

ORIGINAL ARTICLE

PREVALENCE AND LOCALIZATION OF IMPACTED MAXILLARY CANINES: AN ORTHOPANTAMOGRAPHIC STUDY

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ABSTRACT:

Background: Orthodontist often encounters impacted maxillary canines in day to day practice. Hence this study is aimed at studying the prevalence and distribution of the same. **Materials and methods:** This study was based on 400 orthopantamographs obtained from patient records of Department of Orthodontics and Dentofacial Orthopaedics. The overall, male and female prevalence were calculated. Canine incisor index was used for impacted canine localization. Also the comparison of maxillary canine impaction as male/female, buccal/palatal, unilateral/bilateral was studied and it was determined whether the difference was statistically significant using p- value. **Results:** Out of 400 orthopantamographs about 30 had atleast one impacted maxillary canine. Male to female ratio, buccal to palatal ratio and unilateral to bilateral ratio was found to be 1: 1.5, 1:1.3, 1:5 respectively. **Conclusion:** The overall prevalence of maxillary impacted canine was found to be 7.5%. Females showed a higher frequency, palatal and unilateral canine impactions were more common.

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INTRODUCTION:

Orthodontists are often challenged with presence of impacted teeth, frequently the impacted canines. Impaction is from a Latin word *impacto* which means pressing together. Archer (1975) has defined *impacted tooth* as one which is completely or partially unerupted and is positioned against another tooth or bone or soft tissue so that its further eruption is unlikely¹. Sometimes the terms like unerupted or nonerupted canines are used to describe the condition^{2,3}. Maxillary canine is the second most common impacted tooth after mandibular third molar^{4,9}. Orthodontists should be well equipped with the knowledge of diagnosis and management of impacted teeth to prevent or minimize the complications related to them⁵. In literature the etiology of impacted canines has been observed to be multifactorial but at times no apparent etiology is also reported⁶. The diagnosis of impacted canine is based on a proper clinical and radiological examination. To find the exact location of the impacted canine is of utmost importance to aid in proper management of the same. Various radiographic techniques ranging from conventional two dimensional techniques to three dimensional CBCT are available^{7,8}. Literature has reported a varying frequency of impacted canines ranging from 0.8% - 8.8%^{2, 10-14}. Also it has been observed in the literature that the palatally impacted canines are more common than buccal with the frequency ranging from 50% to 92.6% of the total reported maxillary canine impactions¹⁵⁻²¹. Often these advanced diagnostic aids are not available in every place hence simple emphasis has

been put on simpler techniques like orthopantamographs and various calculations done on them to find the location of the impacted canines, by various authors^{8, 22,23}. Orthopantographs are readily available for those patients seeking orthodontic treatment. Hence the present study is based on orthopantographs and is aimed at finding the overall frequency of impacted maxillary canine, based on gender as well as on location.

MATERIALS AND METHODS:

The study was conducted on the patient records of the Department of Orthodontics and Dentofacial Orthopaedics, Government Dental College and Hospital, Srinagar, J&K, India. Out of 400 patients, 30 patients, 18 females and 12 males with a mean age of 16.5±5.1 years, with the atleast one impacted maxillary canine were included in the sample. All the patients studied were Kashmiri in origin. The exclusion criteria included presence of cleft, any syndrome and age less than 13 years of age. The presence of impacted canine was based on examination of orthopantamographs of the patients. In order to localize the impacted canine from an orthopantamograph, following parameters were taken:

1. The widest mesio-distal width of the impacted canine perpendicular to its long axis.
2. The widest mesio-distal width of the ipsilateral central incisors perpendicular to its long axis.

These parameters were taken in accordance to Chaushu., *et al.*²³. The canine incisor index was then calculated. It is defined as the ratio of impacted canine width to ipsilateral

incisor width as defined previously. Canine incisor index was interpreted as follows:

Buccally placed canine: Canine incisor index < 1.15

Palatally placed canine: Canine incisor index equal to or > than 1.15.

All the measurements were done manually by a single operator using an X-ray viewer, a divider and a scale with upto 1mm correction.

Statistical analysis: The data was analysed using prevalence statistics and the difference in distribution of impacted canines on the basis of gender and site was found out and the significance was analysed using p – value. A p- value of < 0.05 was considered significant.

