awareness and educate the population about the clinical implications and the importance of implementing preventive and interceptive procedures.

### Conflict of Interest

No conflict of interest.

### Acknowledgment

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