RESULTS:

Overall prevalence of impacted canines: $\frac{\text{Total number of cases of impacted canines}}{\text{Total number of patients}} \times 100$

Table 1: Prevalence of maxillary canine impaction

Category	Total number of patients	Total number of impacted canine cases	Prevalence
Over all	400	30	7.5%
Males	180	12	6.66%
Females	220	18	8.18%

Table 2: Gender distribution of impacted canine

Gender	Total number of impacted canine cases	Impacted canine cases according to gender	Percentage	Ratio(M:F)	P- value
Male	30	12	40%	1: 1.5	0.029*
Female	30	18	60%		

Table 3: Site distribution of impacted canine

Site	Total number of impacted canine cases	Impacted canine cases according to site	Percentage	Ratio (Buccal : Palatal)	P- value
Buccal	30	13	43.33%	1: 1.3	0.047*
Palatal	30	17	56.66%		

Table 4: Side distribution of impacted canine

Side	Total number of impacted canine cases	Impacted canine cases according to side	Percentage	Ratio (Right : Left)	P- value
Right	30	14	46.66%	1:1.1	0.072
Left	30	16	53.33%		

Table 5: Number distribution of impacted canine

Number	Total number of impacted canine cases	Impacted canine cases according to number	Percentage	Ratio (Bilateral : Unilateral)	P- value
Bilateral	30	5	16.66%	1:5	0.0028*
Unilateral	30	25	83.33%		

The overall prevalence of impacted canines is around 7.5% in this study group. As per the above tables it is evident that the frequency of impacted canines is higher in females than in males, palatal impaction is more common than buccal, unilateral impaction is more common than bilateral impaction and the difference between all these groups is statistically significant. It is also evident that left sided impaction is frequent than right sided but the difference is not statistically significant.

DISCUSSION:

The aim of the present study was to investigate the prevalence and various other factors like gender, site etc. related to impacted canines in a Kashmiri orthodontic sample. The overall prevalence rate of 7.5% is higher than previous studies done on caucasian population^{10, 13,24}. Some studies report higher occurrence as well²⁵. The higher prevalence of impaction in the present study may be due to difference in the ethnicity or race and also from the fact that sample was taken from orthodontic OPD rather than from general OPD.

The buccal to palatal ratio in the present study is 1:1.3 which is quite lower than reported in other studies done by Becker²⁶ (1:2.5) and Jhonston²⁷ (1:3). Higher ratios have been reported in Chinese²⁸ and Japanese²⁹ populations. This fact can be explained on the basis of various comparative studies comparing Chinese and Japanese populations with Indian population with respect to various other dental parameters^{30,31}.

The ratio between bilateral canine impaction and unilateral canine impaction (1:5) was observed to be much lower than found by Nordenram and Stromberg (1:3)²⁰.

The present study shows higher prevalence of impacted maxillary canines in females as compared to males with a ratio of 1:1.5. This is in accordance with various studies which show a ratio in the range of 1:1.5 to 1:3^{32, 33,34}. Some studies show slightly lower ratio than the present study²⁹ (1:1.6). This can be explained by the fact that female patients are associated with the smaller cranium, which may lead to diminution of the facial skeleton³⁵ and the jaws and hence can increase the chance of maxillary canine impaction. Other authors³⁵ have hypothesized that the higher female incidence may simply reflect a trend whereby female patients are more likely to seek orthodontic treatment and thus have their impacted canines discovered.

Clinical implications:

Impacted canines are often encountered in an Orthodontic practice. Orthodontist should have sound background knowledge regarding its occurrence in the local population. This study is a step in that direction. This study aids in identifying the basics of canine impaction in terms of its prevalence and location. Also this study has presented a simple approach of locating the impacted canine using

only orthopantomographs which are readily available for every orthodontic patient.

Study limitations and future directions:

This study is a two dimensional study of three dimensional structure. Also the measurements were done manually in this study. Due to these reasons some errors become inherent. Studies using advanced techniques with a larger sample size need to be conducted.

CONCLUSIONS:

1. The overall prevalence of maxillary canine impaction is 7.5%
2. Females have higher frequency of maxillary canine impactions than males.
3. Palatal, unilateral and left sided maxillary canine impactions are more common.

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